

SIEMENS

SIMATIC

Operating instructions

Process Control System PCS 7

**PCS 7 LAB Collection
Version 3.1**

12/2010

Legal notice

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 personell

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.

Prescribed Usage

Please note:

 WARNING
--

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

Trademarks

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Disclaimer of Liability

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

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1.0 About this document

This document describes the application of the example project PCS 7 LAB Collection V3.1/x for laboratory automation. The term PCS 7 LAB is used as synonym.

Main topic of this manual are:

- Using the example project PCS 7 LAB Collection V3.1.
- Using the PCS 7 LAB Hardware, which is configured in the example project.

This manual does not describe the complete functionality of SIMATIC PCS 7 including the engineering system. Please note the the comprehensive online documentation about SIMATIC PCS 7. See chapter Service and Support for more information.

In particular we recommend the following readings about the the recommended hardware:

- Manual: S7-300 Module data
- Function manual: "Process Control System PCS 7 SIMATIC PCS 7 BOX (V7.1) "
- Operating instructions: "Distributed I/O system ET 200S"
- Device manuals for Distributed I/O system ET 200S
- Operating instructions: "Distributed I/O system ET 200pro"
- Device manuals for Distributed I/O system ET 200pro
- Reference manual „System Software for S7-300/400 System and Standard Functions"

Note:

All manuals are available to download on SIEMENS Service & Support Web pages

<http://support.automation.siemens.com>

1.1 History

The following veditions are publicated up to now:
Changes refer to the version prior to the actual document:

Ausgabe	
07/2008	First editions
08/2010	PCS 7 LAB Collection V3.x
12/2010	PCS 7 LAB Collection V3.1

1.2 Updates to previous editions:

PCS 7 LAB in version 3 comprises an example project including device library and documentation. Additional hard and software needs to be ordered and commissioned separately.

This enables flexible adaption of the lab automation set in considering the requirements.

- The example project additionally supports the SIMATIC PCS 7 AS RTX as controller for the lab automation setup.
- In the example project of version 3.1 there are serial communication interfaces of the family ET 200S implemented.

1.3 Proper operation of the device

In order to operate this product correctly and safely, it may only be used in the manner described by the manufacturer. Furthermore, proper transportation, storage, installation, operation and maintenance of the device are vital for ensuring correct and safe operation.

1.4 Qualified personnel

Knowledge and technically correct implementation of the safety notes and warnings contained in this manual are required for safe installation and commissioning, as well as for safety during operation and maintenance of the described product. Only qualified personnel have the required professional knowledge for correctly interpreting the generally valid safety notes and warnings in this document in each specific case and to act accordingly. Qualified personnel for the purpose of the safety-related notes in this manual or on the product itself are persons that are familiar with setup, commissioning and operation of the product such as

- system planning and design engineers who are familiar with the safety concepts of automation equipment

- or operating personnel who have been trained to work with automation equipment and are conversant with the contents of this manual that describe the operation of the device
- or commissioning and/or service personnel who are trained to repair such automation equipment and who are authorized to energize, deenergize, clear, ground and tag circuits, equipment and systems in accordance with established safety practices and who are qualified to carry out these activities; such qualifications include
- Trained in the proper care and use of protective equipment in accordance with established safety procedures.
- First aid training

1.5 Scope of Supply

Note

PCS 7 LAB Collection V3.1 comprises a PCS 7 example project, documentation and a function block library.

Hard- and software according to the part list (see appendix), which can be ordered via SIEMENS sales organization or the SIEMENS Industry Mall (<https://eb.automation.siemens.com>), respectively.

NOTE

The Microsoft Windows XP operating system and SIMATIC PCS 7 system software including the corresponding licenses is already installed at SIMATIC PCS 7 BOX RTX. .

Standard scope of supply PCS 7 LAB Collection V3.1

The scope of supply comprises:

Nummer	Delivery
1	Certificate of License Single licence for one installation.

NOTE

The Certificate with license qualifies to download the PCS 7 LAB Collection software.

2 Description

2

2.0 Area of application

PCS 7 LAB Collection V3.1 is a PCS 7 example project for the compact version of the SIMATIC PCS 7 process control system. It is predefined for a dedicated number of I/O signals. PCS 7 LAB Collection suites for control automation in process development labs and as training system.

PCS 7 LAB Collection V3.1 comprises application programs to monitor and operate the I/O channels as well as devices communicating by serial protocol:

1. SIMATIC PCS 7 Hardware configuration
2. SIMATIC PCS 7 Bus configuration
3. CFC-programs including
 - I/O drivers
 - Monitor and operating function blocks
4. WinCC pictures
5. Library of function blocks
6. Examples how to implement equipment modules

The required SIMATIC PCS 7 Hard- and software needs to be ordered separately. (see section A.2 Part lists).

NOTE

In particular, before using it for new research and development applications, we recommend to contact us in order to discuss the application in question.

3 Functional units

The hardware to operate PCS 7 LAB Collection starting with version 3.0 is structured as followed:

- PC-Modul (as integrated system or distributed system)
- I/O Modul: digital / analoge I/O devices
- Serial Modul: connecting lab devices using the serial interfaces

The example project PCS 7 LAB Collection V3.1 supports the following I/O families:

- ET 200pro
- ET 200S
- ET 200M serial interfaces
- ET 200S serial interfaces

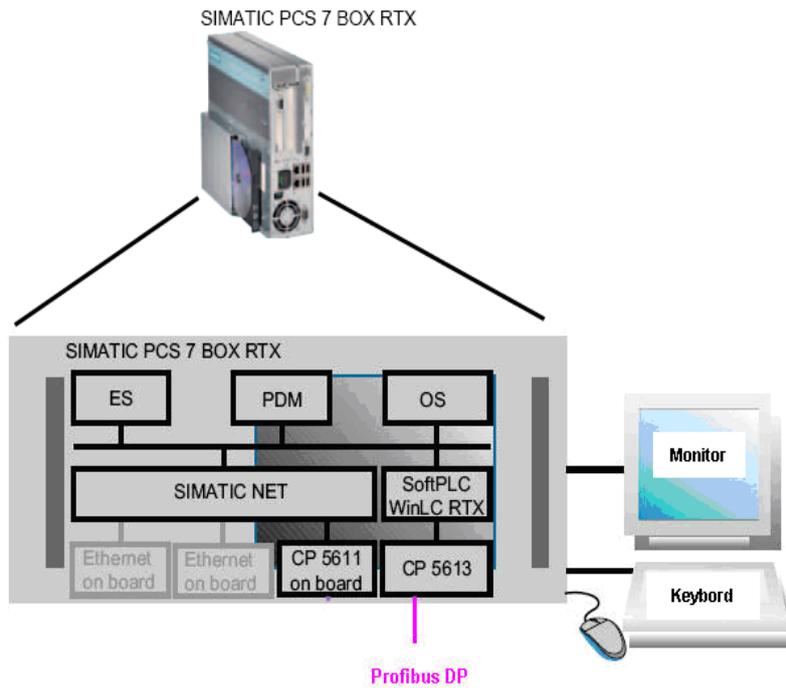
3.0 Safety information

 WARNING
Electric shock Certain parts of this device are under dangerous voltage. The enclosure must be closed and grounded before switching on the device (protective grounding by means of PE conductor in the supplied mains power input). Failure to comply with this can result in death, personal injury and/or damage to property..
 WARNING
Explosion hazard The hardware mentioned in the example project must not be operated in hazardous areas.
Attention
Excessive heat Please keep in mind: Ensure a continuous airflow to operate the lab equipment in a suitable temperature range. Otherwise there is a risk of overheating..

3.1 PC module

3.1.1 Integrated System

The PC module as integrated system utilizes the SIMATIC PCS 7 BOX RTX , where monitor, keyboard and mouse are connected. The PC modules provides a soft-PLC to handle the control application and a Profibus DP interface.



Mode of operation

The PC module as integrated system includes any functionality to create and operate your lab application. The compact system comprises an automation system (AS), too.

You design and maintain the lab application using the corresponding engineering tools; you download it into the AS and the Operator Station (OS)

The scope of supply for **SIMATIC PCS 7 BOX RTX** covers licences for:

- **SIMATIC PCS 7 ES** (Engineering)
- SIMATIC PCS 7 OS (Operations)
- WinAC; WinAC RTX
- SIMATIC PCS 7; RTX
- SIMATIC NET; SIMATIC NET BCE

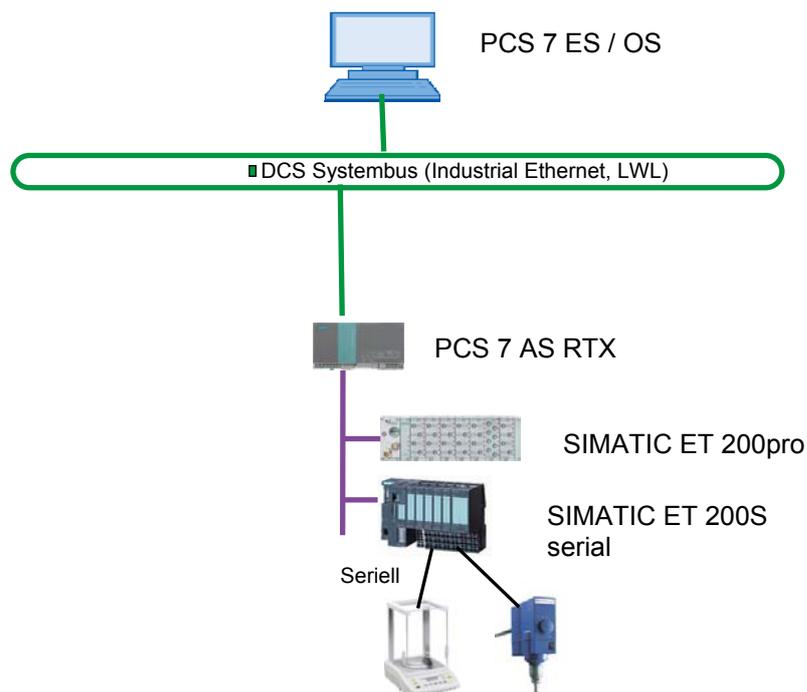
We recommend the software package SFC visualization to simplify working with sequential function charts. This software package needs to be ordered separately.

3.1.1.1 Part list PC module

See section A2..1 for an overview about the article numbers.

3.1.2 Distributed System

The PC module as distributed system comprises a PC featuring the PCS 7 software for engineering and operations and a SIMATIC PCS 7 AS RTX. The later is a PC based automation system serving as controller.



3.1.2.1 Parts list PC Modul (distributed system)

Please refer to chapter Fehler! Verweisquelle konnte nicht gefunden werden. for information about order numbers for the required hardware.

3.2 Power supply

The various modules require a 24V SC power supply. For PCS 7 LAB hardware a SITOP power supply DC 24V / 20A device is recommended. Depending on the installation, i.e. the numbers and power requirements of the connected devices, additional power supplies may be required.

See section A2..2 for an overview about the article numbers.

3.3 I/O moduls

3.3.1 ET 200S I/O module

The ET 200S I/O module comprises a Profibus interface, digital and analog in-/outputs as well as power modules.

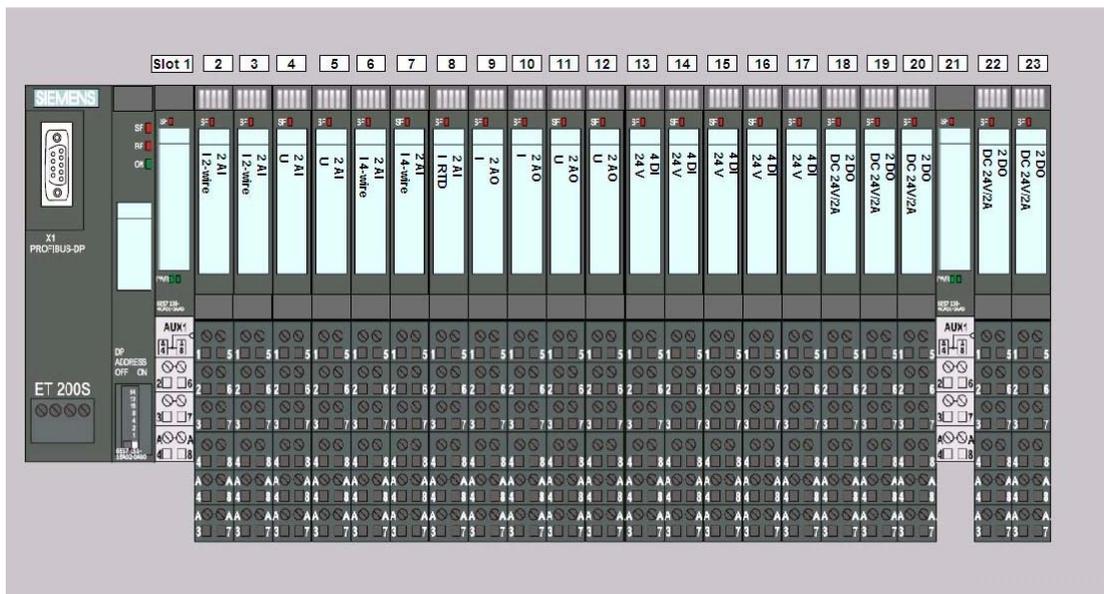


Figure 3-1 ET 200S I/O module

Note

The example project expects the installation of the single ET 200S I/O components modules according to the following order:

Slot	MLFB	Module
1	6ES7138-4CA01-0AA0	POWER MODULE PM-E for ET 200S
2 + 3	6ES7134-4GB01-0AB0	ELECTRONIC MODULE for ET 200S, 2 AI STAND. I-2DMU
4 + 5	6ES7134-4FB01-0AB0	ELECTRONIC MODULE for ET 200S, 2 AI STAND. U
6 + 7	6ES7134-4GB11-0AB0	ELECTRONIC MODULE for FÜR ET 200S, 2 AI STAND. I-4DMU
8	6ES7134-4JB51-0AB0	ELECTRONIC MODULE for ET 200S, 2/4 AI RTD STANDARD
9 + 10	6ES7 135-4MB02-0AB0	ELEKTRONIC MODULE 2 AO I HIGH FEATURE for ET 200S
11 + 12	6ES7135-4LB02-0AB0	ELEKTRONIC MODULE 2 AO U
13 to 17	6ES7131-4BD01-0AB0	ELEKTRONIC MODULE for ET 200S, 4 DI HIGH FEATURE DC 24V
18 to 20	6ES7132-4BB31-0AB0	ELEKTRONIC MODULE for ET 200S. 2 DO HIGH FEATURE DC 24V/2A
21	6ES7138-4CA01-0AA0	POWER MODULE PM-E for ET 200S
22 bis 23	6ES7132-4BB31-0AB0	ELEKTRONIC MODULE for ET 200S. 2 DO HIGH FEATURE DC 24V/2A

NOTE

Please see the Operating Instructions for ET 200S for more information about installation procedures.

The example project defines the Profibus address 3 to access the ET 200S I/O module.

3.3.2 ET 200pro I/O-module

The ET200pro- I/Omodule suits thanks to its degree of protection (IP 65/66/67) for mounting directly in the fume hood. The module comprises a Profibus interface module, analog in- and outputs as well as digital in and outs.

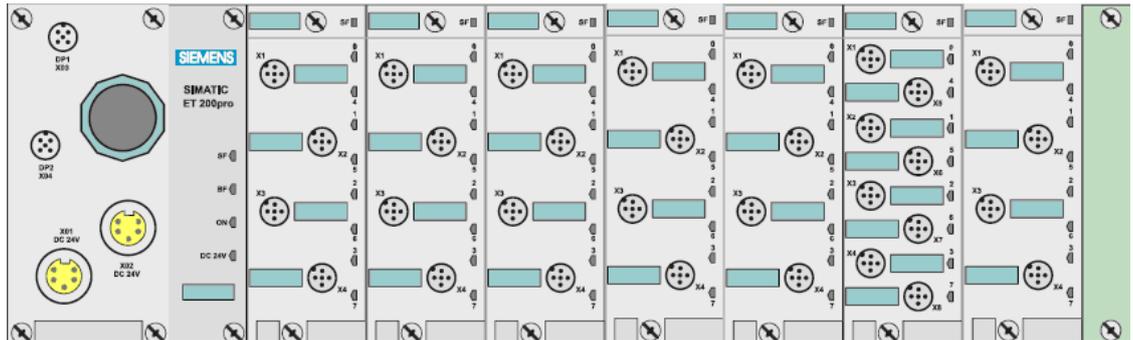


Figure ET 200pro I(O module

Note

The example project expects the installation of the ET 200pro components according to the following order:

Slot	MLFB	Baugruppe
1	6ES7 154-2AA01-0AB0 together with 6ES7 194-4AD00-0AA0	IM154-2 PROFIBUS-intreface
2	6ES7 144-4GF00-0AB0 together with 6ES7 194-4CA00-0AA0	4 AI I HF, +/- 20 mA Analog input
3	6ES7 144-4FF00-0AB0 together with 6ES7 194-4CA00-0AA0	4 AI U HF, +/- 10 V Analog input
4	6ES7 144-4JF00-0AB0	4 AI RTD HF, Pt100 Analog input

	together with 6ES7 194-4CA00-0AA0	
5	6ES7 145-4GF00-0AB0 together with 6ES7 194-4CA00-0AA0	4 AO I HF, +/- 20 mA Analog output
6	6ES7 145-4FF00-0AB0 together with 6ES7 194-4CA00-0AA0	4 AO U HF, +/- 10V Analog output
7	6ES7 141-4BF00-0AB0 together with 6ES7 194-4CB00-0AA0	8 DI DC 24V HF, DC 24 V Digital input
8	6ES7 142-4BD00-0AB0 together with 6ES7 194-4CA00-0AA0	4 DO DC24V HF, DC 24 V Digital output

NOTE

Please see the Operating Instructions for ET 200pro for more information about installation procedures and how to customize the connection cables for the various signals.

The example project defines the Profibus address 10 to access the ET 200pro I/O module.

3.4 Serial interfaces

3.4.1 Shielding of the serial interfaces

The serial port cables (RS232) must be shielded and the cable shield must have contact with the housing potential. The shield of the line must be connected to the shield of the sub D connector with a high contact area. The cross-section of the conductors should be at least

0.5 mm². For the permissible length of the interface cables, refer to the technical data of the components.

3.4.2 ET 200M serial interfaces

The serial RS232C (V.24) interfaces of the CP341 communications processors module enable communication to your lab instrument.

Pin assignment of the serial interfaces

The following table lists the pin assignment of the 9-pole Sub-D connector of the CP 341-RS232C (it is compatible to the 9-pole COM interface).

Pin	Designation	Input / Output	Description
1	DCD1 Received Detector	Input	Received signal level
2	RXD Received Data	Input	Receive data
3	TXD Transmitted Data	Output	Transmit data
4	DTR Data Terminal Ready	Output	Data terminal ready
5	GND Ground - Betriebsserde (GND _{int})	-	Functional ground
6	DSR Data Set Ready	Input	Ready for operation
7	RTS Request to Send	Output	Request to send
8	CTS Clear to Send	Input	Clear to send
9	RI Ring indicator	Input	Incoming call

Table 1 Pin assignment of the serial interfaces (CP341)

Note

Please see the manual CP 341 Point-to-Point Communication, Installation and Parameter Assignment for additional information about mounting and wiring the module.

3.4.3 ET 200S serial interfaces

The ET 200S 1SI serial interface module is a plug-in module belonging to the ET 200S product range. It provides access to serial communication by means of three hardware interfaces (RS 232C, RS 422 and RS 485) and two software protocols (ASCII and 3964(R)).

You can use the ET 200S 1SI interface module to exchange data between automation systems or computers by means of a point-to-point connection. All communication is based on serial synchronous transmission.

The configuration in the example project comprises 7 modules as ASCII transmission devices (32 byte). You select the communication mode when you parameterize the module in the STEP 7 hardware configuration or some other configuration application.

8-byte or 32-byte data transfers increase the throughput rate, but require more I/O memory on the ET 200S rack, whereas 4-byte data transfers require less I/O memory on the ET 200S rack, but provide a lower throughput rate. The module variant you choose depends on your application requirements.

Note

Please see the operating instructions ET 200S serial interface modules for more information about mounting and wiring the interfaces.

The example projects expects the ET 200S serial module configured as Profibus slave no. 4.

3.5 Additional material

In addition to the electronic modules you need conductive material to interconnect the modules and to connect the lab instruments. The amount and length of the material is dependent on the number of instruments and the local architecture.

4 Installation

4

4.0 Installation of I/O - Modules

The components of the PC module, the ET 200S I/O station and the serial module are designed to be mounted in a control cabinet.

The ET 200pro I/O module suits thanks to its rail for mounting at a wall (vertical or horizontal).

4.1 Mounting the ET 200S modules

Please see the operating instructions for ET 200S (including the serial interface module) for more information.

4.2 Mounting of ET 200pro modules

Please see the operating instructions for ET 200S for more information.

4.3 Mounting of ET 200M serial interfaces

Please see the manual CP 341 Point-to-Point Communication, Installation and Parameter assignment for more information about handling the modules.

5 Connecting

5

5.0 Connecting the modules using Profibus

Depending on the type of setup, you can use different lengths of bus cables. The bus cables are available in pre-fabricated lengths



Only standard Siemens bus cables should be used.

Cable length



To ensure the low-resistance power supply connection between the POWER module and ET 200pro IP65 I/O module, the connecting cable between the two modules must not be longer than 10 m. If you connect several ET 200pro modules, then the length of the bus cable from the POWER supply to the last ET 200pro module must not be longer than a total of 10 m.

For a bus speed of 1.5 Mbaud, the total bus length must not exceed 200 m.

Procedure

Interconnect Connect the modules as follows:

1. Interconnect the Profibus interface of the PC module and the Profibus interface of the ET 200S module
2. Connect the interface module of the ET 200M serial module to the ET 200S I/O module
3. Connect the interface module of the ET 200M serial module to the ET 200pro I/O module
4. Activate the bus termination of the ET 200pro I/O module.

6 Commissioning

6.0 Prerequisites

Please ensure the following before commissioning:

- The modules need to be installed
- Cabling is completely done.

6.1 Commissioning SIMATIC PCS 7 BOX RTX

Please see the function manual SIMATIC PCS 7 BOX, chapter 3 and 4 for detailed information about commissioning the PCS 7 BOX RTX

6.2 Commissioning PCS 7 AS RTX

Please see the function manual SIMATIC PCS 7 BOX, chapter 3 and 4 for detailed information about commissioning the PCS 7 BOX RTX

6.3 Adapting and loading the PCS 7 LAB Collection project

6.3.1 Dearchive the PCS 7 project

Introduction

The example project PCS 7 LAB Collection is supplied as ZIP file. Dearchive the file by means of the SIMATIC PCS 7 system function „Retrieve“.

Prerequisite

SIMATIC Manager is started and the ZIP file is available.

Procedure

1. Select „File > Retrieve...“ A dialog „Retrieving – select an archive“ opens.

2. Select the PCS 7 LAB Collection archive and click „Open“
3. Select the destination folder and click „OK“. When the retrieving process is completed a message box “Retrieve” appears..
4. Press Klicken Sie auf die Schaltfläche "OK".
5. Open the example project by means of SIMATIC Manager

6.3.2 Selecting a suitable configuration

Introduction

The example project PCS 7 LAB Collection as a multi project comprises 2 user projects:

- LABV3p1 (integrated system)
- LABV3p1AS (distributed system)



Select and delete the user project that does not match your actual configuration.

6.3.3 Adapt computer name in the example project

Introduction

The name of PC station in the PCS 7 LAB Collection example projects needs to be adapted according to your individual settings, if you did not choose „OSS1“ at first commissioning please adapt the computer name.

Prerequisite

- The project is opened in SIMATIC Manager
- The component view is selected.

Procedure

1. Select /SIMATIC in the tree
2. Invoke the menu item „Edit > Object properties“.
3. Insert the name of the local computer and press OK.

7 HMI software

7

7.0 Operation of the software (example project)

Note

Please note and refer to the comprehensive PCS 7 Manual Collection on the enclosed DVD and the comprehensive online documentation regarding the general PCS 7 operating concept (see Section "Service and Support")

PCS 7 LAB Collection is an example project featuring a small set of PCS 7 functions suitable for use in process development labs.

Why is it useful?

- Get an overview about PCS 7 LAB Collection
- Commission and test the inputs / outputs of your lab automation
- Use the hardware and bus configuration as starting point for own applications

The example project is **not**

- An introduction to PCS 7
- The example project is not dedicated for process automation

WARNING

The example project is not suitable for live operation. The safety and reliability of PCS 7 projects that are created by the user and are to be used for live operation must be checked prior to their application to make absolutely sure that no undesired reactions will occur.

See also

Service und Support (page **Fehler! Textmarke nicht definiert.**)

7.1 Language switching

Changing the user interface language

Using the lower toolbar, you can switch the language in the display of the example project:



To do so, follow these steps:

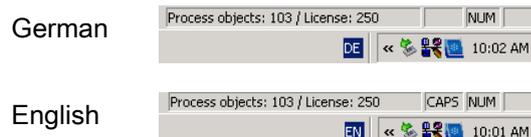
1. Click on  in the tool bar, thus switching to the second set of functions



2. Click on the language icon .
3. In the selection window, select the desired language and confirm with OK
4. The messages and the displays are available in German and English.
5. If another language is selected, the display appears in English and messages are presented in the selected language.
6. Clicking  switches back the toolbar in the original state.

Language settings for the keyboard

The Windows Start bar shows the language that is set for the keyboard layout.



7.2 Start-screen

With the startup of the example project the following start screen appears

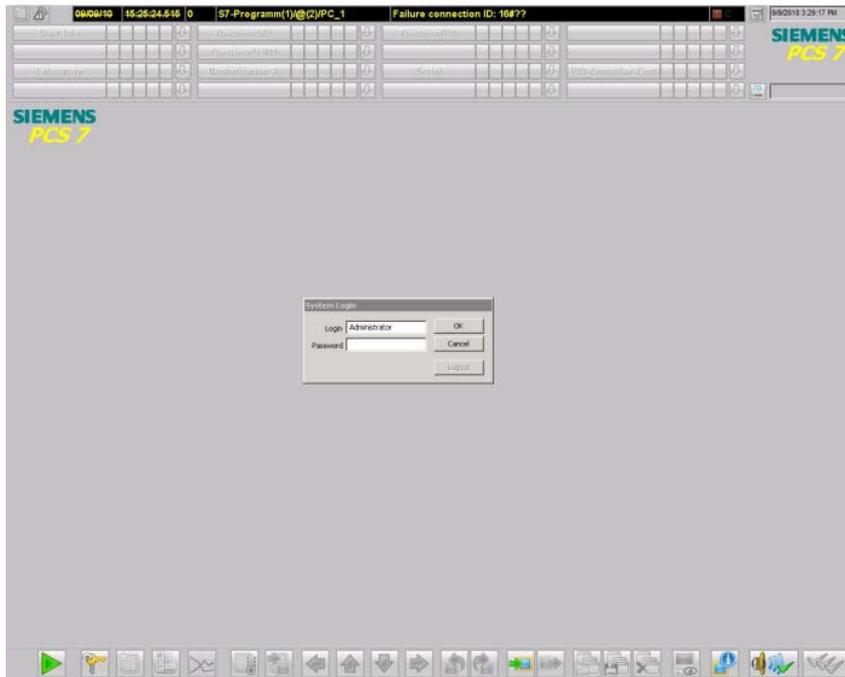


Figure 7-1 start screen after OS startup

Log on to the WinCC Application using

Login = Administrator

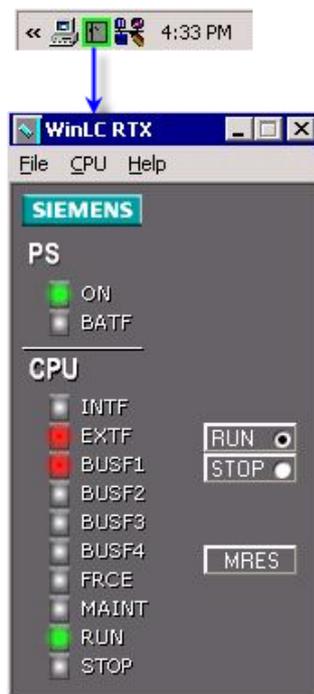
Password = admin



7.3 Get information about the SIMATIC PCS 7 BOX RTX

Activity: Click symbol WINKC RTX in the task bar.

Result: The WinLC RTX operation panel opens

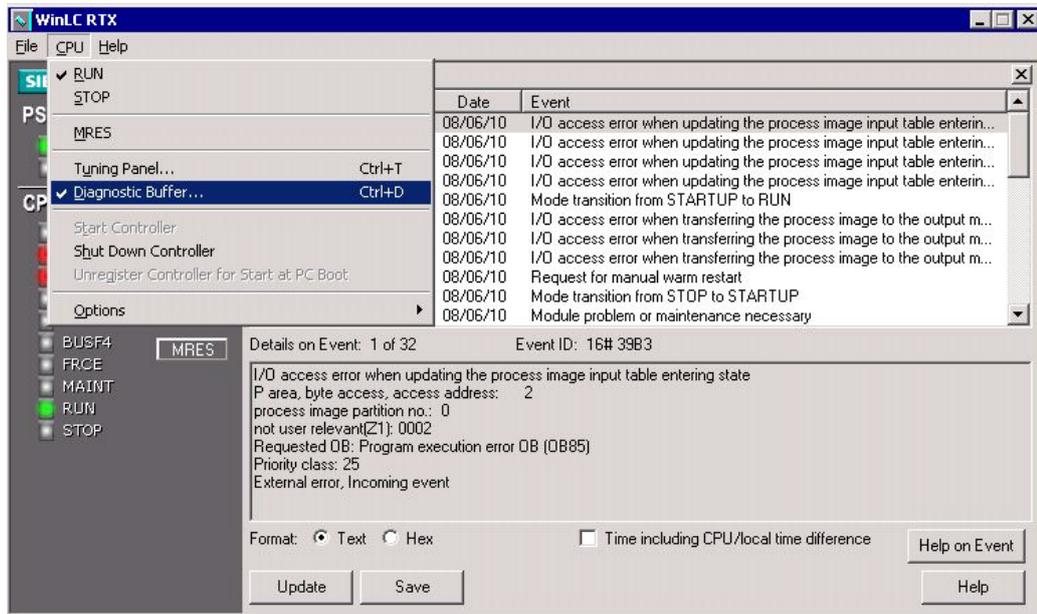


7.3.1 WinLC RTX Diagnosis Buffer

Activity: Open the diagnosis buffer by menu "CPU/Diagnostic Buffer".

Result: Get the diagnosis display for the RTX CPU

7.4 Selecting a module



7.4 Selecting a module



Figure 7-2 Overwie area

Information: Overview about the available modules

Activity: Mouse click on the respective "Overview" button..

Result: Displaying the overview of the corresponding I/O module

Using the mouse, select the respective module with the interfaces you want to operate:

OverviewS03

Overview about the I/O module of type ET 200S defined as slave no. 03

The I/O nomenclature for the module is S<xx> with xx = number of profibus slave.

OverviewS04

Overview about the serial interface modules of type ET 200S

The I/O nomenclature for the module is S<xx> with xx = number of profibus slave

OverviewP10

Overview about the I/O module of type ET 200pro defined as slave no. 10

The I/O nomenclature for the module is P<xx> with xx = number of profibus slave

OverviewSER11

Overview about the serial module of type ET 200M defined as slave no. 11

The I/O nomenclature for the module is SER<xx> with xx = number of profibus slave

7.5 Operating the I/O module ET 200S

7.5.1 Overview about in- and output signals

Activity: Click on button OverviewS03

Result: Show the front panel of all I/O modules

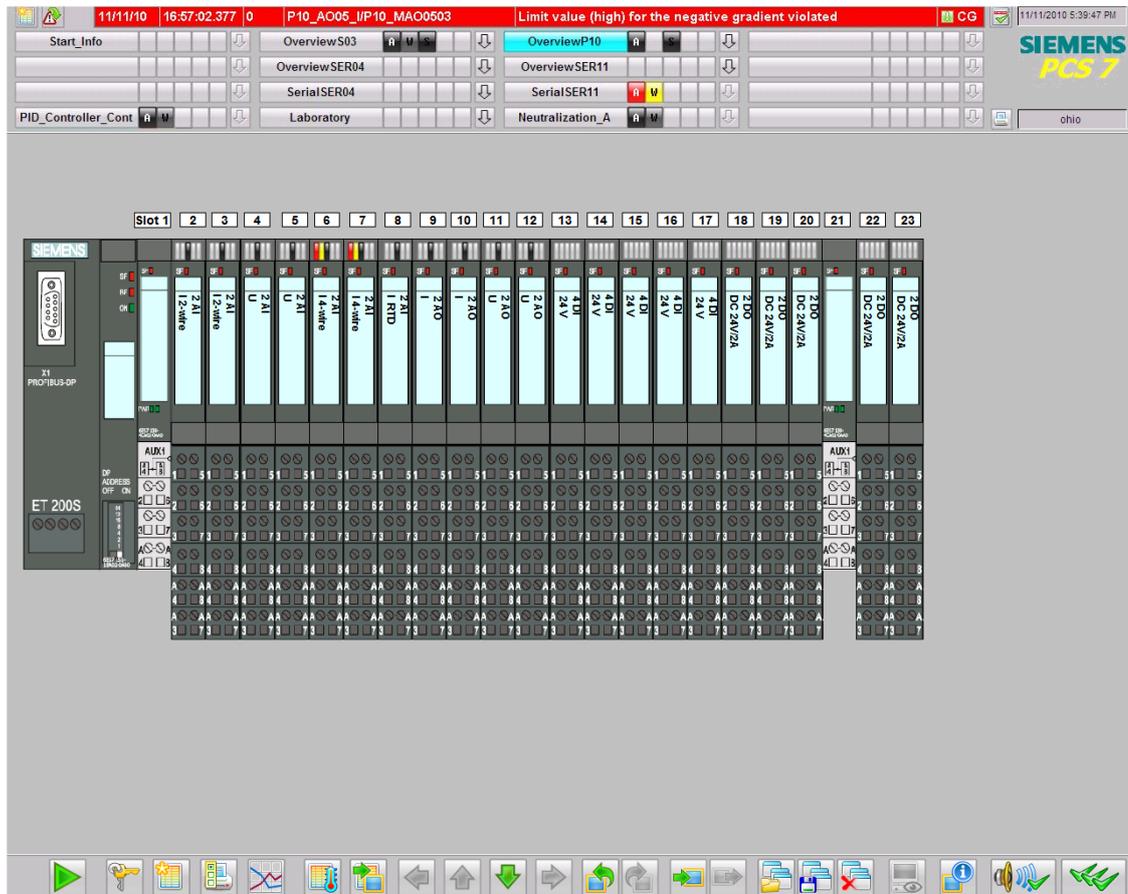


Figure 7-3 Overview ET 200S modules

7.5.2 Detailed information

Information: Detail display for the individual slots.

Activity: Mouse click on the slot panel of the displayed I/O module's front panel. The slot panel serves as a button.

Result: Display of the individual slot (see sections below)

7.5.3 Analog inputs 4 ... 20 mA

Information: Overview of the analog inputs 0(4) ... 20

Activity Mouse click on Slot 2 or 3 in the "Overview" screen

Result: see picture below

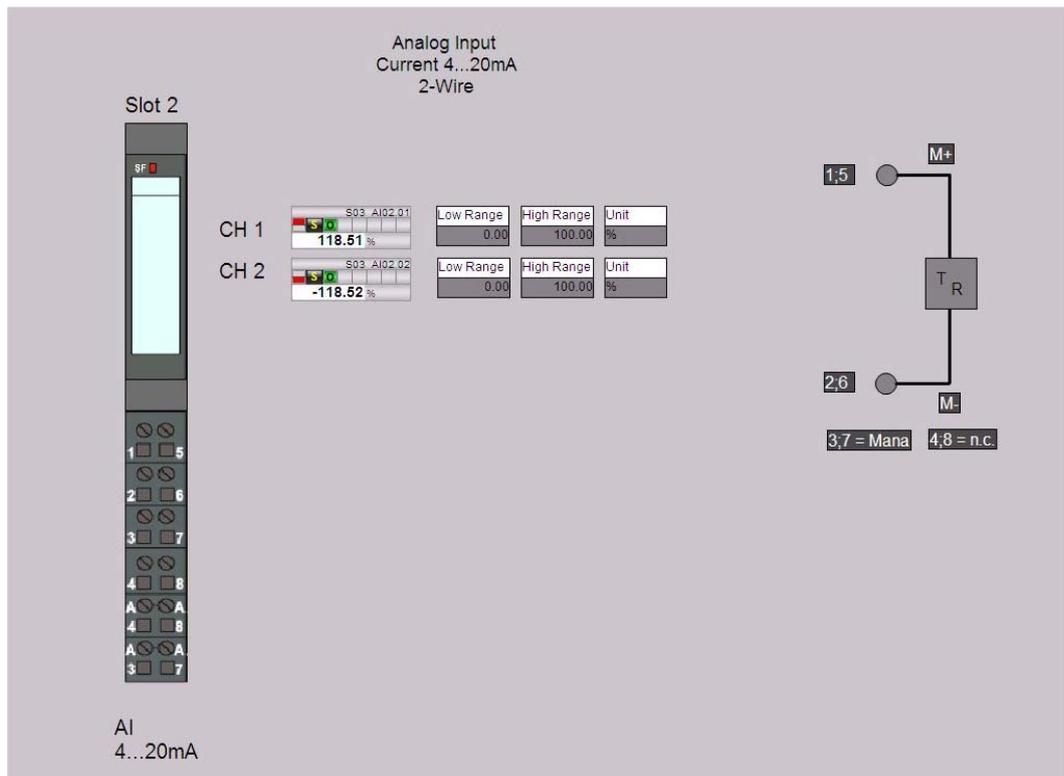


Figure 7-4 Slot 2 for analog inputs 4.20mA

The picture serves to adapt the measurement range and the unit for a channel. Please adjust alarm and warning limits in the faceplate.

If a signal violates the limit values an entry in the message system will be created. You may acknowledge this message using the button right next to the message line.

Information: Limits for alarms and warning messages

Activity: Click on the icon for the input channel (CH1 or CH2)

Result: A window opens to inspect and adjust the limits (see figure below).

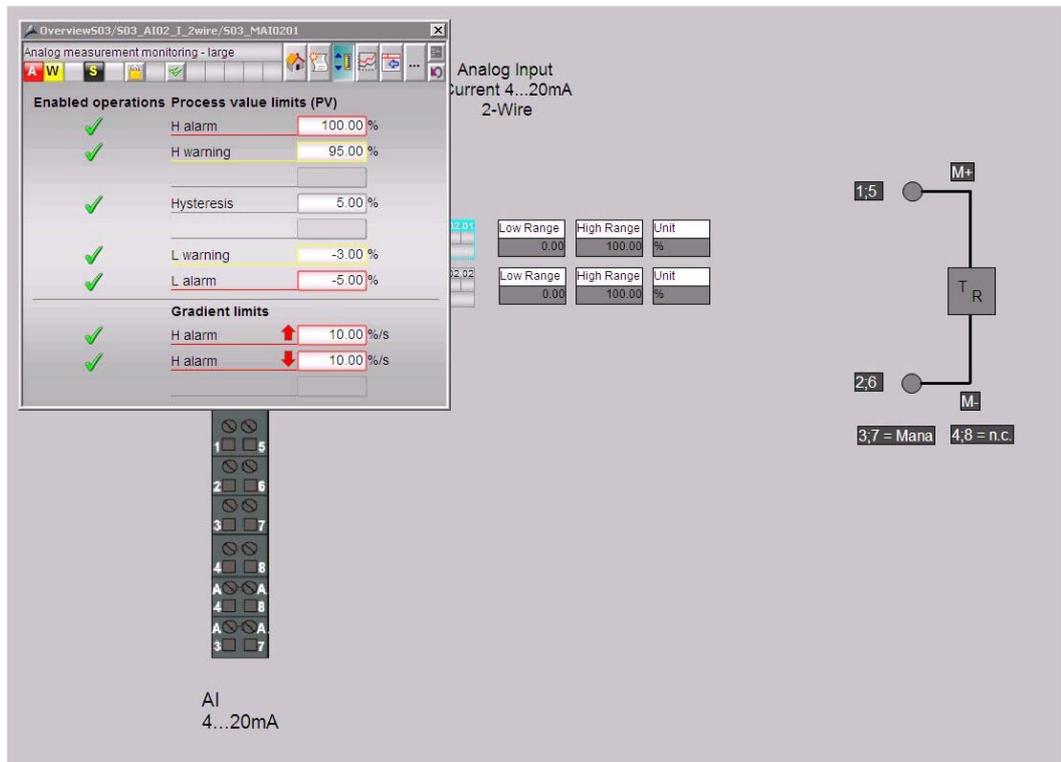


Figure 7-5 Adjust alarm and warning limits

7.5.4 Analog inputs +/- 10 V

Information: Overview of the analog inputs 0(4) ... 20 +/-10V

Activity: Mouse click on Slot 4 or 5 in the "Overview" screen

Result: see picture below

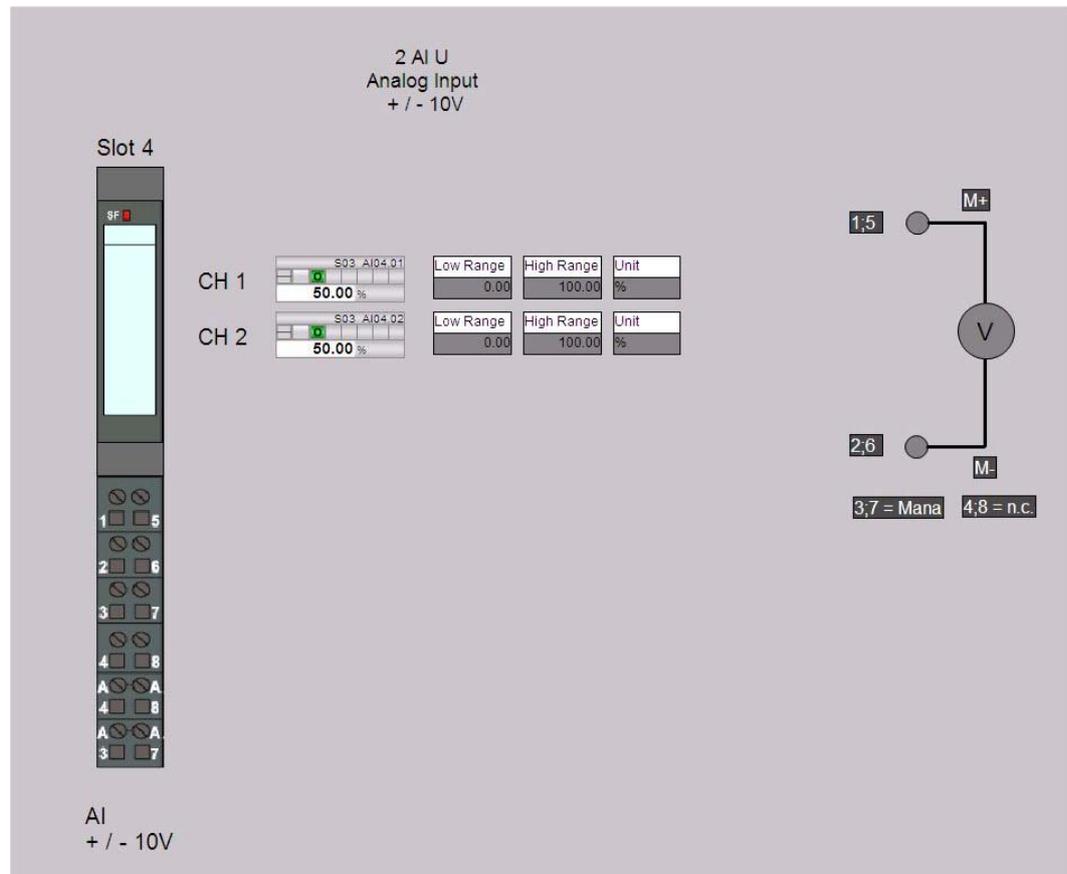


Figure 7-6 Slot 4 and 5: +/- 10V analog inputs

To adjust measurement ranges and unit please refer to section **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.** on page 33 above

See also

Analog inputs 4 ... 20 mA (page 33)

7.5.5 Analog inputs RTD (PT100)

Information: Overview about RTD inputs

Tätigkeit: click slot 8 in the overview picture

Result: see picture below

The picture serves to adjust the measurement ranges and the units for the I/O channels. To define limit values for alarms and warnings please refer to the corresponding channel fabeplate.

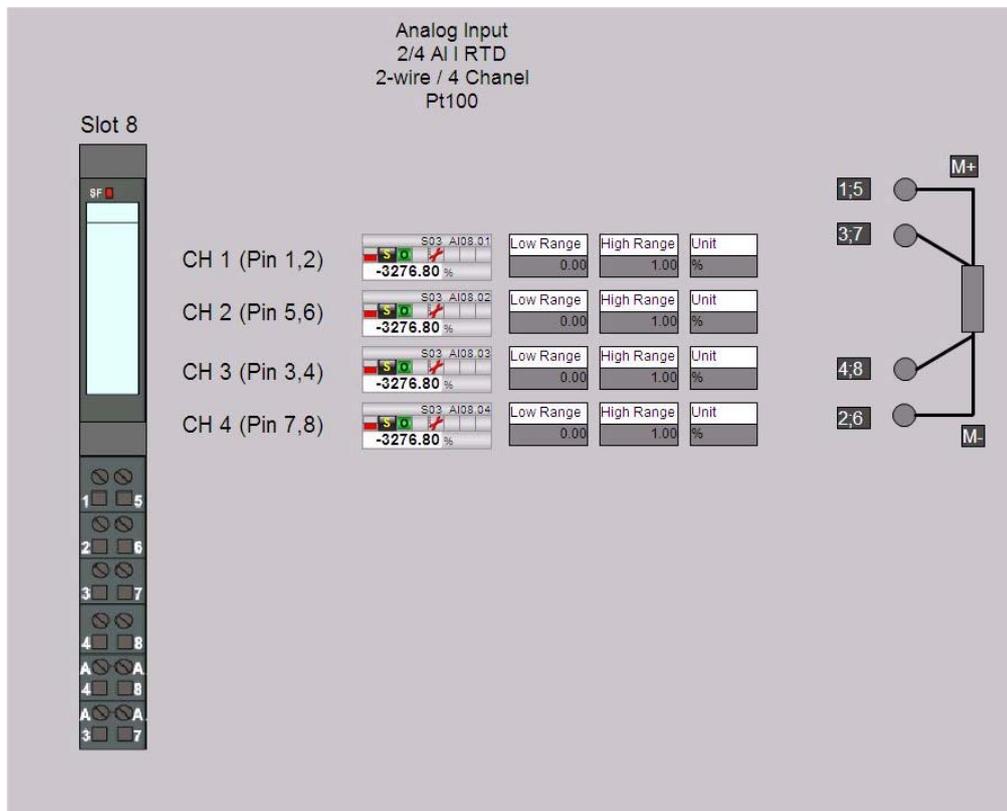


Figure 7-7 Slot 6 analog inputs PT 100

To adjust the measurement ranges, the unit and the alarm/warning limits please refer to chapter Analog inputs 4 ... 20 mA

Siehe also

Analog inputs 4 ... 20 mA on page 33

7.5.6 Analog outputs 4 ... 20 mA

Information: Overview about analog outputs 4..20mA

Activity: Click on Slot 9 in the overview picture

Result: see picture below

The picture serves to adjust the measurement ranges and the units for the I/O channels. To define limit values for alams and warnings please refer to the corresponding channel fabeplate

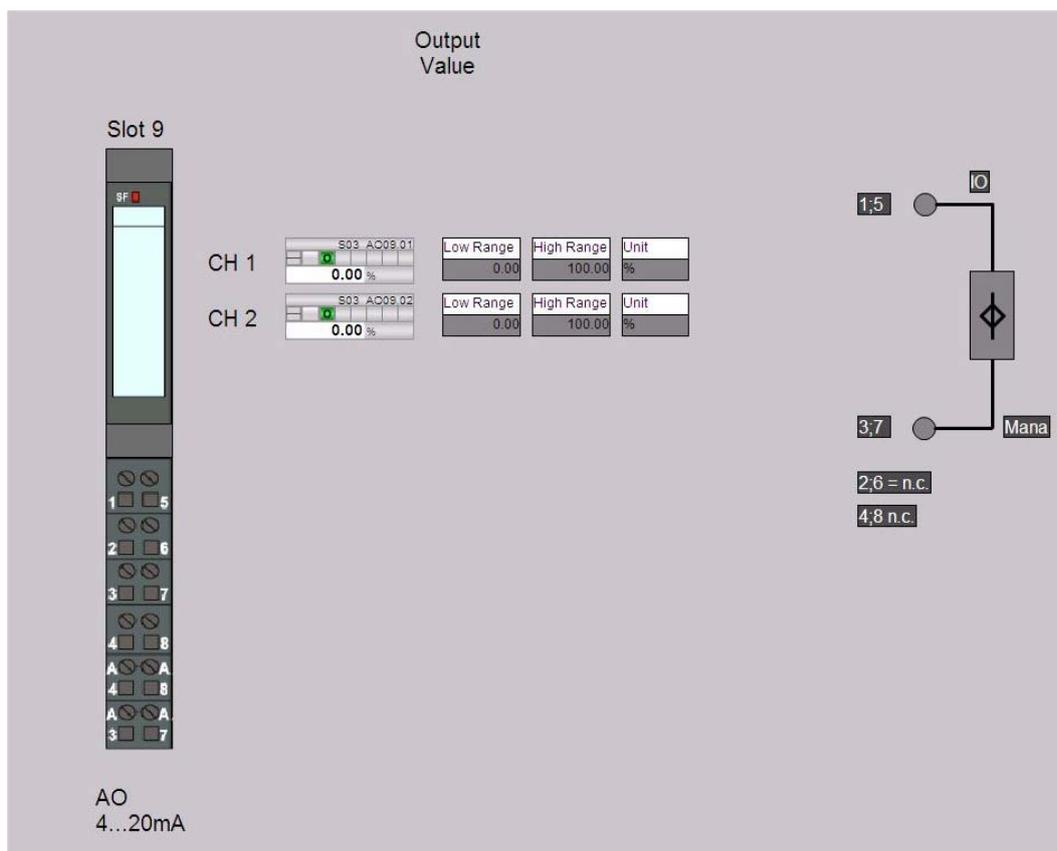


Figure 7-8 Slot 9: 4...20 mA Analog outputs

To adjust the measurement Ranges, the unit and the alarm/Warning limits please refer to analog inputs 4..20 mA.

See also

Analog inputs 4 ... 20 mA on page 33

7.5.7 Digital inputs

Information: Overview about the digital inputs Slot 13 to 15

Activity: Click on Slot 13, 14 or 15 respectively in the overview picture

Result: Details about the digital input channels

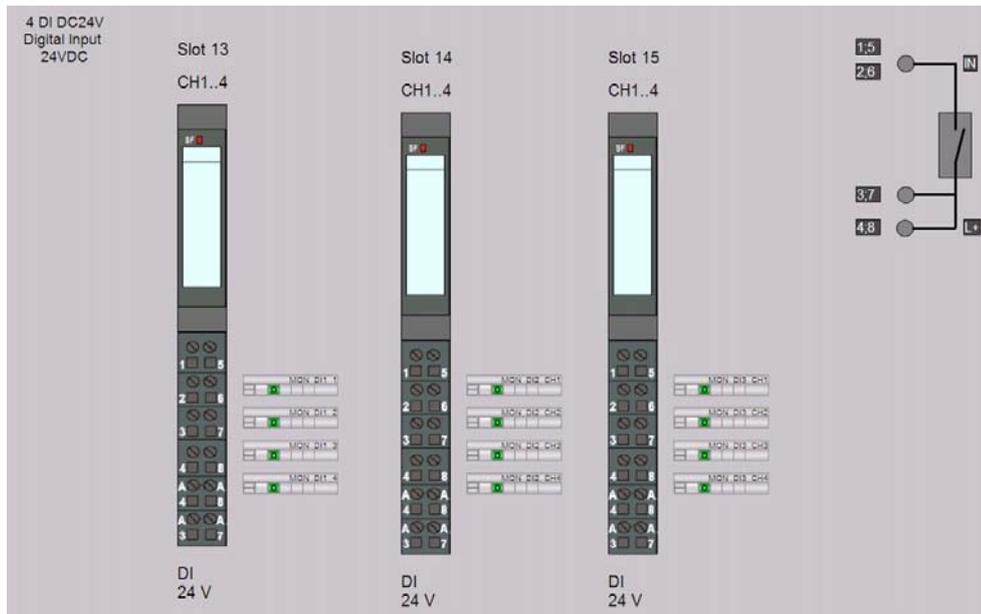


Figure 7-9 Slot 13, 14, 15: Overview about digital inputs

Information: Get the status of a digital input

Activity: Click the faceplate for the corresponding digital channel

Result: The faceplate opens

7.5.8 Digital outputs

Information: Overview about the digital inputs Slot 18 to 22

Activity Click on auf Slot 18, 19, 20, 21 or 22, respectively in the overview picture"

Result: Details about the digital input channels

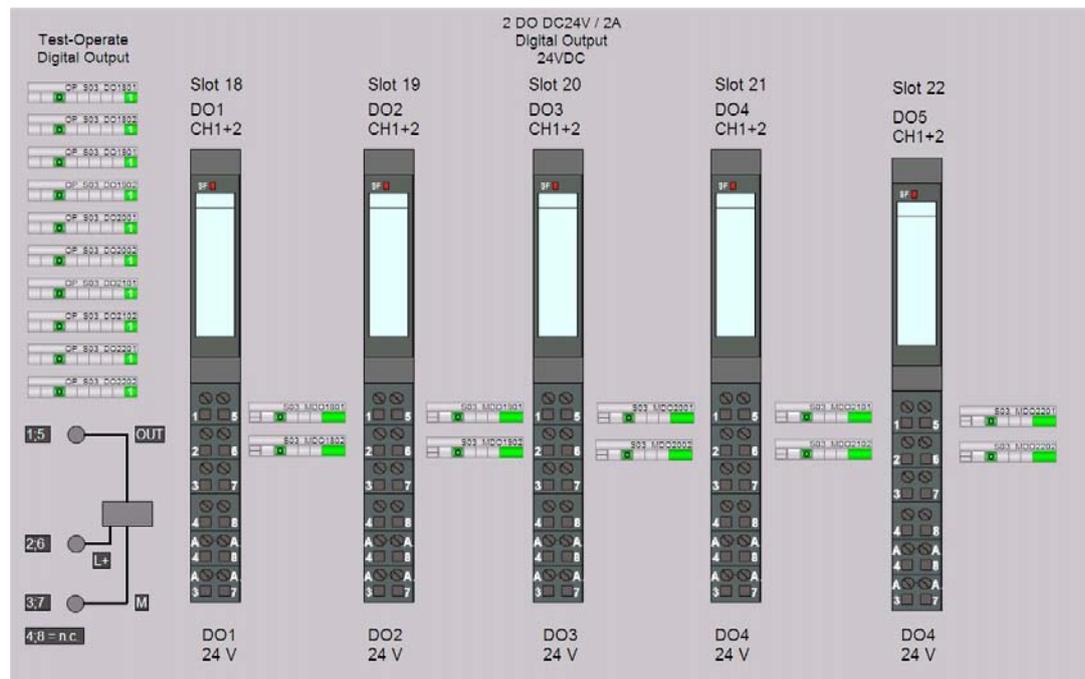


Figure 7-10 Overview about digital outputs

Information: Get the status of a digital output

Activity: Click the faceplate for the corresponding digital channel

Result: The faceplate opens

Using the simulation icons forces your digital outputs.

7.6 Operating the I/O module with ET 200pro

7.6.1 Overview about input and output channels

Activity: Activity: Click with the mouse on the "Overview Pn" button for the n-th connected ET 200pro

Result: Display of the slots of the ET 200pro module

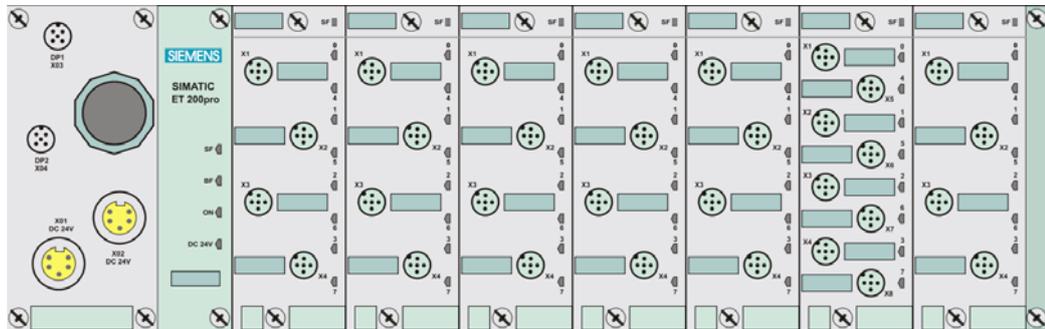


Figure 7-11 Overview about the ET 200pro module

7.6.2 Detailed information

Information: Detail display for the individual slots..

Activity: Mouse click on the slot panel of the displayed I/O module's front panel. The slot panel serves as a button..

Result: Display of the individual slot (see sections below)

7.6.3 Analog inputs (0) 4 ... 20 mA

Information: Overview about analog inputs (0) 4..20mA

Activity: Click on Slot 2 in picture "OverviewP10"

Result: see picture below

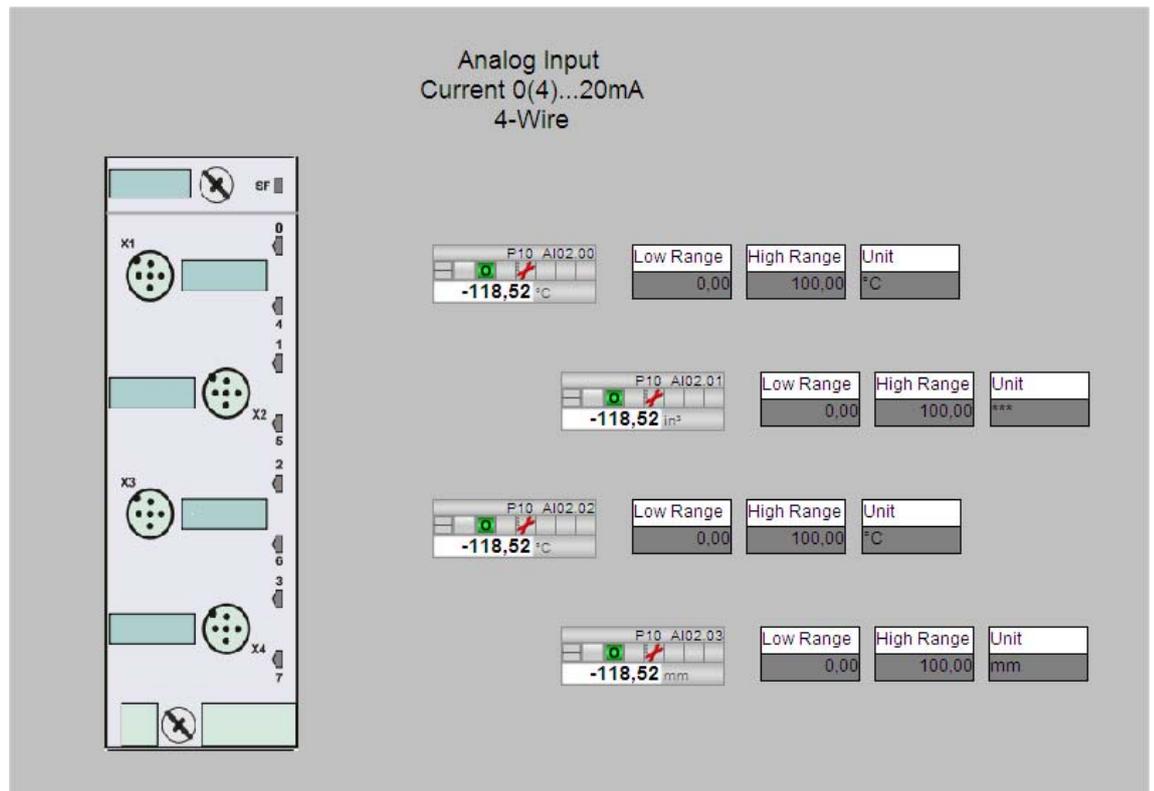


Figure 7-12 analog inputs (0) 4..20mA

The analog inputs 0(4) ... 20 mA are operated, in principle, like the analog inputs of the ET 200S module. Please refer to section 7.5.3 on page 33

7.6.4 Analog inputs +/- 10 V

Information: Overview about analog outputs +/- 10V

Activity: click on slot 3 in the overview picture

Result: see picture below

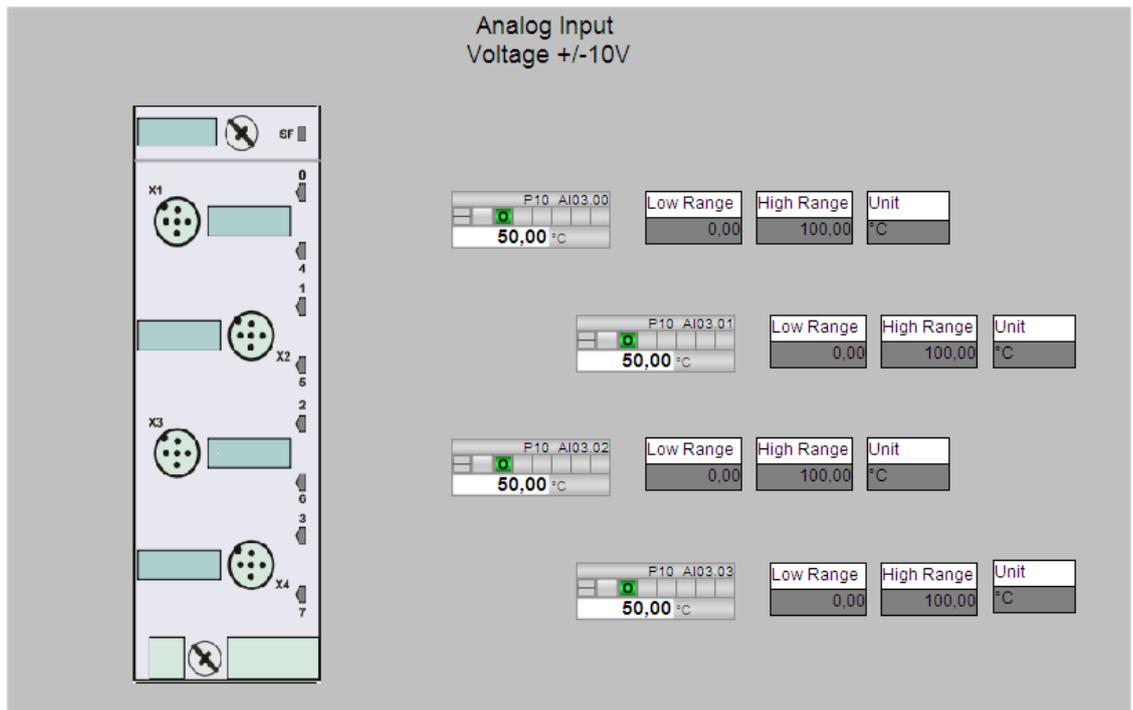


Figure 7-13 + / - 10V analog inputs

The analog inputs +/- 10V are operated, in principle, like the analog inputs of the ET 200S module. Please refer to section 7.5.4. on page 34

7.6.5 Analog inputs (RTD) PT100

Information: Overview about the RTD (PT100) analog signals

Activity click on Slot 4 in the overview picture

Result: See picture below

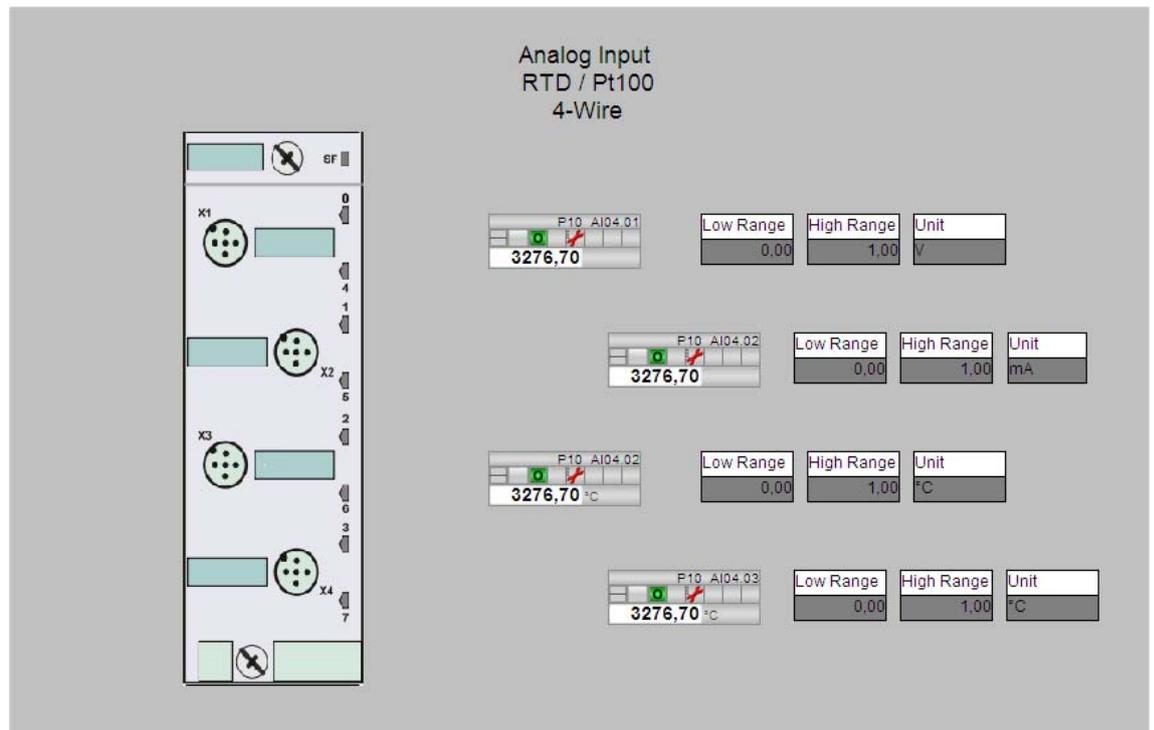


Figure 7-14 Analog inputs PT 100

The analog inputs RTD (PT 100) are operated, in principle, like the analog inputs RTD (PT 100) of the ET 200S module. Please refer to chapter 7.5.5 on page 36.

7.6.6 Analog outputs 4 ... 20 mA

Information: Overview about the analog output channels

Activity: Click on Slot 5 in the overview picture

Result:: see picture below

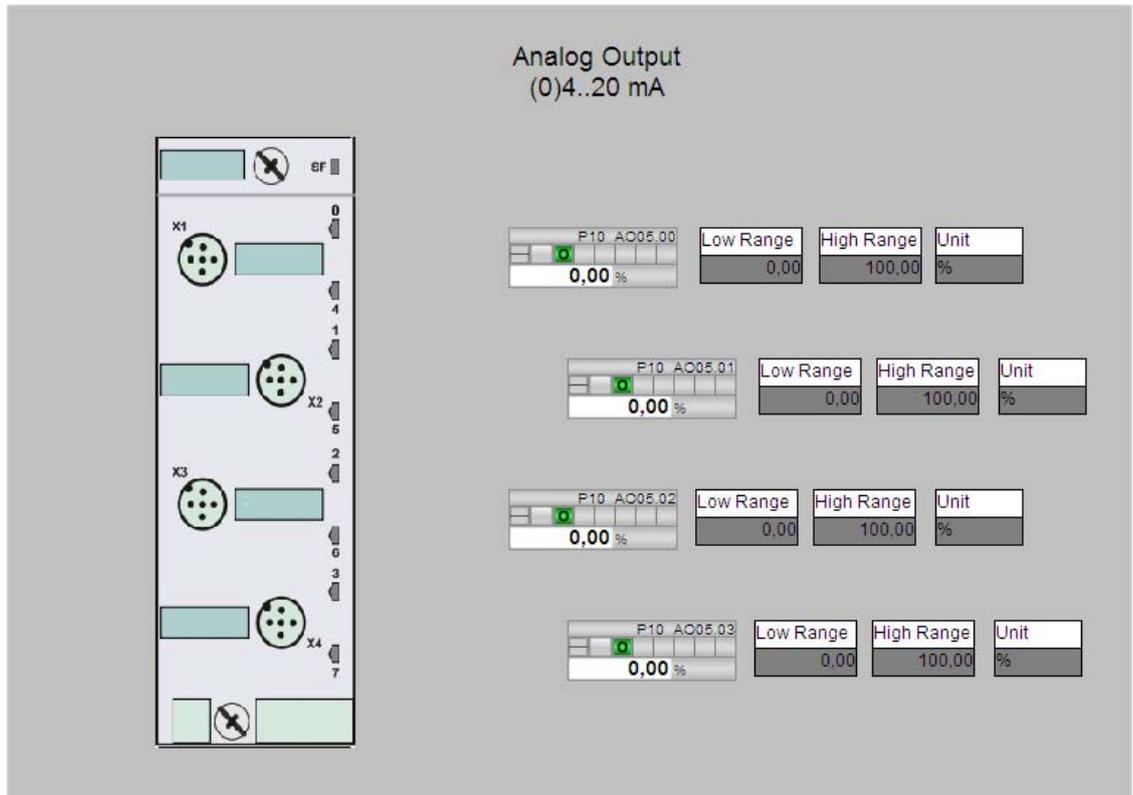


Figure 7-15 (0)4..20mA analog outputsI

The analog outputs 4..20mA are operated, in principle, like the analog inputs of the ET 200S module. Please refer to section 7.5.6 on page 37

7.6.7 Analog outputs +/- 10V

Information: Overview about the analog output channels +/- 10V

Activity: click on Slot 6 in the overview picture

Result: see picture below

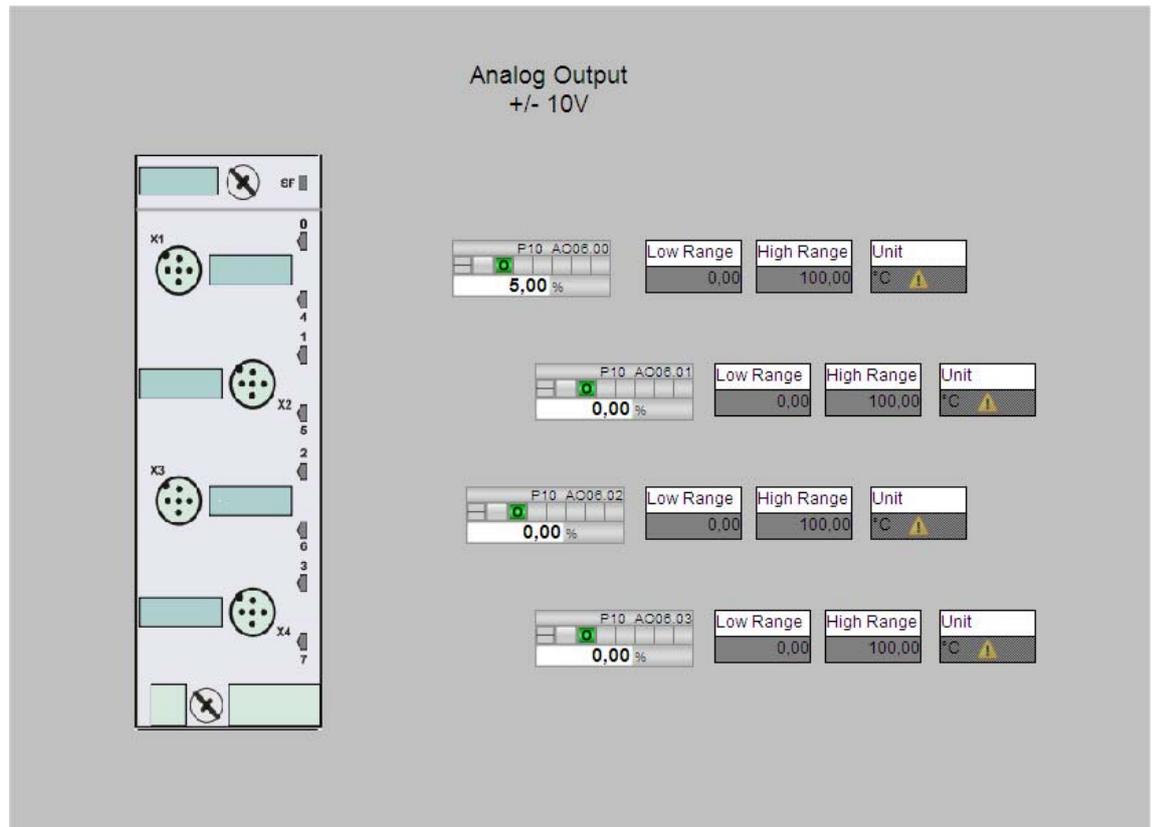


Figure 7-16 +/-10V analog outputs

7.6.8 Digital inputs

Information: Overview about the digital input channels

Activity: Click on Slot7 in the overview picture

Result: see picture below

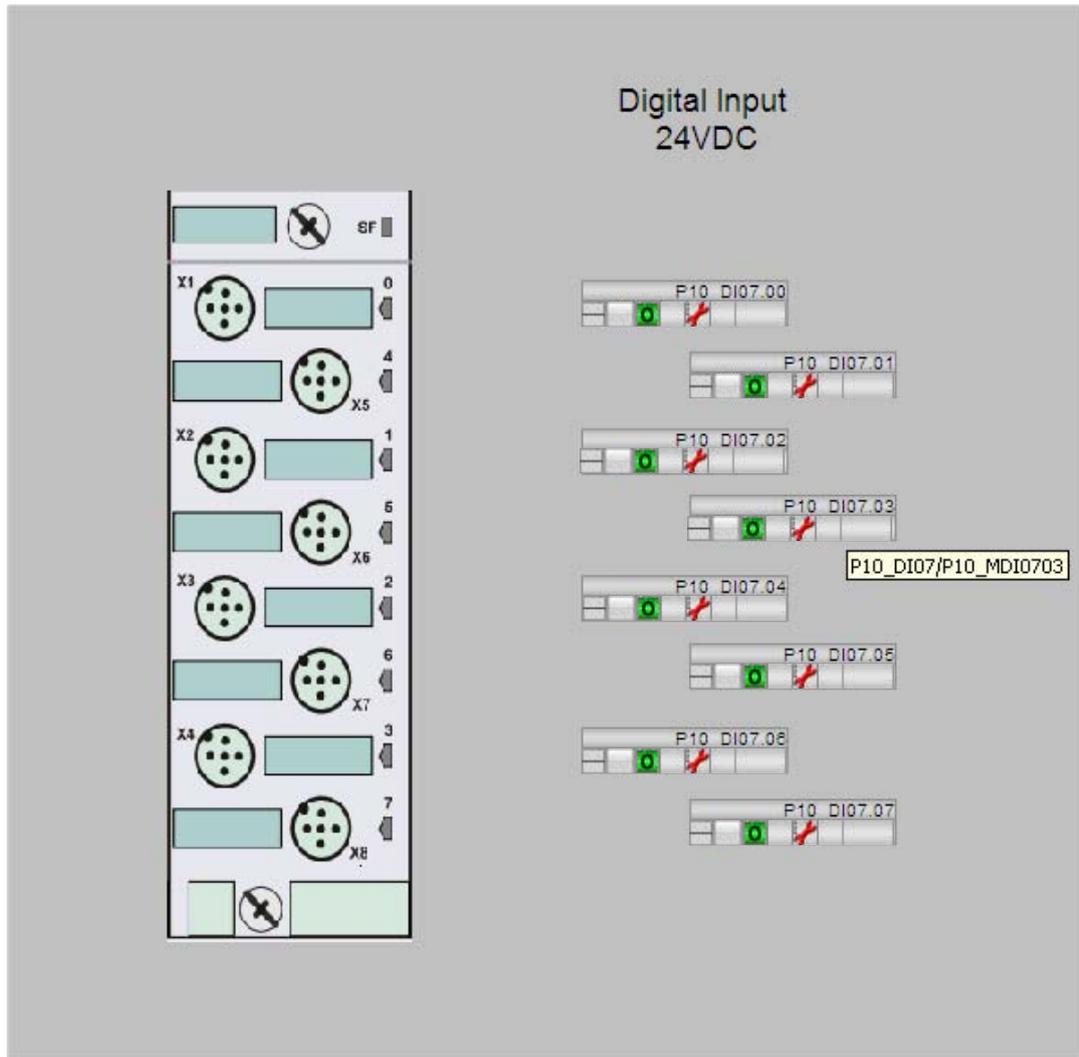


Figure 7-17 Digital Inputs

7.6.9 Digital outputs

Information: Overview about digital outputs

Activity: Click on Slot 8 in the overview picture

Result: See picture below

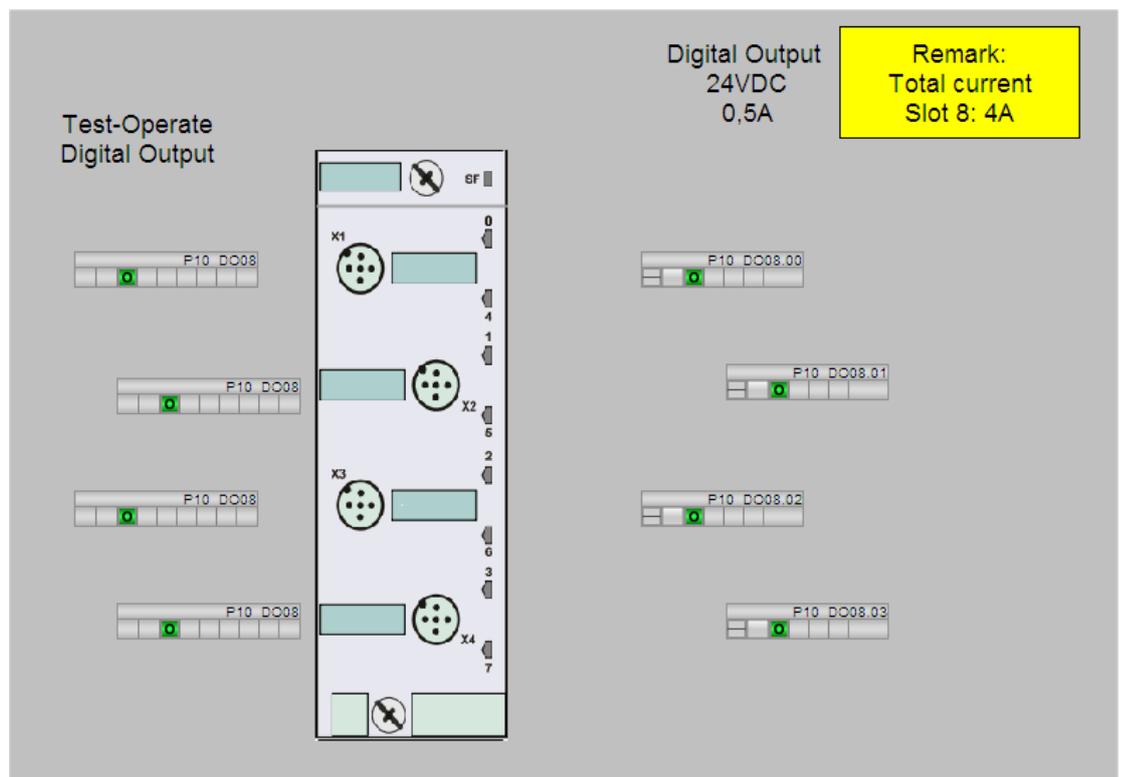


Figure 7-18 Digital Outputs

You may operate the digital outputs similar to the ET 200S I/O module. Please refer to section Digital outputs (page 39)

Attention

The output currents of the digital outputs DO of the ET 200pro module must satisfy the following conditions:

- Maximum 2 A per output
- Maximum 4A per module (Slot)
- Maximum 8 A total current of all of the digital outputs of all ET 200pro connected to a POWER module. A max. of 10 A is possible for a short time. Otherwise an additional load voltage supply must be fed in, see Operating Instructions "Distributed I/O system ET 200pro"

8 Engineering System

8

8.0 Dokumentation des Engineering Systems

This manual is not a guide for working with the PCS 7 Engineering System.

Information on working with the PCS 7 Engineering System can be found in the

- PCS 7 Manual Collection, available on the DVD
- in the comprehensive online help

8.1 S7-HW-Konfiguration

The hardware configuration for PCS 7 LAB Collection is part of the active project is configured as described in this manual.

8.2 S7-Bus-Konfiguration

The bus configuration of the PCS 7 LAB Collection is included in the active sample project and configured according to the data in this manual.

8.3 Plant View

The sample project "LABV3p1_MP" was created and compiled in the PCS 7 Plant View.

NOTE

To expand the sample project for own projects, refer to the notes in the Section "Documentation for the Engineering System".

See also

Documentation of the Engineering Systems

8.4 Additional lab specific applications

For the following laboratory-specific applications there are software equipment modules available:

- Agitate (stirring)
- Pressure (ventilating)
- Discharge (emit / transfer)
- Dosing with control valve
- Analysis
- Temperature control
- Dosing solids
- Dosieren with on/off valve

For additional information on software equipment modules and special software applications for laboratory automation, please contact

SIEMENS I IA.

Anschrift:

SIEMENS AG

I IA AS PA PRM4

Siemensallee 84

Visitor address: 76187 Karlsruhe

Mail address: 76181 Karlsruhe

9 Connection and utilization of I/O signals

9

9.0 General information

Information about mounting the input / output modules are available as well as mounting procedures are available in:

- Operating Instructions for ET 200S
- Operating instructions for ET 200pro
- Operating instructions ET 200M serial interfaces

9.1 Connection of signal cables and reference potential

 WARNING

Explosion hazard/fire hazard

Signal cables can only be connected to devices which have reliable electric isolation from their auxiliary power supply. Encoders with 24 V DC SELV LPS are to be used as the digital encoders.

The signals (e.g. analog output 0...20 mA) must not pass through hazardous areas.

ATTENTION

Electromagnetic interference

Do not run the signal lines in parallel with either switched lines or power lines. Do not run signal lines into the open air or into other buildings.

Please take care about ground while mounting I/O modules.

For analog signals it is recommended to use screened lines. If this is not possible please make sure that cables are as short as possible; this helps to avoid inaccurate measurement values due to interferences.

10 Function block library

10

10.0 Introduction

The software package PCS 7 LAB function block library serves to connect laboratory equipment to a SIMATIC PCS 7 process control system through RS232 / ASCII protocol.

The library comprises function blocks

1. NE_DATADRVR: Sending and receiving of ASCII commands to NE28
2. NE_CMDMUX: Multiplexer for ASCII commands to NE28
3. NE_DEMUX: Demultiplexer for ASCII read commands to NE28
4. NE_CMDGEN: Generation of an ASCII command to NE28
5. NE_CMDLOOP: Cyclic processing of ASCII commands to NE28
6. SAT_RS: Serial communication with Sartorius scale
7. RZR_CTRL: Serial communication with Heidolph stirrer
8. FLWBS_BH: Serial communication with the RS232 interface from Bronkhorst
9. User objects and operator-control blocks for operating and monitoring measured data on the OS

10.1 Additional Information

For more information about the various devices, please refer to the relevant manuals.

Please see the Functional description PCS 7 block library for more information about the function block library.

The PCmodule comprises selected components out of the standard portfolio. Please see the following documents for additional information:

- Functional description SIMATIC PCS 7 BOX
- in the internet : Service&Support-Portal
(<http://www.siemens.com/automation/service&support>)

11.1 Technical data: ET 200pro-Module

The ET 200pro module comprises selected components out of the standard portfolio. Please see the following documents for additional information:

- Operating instructions: ET 200pro distributed I/O system
- in the appendix
- in the internet : Service&Support-Portal
(<http://www.siemens.com/automation/service&support>)

11.2 Technical data: ET 200S-Module

The ET 200S module comprises selected components out of the standard portfolio. Please see the following documents for additional information:

- Operating instructions: ET 200S distributed I/O system
- in the appendix
- in the internet : Service&Support-Portal
(<http://www.siemens.com/automation/service&support>)

Appendix

0

A.0 Service und Support

SIMATIC Technical Support

You can contact Technical Support for all Industry Automation products:

- via the Internet using the **Support Request**:
<http://www.siemens.com/automation/service&support>
- E-mail: adsupport@siemens.com
- phone: +49 (0) 180 5050 222
- fax: +49 (0) 180 5050 223
- For mailing address see back of cover

Further information about our technical support is available in the Internet at

<http://www.siemens.com/automation/csi/service>

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base online on the internet at

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

You will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- A Knowledge Manager to find the right documents for you.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- your local contact partner for Industry Automation in our Partner Database
- Information about field service, repairs, spare parts and lots more under "Services"

Additional Support

Bei Fragen zur Nutzung der im Handbuch beschriebenen Produkte, die Sie hier nicht beantwortet finden, wenden Sie sich bitte an Ihren Siemens-Ansprechpartner in den für Sie zuständigen Vertretungen und Geschäftsstellen.

Ihren Ansprechpartner finden Sie unter:

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

Den Wegweiser zum Angebot an technischen Dokumentationen für die einzelnen SIMATIC Produkte und Systeme finden Sie unter:

<http://www.siemens.de/simatic-tech-doku-portal>

Trainingscenter

Please contact your local Siemens representative and offices if you have any questions about the products described in this manual and do not find the right answers.

Find your contact partner at:

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

A.1 Conformity

CE-marking

The manufacturer of this programmable controller is authorized to attach a CE marking to the rating plate, since the device complies with the following applicable directives:

EMV-Richtlinie

The requirements of the EC Directive 89/336/EEC "Electromagnetic Compatibility", changed by 91/263/EEC, 92/31/EEC, and 93/68/EEC, are complied with. The device is designed for the following applications:

Area of use	Noise emission requirements	Immunity to noise
-------------	-----------------------------	-------------------

Low-voltage directive

The requirements of the EC Directive 2006/95/EC "Low Voltage Directive." are complied. Conformance with this directive has been verified according to the valid standard.

Standards	Content
-----------	---------

DIN EN 61010-1:2001	Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements
---------------------	--

The EC Declarations of Conformity are available for the responsible authorities according to the above-mentioned EC Directive at the following address:

Siemens Aktiengesellschaft

Industry Sector

IA SE S2

90766 Fürth.

If this product is used outside the European Union, the standards and regulations valid in the country of the company using the product must be observed!

A.2 Part lists

Attention

The advised MLFB for the single modules may change without notice. This happens, when modules are changed due to technical improvements or other reasons.

A2.1 PC Module (complete system)

Order-No	Description	Amount
6ES7 650-4AA0-0AA6	SIMATIC PCS 7 BOX RTX V7.1 complete system (ES, OS and AS) PREASSEMBLED, INSTALLED AND TESTED, including: <ul style="list-style-type: none"> • SIMATIC Box PC 627B, DC 24 V, with Betriebssystem Windows XP Professional MUI (german,, english, french, italian, spanish), Software Controller WinAC RTX und Diagnosesoftware SIMATIC PC DiagMonitor • SIMATIC PCS 7 AS/OS Engineering Software V7.1 for Operations,, 250 AS/OS Engineering und Runtime PO, 5-sprachig (german,, english, french, italian, spanish), Softwareklasse A, Floating License for 1 User 	1
6ES7 652-0XD17-2YB5	SIMATIC PCS 7 SFC Visualization V7.1 For displaying and operating SFC sequence controls on an operator station 6 languages (German, English, French, Italian, Spanish, Chinese), software class A, executes with Windows XP Professional or Windows Server 2003, floating license for 1 user	1
Optional equipment		
6ES7 648-0CB00-0YA0	SIMATIC PC KEYBOARD GERMAN / INTERNATIONAL USB INTERFACE USB	1
6ES7 790-0AA01-0XA0	OPTICAL USB MOUSE 3 BUTTON WHEEL MOUSE WITH PS/2 ADAPTER FOR SIMATIC PG AND PC	1
6GF6 220-1DA01	SCD 19101-D, LCD DISPLAY 19", DESKTOP WITH PROTECTION GLASS UL1950 / IP 20, RESOLUTION 1280X1024, 30-97 KHZ INPUT: DVI-D	1

A2..2 PC Module (distributed system)

Order-No	Description	Amount
6ES7654-0UE13-0XX0c	SIMATIC PCS 7 AS RTX AUTOMATION SYSTEM BASED ON IPC427C, CORE2 DUO 1.2 GHZ, 800 MHZ FSB, 3MB SLC, 2 GB DDR3 1066 SODIMM RAM, 4 GB COMPACT-FLASH CHANGEABLE, CP5611 ONBOARD, WINDOWS EMBEDDED STANDARD 2009, WINAC RTX 2010 SOFTWARE CONTROLLER, RUNTIME LICENSE AS PO100 PREINSTALLED FOR PCS 7 OPERATING, APPLICABLE EX PCS 7 V7.1 SP2 OR HIGHER	1
6ES7 658-5AA17-0YA5	SIMATIC PCS 7, SOFTWARE, ENGINEERING V7.1 (AS/OS: PO 250), FLOATING LICENSE F.1 USER, E-SW, OHNE SW, OHNE DOKU., LICENSE KEY AUF USB STICK, KLASSE A, 3-SPRACHIG (D, E, F), ABLAUFFAEHIG UNTER XPPROF/ WINSRV2003 REFERENZ-HW: PCS 7 547C: ES/OS, PCS 7 BOX 416	1
6ES7 652-0XD17-2YB5	SIMATIC PCS 7, SOFTWARE SFC VISUALIZATION V7.1	1
Optional equipment		
6ES7 648-0CB00-0YA0	SIMATIC PC KEYBOARD GERMAN / INTERNATIONAL USB INTERFACE USB PS/2 ADAPTER INCLUDED	1
6ES7 790-0AA01-0XA0	SIMATIC PC, OPTICAL USB MOUSE 3 BUTTON WHEEL MOUSE WITH PS/2 ADAPTER FOR SIMATIC PG AND PC	1
6GF6 220-1DA01	SCD 19101-D, LCD DISPLAY 19", DESKTOP WITH PROTECTION GLASS UL1950 / IP 20, RESOLUTION 1280X1024, 30-97 KHZ INPUT: DVI-D	1

A2..3 Power Supply

Order-No	Description	Amount
6EP1336-3BA00	SITOP MODULAR 20 STABILIZED POWER SUPPLY INPUT: 120/230 V AC OUTPUT: 24 V DC/20 A	1

A2..4 ET 200S I/O Module

Order-No	Description	Amount
6ES7131-4BD01-0AB0	Electronic module, 4 DI HIGH FEATURE 24V DC, (5 Pcs)	1
6ES7132-4BB31-0AB0	Electronic module, 2 DO HIGH FEATURE DC 24V/2A, 5 Pcs	1
6ES7134-4FB01-0AB0	Electronic module, 2 AI STANDARD	2
6ES7134-4GB01-0AB0	Electronic module, 2 AI STAND. I-2DMU	2
6ES7134-4GB11-0AB0	Electronic module, 2 AI STAND. I-4DMU	2
6ES7134-4JB51-0AB0	Electronic module, 2/4 AI RTD STANDARD,	1
6ES7135-4LB02-0AB0	Electronic module, 2 AO U HIGH FEATURE	2
6ES7135-4MB02-0AB0	Electronic module, 2 AO I HIGH FEATURE	2
6ES7138-4CA01-0AA0	POWER MODULE PM-E; 24V DC WITH DIAGNOSIS	2
6ES7151-1BA02-0AB0	INTERFACE MODULE IM151-1 HIGH TRANSMISS. RATE UP TO 12MBIT/S; DATA VOLUMEN 244 BYTE FOR I/O, MAX. 63 MODULES CONNECTABLE; ISOCHRON MODE, BUS INTERFACING VIA 9-WAY SUB-D CONNECTOR, INCL. TERMINATING MODULE	1
6ES7193-4CA40-0AA0	5 UNIVERSAL TERMINAL MODULES WITH TERMINAL LEAD TO AUX1, AUX1 IN LINE, 5 PIECES PER PACKAGING UNIT Note: 4 pcs spare	5
6ES7193-4CC20-0AA0	Terminal modul for AUX1-power screw type connection	2
6ES5710-8MA11	Section Rail lengt:483 mm (for 19"-cabinet)	1

A2..6 ET 200pro I/O Modul

Order-No	Description	Amount
6ES7141-4BF00-0AB0	Elektronic module, 8DI, DC 24V, High Feature	1
6ES7142-4BD00-0AB0	Elektronic module, 4 DO DC 24V/0,2A, Standard	1
6ES7144-4FF00-0AB0	Elektronic module, 4 AI-U High Feature	1
6ES7144-4GF00-0AB0	Elektronic module, 4 AI-I High Feature	1
6ES7144-4JF00-0AB0	Elektronic module, 4 AI-RTD High Feature	1

6ES7145-4FF00-0AB0	Elektronic module, 4 AO-U High Feature	1
6ES7145-4GF00-0AB0	Elektronic module, 4 AO-I High Feature	1
6ES7154-2AA01-0AB0	IM 154-1 DP bus interface for PROFIBUS DP	1
6ES7194-4AD00-0AA0	Connection module for IM DP M12 / 7/8"	1
6ES7194-4CA00-0AA0	Connection module for IO 4xM12	6
6ES7194-4CB00-0AA0	Connection module for IO 8xM12	1
6ES7194-4GA00-0AA0	Module carrier small, Length 500 mm	1

A2..7 ET 200M serial module

Order-No	Description	Amount
6ES7 153-2BA02-0XB0	IM 153-2 interface module for PROFIBUS	1
6ES7 341-1AH01-0AE0	CP341 COMMUNICATION PROCESSOR WITH RS232C	8

A2..8 ET 200S serial module

Order-No	Description	Amount
6ES7151-1BA02-0AB0	DP, INTERFACEMODUL IM151-1 HIGH FEATURE F. ET200S;	1
6ES7138-4DF01-0AB0	1 SI, ELEKTRONIKMODUL FOR ET 200S, SERIAL Interface RS232/422, 485 ASCII, 3964R	8
6ES7138-4CA01-0AA0	DP, POWERMODUL PM-E FOR ET 200S; DC 24V incl diagnosis	1
6ES7193-4CC20-0AA0	TERMINAL MODULE TM-P15S23-A1 FOR ET 200S FOR POWER MODULES 15MM WIDE, SCREW-TYPE TERMINALS 2X3 TERMINAL CONNECTIONS WITH TERMINAL LEAD TO AUX1 AUX1 IN LINE	
6ES7193-4CA40-0AA0	UNIVERSAL TERMINAL MODULES TM-E15S26-A1 FOR ET 200S FOR ELECTRONIC MODULES 15MM WIDE, SCREW-TYPE TERMINALS 2X6 TERMINAL CONNECTIONS WITH TERMINAL LEAD TO AUX1, AUX1 IN LINE, 5 PIECES PER PACKAGING UNIT	
6ES5710-8MA11	STAND.SECTIONAL RAIL WIDTH 35MM, LENGTH 483MM FOR 19 IN.CABINETS	

ESD - Guidelines

B

WARNING

PC-Modul, I/O-Modul, SER-Modul and POWER-Modul may be accessed by SIEMENS Service personal or by personal who is authorized by SIEMENS

ESD guidelines

Definition of ESD

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The electrostatic sensitive components/modules are commonly referred to as ESD devices. This is also the international abbreviation for such devices.

ESD modules are identified by the following symbol:



CAUTION

ESD devices can be destroyed by voltages well below the threshold of human perception these static voltages develop when you touch a component or electrical connection of a device without having drained the static charges present on your body. The electrostatic discharge current may lead to latent failure of a module, that is, this damage may not be significant immediately, but in operation may cause malfunction

Electrostatic charging

Anyone who is not connected to the electrical potential of their surroundings can be electrostatically charged.

The figure below shows the maximum electrostatic voltage which may build up on a person coming into contact with the materials indicated. These values correspond to IEC 801-2 specifications.

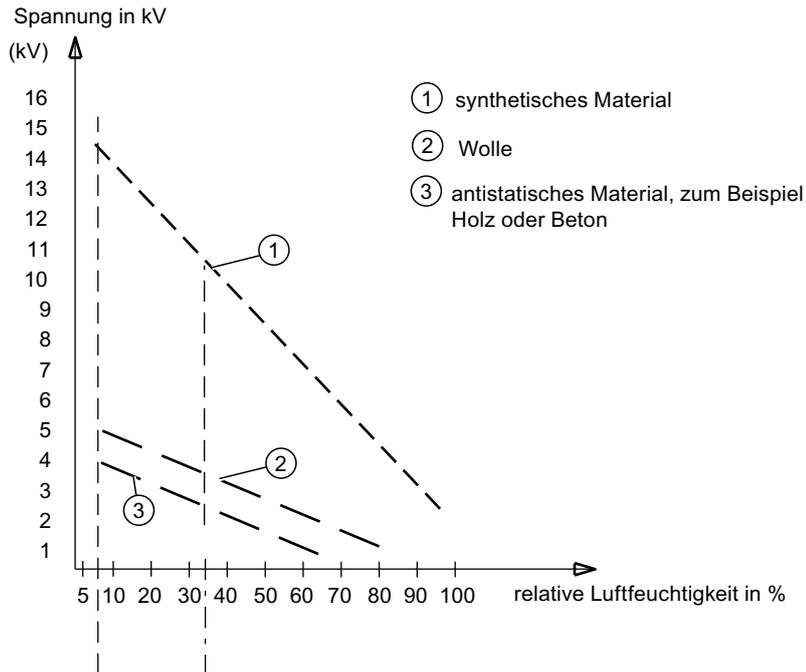


Bild B-1 Electrostatic voltages on an operator

Basic protective measures against electrostatic discharge

- Ensure good equipotential bonding:
When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. This prevents electrostatic charge.
- Avoid direct contact:
As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the modules without touching any chip pins or PCB traces. In this way, the discharged energy can not affect the sensitive devices. Discharge your body before you start taking any measurements on a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

ESD protective measures



ATTENTION

ESD protective measures

When handling modules and components carrying this symbol, always observe the ESD protection directives (Electrostatically Sensitive Devices/).

- Never touch the boards unless necessary work makes this unavoidable.
- When handling the boards, use a conductive and grounded work surface.
- Wear a grounding bracelet.
- Never touch chip pins, component connections or circuit board conductors when handling the boards.
- Never allow boards or components to touch chargeable objects (plastics)).
- Never place components or boards in the vicinity of cathode ray tube units or television sets (minimum distance: 10 cm)
- Leave the boards in their special packaging until you are ready to use them. Do not take the boards out of their packaging or touch them when registering them and so on
- Boards may only be installed or removed when the power is off..
- This warning sign on Siemens products draws your attention to appropriate protective measures you need to take

List of abbreviations



Abbreviations, symbols, and terms

Abbrev. Symbols and terms	Description
A	Ampere
AC	Alternating Current
CD	Compact disc
CFC	Continous Function Chart graphic programminglanguage for PCS 7
Communications processor	A module that is responsible for communication tasks and offloads the central processso
CPU	Central Processing Unit
DC	Direct current
DI	Digital Input
DO	Digital Output
EMC	Electromagnetic Compatibility
Faceplate	An operating element on the PCS 7 user interface that belongs to a block in a CFC that can be operated
I/O	Input/Output; input/output signals
I/O-module	Input/output module
k Ω	Kiloohm
LED	Light Emitting Diode
LPS	Low Power Source;
Max	maximum
MBA	Start of measuring range, lower range value
MBE	End of measuring range, upper range limit
Min	Minute
MLFB	Machine-readable product code, Siemens AG order numbers
Mm	Millimeter
m Ω	MilliOhm
M Ω	MegaOhm
mV	MilliVolt
MP	Multi-Project
m ³	Cubic meters
NS	Not Switched
No	Number
Ω	Ohm
PC MODULE	Processing unit
PT100	Resistance thermometer (platinum) with +0.385

List of abbreviations

0 Abbreviations, symbols, and terms

	Ohms/°C
S	second
SELV	Safety Extra Low Voltage; Sicherheitskleinspannung
SCHUKO-connectorr	Earthing type plug CEE 7/VII
Typ	Typical value
V	Volts
°C	Degree Celsius
" / inch	1" = 25,4 mm
>	greater than
<	less than
>=	greater than or equal than
<=	less than or equal than
Δ	difference

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