

S7-1500 Software Controller: Combination Drive Control, Database, Visualization

STEP 7 Professional, WinCC Advanced, Startdrive

<https://support.industry.siemens.com/cs/ww/en/view/62521281>

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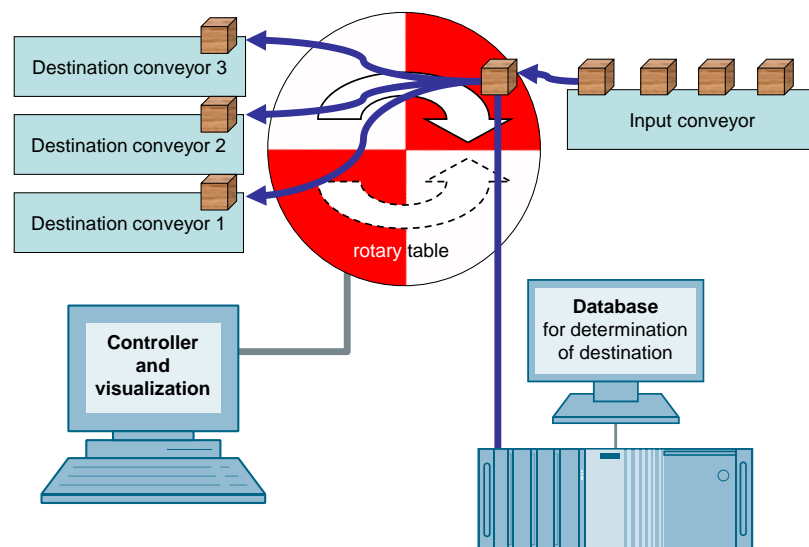
1 Task

Introduction

This extensive application example uses a transport solution with rotary table to illustrate various functions and options of SIMATIC S7-1500 Software Controller. Due to the large scope of topics, the functions cannot be described in every detail. References to related applications and FAQs are provided instead.

Overview of the automation task

Figure 1-1: Overview of the automation task



- On a conveyor belt (input conveyor) different packages are transported to a rotary table.
- The packages are identified on the destination conveyor.
- All package types and respective destination conveyors are stored in a database. This database is polled to receive the destination conveyor for the packages.
- The package is positioned on the rotary table. The rotary table is set in motion and transports the package to the destination conveyor.
- The various conveyors are approached by means of sensors (BEROs).
- After the package has arrived on the destination conveyor, the rotary table moves back to the input conveyor.
- The process then starts from the beginning.

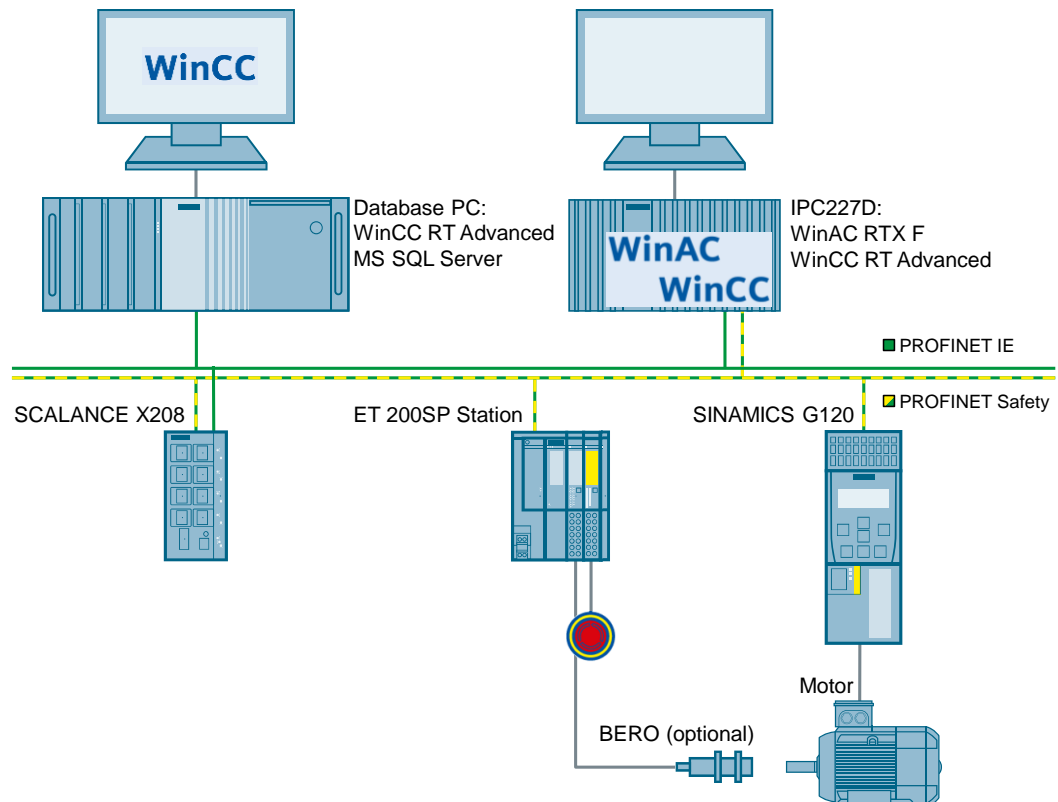
2 Solution

2.1 Overview

Schematic layout

The following figure gives a schematic overview of the most important components of the solution:

Figure 2-1: Schematic illustration the application



The example shows you how ...

- the communication between the Software Controller and the SINAMICS G120 drive is programmed.
- the SINAMICS G120 drive is configured.
- a database communication is implemented with WinCC RT Advanced.
- safety measures are taken against unauthorized access.

Advantages

The solution introduced here shows the versatility of the S7-1500 Software Controller and the simple and time-saving engineering with TIA Portal.

Delimitation

This application does not include a basic description of

- STEP 7 programming
- WinCC programming
- Drive technology
- Databases

Assumed knowledge

Basic knowledge on STEP 7 and WinCC programming, and the basic application of S7-1500 Software Controller are assumed.

2.2 Description of the core functionality

2.2.1 S7-1500 Software Controller: Drive connection

A drive connection is realized with S7-1500 Software Controller via PROFINET. The motor is moved to four positions. The determination of the position is simulated or, as an option, determined with inductive BEROs.

The following application provides you with an overview of drive control for a SINAMICS G120 using an S7-1500 CPU. Existing user programs of S7-1500 can continue to be used in S7-1500 Software Controller. The application can therefore be fully adopted in S7-1500 Software Controller.

SINAMICS G: Speed Control of a G110M / G120 (Startdrive) with S7-1500 (TO) via PROFINET or PROFIBUS with Safety Integrated (via Terminal) and HMI
<https://support.industry.siemens.com/cs/ww/en/view/78788716>

2.2.2 WinCC RT Advanced: visualization and database connection

The automation solution contains a database request for a Microsoft SQL server. The request is realized in WinCC RT Advanced via scripts.

For further information, please refer to:

How do you log tags in an SQL database and read them out again with WinCC flexible?

<https://support.industry.siemens.com/cs/ww/en/view/24677043>

How do you access an SQL database in WinCC Runtime Advanced using a script?

<https://support.industry.siemens.com/cs/ww/en/view/61883659>

Outlook

There are still further options of realizing a database connection.

PC-based automation: connecting databases via open interfaces using OPC Client, programmed in C# .net

<https://support.industry.siemens.com/cs/ww/en/view/21576581>

This example application illustrates how a data exchange is handled between a database and a SIMATIC controller via OPC.

SIMATIC ODK 1500S SQL driver

<https://support.industry.siemens.com/cs/ww/en/view/109479140>

This application example shows how to connect an S7-1500 Software Controller to an SQL database by means of the ODK 1500S SQL driver.

2.2.3 Security mechanisms

Various security options are illustrated for protection from unauthorized access to the controller. The following topics are discussed:

- Preventing unauthorized access to WinCC Runtime
 - Access protection by means of user administration with WinCC (TIA Portal)
 - Deactivating the remote control of the WinCC Runtime Loader
 - Blocking the task switch over in Runtime
- Preventing unauthorized access to the Open Controller
 - BIOS password
 - Preventing the booting of USB media
 - User accounts under Windows
 - Group policy under Windows
 - Security guideline for PC-based automation systems with Windows embedded operating systems.
<https://support.industry.siemens.com/cs/ww/en/view/55390879>

2.2.4 PC-based outlook (no integral part of this application)

The following information shows you further functions of PC-based which are not discussed in this application.

The topics page on PC-based automation with all of the important links around the topic is available at the following link.

<https://support.industry.siemens.com/cs/ww/en/view/75852684>

C/C++ Code with S7-1500 Software Controller

SIMATIC ODK 1500S enables using C/C++ Code. You will find an Application Example for SIMATIC ODK 1500S under the following link:

<https://support.industry.siemens.com/cs/ww/en/view/106192387>

Overview of further applications on PC-based automation

<https://support.industry.siemens.com/cs/ww/en/ps/16739/ae>

2.3 Hardware and software components

The application was created with the following components:

It is recommended to perform the hardware configuration with the TIA Selection Tool:

<http://www.siemens.com/tia-selection-tool>

Note

The used hardware and software products are also available in the file in archive folder "62521281_S7-1500S_at_TIA_Portal_PRODUCTS_v50.zip". Use the TIA Selection Tool.

Use the TIA Selection Tool. Refer to the table below for the hardware and software components that are included in the TIA Selection Tool.

Hardware components

Table 2-1: Hardware components included in the TIA Selection Tool

Component	No.	Article number	Note
SIMATIC IPC (SIMATIC PC Station)	1	-	Alternatively, a field PG M3 or a standard PC can be used. For engineering and Database_PC
Open Controller (CPU 1515SP PC) WES7P 64 Bit + CPU 1505SP F + HMI	1	6ES7677-2AA41-0FK0	There are various bundles for the Open Controller, see: https://support.industry.siemens.com/cs/ww/en/view/104117388 The bundle must contain the following software products: CPU S7-1505S WinCC RT Advanced V13
ET 200SP IM 155-6 PN ST inkl. Servermodul, inkl. Busadapter 2xRJ45	1	6ES7155-6AA00-0BN0	https://support.industry.siemens.com/cs/ww/en/ps/6ES7155-6AA00-0BN0 https://support.industry.siemens.com/cs/ww/en/view/84133942
BU-Typ A0, 16 Push-In (Digital-/Analog, max.24VDC/10A)	1	6ES7193-6BP00-0DA0	-
DI 8x24VDC ST	1	6ES7131-6BF00-0BA0	-
SCALANCE X208	1	6GK5208-0BA10-2AA3	Alternatively other switches can be used with min. 4 ports.

Tabelle 2-2: Hardware components not included in the TIA Selection Tool

Component	No.	Article number	Note
SINAMICS CU240E-2 PN F	1	6SL3244-0BB13-1FA0	https://support.industry.siemens.com/cs/ww/en/ps/6SL3244-0BB13-1FA0
SINAMICS PM340 230V	1	6SL3 210-1SB14-0UA0	-
SINAMICS G120 IOP	1	6SL3255-0AA00-4JA0	Optional https://support.industry.siemens.com/cs/ww/en/ps/6SL3255-0AA00-4JA0
Motor	1	1LA7060-4AB10	-
Ind. Ethernet RJ45/RJ45, CAT 6, Leitung 4X2, 2m	6	6XV1840-2AH10	Alternatively other Ethernet cable can be used in different lengths.
Inductive Sensor (BERO)	4	NBN2-8GM40-Z1	Optional http://www.pepperl-fuchs.com
Emergency-stop button	1	-	-
Standard PC monitor	1	-	-
Standard keyboard with USB connection	1	-	-
Standard mouse with USB connection	1	-	-

Software components

Tabelle 2-3: Software components included in the TIA Selection Tool

Component	No.	Article number	Note
STEP 7 Professional V13 SP1 Update 4	1	6ES7822-1..03-..	If you order a Field PG bundle with STEP 7 and WinCC licenses, you don't have to order this product separately.
WinCC Advanced V13 SP1 Update 4	1	6AV210.-....3-0	If you order a Field PG bundle with STEP 7 and WinCC licenses, you don't have to order this product separately.
WinCC RT Advanced V13 SP1	1	6AV2104-....3-0	-

Tabelle 2-4: Software components not included in the TIA Selection Tool

Component	No.	Article number	Note
Startdrive V13 SP1	1	6SL3072-4DA02-0XG0	Free download: https://support.industry.siemens.com/cs/ww/en/view/68034568

Sample files and projects

The following list includes all files and projects that are used in this example.

Table 2-5: Example projects and documentation

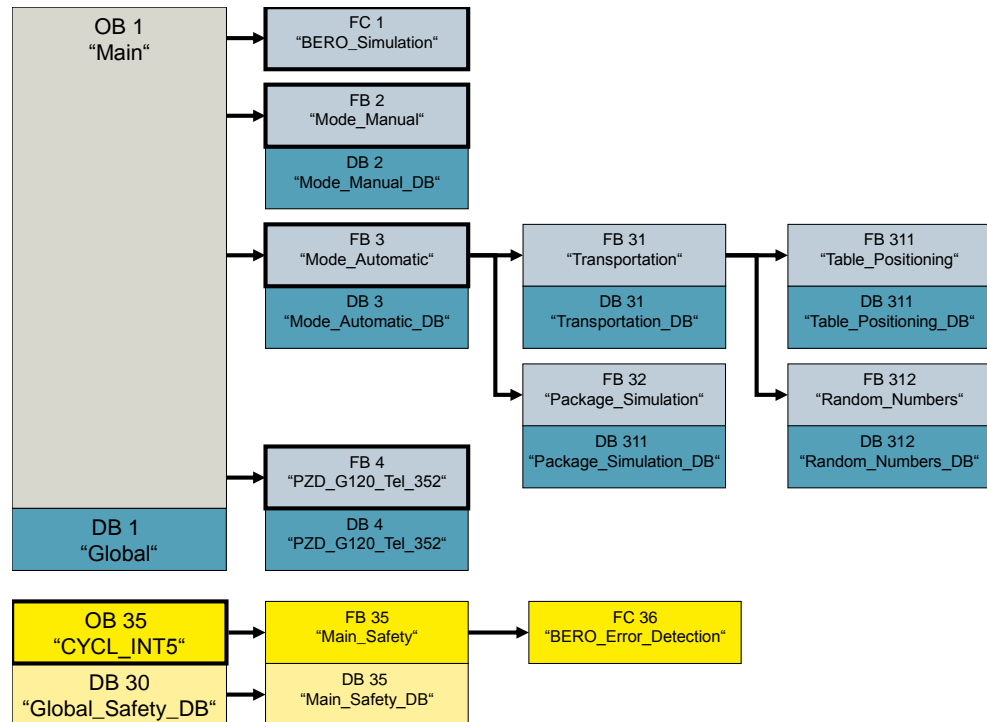
Component	Note
62521281_S7-1500S_at_TIA_Portal_CODE_v50.zip	The zip file contains: <ul style="list-style-type: none">• TIA Portal project• database import
62521281_S7-1500S_at_TIA_Portal_PRODUCTS_v50.zip	The zip file contains: TIA Selection Tool file with hardware and software products.
62521281_S7-1500S_at_TIA_Portal_DOKU_v50_en.pdf	This document

3 Function Mechanisms

This chapter gives a clear description of the programmed function method of the application. If you are interested in detailed information on programming this application, please refer to the TIA Portal project and the comments.

3.1 Program overview: S7-1500 Software Controller

Figure 3-1: General overview of the control program



The control program consists of four main parts:

- **BERO simulation**
In this area, it is specified whether hardware BEROs are used or whether the signals shall be only simulated.
- **Manual mode**
In this area, the drive is operated directly manually via the HMI, i.e. the setpoint speed and rotational direction is specified for the drive.
- **Automatic mode**
In this area, the entire application (rotary table) is run automatically, i.e. all different steps of the application are processed in sequence.
- **Drive G120**
In this area, the control signals are transferred to the drive.
- **Safety**
In this area, the safety program is separated from the standard program.

Note

There are two main operating modes of the application:

- Manual mode
- Automatic mode

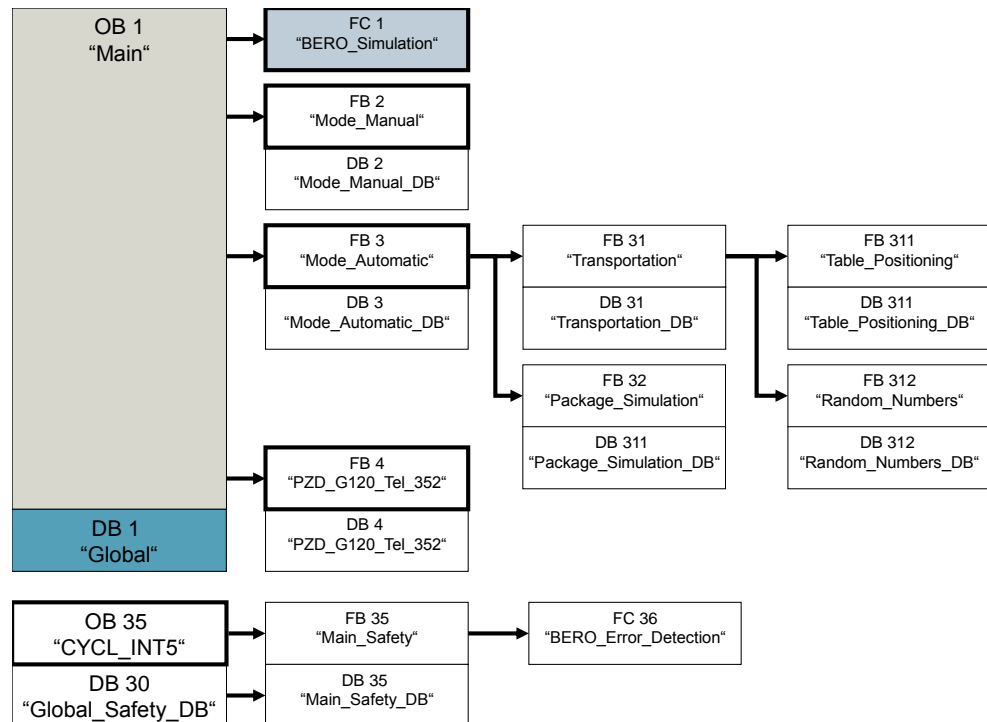
Only one of the operating modes can be active.

DB1 "Global"

DB1 "Global" contains the most important tags of the application.

3.1.1 BERO simulation

Figure 3-2: BERO_Simulation



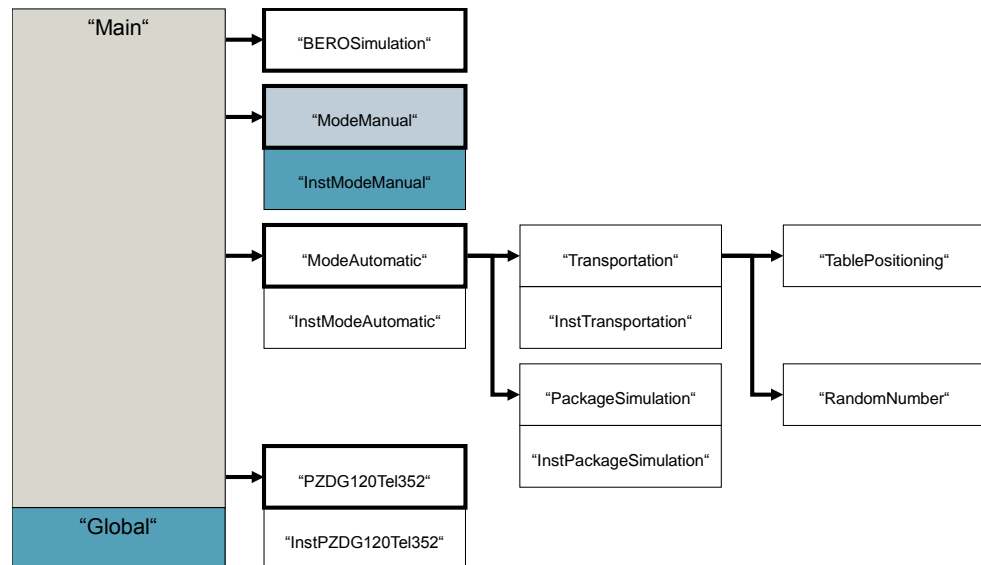
This application can be operated using a hardware setup of the rotary table with or without BEROs. Using the FC1 "BEROSimulation" block enables switching between the I/O inputs of ET 200SP (DI 8x24VDC ST) or simulated BERO signals.

The Boolean tag "beroSim.enable" must be set here in DB1 "Global":

- 0 = no simulation mode, hardware inputs of the ET 200SP are used
- 1 = simulation mode, the BERO signals are simulated and set accordingly in FB32 "PackageSimulation".

3.1.2 Manual mode

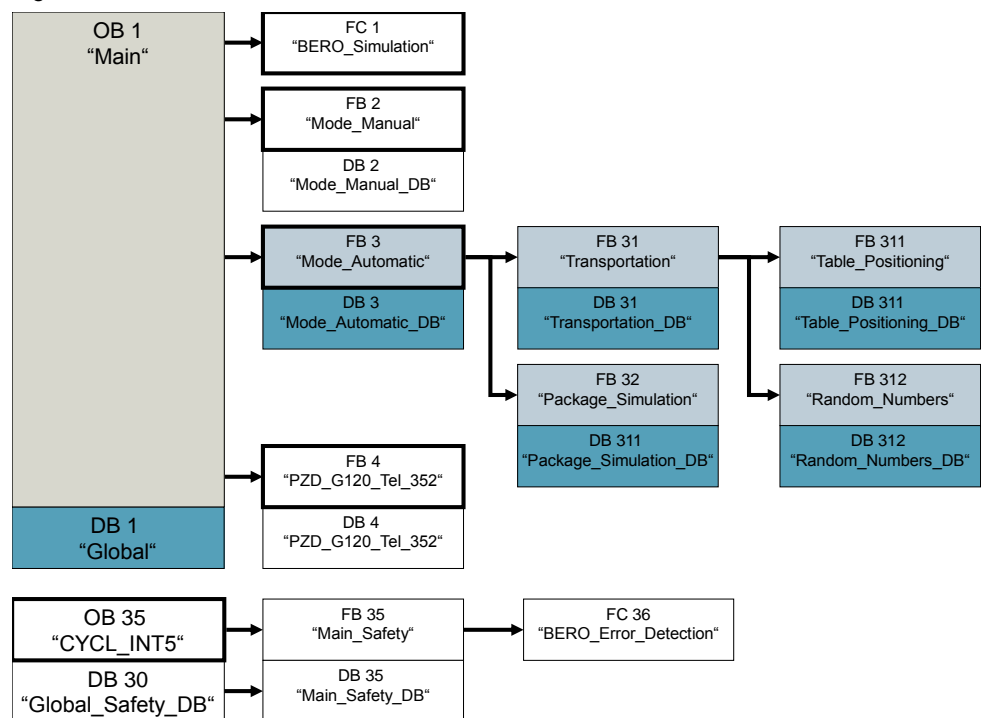
Figure 3-3: Manual mode



HMI Panel contains a control board for the drive (drive control). There, the manual mode can be activated or deactivated. In the active state, the control signals from HMI are set via the FB2 "ModeManual" block. FB3 "ModeAutomatic" is then not called. In FB4 "PZDG120Tel352" the control signals are then transferred to the drive.

3.1.3 Automatic mode

Figure 3-4: Automatic mode



FB3 "Mode_Automatic"

In FB3 "ModeAutomatic", the entire automatic sequence of the application is programmed. In this block, FB31 "Transportation" and FB32 "PackageSimulation" is called.

FB31 "Transportation"

Figure 3-5: Block FB31 "Transportation"

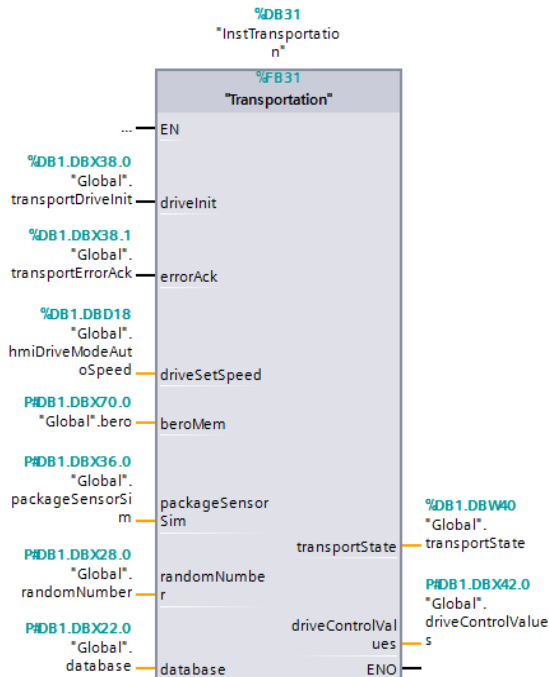


Table 3-1: FB31 "Transportation" interfaces

Name	Type	Value	Function
Input			
driveInit	Bool	0	-
		1	The motor is initialized: • motor moves forwards until BER (Input) is active.
errorAck	Bool	0	-
		1	When exceeding a time limit while the motor moves to a position, the motor is stopped. The error is acknowledged with "errorAck".
driveSetSpeed	Real		Given speed for the drive in revolutions per minute.
beroMem	typeBero		Sensors positions
packageSensorSim	typePackageSensorSim		Simulation sensors positions
randomNumber	typeRandomNumber		Limits random number
Output			
transportState	Int		Current step of step chain
driveControlValues	typeControlValues		Control values drive

Name	Type	Value	Function
InOut			
database	typeDatabase		Data from database

In FB31 "Transportation", the entire step chain for the transport of a package from the input conveyor to the destination conveyor is programmed via the rotary table.

The following steps are run through:

1. Initialization
The motor is positioned on reference point "Input" Conveyor.
2. Waiting until the package is placed on the input conveyor and defining the package type.
In this application, the packages are simulated. The package type is generated with random numbers. FC4 "RandomNumber" is called for this.
3. The "Global".database.request tag is set. The database supplies the destination conveyor for the package, depending on the package type.
4. Request, whether the package is located on the rotary table.
5. Motor moves rotary table to the destination conveyor and stops.
6. Request, whether the package has been positioned from the rotary table to the destination conveyor.
7. Motor moves back to starting position (input conveyor) and the sequence starts from the beginning.
99. Error due to timeout while the motor is moving to a position. As soon as the motor moves, a time monitoring is always triggered. In the case of a defective BERO, positioning of the motor is not possible. Hence, the motor is stopped after a defined time. In this case, the sequence remains in this step until acknowledged with "errorAck".

FB311 "TablePositioning"

Figure 3-6: Block FB311 "TablePositioning"

```
#instTablePositioning(driveMoveTo := #statDriveMoveTo,
                    driveStopp := #statDriveStopp,
                    driveSetSpeed := #driveSetSpeed,
                    driveDirReverse := #statDriveDirReverse,
                    beroMem := #beroMem,
                    driveControlValues => #driveControlValues);
```

Table 3-2: FB311 "TablePositioning" interfaces

Name	Type	Value	Function
Input			
driveMoveTo	Int	0	Motion to input conveyor
		1	Motion to output 1 conveyor
		2	Motion to output 2 conveyor
		3	Motion to output 3 conveyor
driveStopp	Bool	0	-
		1	Motor stopped
driveSetSpeed	Real		Given speed for the drive in revolutions per minute.

Name	Type	Value	Function
driveDirReverse	Bool	0	Motor forwards
		1	Motor backwards
beroMem	typeBero		Sensors positions
Output			
driveControlValues	typeControlValues		Control values drive

This block positions the motor to the desired position and is called by FB31 "Transportation".

- Input conveyor
- Output 1 conveyor
- Output 2 conveyor
- Output 3 conveyor

FC4 "RandomNumber"

Figure 3-7: Block FC4 "RandomNumber"

```
#database.packageType := "RandomNumber"(hLimit := #randomNumber.hLimit,  
                                         lLimit := #randomNumber.lLimit);
```

Table 3-3: FC4 "RandomNumber" interfaces

Name	Type	Value	Function
Input			
hLimit	Int		Upper limit value
lLimit	Int		Lower limit value
Return			
RandomNumber	Int		Random number between upper and lower limit value

It is the job of FC4 "RandomNumber" to create randomly generated numbers from 101 to 112. In this application, these are the various package types.

FB32 "PackageSimulation"

Figure 3-8: Block FB32 "PackageSimulation"

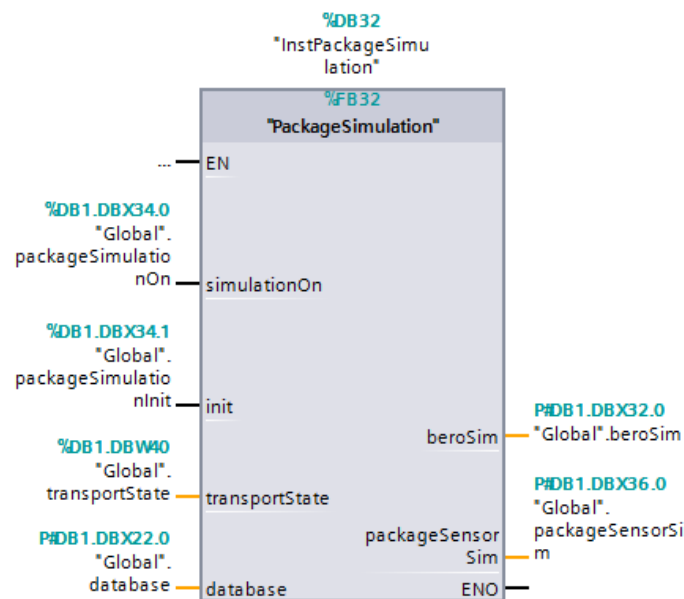


Table 3-4: FB32 "PackageSimulation" interfaces

Name	Typ	Value	Function
Input			
simulationOn	Bool	0	Paketsimulation deaktiviert
		1	Paketsimulation aktiviert
init	Bool	0	-
		1	Alle simulierten Pakete werden gelöscht.
transportState	Int		Aktueller Schritt der Schrittkette des FB31 "Transportation"
Output			
beroSim	typeBero		Simulation sensors
packageSensorSim	typePackageSensorSim		Simulation sensors positions
InOut			
database	typeDatabase		Data from database

In FB32 "PackageSimulation", the packages to be transported and the simulated BERO signals for FB31 "Transportation" are generated. Hence, the entire application can run automatically.

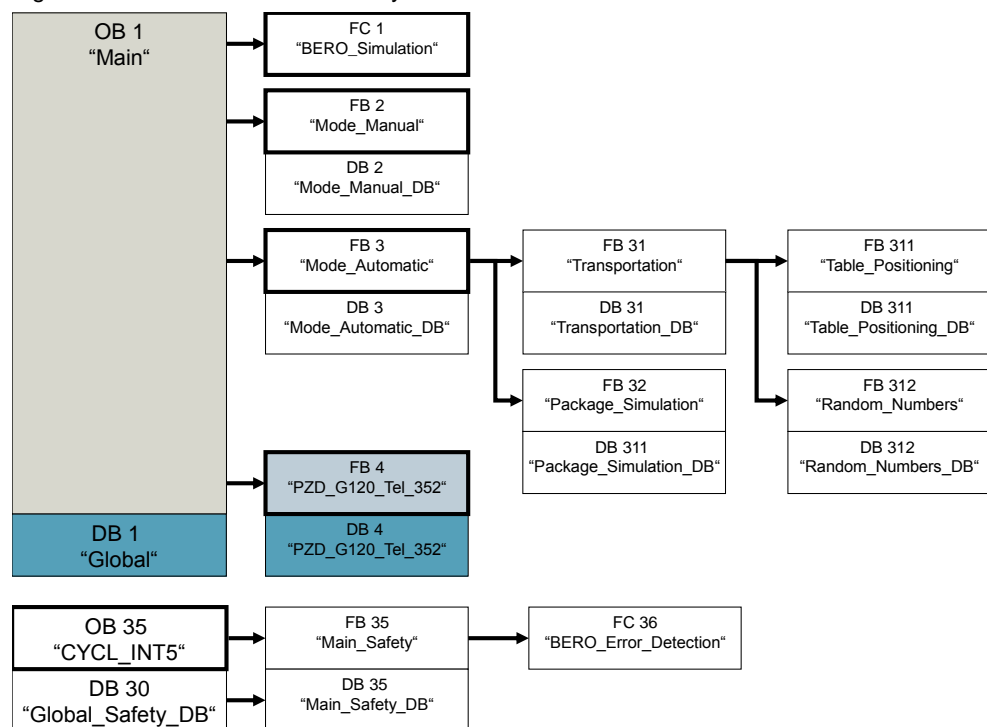
The following signals are generated depending on the situation ("statSequencer" of FB31 "Transportation"):

- Package signals (for determining the position of the packages)
 - "Global".packageSensorSim.simInput
 - "Global".packageSensorSim.simTable
 - "Global".packageSensorSim.simOutput1
 - "Global".packageSensorSim.simOutput2
 - "Global".packageSensorSim.simOutput3
- Simulated BERO signals
 - "Global".beroSim.posInput
 - "Global".beroSim.posOutput1
 - "Global".beroSim.posOutput2
 - "Global".beroSim.posOutput3

In case you are interested in detailed information on programming for this application, please refer to the TIA Portal projects and the comments.

3.1.4 Drive control functionality

Figure 3-9: Drive control functionality



For controlling the drive (SINAMICS G120), the project from the following application was integrated:

<https://support.industry.siemens.com/cs/ww/en/view/60140921>

FB4 "PZDG120Tel352"**Input parameters**

Table 3-5: Input parameters

Parameter	Data type	Description
address	Int	Hardware ID of SINAMICS G120
onOff1	Bool	Control word 1;Bit 0: switching the drive on/off
off2	Bool	Control word 1;Bit 1: electronic stop of the drive
off3	Bool	Control word 1;Bit 2: quick stop of the drive
acknowledge	Bool	Control word 1;Bit 7: acknowledge failure
directionReversal	Bool	Control word 1;Bit 11: reverse direction (setpoint value)
activateManualMode	Bool	Changing the operating mode
speedSetpoint	Real	Speed setpoint of the drive
referenceSpeedP2000	Real	Reference speed / reference frequency
referenceCurrentP2002	Real	Reference current
referenceTorqueP2003	Real	Reference torque

Output parameters

Table 3-6: Output parameters

Parameter	Data type	Description
operationEnabled	Bool	Status word 1, 2 Bit: operation enabled
faultActive	Bool	Status word 1, 3 Bit: fault active
closingLockoutActive	Bool	Status word 1, 6 Bit: On-inhibit active
alarmActive	Bool	Status word 1, 7 Bit: alarm active
rotatingForward	Bool	Status word 1, 14 Bit: motor right-hand rotation
actualSpeed	Real	Current motor speed
actualCurrent	Real	current electrical current
actualTorque	Real	Current torque
actualAlarm	Word	Current alarm of the drive
actualFault	Word	Current fault of the drive

Principle of operation for FB "PZDG120Tel352"

Function block "PZDG120Tel352" fulfils two tasks:

- Communication setup between controller and drive
- Processing the received data and preparing data to be sent

Communication setup between controller and drive

The communication of process data between controller and SINAMICS G120 is handled in the controller using standard functions (SFC). The following block is used for this:

- SFC 14 "DPRD_DAT" for receiving the data of the drive
- SFC 15 "DPRD_DAT" for sending data to the drive

Note

More information on the communication with DP standard slaves can be taken from the STEP 7 (TIA-Portal) online help.

Processing the received data and preparing data to be sent

The data received from the drive is supplied at the interface of the function block. Data to be sent to the drive is received from the interface or from an operator panel and forwarded to the drive.

Further information

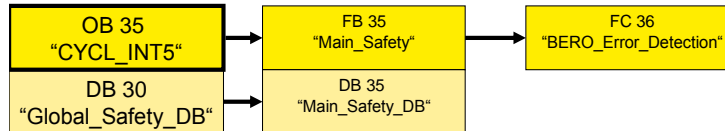
In case you are interested in detailed information on drive programming, please refer to the TIA Portal projects and the comments.

3.1.5 Safety functionality

Safety functions were realized in the safety program of this application. The motor is set torque-free via the emergency-stop button.

The figure below illustrates the complete Safety program.

Figure 3-10: Safety program



OB35 "CYCL_INT5"

FB 35 "Main Safety" is called in the Safety organization block.

DB30 "Global_Safety_DB"

The "Global_Safety_DB" contains the following tags. They are read by the HMI to display the respective states.

Table 3-7

Name	Type	Function
ESTOP_state_on	Bool	Value = 1: Emergency-stop is pressed, or BERO error (two BEROs simultaneously have value 1).
ESTOP_state_off	Bool	Value = 1: Emergency-stop button is not pressed and no BERO error pending.
ESTOP_state_ack	Bool	Value = 1: Emergency-stop button is not pressed and no BERO error pending. Safety program waits for error acknowledgement.

FB35 "Main_Safety"

"Main Safety" contains the following program parts:

- BERO error detection: call of FC36 "BERO_error_detection"
- Emergency-stop button detection
- Activate emergency-stop with the "ESTOP1" block
- Stop motor via PROFIsafe protocol
- Acknowledge emergency-stop with HMI Panel via "ACK_OP" block
- Evaluate feedback of the drive with the "FDBACK" block
- Reintegration of ET 200S F-DI module
- Reintegration of the PROFIsafe protocol
- Provide status for HMI (see tags of "Global_Safety_DB")

FC36 “BERO_error_detection”

In the case of more than one BERO supplying the value 1, an error must have occurred. In this application, it is not possible that the motor is standing at more than one position at a time. The BERO signals are evaluated in this block. The Boolean output parameter of the function block indicates, whether there is an error:

- “Error” = 0 → Error

Further information

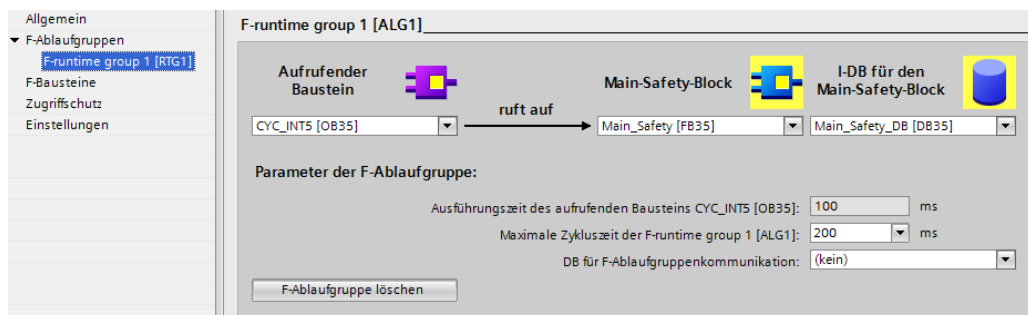
In case you are interested in detailed information on safety programming, please refer to the TIA Portal projects and the comments.

3.1.6 Safety administrator

At Safety Administration (Safety Administrator), an F-runtime group is parameterized as displayed in the figure below.

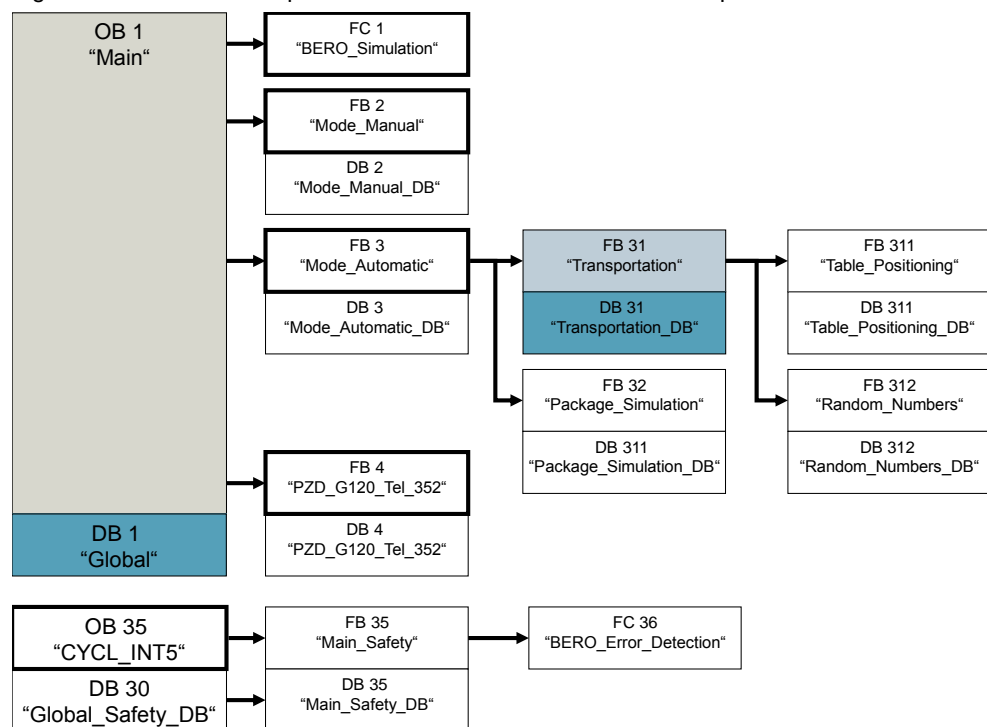
Note Safety password: 0

Figure 3-11: Safety administrator



3.1.7 Functionality of the database request

Figure 3-12: Database request with DB1 "Global" and FB31 "Transportation"



In the user program of S7-1500 Software Controller the "Database" structure is located in DB1 "Global".

Figure 3-13: DB1 "Global", "Database" data type

database	"typeDatabase"	22.0	Database
request	Bool	0.0	Database requested for destination conveyor
reply	Bool	0.1	Database replied for destination conveyor
packageType	Int	2.0	Actual package_type
destinationConveyor	Int	4.0	Actual destination conveyor

The following sequence shows the structure of the database request:

- **"request"** tag is set by the S7 program in the FB31 "Transportation" block.
- The script triggers a database request with the **"packageType"** tag.
- The database supplies the suitable value for the **"destinationConveyor"** tag.
- The script stores the value in the **"destinationConveyor"** tag.
- After a successful request, the script sets the **"reply"** tag.
- The set **"reply"** tag informs the S7 program that the database request is terminated and the correct value is written in the **"destinationConveyor"**.

If you are interested in detailed information on database programming, please refer to the TIA Portal project and the comments, or the following FAQ:

<https://support.industry.siemens.com/cs/ww/en/view/24677043>

3.2 Functional mechanism: Database PC

The database connection is realized on the Database_PC (SIMATIC PC Station). This PC was also used for programming of the TIA Portal project.

3.2.1 Database connection of an MS SQL database

For database request, this application provides the option to poll an MS SQL database using scripts in WinCC RT Advanced.

3.2.2 Scripts for database connection

This application requires reading a specific data record. The example of the following FAQ was used for this and integrated into the project:

<https://support.industry.siemens.com/cs/ww/en/view/61883659>

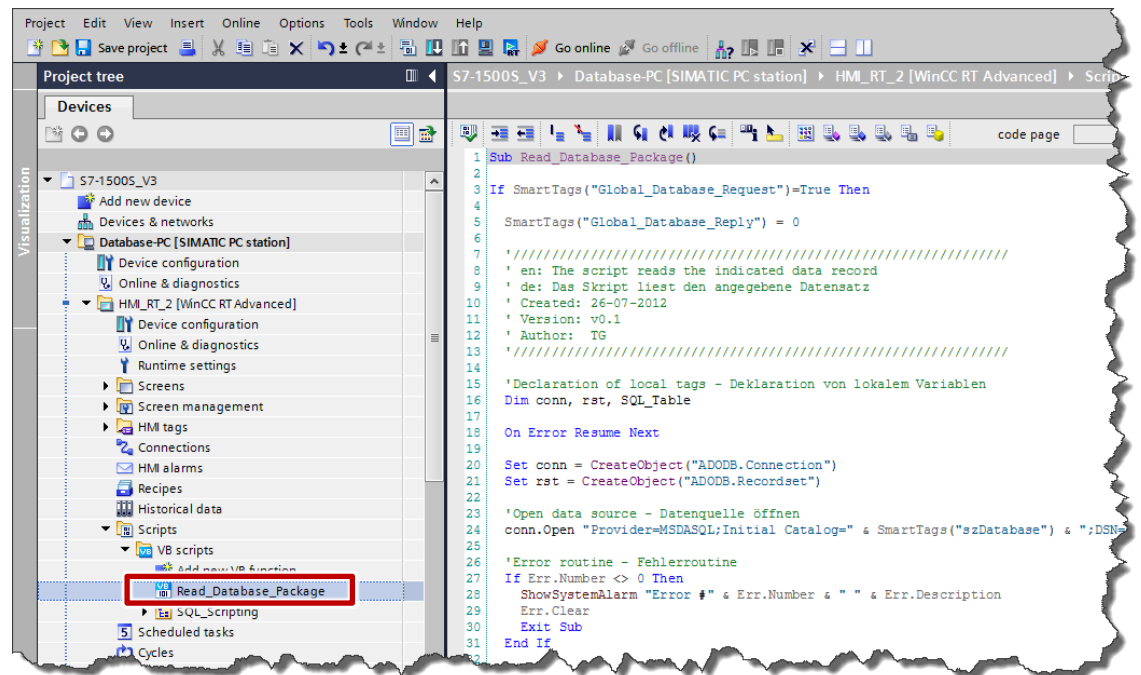
In this FAQ, further database functions are realized, which are not necessary for this application example, however, they still remain in the project.

The following functions can be executed via the scripts.

- Create new database
- Delete database
- Create a table in a database
- Create a data record in a table
- Read a data record from a table
- Edit a data record in a table retrospectively
- Delete a data record from a table
- Read data records of an entire table
- Copy a table
- Delete a table

For this application, only the "Read data record from the table" function needs to be used. The "**Read_Database_Package**" script was written for this.

Figure 3-14: "Read_Database_Package" script



3.3 Preventing unauthorized access to WinCC Runtime

3.3.1 Access protection by user administration with WinCC V11

In WinCC Runtime, the access protection controls the access to data and functions, so your application is protected from unauthorized operation. When generating your project, you already restrict security-relevant operations to particular user groups. You establish users and user groups and grant them characteristic access rights, the authorizations. At security-relevant objects, you then configure the authorizations required for operation. The users have only access to certain control objects, for example. Commissioning engineers, for example, have unrestricted access in Runtime.

- They administer user, user groups, and authorizations centrally in the User Administration of WinCC.
- They transfer user and user groups to the operator panel together with the project.
- Users and passwords are managed at the operator panel via the user display.

Within the framework of this application, one user group "Service engineer" with the user "engineer" was defined.

The "engineer" is granted unrestricted access to the HMI user interfaces, including the system control of the plant such as "Start WinCC Runtime" and "Stop" or access to the Task Manager.

You can define a further user group "Plant operator". The user of this group does not have access to the system control. He only has access to the plant control.

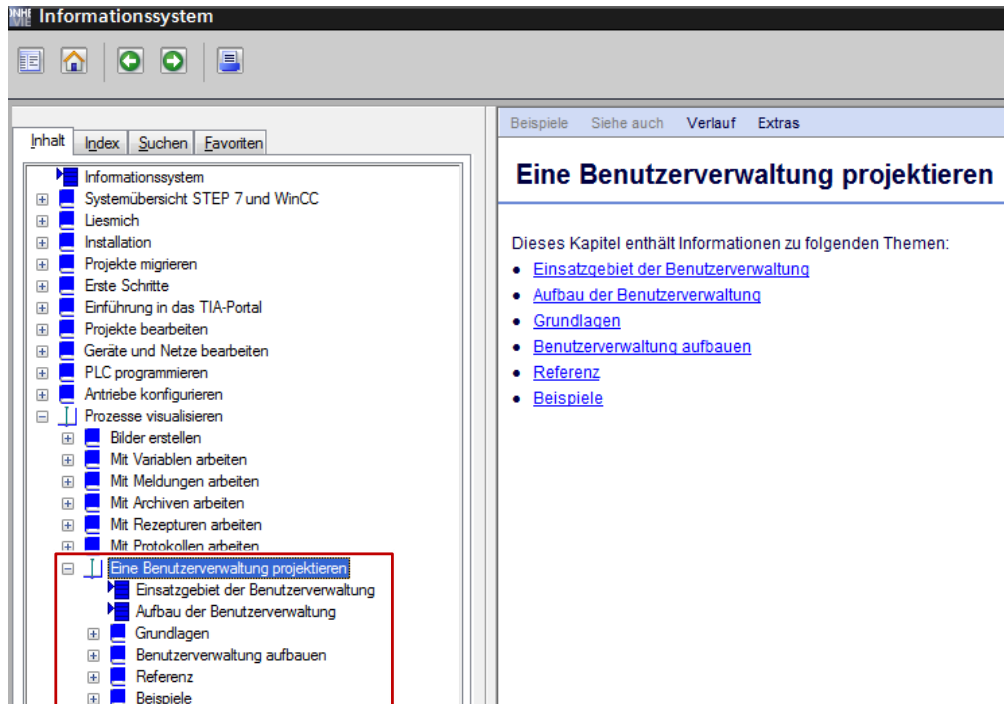
Note

In the example project, the following user was created.

User name	engineer
Password:	12345

Information on how to configure the user administration in WinCC (TIA Portal) is given in the online help of the TIA Portal.

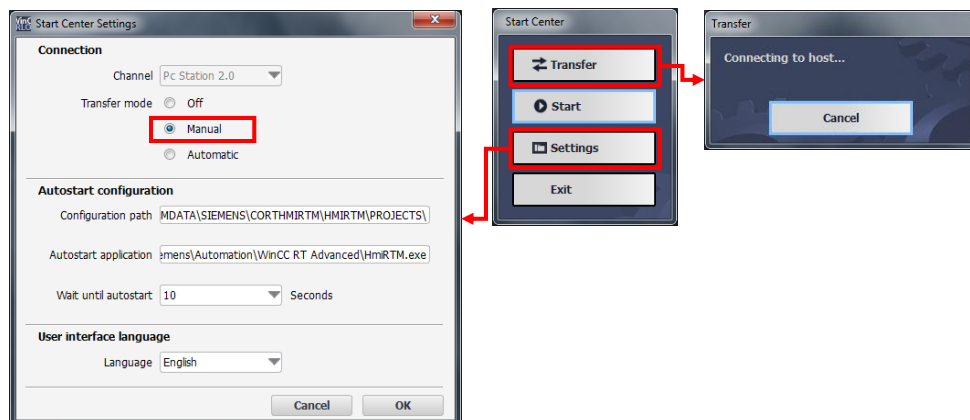
Figure 3-15: TIA Portal information system, configuring user administration



3.3.2 Deactivating the remote control of the WinCC Runtime Loader

To prevent unauthorized loading of a project into WinCC Runtime, activate the "Transfer mode" "Manual" of the connection channel. The "Transfer" must always be activated directly at the operator panel before a download can be performed.

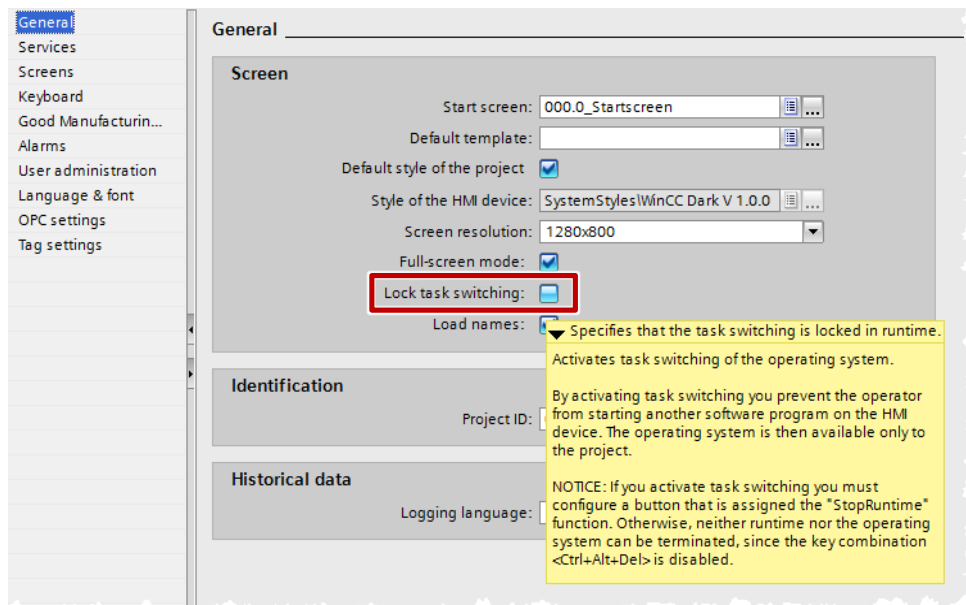
Figure 3-16: Deactivating the remote control of the WinCC Runtime Loader



3.3.3 Lock task switching in Runtime

Task switching can be blocked to prevent the user from exiting WinCC Runtime. You can set the checkmark at "Lock task switching" in the "Runtime settings" under "General". This makes it impossible to exit WinCC Runtime.

Figure 3-17: WinCC Runtime settings



3.4 Preventing unauthorized access to the IPC227D

3.4.1 BIOS password

Set a BIOS password to protect BIOS from unauthorized access.

3.4.2 Preventing the booting of USB media

To prevent unauthorized booting of USB media, deactivate the USB Boot in the BIOS of Open Controller.

How you can activate USB mouse and keyboard is described in following FAQ:

<https://support.industry.siemens.com/cs/ww/en/view/109479209>

More information on setting the BIOS parameters is available in the manual of Open Controller:

<https://support.industry.siemens.com/cs/ww/en/view/109248384>

3.4.3 User accounts under Windows

Use the user account control of Windows and create an account without administrative rights. This helps prevent unauthorized installation of software.

The Open Controller has already preinstalled user accounts: One admin with password and an operator who is booted by default.

Further information on user account control is available at:

[http://technet.microsoft.com/en-us/library/cc709691\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc709691(v=ws.10).aspx)

3.4.4 Group policy under Windows

Use the Windows group policy as a protection against unauthorized access to operating system components. The group policy allows you to implement certain configurations for user and computer.

Further information is available at:

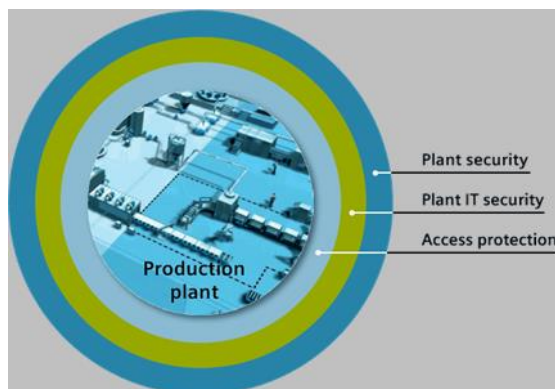
<http://technet.microsoft.com/en-us/windowsserver/bb310732.aspx>

3.4.5 Security guideline for PC-based automation systems with Windows embedded operating systems.

Further notes and recommendations on security aspects of PC-based automation systems with Windows Embedded operating systems are available in the security guideline, where the following topics are discussed:

- Security management
- Defense-in-depth strategy
- Protection of network services
- Access protection for Windows systems
- Protection against malware
- Methods for reinforcing systems
- Software updates of the operating system

Figure 3-18: Overview of security concept



The security guideline can be downloaded under the following link:

<https://support.industry.siemens.com/cs/ww/en/view/55390879>

4 Configuration and Settings

This chapter shows you how the configuration of the hardware is specified. It is only for information purposes. For installation and commissioning, please continue directly with chapter [5 Installation and Commissioning](#).

Delimitation

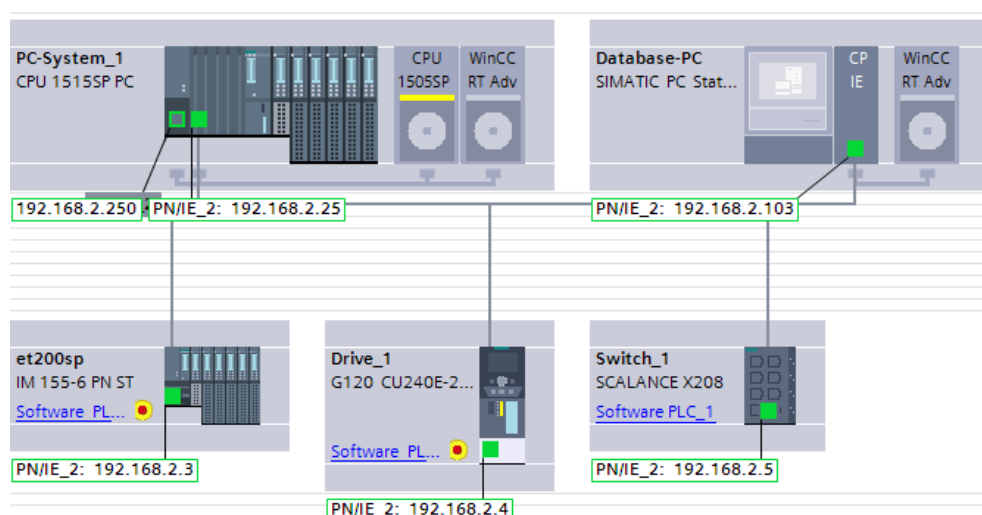
For the configuration and settings, only the main components of the application are discussed. For details, please refer to the project or the references to descriptions in this document.

4.1 Overview of the device configuration

The figures below contain the complete device configuration of the application.

Network view of the device configuration

Figure 4-1: Network view (TIA Portal)



Configured PROFINET device names

Tabelle 4-1 PROFINET device names

IP Adresse	Typ	Name
192.168.2.25	CPU 1505SP F	software plc_1
192.168.2.3	IM 155-6 PN ST	et200sp
192.168.2.4	CU204E-2 PN-F	drive_1
192.168.2.5	SCALANCE X208	switch_1
192.168.2.103	IE Allgemein	Database-pc.ie general_1

4.2 PLC: CPU 1515SP PC (CPU 1505S, WinCC RT Adv)

Configure the CPU 1515SP PC as in the figure below or adopt the configuration from the supplied "S7-1500S_V" project.

Figure 4-2: CPU 1515SP PC hardware configuration



The following setup has been configured in the CPU 1515SP PC station:

Table 4-2: CPU 1515SP PC Station

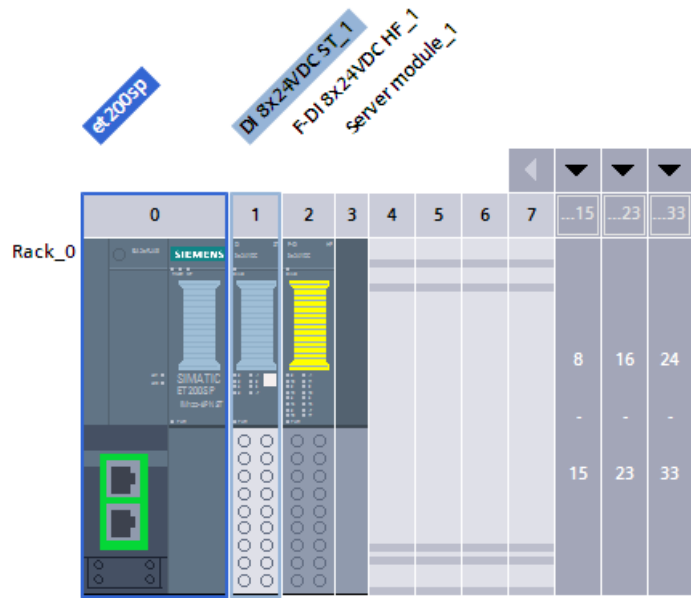
Slot	Module	Task
1	PROFINET onboard	PROFINET communication with ET 200SP station, SINAMICS G120, database PC
2	CPU 1505SP F	Software Controller for controlling the application
3	WinCC RT Advanced	Visualization of the application

Further information is available in the manual of SIMATIC S7-1500 CPU 150xS:

<https://support.industry.siemens.com/cs/ww/de/view/109249299>

4.3 Distributed I/Os: ET 200SP station

Figure 4-3: ET 200SP hardware configuration



The distributed I/O ET 200SP is configured with the following modules:

Table 4-3: ET 200S Station

Slot	Module	Task
0	IM 155-6 PN (Firmware:V1.1)	Central processing unit: Communication with CPU 1505SP F
1	DI 8x24VDC_ST	Optional for connecting BEROs
2	F-DI 8x24VDC HF	Digital safety module: Connection for emergency-stop button
3	Server module	Electrical and mechanical backplane bus termination

Further information is available in the manual of ET 200SP:
<https://support.industry.siemens.com/cs/ww/en/view/84133942>

4.4 Drive: SINAMICS G120

4.4.1 Hardware configuration

Figure 4-4: SINAMICS G120 hardware configuration



Table 4-4: SINAMICS G120

Slot	Module	Task
1	CU240E-2 DP-F (Firmware V4.7)	Control module (central unit): Communication with CPU 1505SP F and controlling the motor
2	PM340 IP20 FSA U 240 0.74kW	Power unit

Further information is available in the manual of SINAMICS G120:

<https://support.industry.siemens.com/cs/ww/en/view/71762451>

4.4.2 S7-1500 Software Controller / SINAMICS G120 communication

For the S7-1500 Software Controller to be able to control the SINAMICS G120 drive, a communication between the devices must be established. In this application example, a PROFINET communication was established. The "SIEMENS Telegram 352" frame, PZD-6/6 was used for the data exchange.

You will find further information in the following application description:

<https://support.industry.siemens.com/cs/ww/en/view/60140921>

4.4.3 Drive frames

The figure below contains the configured frames for the communication between Software Controller and SINAMICS G120.

Figure 4-5: Drive frames

Name	Item	Link	Telegram	Length	Extension	Type	Partner	Partner data area
Drive_1	1							
Send Safety telegram			PROFIsafe telegram 30	6 bytes	—	→ F-CD	Software PLC_1	I 268...273
Receive Safety telegram			PROFIsafe telegram 30	6 bytes	—	← F-CD	Software PLC_1	Q 268...273
Send (Actual velocity)			SIEMENS telegram 352	6 words	0 words	→ CD	Software PLC_1	I 256...267
Receive (Setpoint velocity)			SIEMENS telegram 352	6 words	0 words	← CD	Software PLC_1	Q 256...267

Note

In this window, you can read the configured input/output addresses of the protocols. The drive in the user program is controlled via these addresses.

4.5 Switch: SCALANCE X208

Figure 4-6: SCALANCE X208 hardware configuration

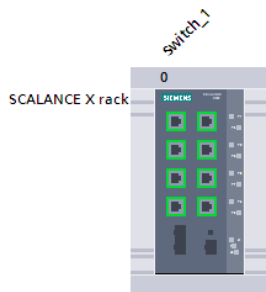
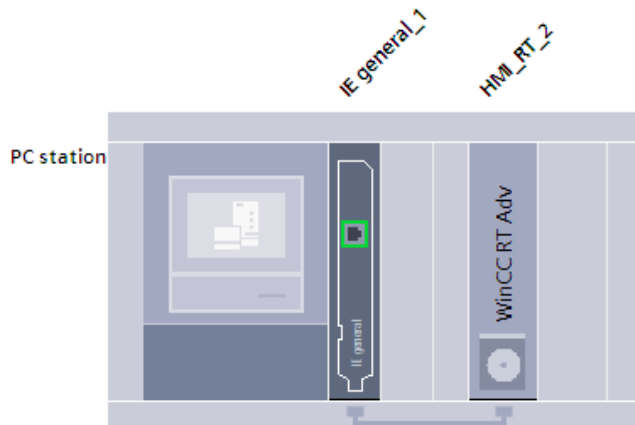


Table 4-5: SINAMICS G120

Slot	Module	Task
1	SCALANCE X208	IE/PN Switch: PROFINET communication

4.6 Database PC: WinCC RT Advanced, Microsoft SQL DB

Figure 4-7: Database PC hardware configuration



A standard PC with Windows operating system can be used. This PC works as master computer with a Microsoft SQL database.

In this example, the PC is also used as a programming PC for TIA Portal.

The SIMATIC PC station is configured as follows:

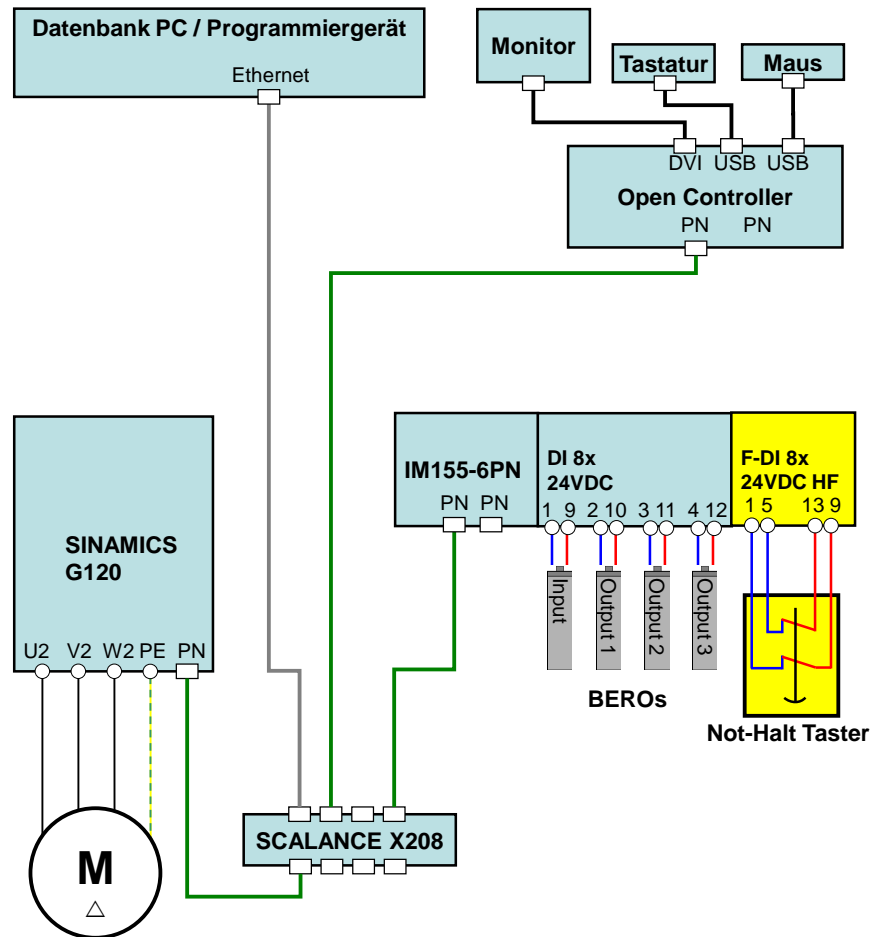
Table 4-6: PC Station

Slot	Module	Task
1	IE General	PROFINET communication
2	WinCC RT Advanced	Database request via script

5 Installation and Commissioning

5.1 Hardware installation

Figure 5-1: Hardware configuration



Note

For the cabling of the power supply, please refer to the respective manuals of the devices. Please also generally note the setup guidelines of the devices.

5.2 Software installation (download)

Engineering / database PC

Install the following components on the engineering/database PC. If purchasing a preinstalled field PG, only WinCC RT Advanced and Microsoft SQL Server Management Studio 2008 R2 need to be installed.

Table 5-1: Software installation engineering/database PC

No.	Action	Remarks
1.	STEP 7 Professional V14 SP1	-
2.	WinCC Advanced V14 SP1	-
3.	Startdrive V14 SP1	Free download: https://support.industry.siemens.com/cs/ww/en/view/68034568
4.	WinCC RT Advanced V14 SP1	-
5.	Microsoft SQL Server 2014 Management Studio	Configuration the database Free download on the Microsoft Homepage

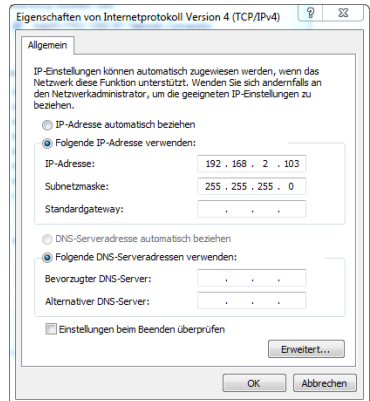
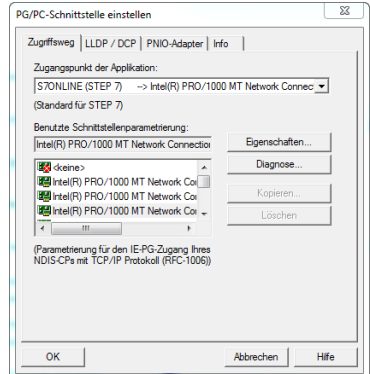
CPU 1515SP PC

The SIMATIC Open Controller CPU 1515SP PC is already preinstalled with CPU 1505SP F.

5.3 Preparation for commissioning

5.3.1 Engineering / database PC: Interface

Table 5-2: Settings of the interfaces

No.	Action	Remarks
1.	Set the following Network addresses : IP address: 192.168.2.103 Subnet mask: 255.255.255.0	
2.	Open the " Setting the PG-PC Interface " and select the Ethernet network card as access point for " S7Online (STEP 7) "	

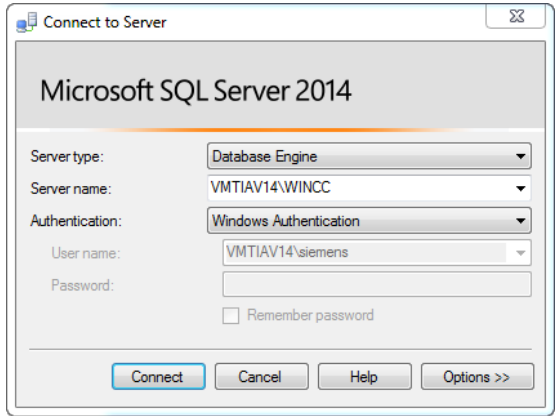
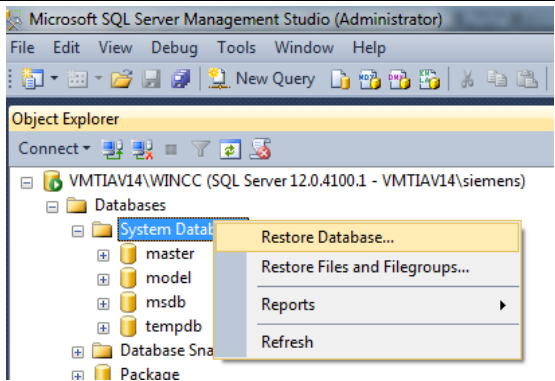
5.3.2 Engineering / database PC: MS SQL database

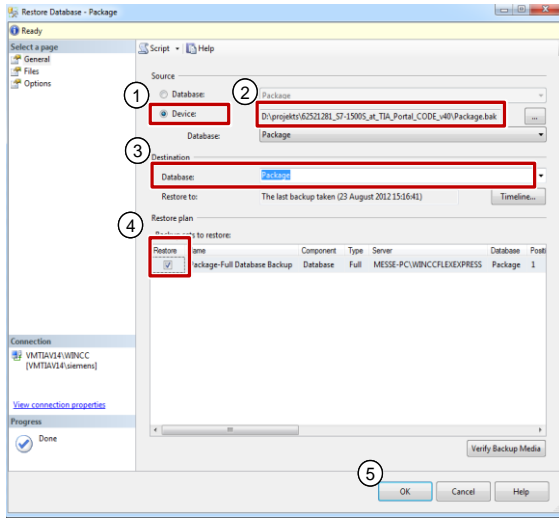
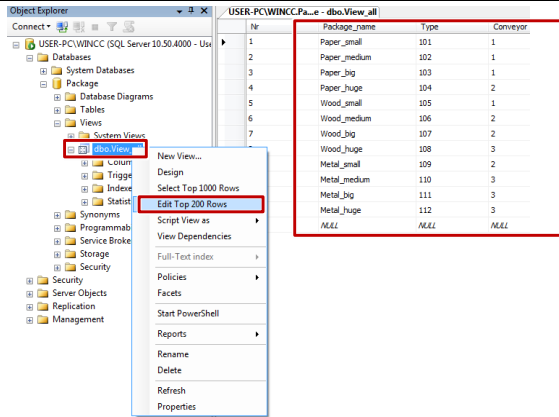
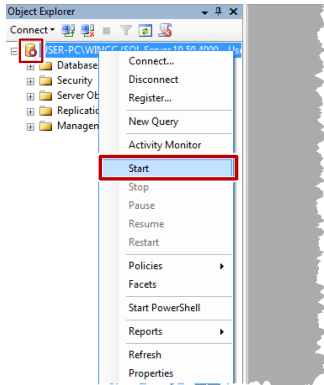
Note In this example application, **programming unit is also the database PC** with WinCC RT Advanced and Microsoft SQL Server already installed.

Create the database with "MS SQL Management Studio"

The example below illustrates how an "MS SQL database" is created with "Microsoft SQL Management Studio".

Table 5-3: Creating an MS SQL database

No.	Action	Remarks
6.	Start the "Microsoft SQL Management Studio" on your PC. "Start > All Programs > Microsoft SQL Server 2014 > SQL Server 2014 > SQL Server Management Studio" .	
7.	Connect to the local server: Specify server name: The server name is composed of "Computer name \ instance name" In this example, the instance name is "WINCC" .	
8.	Import database: In order to prevent having to create the entire database manually, you can import it as follows. <ul style="list-style-type: none"> Right-click on the "Databases" folder. Select the "Restore Database" item from the context menu. 	

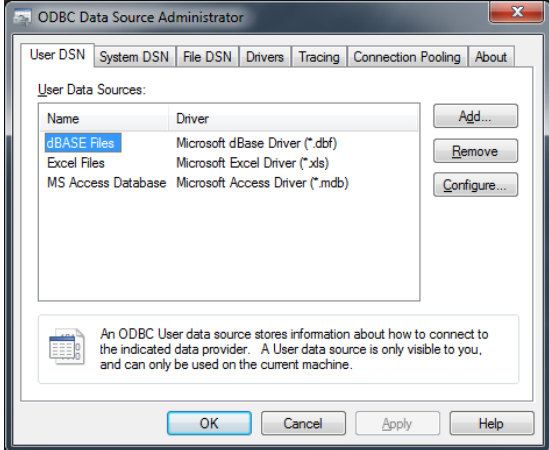
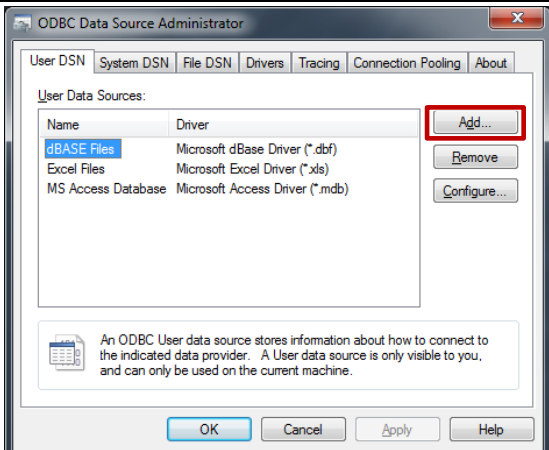
No.	Action	Remarks																																																								
9.	<ol style="list-style-type: none">1. Select "From device:"2. Enter the path to the "Package.bak" file.3. Set the checkmark at "Restore"4. Select "Package" at "To Database:"5. Click on the "OK" button.																																																									
5.	<p>If you wish to see the content of the database, you can navigate to "Databases > Package > Views". Right-click on "dbo.View_all" to open the context menu and select "Edit Top 200 Rows".</p>	 <table><thead><tr><th>Package_name</th><th>Nr</th><th>Type</th><th>Conveyor</th></tr></thead><tbody><tr><td>Paper_small</td><td>101</td><td>1</td><td></td></tr><tr><td>Paper_medium</td><td>102</td><td>1</td><td></td></tr><tr><td>Paper_big</td><td>103</td><td>1</td><td></td></tr><tr><td>Paper_huge</td><td>104</td><td>2</td><td></td></tr><tr><td>Wood_small</td><td>105</td><td>1</td><td></td></tr><tr><td>Wood_medium</td><td>106</td><td>2</td><td></td></tr><tr><td>Wood_big</td><td>107</td><td>2</td><td></td></tr><tr><td>Wood_huge</td><td>108</td><td>3</td><td></td></tr><tr><td>Metal_small</td><td>109</td><td>2</td><td></td></tr><tr><td>Metal_medium</td><td>110</td><td>3</td><td></td></tr><tr><td>Metal_big</td><td>111</td><td>3</td><td></td></tr><tr><td>Metal_huge</td><td>112</td><td>3</td><td></td></tr><tr><td>NALL</td><td>NALL</td><td>NALL</td><td>NALL</td></tr></tbody></table>	Package_name	Nr	Type	Conveyor	Paper_small	101	1		Paper_medium	102	1		Paper_big	103	1		Paper_huge	104	2		Wood_small	105	1		Wood_medium	106	2		Wood_big	107	2		Wood_huge	108	3		Metal_small	109	2		Metal_medium	110	3		Metal_big	111	3		Metal_huge	112	3		NALL	NALL	NALL	NALL
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6.	<p>Start the SQL server:</p> <p>If the server has not been started yet, indicated by the "red" symbol, start the server manually.</p> <ul style="list-style-type: none">• In the "Object Explorer" you right-click on the instance name of the connection and select the "Start" entry via the context menu.• A query follows, asking whether SQL Server shall be restarted. Confirm the message with "Yes". <p>The SQL server is started.</p> <p>If you don't make any further entries, you can close the "Microsoft SQL Management Studio" again.</p>																																																									

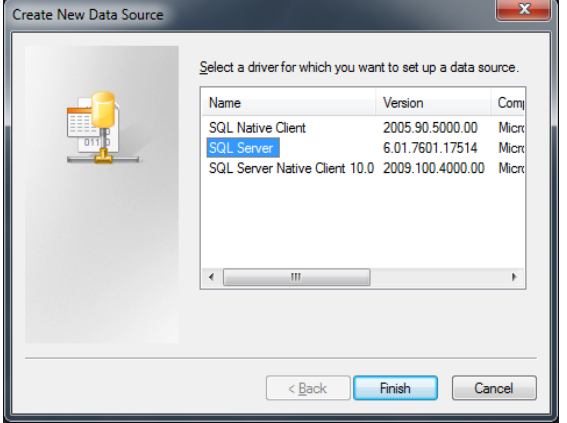
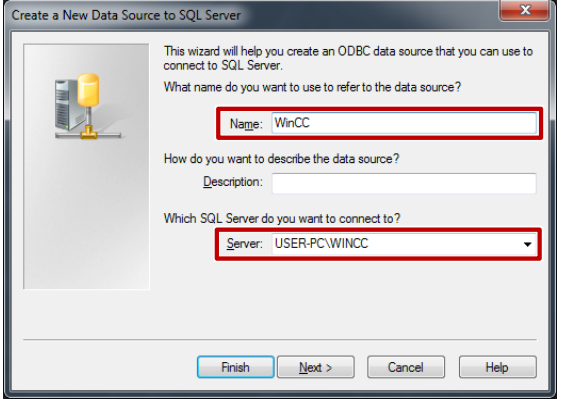
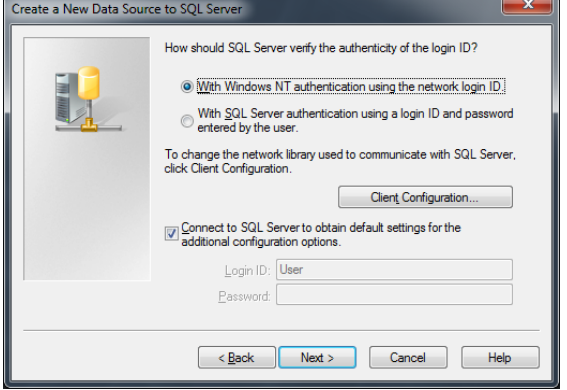
5.3.3 Engineering / database PC: ODBC data source

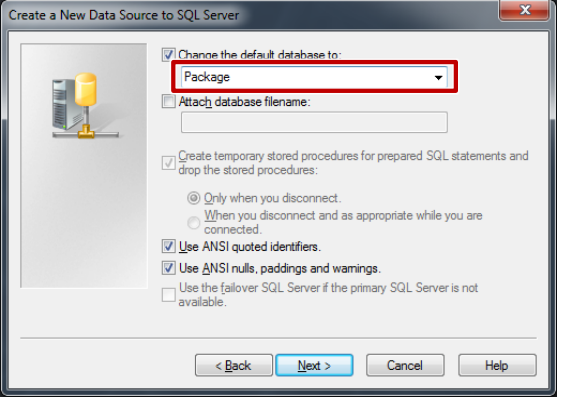
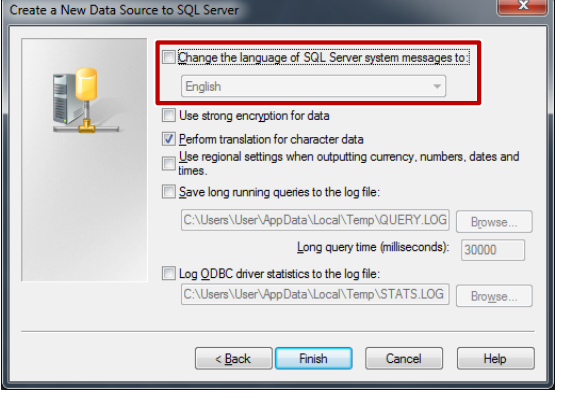
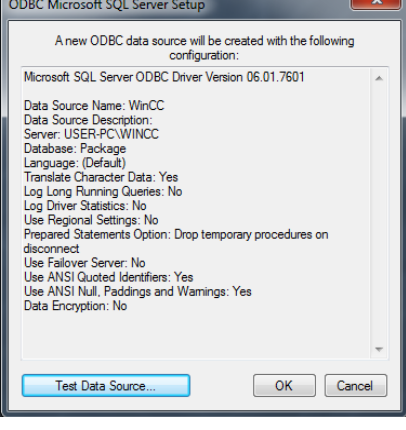
Using an ODBC application, an ODBC data source is created via which the connection with a Microsoft SQL Server is created.

The ODBC setting is made on the database or the engineering PC.

Table 5-4: Configuring the ODBC data source

No.	Action	Remarks
1.	<p>Call the "ODBC Data Source Administrator":</p> <p>Open the "ODBC Data Source Administrator" on your PC.</p> <p>Windows 7: Click on "Start" and enter "ODBC" search bar. Start "Data Sources (ODBC)".</p> <p>The dialog screen displayed on the right is called up.</p> <p>Note: Entries of user data sources may already exist. However, these can be ignored.</p>	
2.	<p>Add data source:</p> <p>From the menu bar you select the "User DSN" menu and then click on the "Add..." button.</p>	

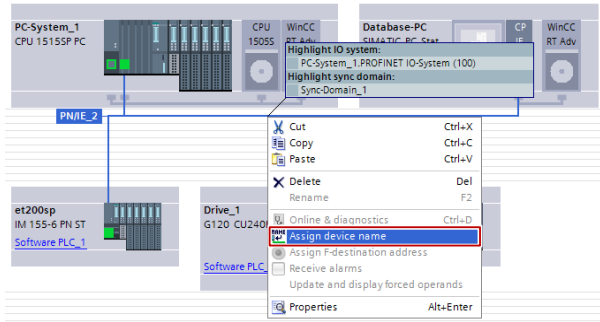
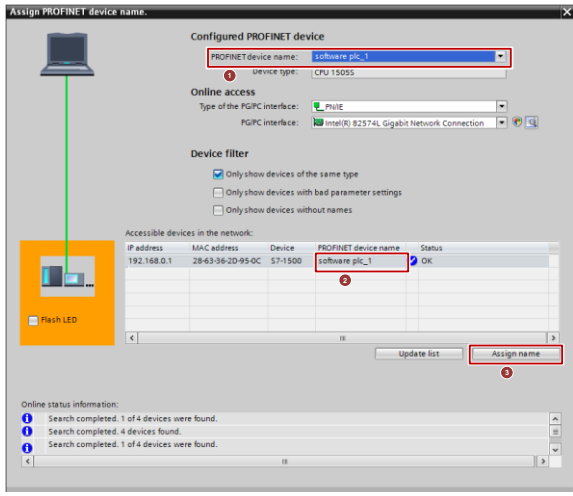
No.	Action	Remarks
3.	<p>Select SQL server:</p> <p>In the drop-down list of the dialog you select item "SQL Server" and then click on the "Finish" button.</p> <p>The "Create New Data Source" dialog field opens.</p>	
4.	<p>Specify reference name and server:</p> <p>Specify a data source name in the "Name" input field.</p> <p>With this name, you reference the database and the storage location. The name used here must match the one used for identifying the "DSN" (DataSourceName) in WinCC RT Advanced.</p> <p>The "DataSourceName" is stored in several scripts.</p> <p>Specify a server in the "Server" input field.</p> <p>Select the server on which to store or from which to call the data. The "local PC" should be the one to run WinCC RT Advanced.</p> <p>Then click on the "Next >" button</p>	
5.	<p>Login settings:</p> <p>Select a login option for the SQL data source. When already within a domain, you can use your domain account to log on.</p> <p>In this example, the options selected on the screen were adopted.</p> <p>Then click on the "Next >" button.</p>	

No.	Action	Remarks
6.	<p>Select database:</p> <p>Activate the "Change the default database to:" checkbox. Via the dropdown list you can select the database you created - in this example "Package".</p> <p>Note: the name of the standard database must match the programming in WinCC RT Advanced. Then click on the "Next >" button.</p>	
7.	<p>Complete the user data source:</p> <p>You can still make various settings on this page. It makes sense to select the system messages of the SQL server in the respective "local language".</p> <p>Complete the user data source by pressing the "Finish" button.</p> <p>After pressing the "Finish" button the "ODBC Microsoft SQL Server Setup" window opens.</p>	
8.	<p>ODBC Microsoft SQL Server Setup:</p> <p>All performed settings are once more displayed in this window. Furthermore, you can test the connection via the "Test Data Source" button. Close the dialog box via the "OK" button.</p> <p>After pressing the "OK" button, the "ODBC Data Source Administrator" window opens again.</p>	

5.3.4 Assign a PROFINET device name

In order for all PROFINET to be able to communicate with each other, a PROFINET device name must be assigned. The configured IP addresses of the devices are automatically transferred when downloading the project.

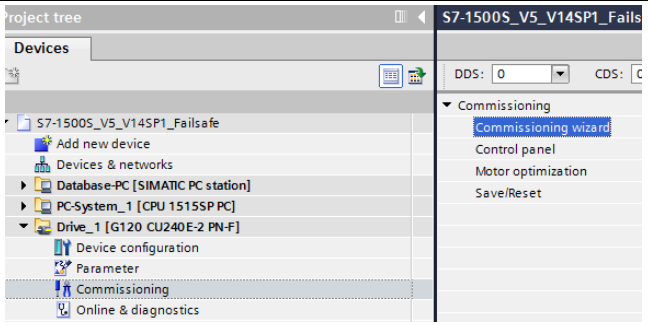
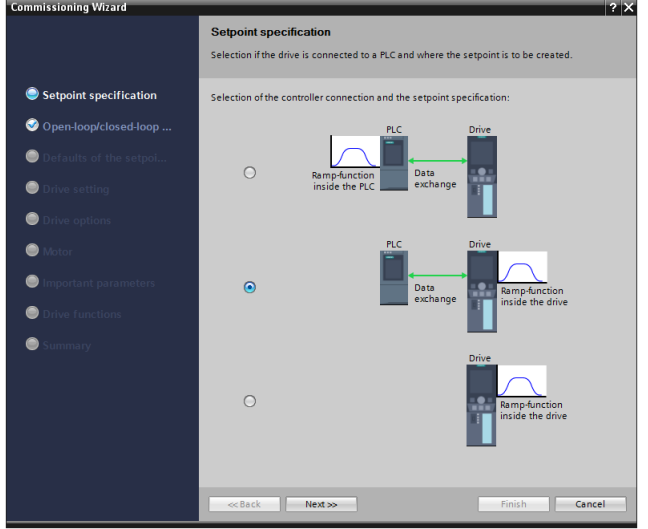
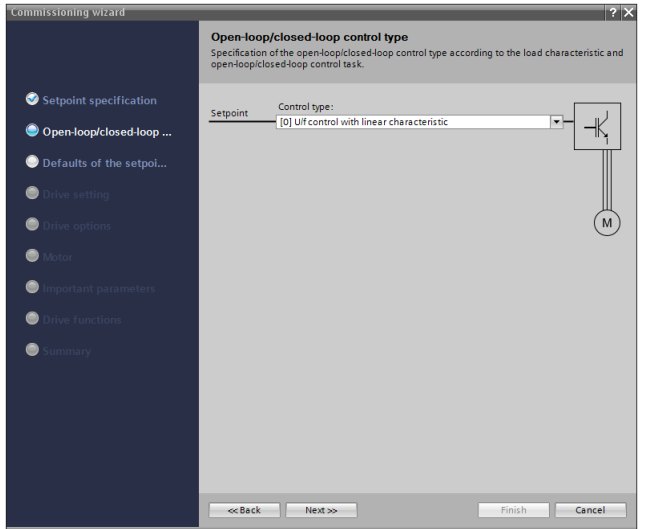
Table 5-5: Instructions – PROFIsafe and PROFINET in the TIA Portal

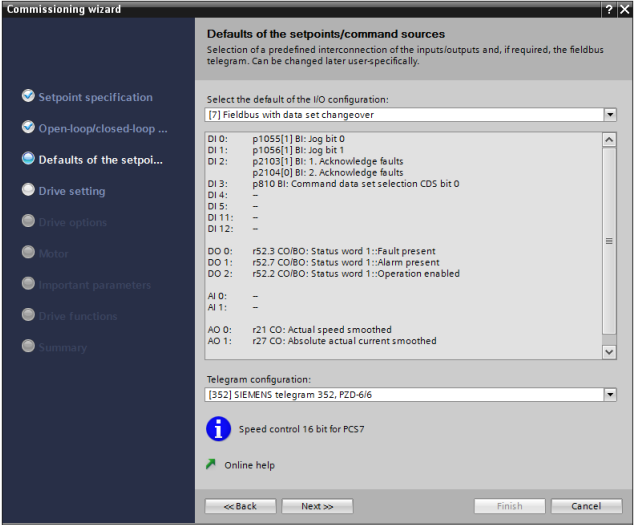
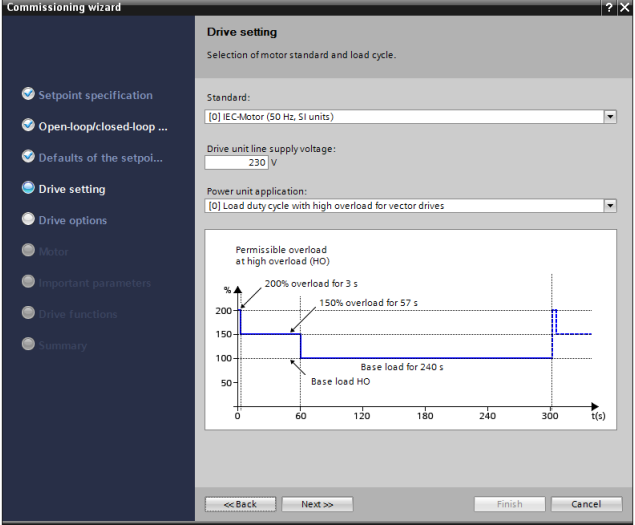
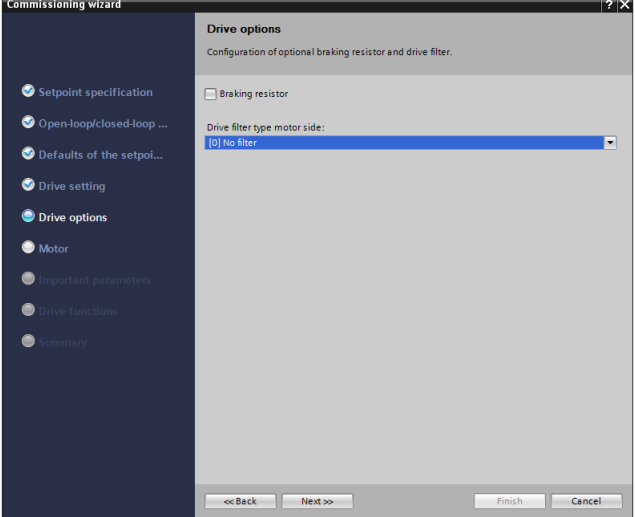
No.	Action	Remarks
1.	Start the TIA Portal and open the example project.	-
2.	Open " Devices & Network " and activate the " Network view ". Right-click on the PROFINET connection and select " Assign device name ".	
3.	In this window you assign the PROFINET device names to all of the devices. <ol style="list-style-type: none"> 1. Select the "PROFINET device name". 2. Assign the correct devices to the PROFINET device names. 3. Click on "Assign name" 	
4.	Repeat step 3 until all devices have a PROFINET device name.	

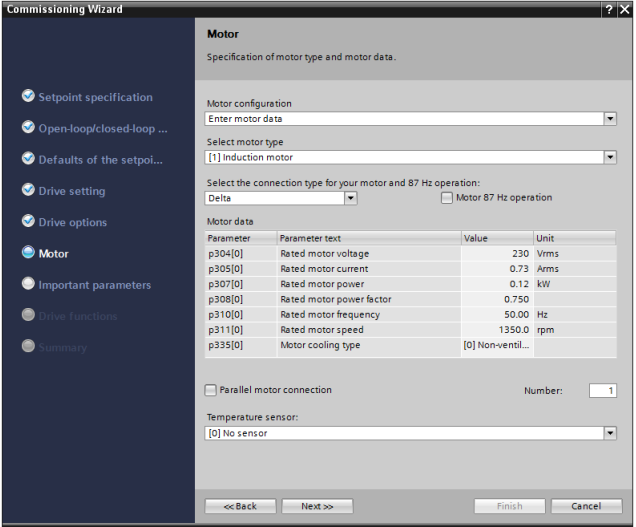
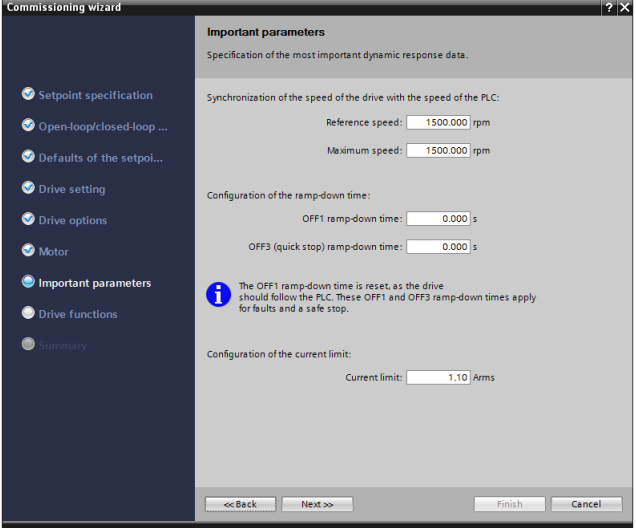
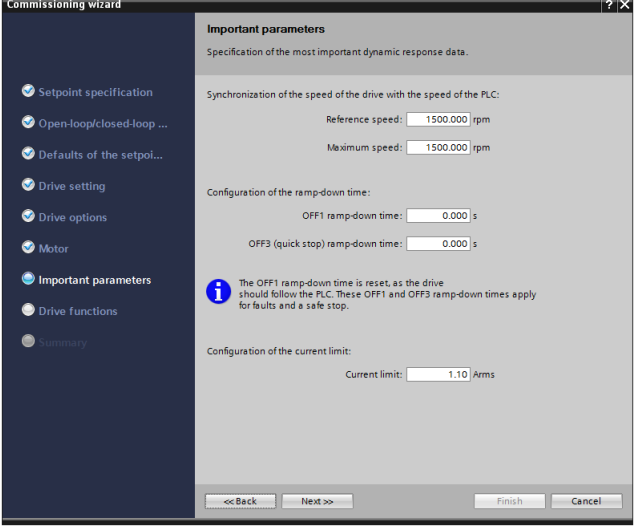
5.3.5 SINAMICS G120 standard parameter configuration

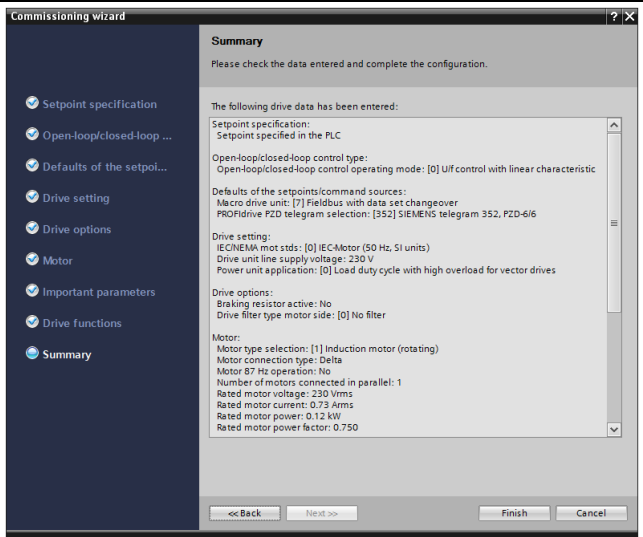
The following instruction needs not be performed since all standard parameters have already been set in the example project. It is only given for information purposes.

Table 5-6: Instruction - Standard parameters of SINAMICS G120

No.	Action	Remarks
1.	In the project tree you navigate to "Drive_1 - Parameter" . Open the dialog "Commissioning wizard" .	
2.	In the "Data sets" dialog you click on "Next" .	
3.	In the "Open-loop/closed-loop control type" you click on "Next" .	

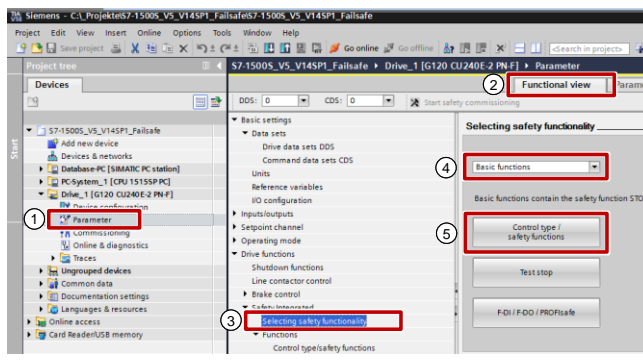
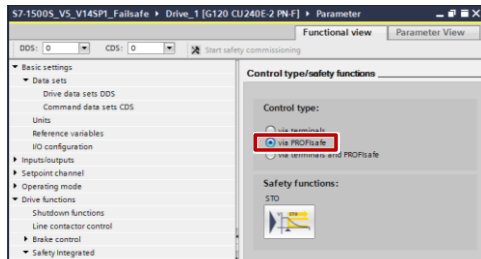
No.	Action	Remarks
4.	In the "Defaults of the setpoints/command sources" dialog you click on "Next".	
5.	In the "Drive settings" dialog you click on "Next".	
6.	In the "Drive options" you click on "Next"	

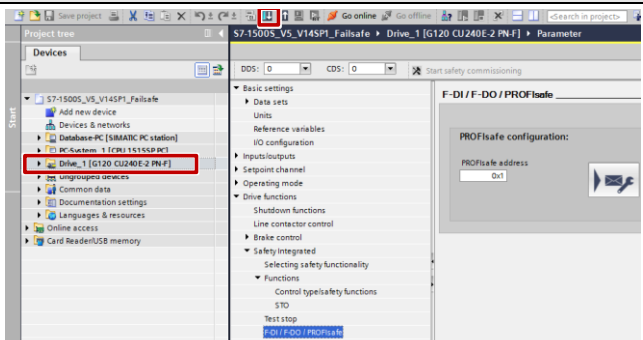
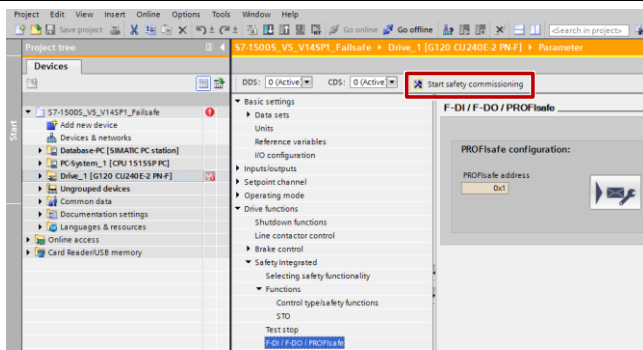
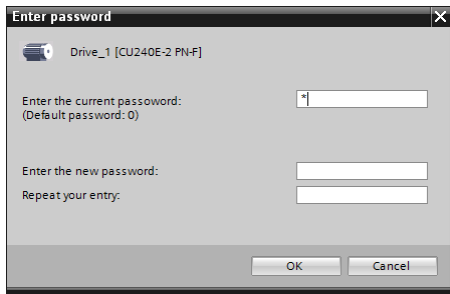
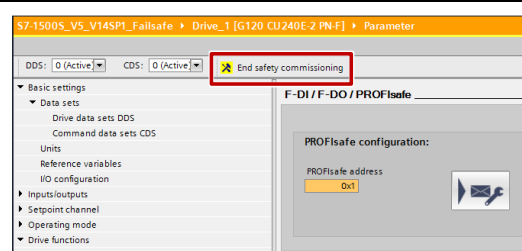
No.	Action	Remarks
7.	Set the motor data as in the screenshot and click on "Next" .	
8.	Set the parameters as in the screenshot and click on "Next" .	
9.	In the "Drive functions" dialog you click on "Next"	

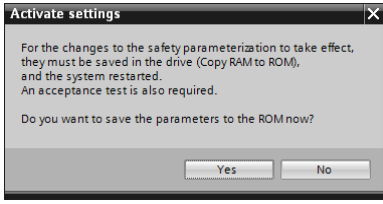
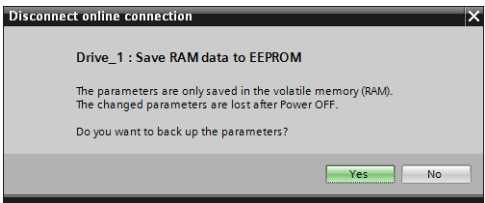
No.	Action	Remarks
10.	In the " Summary " dialog you click on " Finish ".	

5.3.6 SINAMICS G120 Safety-Parametereinstellung

Tabelle 5-7: Handlungsanweisung – Safety-Parameter des SINAMICS G120

Nr.	Aktion	Anmerkung
1.	<ol style="list-style-type: none"> In the project tree you navigate to "Drive_1 - Parameter". Open the "Functional view". Navigate to "Drive functions – Safety Integrated – Selection of the Safety functionality". Set the "Basic functions". Click on the "Control type / safety functions" button 	
2.	<p>Select "via PROFIsafe".</p> <p>Note: Leave the windows in the Editor open.</p>	

Nr.	Aktion	Anmerkung
3.	<p>In the project navigation, select the drive and click on “Download to device” in the menu bar.</p> <p>Confirm the dialog with “Load”.</p> <p>Note: At the first download, the interface of the engineering PC must still be selected.</p>	
4.	<p>After the download you click on “Go online” in the menu bar.</p>	-
5.	<p>Click on “Start safety commissioning”.</p>	
6.	<p>Enter the password. The default password is “0”.</p> <p>Confirm the dialog with “OK”.</p>	
7.	<p>Click on “Exit safety ...”.</p>	

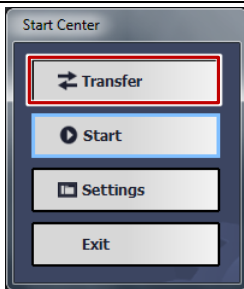
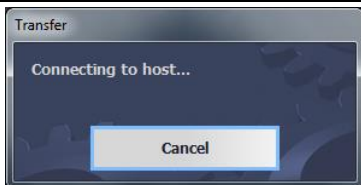
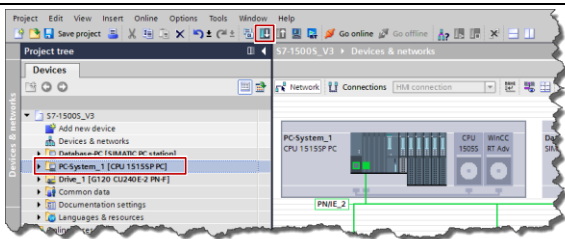
Nr.	Aktion	Anmerkung
8.	Confirm the dialog with "Yes" .	
9.	Click on "Go offline" .	-
10.	Confirm the dialog with "Yes" .	
11.	Restart the drive by disconnecting and reconnecting the power supply	-

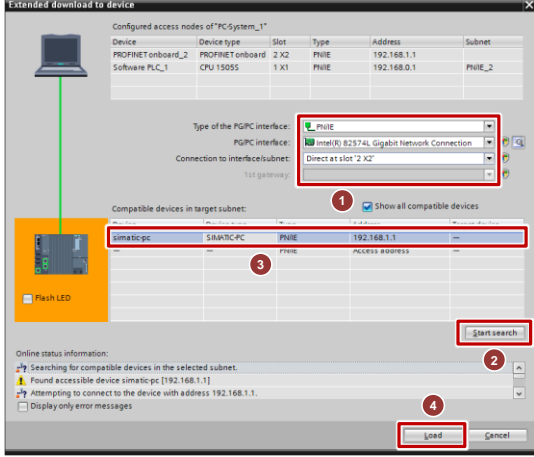
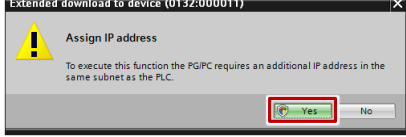
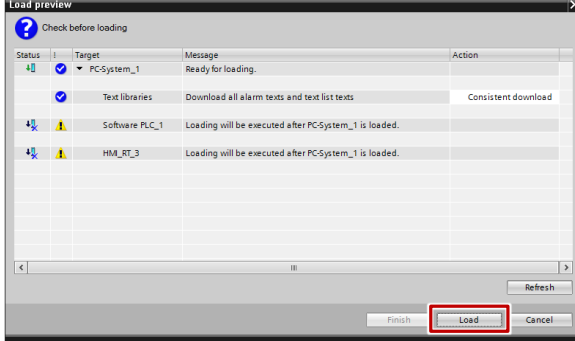
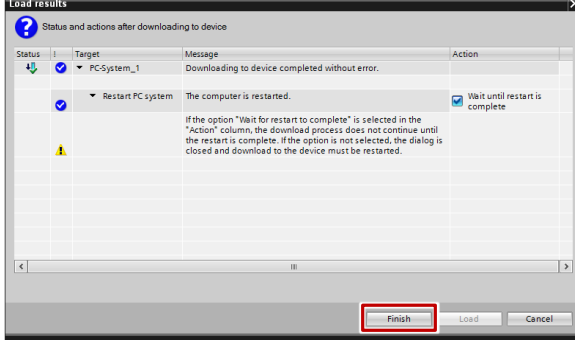
5.4 Loading the project

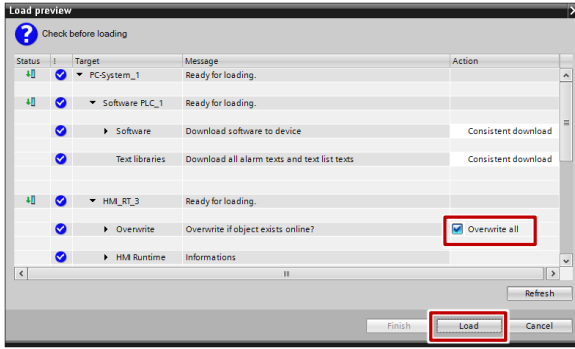
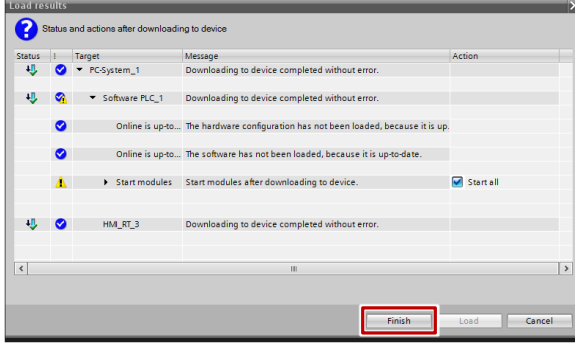
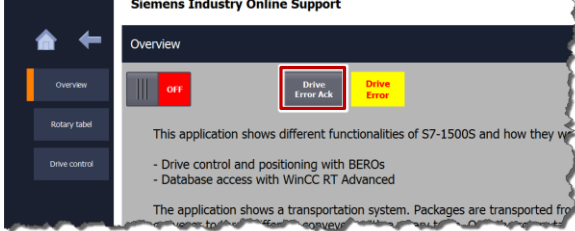
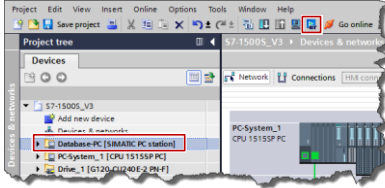
Note If the project is loaded the first time on Open Controller you have to download via Ethernet interface X2P1. The IP address of the Open Controller (Windows) must be the same like the parameterized address in the TIA Portal project.

After the download the Open Controller will be restarted.

Table 5-8: Loading the TIA Portal project onto the device

No.	Action	Remarks
1.	Open the " S7-1500S_V5 " project with the TIA Portal.	
2.	Open the " WinCC Runtime Loader " and start the " Transfer "	
3.	Now you can load the WinCC Runtime.	
4.	Load " PC-System_1 " into the device. Select " PC-System_1 " and click on the "Download to device" button	

No.	Action	Remarks
5.	<ol style="list-style-type: none"> 1. Set the PG/PC interface. 2. Click on "Start search" button to search for devices. 3. Select the compatible device. 4. Click on the "Load" button. 	
6.	<p>Agree the request "Assign IP address" with "Yes" and quit the following message with "OK".</p>	
7.	<p>Click on "Load" button.</p> <p>→ The system configuration is loaded.</p>	
8.	<p>Wait until the PC system is restarted.</p> <p>Click on the "Finish" button.</p>	

No.	Action	Remarks
9.	Activate "Overwrite all" and click on the "Load" button.	
10.	Activate "Start all" and click on the "Finish" button.	
11.	After loading the project, put the PROFINET cable of the Ethernet interface X2P1 on the Ethernet interface X1.	
12.	Open the screen "Overview" in WinCC Runtime and quit the drive error.	
13.	Start the Runtime of the "Database_PC".	

Note

After changing the socket of the PROFINET cable, you also need to change the PG/PC interface, for example to be able to establish an online connection with your PLC. To do so, open the menu "Online > Extended go online", and set the parameter "Connect to interface/subnet" to the value "PN/IE_2" of the PROFINET connection.

6 Operating the Application






6.1 Preconditions

6.1.1 CPU 1515SP PC (Software Controller and WinCC RT Advanced)

- The TIA Portal project must be loaded in CPU 1515SP PC.
- S7-1500 Software Controller must be in "RUN" mode.
- WinCC RT Advanced must be started.

6.1.2 SINAMICS G120

To be able to control the drive via S7-1500 Software Controller, the following points must be fulfilled:

- When using an IOP, please check that the network icon () is displayed on the top right. If the hand icon () is displayed there, press the Hand/Auto button ()
- When using a BOP-2, please check whether the hand icon () is displayed. If yes, press the Hand/Auto button ()

6.1.3 Database / engineering PC with WinCC RT Advanced and SQL database

- The MS SQL server with the database must be started (see chapter [5.3.2 Engineering / database PC: MS SQL database](#)).
- WinCC RT Advanced must be started.

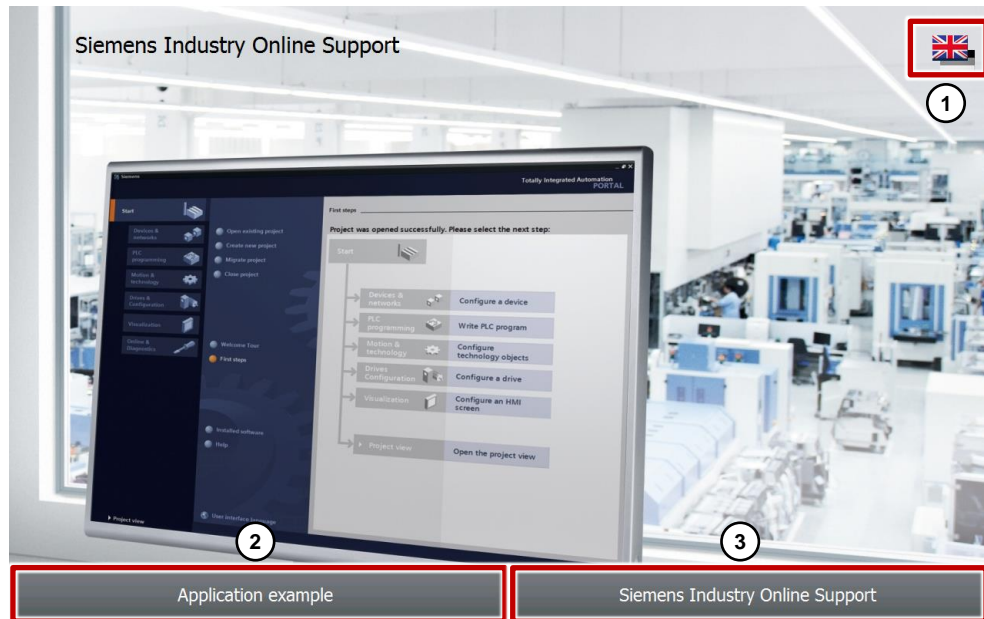
6.2 Operation via WinCC RT Advanced (CPU 1515SP PC)

The entire application can be controlled by the visualization on WinCC RT Advanced Control. The setup is described in this chapter.

6.2.1 Start screen

The following screen is displayed when starting runtime:

Figure 6-1: HMI start screen



In this start screen there are three buttons:

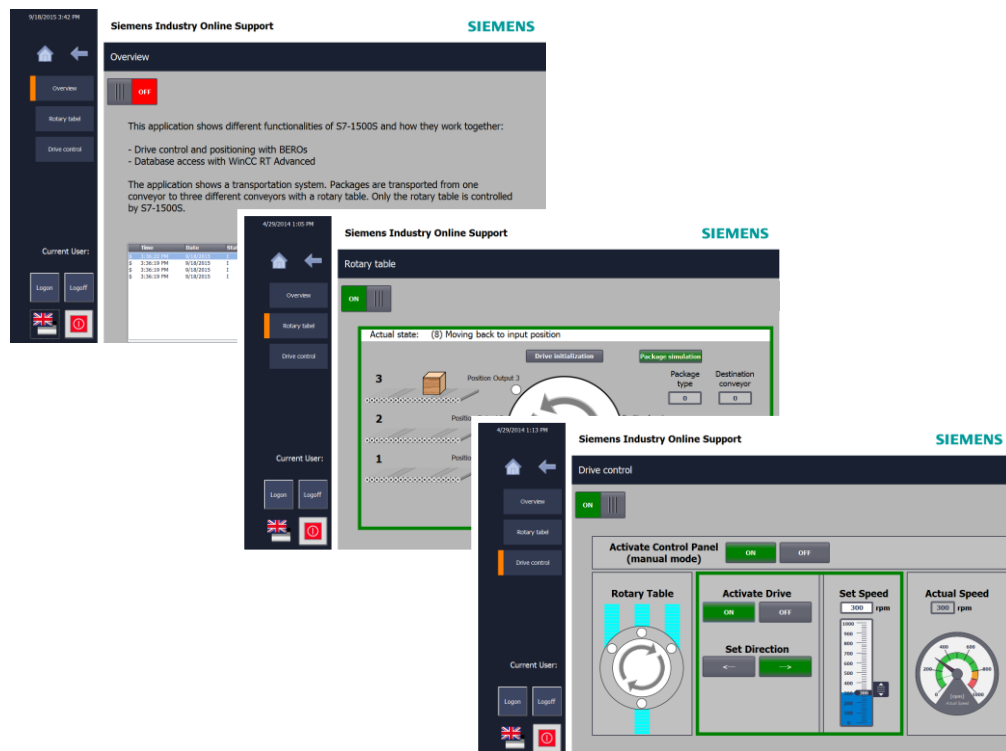
1. **Change language:** English / German
2. The **"Application example"** button takes you to the example project.
3. The **"Siemens Industry Online Support"** button takes you to general information on the Siemens Industry Support.

6.2.2 Example Project

The following three HMI screens exist:

- "Overview"
- "Rotary table"
- "Drive control"

Figure 6-2: HMI screens of the application

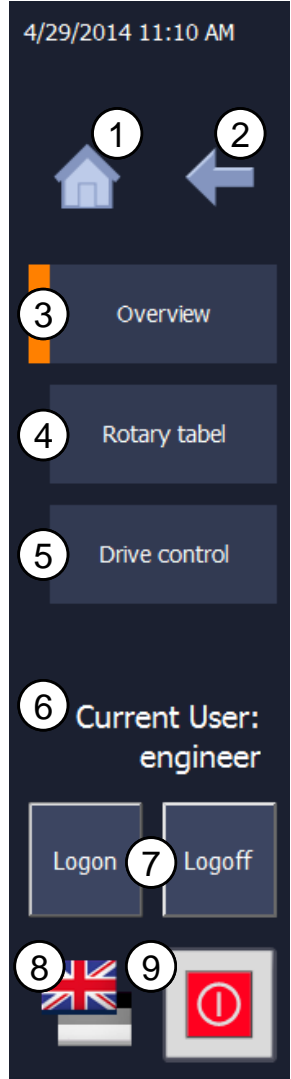


A detailed description is given on the next page.

6.2.3 Navigation

The various screens can be accessed via the right hand navigation.

Table 6-1: Navigation HMI

No.	Action	Remarks
1	<ol style="list-style-type: none"> The "House" icon takes you to the start screen. The "Back" icon takes you to the previous screen. The "Overview" icon takes you to the overview screen. "Rotary table" takes you to the control screen of the rotary table. "Drive control" takes you to the control screen of the drive. "Current User" shows the currently logged on user. "Logon" and "Logoff" is used for logging on and off. The "Flag" icon is used for changing the language of the HMI interface (English / German) The "Stop Runtime" icon is used for terminating the HMI interface. 	 <p>The screenshot shows a vertical navigation sidebar on a dark background. At the top, the date and time '4/29/2014 11:10 AM' are displayed. Below this are two icons: a house icon (1) and a left-pointing arrow icon (2). Further down are three menu items: 'Overview' (3), 'Rotary tabel' (4), and 'Drive control' (5). Below these is the text 'Current User: engineer' (6). At the bottom are four icons: a 'Logon' button (7), a 'Logoff' button (8), a flag icon (9), and a red stop icon (10).</p>

Note

Logon:

User: engineer

Password: 12345

The user is then automatically logged off after 1 minute.

6.2.4 Acknowledging errors and emergency-stop

Current errors are displayed in the upper area of the three pictures. The error messages and the acknowledge buttons are only visible after the error has occurred.

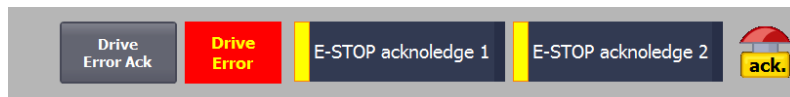
If no errors are pending, only one symbol for the deactivated emergency-stop appears.

Figure 6-3: No errors



If errors are pending, they can be acknowledged here.

Figure 6-4: Error state



Drive error

If an error has occurred in the drive, the “**Drive Error**” output field is blinking. When the error at the drive was repaired, you can acknowledge this by clicking the “**Drive Error Ack**” button.

Emergency-stop

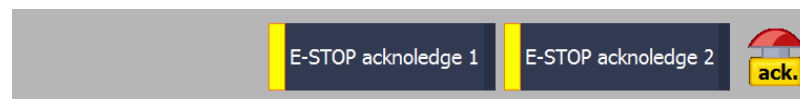
If the emergency-stop button is pressed, the emergency-stop symbol is blinking.

Figure 6-5: Emergency-stop is pressed



If the emergency-stop button was returned to the initial state, this must still be acknowledged.

Figure 6-6: Emergency-stop awaits acknowledgement



In this case, the emergency-stop icon is marked with the “**ack.**” label. Acknowledgement is performed in two steps:

4. Click on the “**E-STOP acknowledge 1**” button
5. Click on the “**E-STOP acknowledge 2**” button after 1 second at the earliest and after 1 minute at the latest.

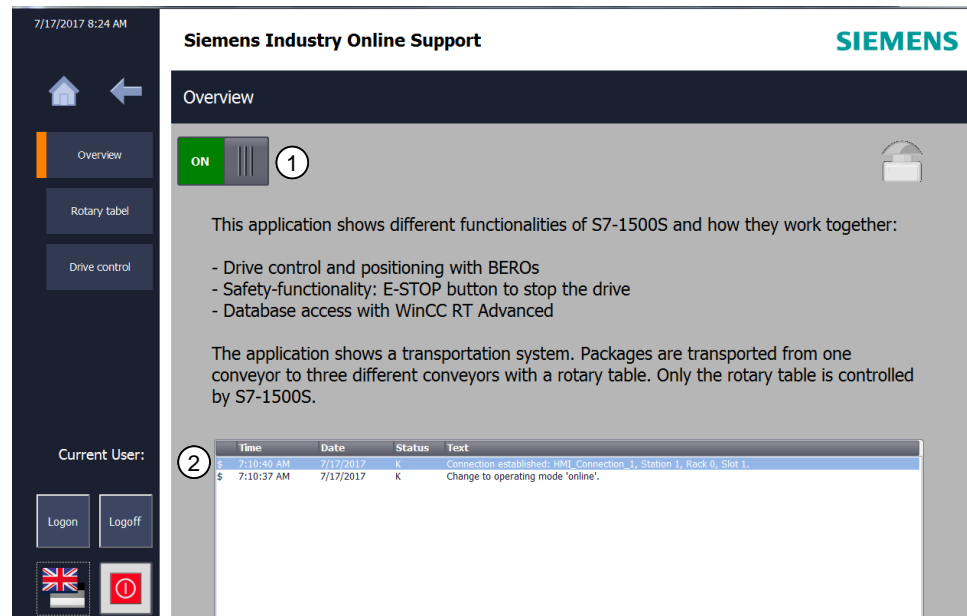
Note

The emergency-stop acknowledgement is performed in the STEP 7 program via the “Ack_OP” block. For security reasons, this sequential acknowledgement is performed. For more information refer to the Online Help of the TIA Portal.

6.2.5 "Overview" screen

This figure shows the general information of the visualization and the content of the application.

Figure 6-7: HMI "Overview"



The switch for starting and stopping the application is located in the top left corner (1) in all of the screens.

In the bottom half of the screen, the "Alarm view" (2) is displayed

6.2.6 "Rotary table" screen

With this screen you can control and monitor the automatic part of the plant.

Active package simulation

Green frame:

- Activated application
- Automatic mode activated (1)
- **"Package simulation"(4)** activated.

Figure 6-8: "Package simulation" view (3) is active

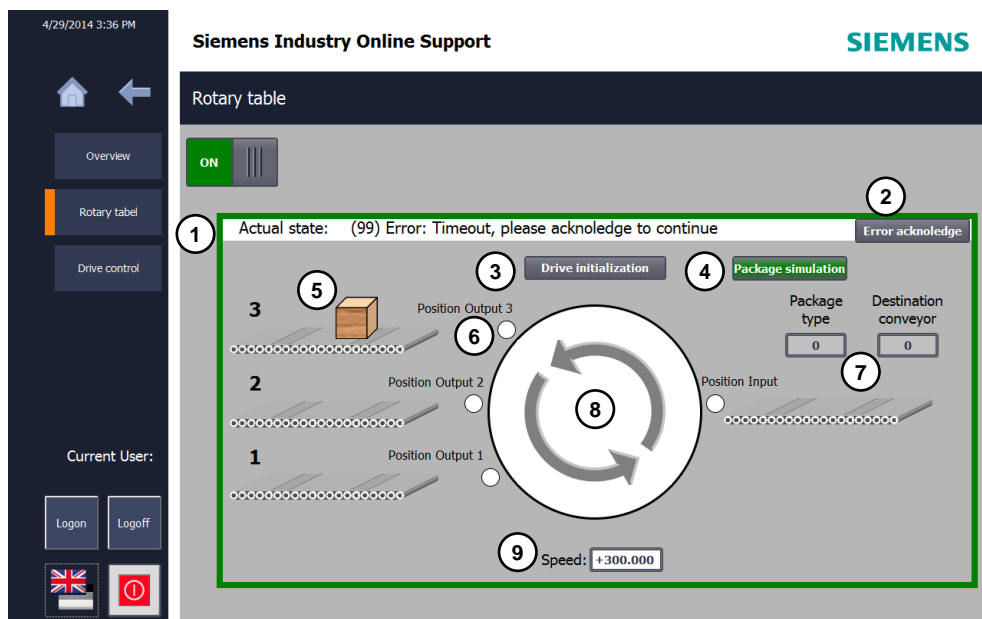


Table 6-2

No.	Description
1	In the top part, all status messages of the application are displayed, such as the current transport step or error messages
2	Use the "Error acknowledge" button to acknowledge runtime errors of the rotary table. A timer is always started when the rotary table is moved to a position. In the case of a defective BERO, the rotary table would turn indefinitely. The elapsed Timer stops the motion and shows the user the error message and the button for acknowledgement.
3	The "Drive initialization" button enables you to move the motor, or the rotary table to the "Position Input" start position.
4	With the "Package simulation" button you can activate the simulation of the packages.
5	The "Package" icon indicates where the package is currently located. The following positions are possible: Position Input, Rotary Table, Conveyor Output 1, Conveyor Output 2, Conveyor Output 3
6	BEROs for position detection of the rotary table are located all positions. When the signal lamp is "green", the rotary table is at this position.

No.	Description
7	" Package type " shows the type of the current package. " Destination Conveyor " indicates the conveyor to which the package is transported.
8	The " arrow " symbols show the current rotation direction of the rotary table during motion.
9	The field indicates the current rotation speed. It can also be changed here.

Note

In order to operate the "Rotary table" screen, the "Manual mode" in the "Drive control" screen must be deactivated.

Deactivated package simulation

For deactivated package simulation it is possible to control all signals manually for test purposes.

Figure 6-9: "Package simulation" view (3) deactivated and "Manual mode" active

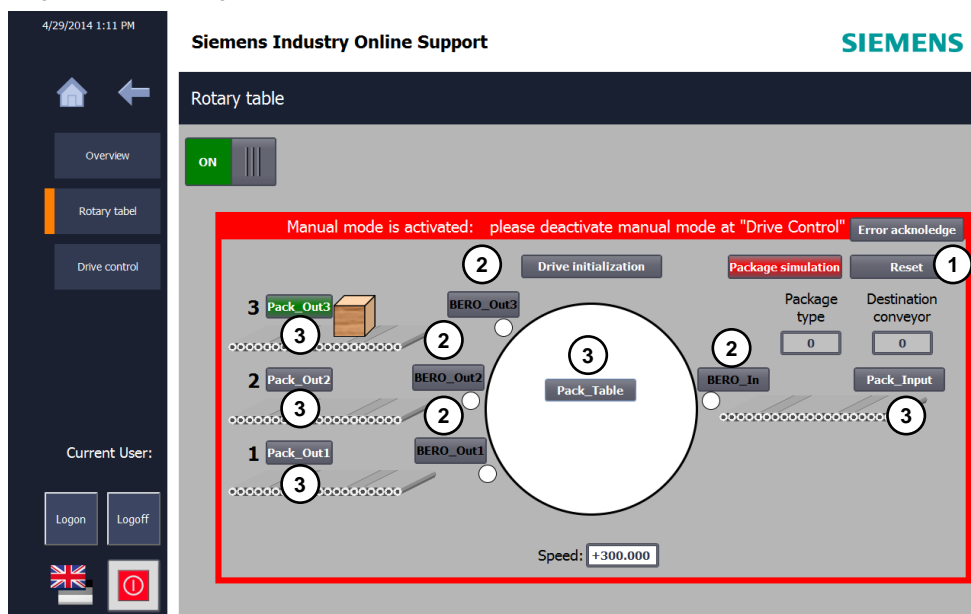


Table 6-3: Rotary table legend (deactivated package control)

No.	Description
1	Use the " Reset " button to reset all package signals.
2	Use the " BERO_... " buttons to control any BERO. Note: in the case of two BEROs being activated at the same time, the emergency-stop is activated. In the application it is not possible for the rotary table to be located in two positions at once.
3	The " Pack_... " buttons can be used to control all package positions.

6.2.7 "Drive control" screen

With this screen you can move the rotary table. You can specify rotation direction and speed. The green frame signals the active manual mode. The control of the rotary table is now enabled. If the manual mode is deactivated, the automatic mode is active. The control signals can then no longer be operated.

Figure 6-10: Drive control

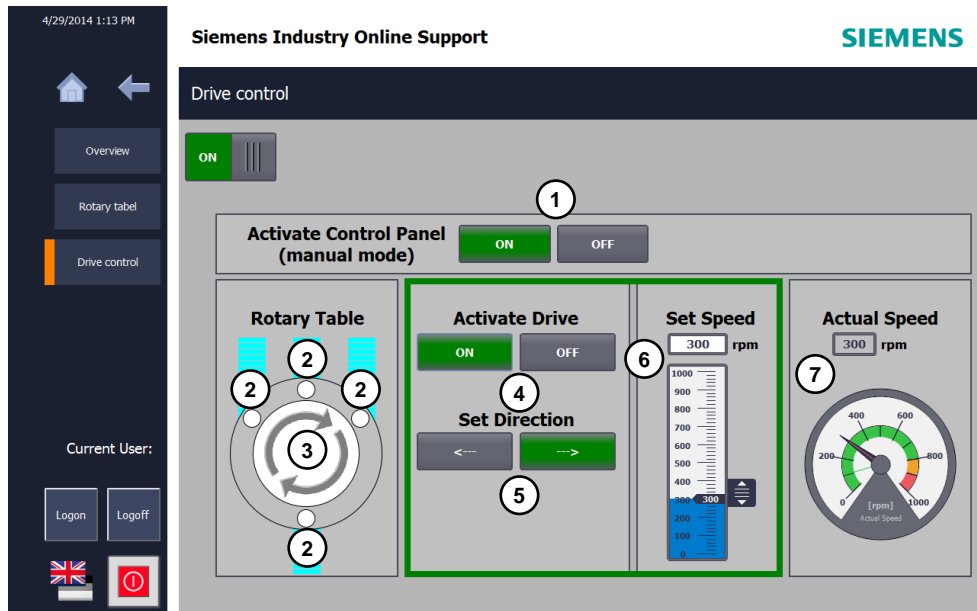


Table 6-4: Drive control legend

No.	Description
1	Button for activating/deactivating the manual mode
2	Display of the BERO signals
3	Display of the current rotation direction
4	Button for activating/deactivating the drive
5	Buttons for controlling the rotation direction
6	Slide controls and input field for controlling the speed
7	Display of the current speed

6.3 Operating the database

The visualization with WinCC Runtime of the database PCs is structured in the same way as the visualization of the CPU 1515SP PC (see [Operation via WinCC RT Advanced \(CPU 1515SP PC\)](#)).

In this example, WinCC Runtime only has the task of communicating with the database. The screens of the visualization are not necessary for controlling this application.

In case you are interested in details on the control options of the database via WinCC Runtime, please study the following FAQ:

<https://support.industry.siemens.com/cs/ww/en/view/61883659>

Note

For the database PC, the same user administration is programmed as for WinCC Runtime in CPU 1515SP PC.

Logon:

User: engineer

Password: 12345

The user is then automatically logged off after 1 minute.

7 Appendix

7.1 Service and Support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks at:

<https://support.industry.siemens.com>

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. You send queries to Technical Support via Web form:

www.siemens.com/industry/supportrequest

Service offer

Our range of services includes, inter alia, the following:

- Product trainings
- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog:

<https://support.industry.siemens.com/cs/sc>

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:

<https://support.industry.siemens.com/cs/ww/en/sc/2067>

7.2 Links and Literature

Table 7-1

	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/62521281
\3\	How do you log tags in an SQL database and read them out again with WinCC flexible? https://support.industry.siemens.com/cs/ww/en/view/24677043
\4\	How do you access an SQL database in WinCC Runtime Advanced using a script? https://support.industry.siemens.com/cs/ww/en/view/61883659
\5\	PC-based automation: Connection of Databases via open Interfaces Using OPC-Client, Programmed in C# .net https://support.industry.siemens.com/cs/ww/en/view/21576581
\6\	WinAC Link to an SQL Database https://support.industry.siemens.com/cs/ww/en/view/48354880
\7\	Security guideline for PC-based automation systems with Windows embedded operating systems. https://support.industry.siemens.com/cs/ww/en/view/55390879
\8\	PC-based automation An Overview of the Most Important Documents and Links https://support.industry.siemens.com/cs/ww/en/view/75852684
\9\	PC-based automation applications https://support.industry.siemens.com/cs/ww/en/ps/16739/ae
\10\	S7-1500 Software Controller Handbücher https://support.industry.siemens.com/cs/ww/de/ps/13912/man
\11\	SIMATIC S7-1500 CPU 150xS https://support.industry.siemens.com/cs/ww/en/view/109249299
\12\	TIA Portal - An Overview of the Most Important Documents and Links- Controller https://support.industry.siemens.com/cs/ww/en/view/65601780
\13\	TIA Selection Tool http://www.siemens.com/tia-selection-tool
\14\	SIMATIC ET 200SP Manual Collection https://support.industry.siemens.com/cs/ww/en/view/84133942
\15\	SIMATIC ET 200SP Open Controller CPU 1515SP PC https://support.industry.siemens.com/cs/ww/en/view/109248384
\16\	SINAMICS Startdrive https://support.industry.siemens.com/cs/ww/en/view/68034568
\17\	SINAMICS G: Speed Control of a G110M / G120 (Startdrive) with S7-1500 (TO) via PROFINET or PROFIBUS with Safety Integrated (via Terminal) and HMI https://support.industry.siemens.com/cs/ww/en/view/78788716
\18\	SINAMICS G120 CU240E-2 PN-F https://support.industry.siemens.com/cs/ww/en/ps/6SL3244-0BB13-1FA0
\19\	SINAMICS G120 INTELLIG.OPERAT.PANEL IOP https://support.industry.siemens.com/cs/ww/en/ps/6SL3255-0AA00-4JA0

	Topic
\20\	Passive network components http://support.automation.siemens.com/WW/view/en/18689247/133200
\21\	Pepperl+Fuchs Homepage http://www.pepperl-fuchs.com
\22\	Microsoft User Account Control Step-by-Step Guide http://technet.microsoft.com/us-en/library/cc709691(v=ws.10).aspx
\23\	Microsoft Group Policy http://technet.microsoft.com/us-en/windowsserver/bb310732.aspx

7.3 Change documentation

Table 7-2

Version	Date	Modifications
V1.0	09/2012	First version
V2.0	05/2014	Update: <ul style="list-style-type: none"> - New hardware SIMATIC IPC227D, SINAMICS G120 (PROFINET), SCALANCE X208 - Engineering with TIA Portal V13
V3.0	09/2015	Update: <ul style="list-style-type: none"> - New hardware SIMATIC Open Controller (CPU 1515SP PC) - Engineering with TIA Portal V13 SP1 Update 4
V4.0	03/2017	Update: <ul style="list-style-type: none"> - New hardware CPU 1505SP F - Engineering with TIA Portal V14
V5.0	07/2017	Update: <ul style="list-style-type: none"> - Engineering with TIA Portal V14 SP1