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Application Description • 08/2014

WinAC RTX: Combination Drive Control, Safety, Database, Visualization

STEP 7 Professional, WinCC Advanced, Safety Advanced, Startdrive

<http://support.automation.siemens.com/WW/view/en/62521281>

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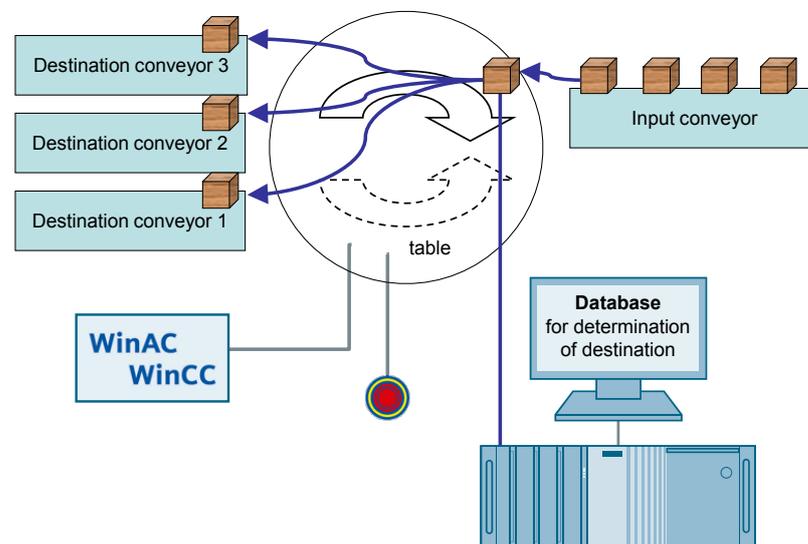
1 Task

Introduction

This extensive application example uses a transport solution with rotary table to illustrate various functions and options of WinAC RTX. 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.

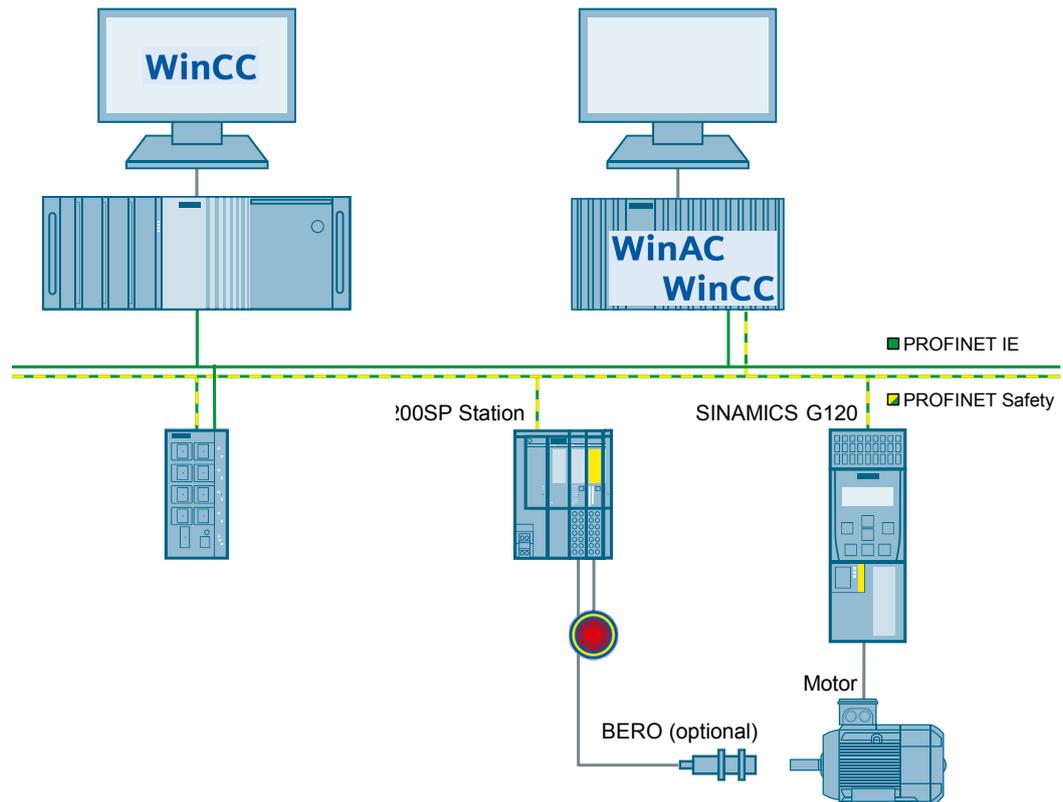
2 Solution

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 WinAC RTX F controller and the SINAMICS G120 drive is programmed.
- the SINAMICS G120 drive is configured.
- safety functions are implemented with emergency-stop button at an ET 200SP station.
- a safe PROFIsafe communication is configured between WinAC RTX F and SINAMICS G120.
- a database communication is implemented with WinCC Runtime Advanced.
- safety measures are taken against unauthorized access.

Advantages

The solution introduced here shows the versatility of WinAC RTX 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
- Safety programming
- Drive technology
- Databases

Assumed knowledge

Basic knowledge on STEP 7 and WinCC programming, and the basic application of WinAC RTX are assumed.

2.2 Description of the core functionality

2.2.1 WinAC RTX: Drive connection

A drive connection is realized with WinAC RTX 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 S7-300/400 CPU. Existing user programs of S7-300/400 can continue to be used in WinAC. The application can therefore be fully adopted in WinAC.

SINAMICS G: Speed control of a G120 using S7-300/400 (TIA-Portal) with PROFINET/PROFIBUS and Safety Integrated (not via PROFIsafe) and HMI
<http://support.automation.siemens.com/WW/view/en/60140921>

2.2.2 WinAC RTX: Safety

The motor shall be set torque-free (STO Safe torque off) via a central emergency-stop button.

The SINAMICS drive has the option of performing a fail-safe shutdown. The PROFIsafe protocol for safe communication between controller and drive is used here.

For further information, please refer to:

Function Manual Safety Integrated, SINAMICS G120, G120C and G120D
<http://support.automation.siemens.com/WW/view/en/70235827>

SIMATIC Safety - Getting Started
<http://support.automation.siemens.com/WW/view/en/49972838>

2.2.3 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 Runtime 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?
<http://support.automation.siemens.com/WW/view/en/24677043>

How do you access an SQL database in WinCC Runtime Advanced using a script?
<http://support.automation.siemens.com/WW/view/en/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

<http://support.automation.siemens.com/WW/view/en/21576581>

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

WinAC to an SQL database

<http://support.automation.siemens.com/WW/view/en/70984996>

For this application, a direct connection is established with an SQL database on the basis of a WinAC RTX driver.

2.2.4 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 IPC227D
 - 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.
<http://support.automation.siemens.com/WW/view/en/55390879>

2.2.5 WinAC RTX outlook (no integral part of this application)

The following information shows you further functions of WinAC RTX 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.

<http://support.automation.siemens.com/WW/view/en/78025910>

C/C++ Code with WinAC RTX

WinAC ODK

WinAC RTX enables using C/C++ Code. The WinAC ODK (Open Development Kit) software package is used in this case.

For further information, please refer to:

<http://www.automation.siemens.com/mcms/programmable-logic-controller/en/software-plc/simatic-winac-odk/Pages/Default.aspx>

Example Application

PC-based automation Reporting of process values via e-mail with WinAC RTX and WinAC ODK

<http://support.automation.siemens.com/WW/view/en/20987360>

MATLAB/Simulink

WinAC Target:

Add-on for MATLAB/Simulink for integrating and calling MATLAB/Simulink models using STEP 7 and WinAC ODK

If you are working with MATLAB/Simulink and wish to run generated algorithms with a controller, this can be easily implemented with WinAC Target.

For further information, please refer to:

<http://support.automation.siemens.com/WW/view/en/56969417>

Overview of further applications on PC-based automation

<http://support.automation.siemens.com/WW/view/en/34677186/136000&csplfrm=10&cssw=0&csbinh=8>

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_PRODUCTS_v20.zip". Use the TIA Selection Tool.

Due to the fact that at the time of generation not all of the products in the TIA Selection Tool existed, all articles not available in the TIA Selection Tool are "grayed" in the following list.

Hardware components

Table 2-1: Hardware components used

Component	No.	Article number	Note
SIMATIC IPC	1	-	Alternatively, a SIMATIC Field PG M4 or a standard PC can also be used. SIMATIC Field PGs can be ordered with already installed SIMATIC software.
IPC227D (WES 7 SP1 32Bit, HMI / RTX F)	1	6ES7647-8AH...-3...	Different bundles are available for the IPC227D, see: http://support.automation.siemens.com/WW/view/en/63033667/133300 The bundle must include the following software products: WinAC RTX F 2010 UPD 3 WinCC RT Advanced V13 SIMATIC NET V8.2 SP1
ET 200SP IM 155-6 PN ST incl. Server module, incl. bus adapter 2xRJ45	1	6ES7155-6AU00-0BN0	http://support.automation.siemens.com/WW/view/en/58207976 http://support.automation.siemens.com/WW/view/en/84133942
F-DI 8x24VDC HF	1	6ES7136-6BA00-0CA0	-
BU type A0, 16 push-in, 2 feed terminals separated (digital/analog, max.24VDC/10A)	1	6ES7193-6BP00-0DA0	-

2 Solution

2.3 Hardware and software components

Component	No.	Article number	Note
DI 8x24VDC ST	1	6ES7131-6BF00-0BA0	-
BU type A0, 16 push-in, 2 feed terminals bridged (digital/analog, 24VDC/10A)	1	6ES7193-6BP00-0BA0	-
SINAMICS CU240E-2 PN F	1	6SL3244-0BB13-1FA0	http://support.automation.siemens.com/WW/view/en/56649766
SINAMICS PM340 230V	1	6SL3 210-1SB14-0UA0	-
SINAMICS G120 IOP	1	6SL3255-0AA00-4JA0	(optional) http://support.automation.siemens.com/WW/view/en/70235827
Motor	1	1LA7060-4AB10	-
SCALANCE X208	1	6GK5208-0BA10-2AA3	Alternatively, other switches with at least 5 ports can also be used.
Ind. Ethernet RJ45/RJ45, CAT 6, 4X2 line, preassembled, 2m length	6	6XV1870-3QH20	Alternatively, you can also use different Ethernet cables of different lengths. http://support.automation.siemens.com/WW/view/en/18689247/133200
Inductive sensor (BERO)	4	NBN2-8GM40-Z1	(optional) http://www.pepperl-fuchs.com
Emergency-stop button	1	-	-
Standard PC screen	1	-	-
Standard keyboard with USB connection	1	-	-
Standard mouse with USB connection	1	-	-

At the time of generation, the application is not included in the TIA Selection Tool.

2 Solution

2.3 Hardware and software components

Software components

Table 2-2: Software components used

Component	No.	Article number	Note
STEP7 V13 Professional Update 1	1	6ES7822-1...03-..	When ordering a Field PG Bundle with STEP 7 and WinCC licenses, you do not need to order this article separately.
STEP 7 Safety Advanced V13 Update 1	1	6ES7833-1F.13-0Y..	-
WinCC Advanced V13	1	6AV210-....3-0	When ordering a Field PG Bundle with STEP 7 and WinCC licenses, you do not need to order this article separately.
WinCC Runtime Advanced V13	1	6AV2104-....3-0	-
Startdrive V13	1	6SL3072-4DA02-0XG0	free download: http://support.automation.siemens.com/WW/view/en/68034568

At the time of generation, the application is not included in the TIA Selection Tool.

Sample files and projects

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

Table 2-3: Example projects and documentation

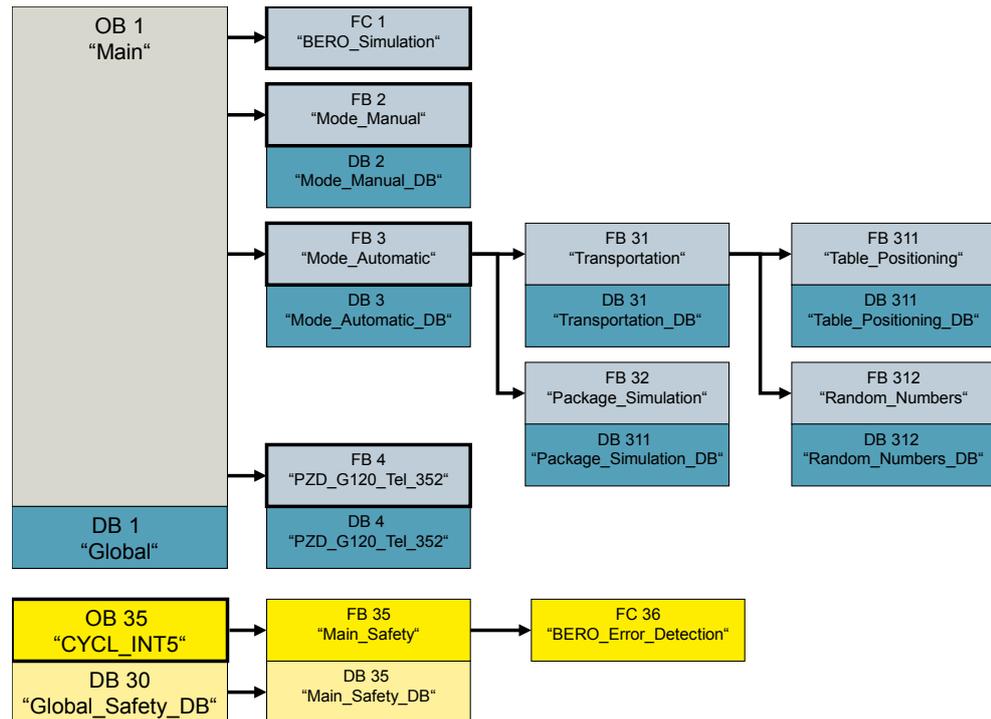
Component	Note
62521281_CODE_v20.zip	The zip file contains: <ul style="list-style-type: none">• TIA Portal project• database import
62521281_PRODUCTS_v20.zip	The zip file contains: TIA Selection Tool file with hardware and software products.
62521281_WinAC_at_TIA_Portal_DOKU_v20_en.pdf	This document

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: WinAC RTX F

Figure 3-1: General overview of the control program



The control program consists of five 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.
- **PZD_G120_Tel_352**
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

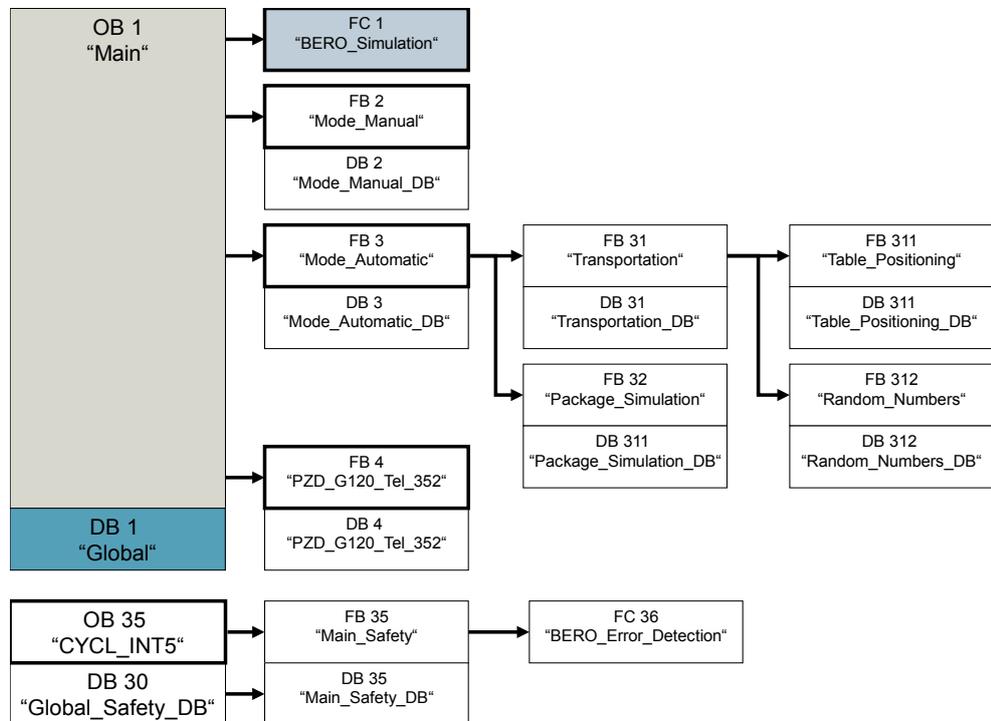
Only one of the operating modes can be active.

DB1 “Global”

DB1 “Global” contains the most important tags of the application.

3.1.1 BERO simulation

Figure 3-2: BERO_Simulation



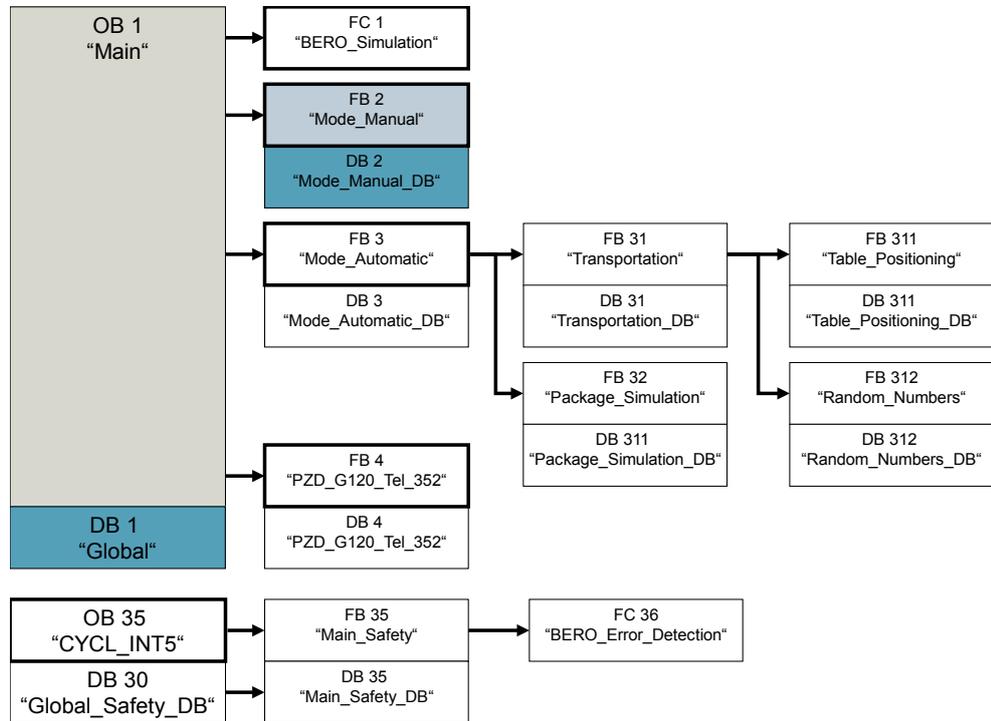
This application can be operated using a hardware setup of the rotary table with or without BEROs. Using the FC1 “BERO_Simulation” block enables switching between the I/O inputs of ET 200SP (DI 8x24VDC ST) or simulated BERO signals.

The Boolean tag BERO_SIM.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 “Package_simulation”.

3.1.2 Manual mode

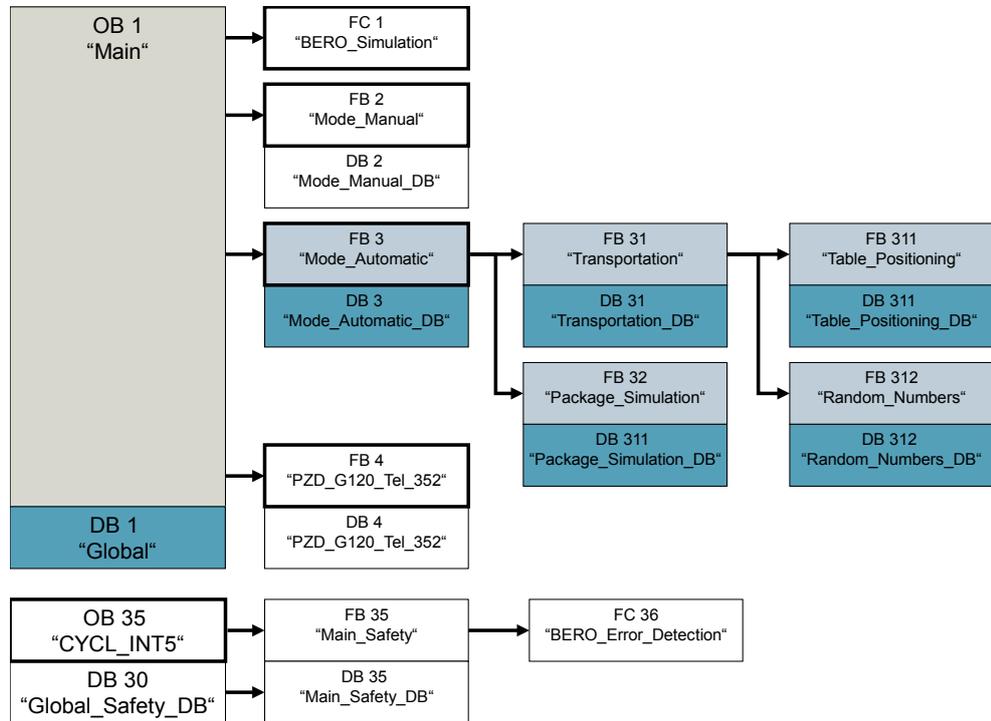
Figure 3-3: Manual mode



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 "Mode_Manual" block. FB3 "Mode_Automatic" is then not called. In FB4 "PZD_G120_Tel_352" the control signals are then transferred to the drive.

3.1.3 Automatic mode

Figure 3-4: Automatic mode



FB3 "Mode_Automatic"

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

FB31 “Transportation”

Figure 3-5: Block FB31 “Transportation”

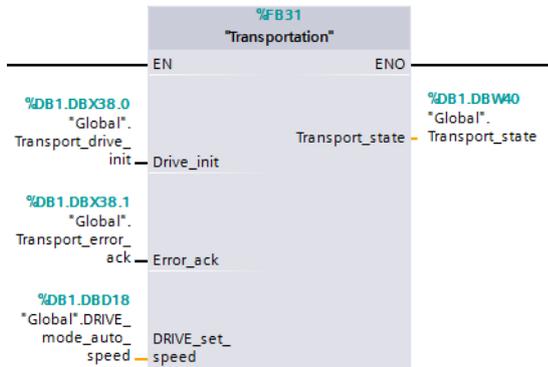


Table 3-1: FB31 “Transportation” interfaces

Name	Type	Value	Function
Input			
DRIVE_init	Bool	0	-
		1	The motor is initialized: <ul style="list-style-type: none"> motor moves forwards until BER (Input) is active.
Error_ack	Bool	0	-
		1	When exceeding a time limit while the motor moves to a position, the motor is stopped. The error is acknowledged with Error_ack.
DRIVE_set_speed	Real		Given speed for the drive in revolutions per minute.
Output			
Transport_state	Int		Current step of step chain

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. FB312 “Random_Numbers” 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.

3.1 Program overview: WinAC RTX F

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 is not possible. Hence, the motor is stopped after a defined time. In this case, the sequence remains in this step until acknowledged with "Error_ack".

FB311 "Table_Positioning"

Figure 3-6: Block FB311 "Table_Positioning"

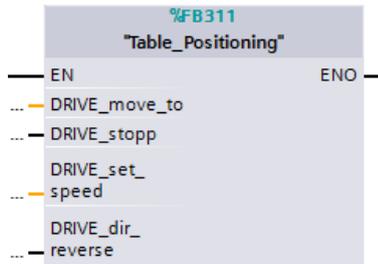


Table 3-2: FB311 "Table_Positioning" interfaces

Name	Type	Value	Function
Input			
DRIVE_move_to	Int	0	Motion to input conveyor
		1	Motion to output 1 conveyor
		2	Motion to output 2 conveyor
		3	Motion to output 3 conveyor
DRIVE_stopp	Bool	0	-
		1	Motor stopped
DRIVE_set_speed	Real		Given speed for the drive in revolutions per minute.
DRIVE_dir_reverse	Bool	0	Motor forwards
		1	Motor backwards

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

FB312 “Random_Numbers”

Figure 3-7: Block FB312 “Random_numbers”



Table 3-3: FB312 “Random_numbers” interfaces

Name	Type	Value	Function
Input			
H_Limit	Int		Upper limit value
L_Limit	Int		Lower limit value
Output			
Random_number	Int		Random number between upper and lower limit value

It is the job of FB312 “Random_Numbers” to create randomly generated numbers from 101 to 112. In this application, these are the various package types.

FB32 “Package_Simulation”

Figure 3-8: Block FB22 “Package_Simulation”

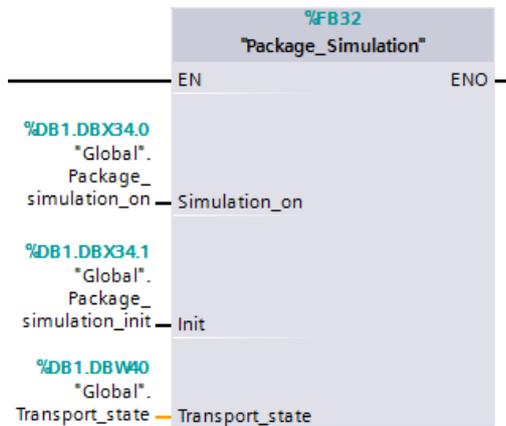


Table 3-4: FB22 “Package_simulation” interfaces

Name	Type	Value	Function
Input			
Simulation_on	Simulation_on	Simulation_on	Simulation_on
Init	Init	Init	Init
Transport_state	Transport_state	Transport_state	Transport_state

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

3.1 Program overview: WinAC RTX F

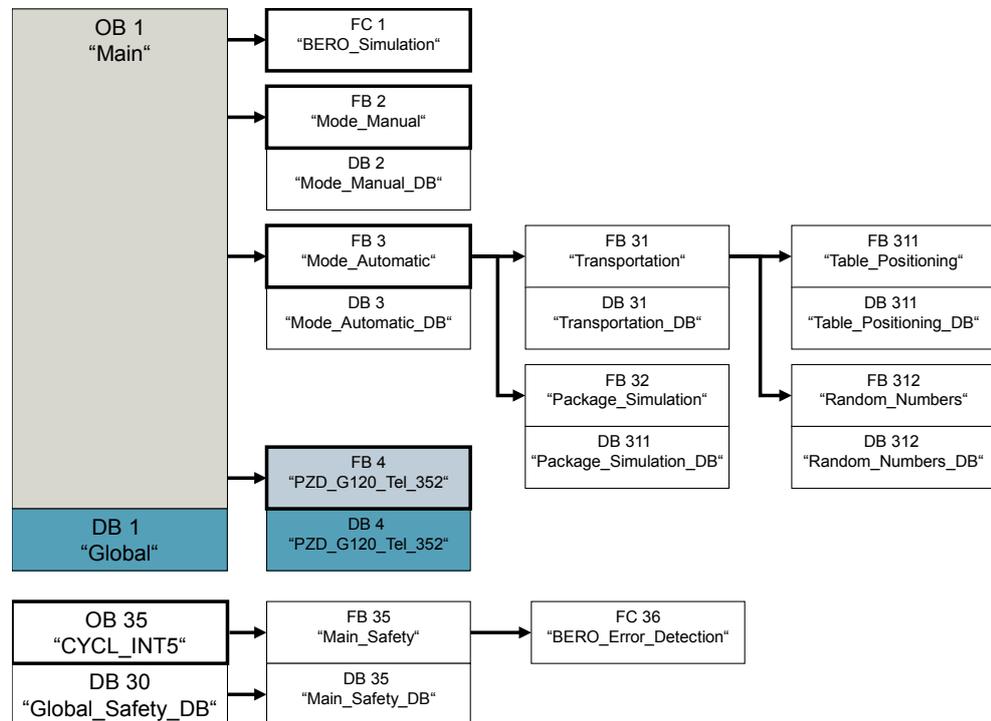
The following signals are generated depending on the situation (Sequencer_state of FB31 "Transportation"):

- Package signals (for determining the position of the packages)
 - "Global".Package_Sensor_SIM.Package_SIM_Input
 - "Global".Package_Sensor_SIM.Package_SIM_Table
 - "Global".Package_Sensor_SIM.Package_SIM_Output_1
 - "Global".Package_Sensor_SIM.Package_SIM_Output_2
 - "Global".Package_Sensor_SIM.Package_SIM_Output_3
- Simulated BERO signals
 - "Global".BERO_SIM.Pos_Input
 - "Global".BERO_SIM.Pos_Output_1
 - "Global".BERO_SIM.Pos_Output_2
 - "Global".BERO_SIM.Pos_Output_3

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



3 Function Mechanisms

3.1 Program overview: WinAC RTX F

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

<http://support.automation.siemens.com/WW/view/en/60140921>

FB4 “PZD_G120_Tel_352”

Input parameters

Table 3-5: Input parameters

Parameter	Data type	Description
Address	Int	Address of SINAMICS G120
ON_OFF1	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
Direction_reversal	Bool	Control word 1;Bit 11: reverse direction (setpoint value)
Activate_manual_mode	Bool	Changing the operating mode
Speed_setpoint	Real	Speed setpoint of the drive
Reference_speed_P2000	Real	Reference speed / reference frequency
Reference_current_P2002	Real	Reference current
Reference_torque_P2003	Real	Reference torque

Output parameters

Table 3-6: Output parameters

Parameter	Data type	Description
Operation_enabled	Bool	Status word 1, 2 Bit: operation enabled
Fault_active	Bool	Status word 1, 3 Bit: fault active
Closing_lockout_active	Bool	Status word 1, 6 Bit: On-inhibit active
Alarm_active	Bool	Status word 1, 7 Bit: alarm active
Rotating_forward	Bool	Status word 1, 14 Bit: motor right-hand rotation
Actual_speed	Real	Current motor speed
Actual_current	Real	current electrical current
Actual_torque	Real	Current torque
Actual_alarm	Word	Current alarm of the drive
Actual_fault	Word	Current fault of the drive

Principle of operation for FB “PZD_G120_Tel_352”

Function block “PZD_G120_Tel_352” 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) V11 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 “Cyclcl_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.

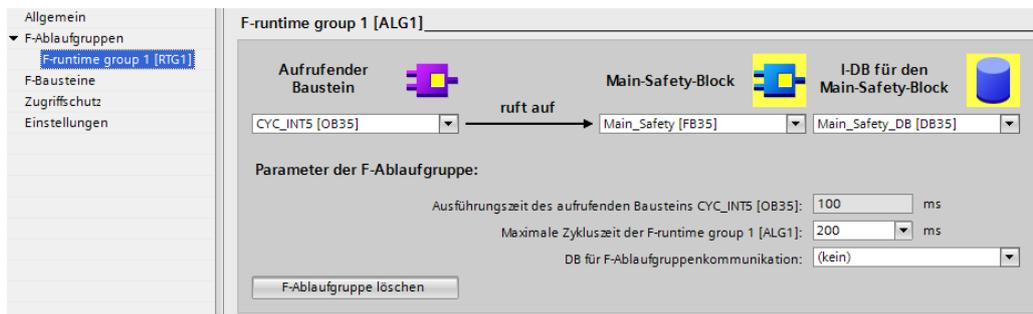
3.1.6 Safety administrator

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

Note

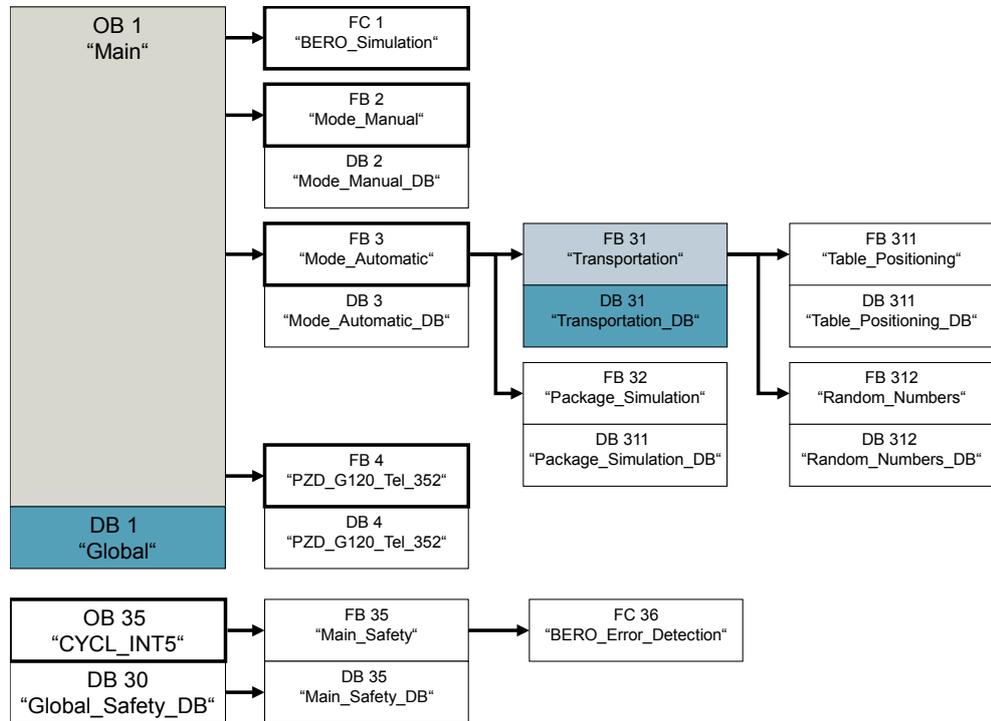
Safety password: 0

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 WinAC RTX F the “Database” structure is located in DB1 “globally”.

Figure 3-13: DB1 “Global”, “Database” structure

Variable	Struct	Value	Initial Value	Access	Comment
Database	Struct	22.0		<input checked="" type="checkbox"/>	Database
Request	Bool	0.0	false	<input checked="" type="checkbox"/>	Database requested for destination conveyor
Reply	Bool	0.1	false	<input checked="" type="checkbox"/>	Database replied for destination conveyor
Package_type	Int	2.0	0	<input checked="" type="checkbox"/>	Actual package_type
Destination_conveyor	Int	4.0	0	<input checked="" type="checkbox"/>	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 “Package_type” tag.
- The database supplies the suitable value for the “Destination_conveyor” tag.
- The script stores the value in the “Destination_conveyor” 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 “Destination_conveyor”.

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

<http://support.automation.siemens.com/WW/view/en/24677043>

3.2 Functional mechanism: Database PC

The database connection is realized on the Database_PC. 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 Runtime 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:

<http://support.automation.siemens.com/VW/view/en/61883659>

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

The following functions can be executed via the scripts.

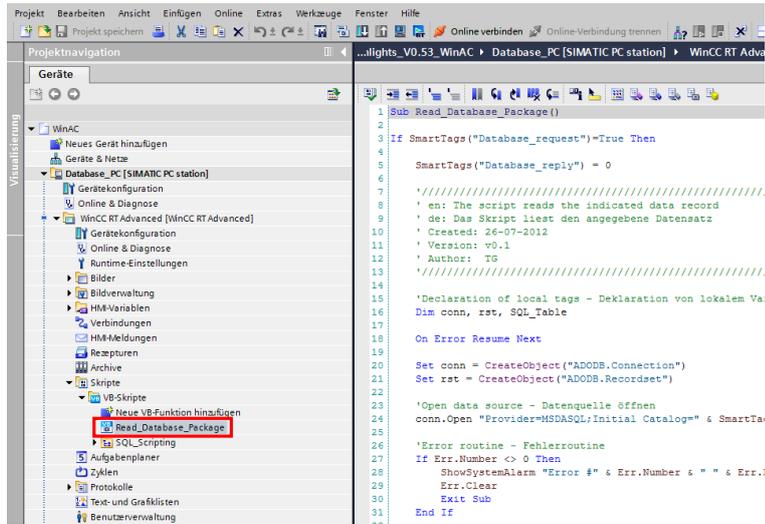
- Create new database
- Delete database
- Create a table in a database
- Create a data record in a table
- Read a data record from a table
- Edit a data record in a table retrospectively
- Delete a data record from a table
- Read data records of an entire table
- Copy a table
- Delete a table

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.

3 Function Mechanisms

3.2 Functional mechanism: Database PC

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 was defined for a simplified user administration: "Engineer".

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.

The plant operator does not have access to the system control. He only has access to the plant control.

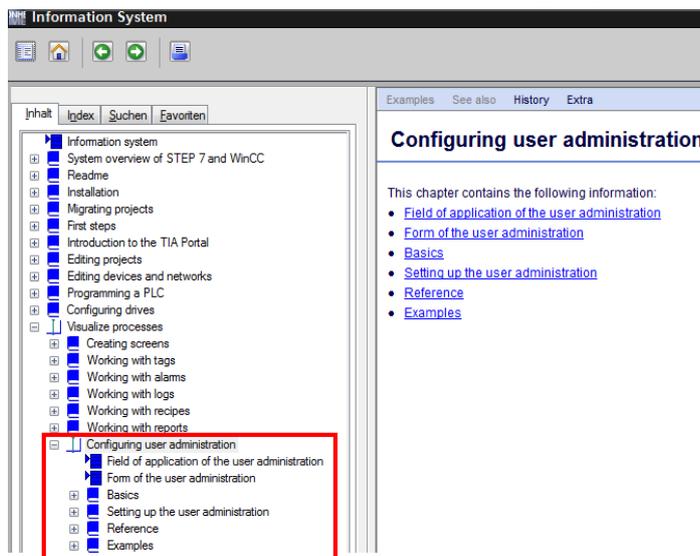
Note

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 Function Mechanisms

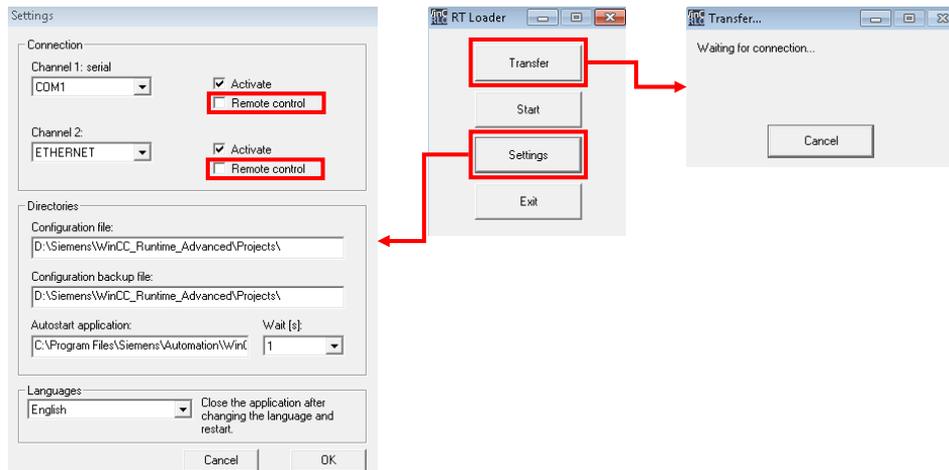
3.3 Preventing unauthorized access to WinCC Runtime

3.3.2 Deactivating the remote control of the WinCC Runtime Loader

3.3.3 Deactivating the remote control of the WinCC Runtime Loader

To prevent unauthorized loading of a project into WinCC Runtime, you deactivate the remote control of the connection channels. The **“Transfer”** must always be activated directly at the operator panel before a download can be performed.

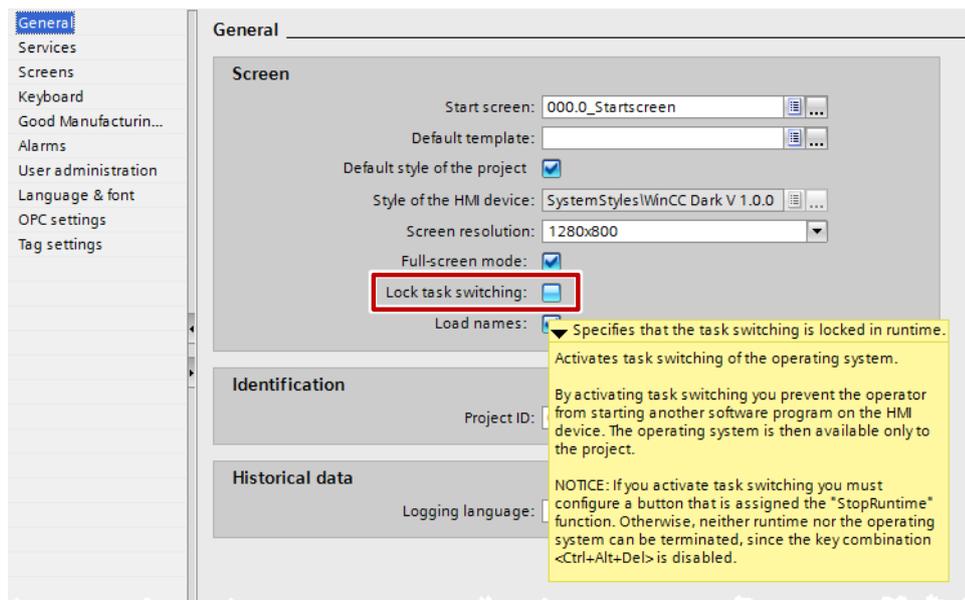
Figure 3-16: Deactivating the remote control of the WinCC Runtime Loader



3.3.4 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 Legacy USB Support in the BIOS of IPC227D.

However, USB mouse and keyboard are still working.

More information on setting the BIOS parameters is available in the manual of IPC227D:

<http://support.automation.siemens.com/WW/view/en/51924060>

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.

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:

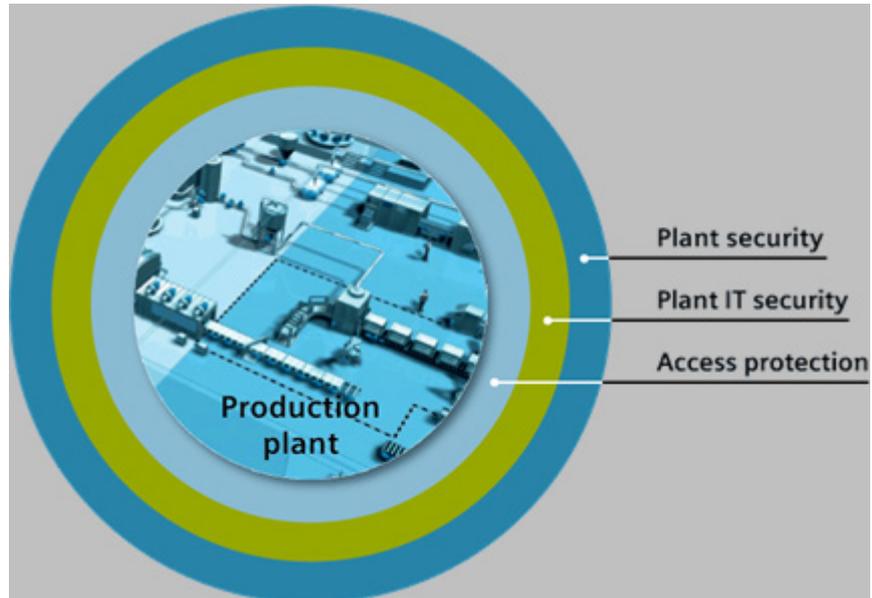
- Security management
- Defense-in-depth strategy
- Protection of network services

3 Function Mechanisms

3.4 Preventing unauthorized access to the IPC227D

- 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:

<http://support.automation.siemens.com/WW/view/en/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

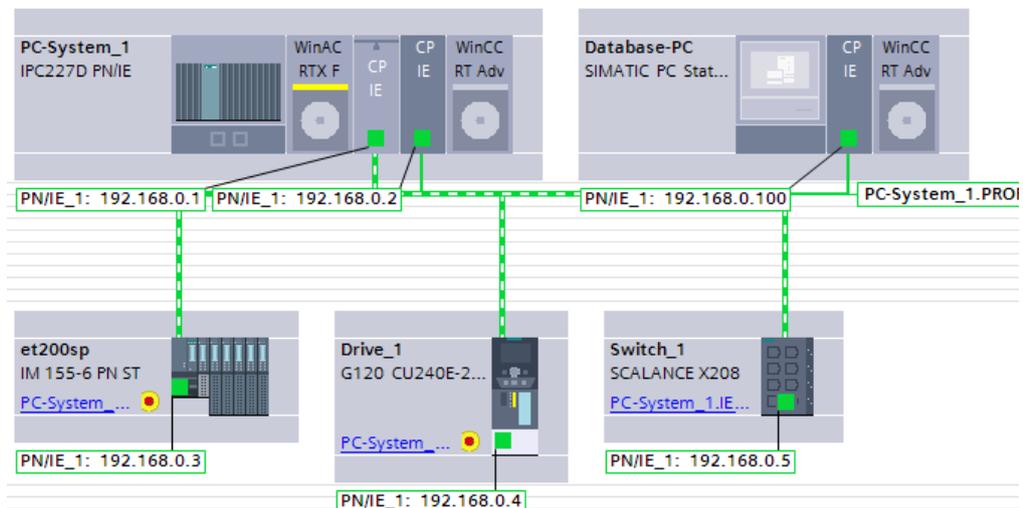
For the configuration and settings, only the main components of the application are discussed. For details, please refer to the project or the references to descriptions in this document.

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)



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Configured PROFINET device names

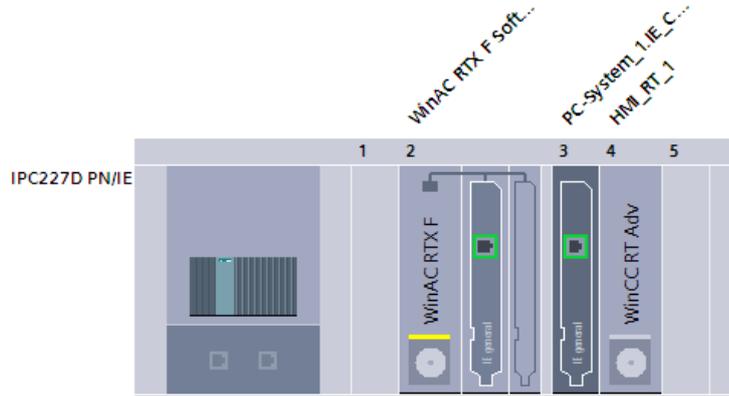
Figure 4-2: PROFINET device names

IP address	MAC address	Type	Name	Status
192.168.0.1	00-1B-1B-08-94-EF	WinAC RTX	winac_rtx.fsoftware_plc	OK
192.168.0.2	00-1B-1B-08-32-B3	S7-PC	pc-system_1.pc-system_1_ie_cp_1	OK
192.168.0.3	00-1B-1B-20-F2-6A	ET200SP	et200sp	OK
192.168.0.4	00-1F-F8-EF-50-F3	SINAMICS G120 CU240	drive_1	OK
192.168.0.5	00-1B-1B-48-BA-3C	SCALANCE X-200	switch_1	OK

4.2 PLC: IPC227D (WinAC RTX F, WinCC RT Advance)

Configure the IPC227D as in the figure below or adopt the configuration from the supplied “WinAC_RTX_V2” project.

Figure 4-3: IPC227D hardware configuration



The following setup has been configured in the IPC227D station:

Table 4-1: IPC227D Station

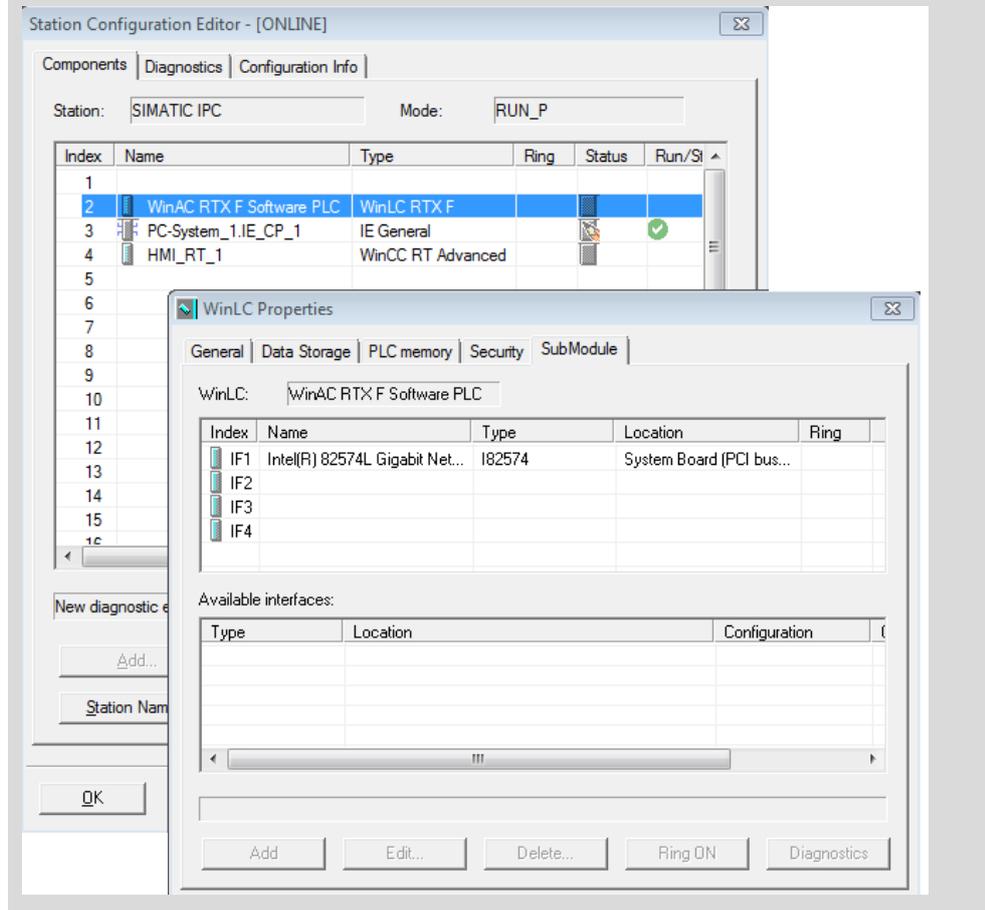
Slot	Module	Task
1	-	-
2	WinAC RTX F	PLC for controlling the application
	IE General	PROFINET communication with ET 200SP station, SINAMICS G120, database PC
3	IE General	PROFINET communication for visualization
4	WinCC Runtime Advanced	Visualization of the application

4 Configuration and Settings

4.2 PLC: IPC227D (WinAC RTX F, WinCC RT Advance)

Note

The identical setup must also be configured in the station configuration manager in IPC227D:



Further information is available in the manual of IPC227D:

<http://support.automation.siemens.com/WW/view/en/48958203/133300>

and in the manual of WinAC RTX F:

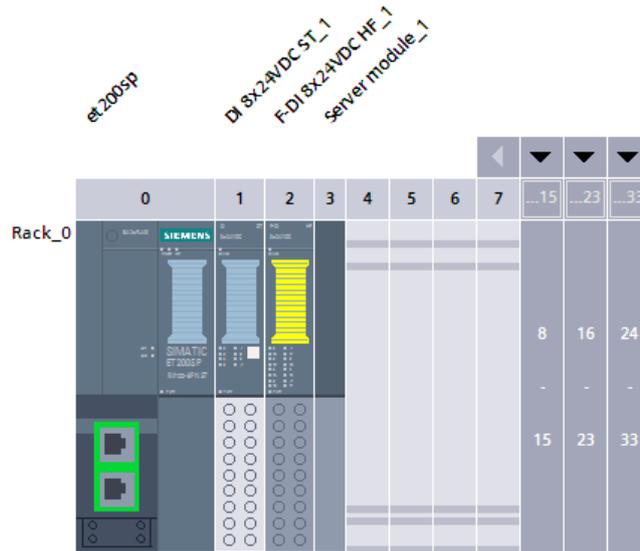
<http://support.automation.siemens.com/WW/view/en/37560771/133300>

and in the additional information:

<http://support.automation.siemens.com/WW/view/en/45993764>

4.3 Distributed I/Os: ET 200SP station

Figure 4-4: ET 200SP hardware configuration



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

Table 4-2: ET 200S Station

Slot	Module	Task
0	IM 155-6 PN (Firmware:V1.1)	Central processing unit: Communication with WinAC RTX
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:

<http://support.automation.siemens.com/WW/view/en/55679227/133300>

4.4 Drive: SINAMICS G120

4.4.1 Hardware configuration

Figure 4-5: SINAMICS G120 hardware configuration



Table 4-3: SINAMICS G120

Slot	Module	Task
1	CU240E-2 DP-F (Firmware V4.6)	Control module (central unit): Communication with WinAC RTX and controlling the motor
2	PM340 IP20 FSA U 240 0.74kW	Power unit

Further information is available in the manual of SINAMICS G120:

<http://support.automation.siemens.com/WW/view/en/22339653/133300>

4.4.2 WinAC RTX / SINAMICS G120 communication

For WinAC RTX 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:

<http://support.automation.siemens.com/WW/view/en/60140921>

4 Configuration and Settings

4.4 Drive: SINAMICS G120

4.4.3 PROFIsafe

Using PROFIsafe for drive and PLC requires configuring a PROFIsafe message frame.

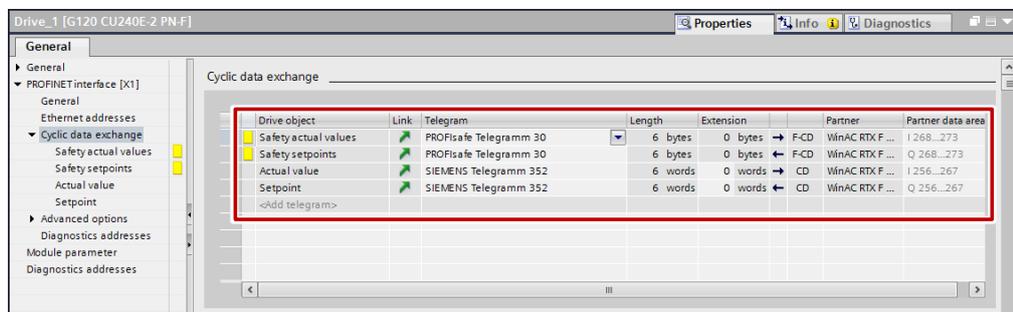
Further information is available in the Safety Integrated function manual SINAMICS G120, G120C and G120D.

<http://support.automation.siemens.com/WW/view/en/63035886>

4.4.4 Drive frames

The figure below contains the configured frames for the communication between WinAC RTX and SINAMICS G120.

Figure 4-6: Drive frames



Drive object	Link	Telegram	Length	Extension	Partner	Partner data area
Safety actual values	↗	PROFIsafe Telegramm 30	6 bytes	0 bytes →	F-CD WinAC RTX F...	I 268...273
Safety setpoints	↖	PROFIsafe Telegramm 30	6 bytes	0 bytes ←	F-CD WinAC RTX F...	Q 268...273
Actual value	↗	SIEMENS Telegramm 352	6 words	0 words →	CD WinAC RTX F...	I 256...267
Setpoint	↖	SIEMENS Telegramm 352	6 words	0 words ←	CD WinAC RTX F...	Q 256...267
<add telegram>						

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 4-7: SCALANCE X208 hardware configuration

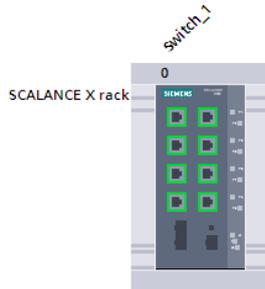
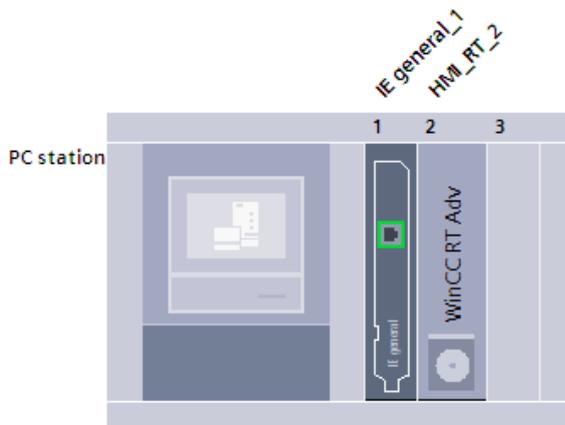


Table 4-4: SINAMICS G120

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

4.6 PC station: WinCC RT Advanced, Microsoft SQL DB

Figure 4-8: 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:

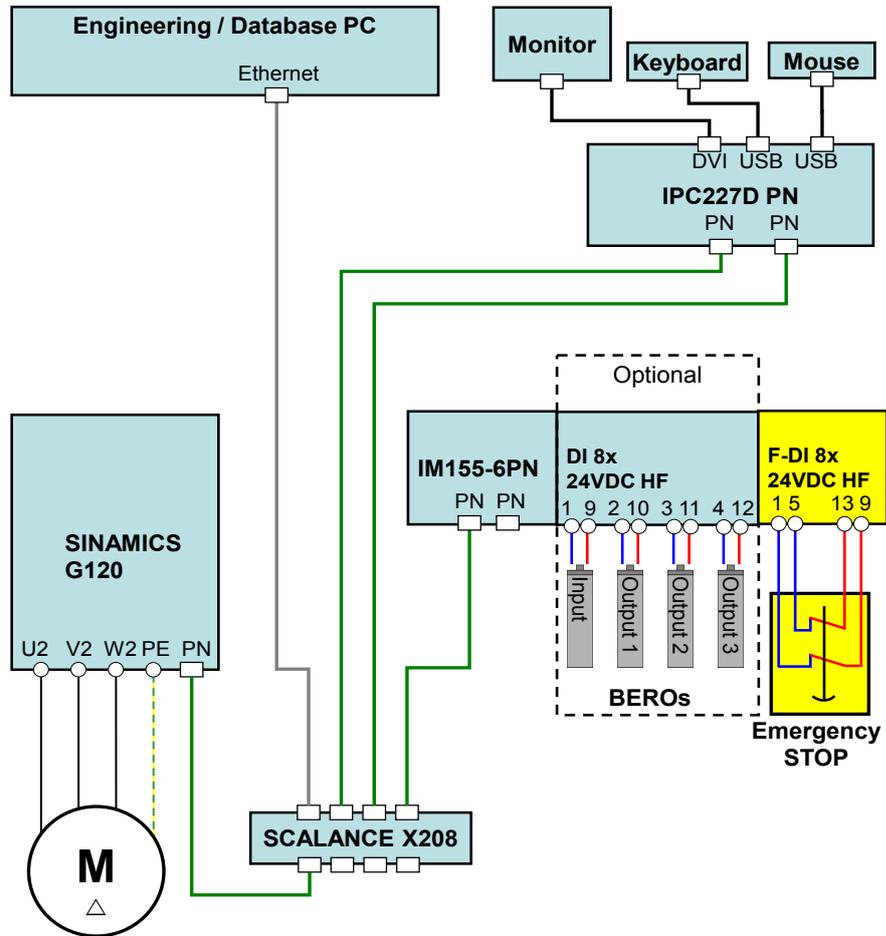
Table 4-5: PC Station

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 Runtime 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 V13	-
2.	STEP 7 Safety V13	-
3.	STEP 7 Safety V13 Update 1	Free download: http://support.automation.siemens.com/WW/view/en/95197647
4.	WinCC Advanced V13	-
5.	Startdrive V13 Update 1	Free download: http://support.automation.siemens.com/WW/view/en/68034568
6.	STEP 7, WinCC V13 Update 2	Free download: http://support.automation.siemens.com/WW/view/en/90466591
7.	WinCC RT Advanced V13	-
8.	Microsoft SQL Server Management Studio 2008 R2	Configuration the database Free download on the Microsoft Homepage

IPC227D

For the IPC227D you best use the preinstalled bundle with WinAC RTX F and HMI or install the following software.

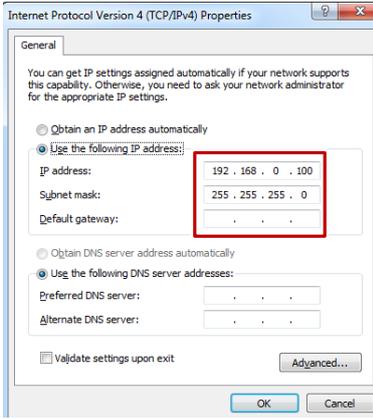
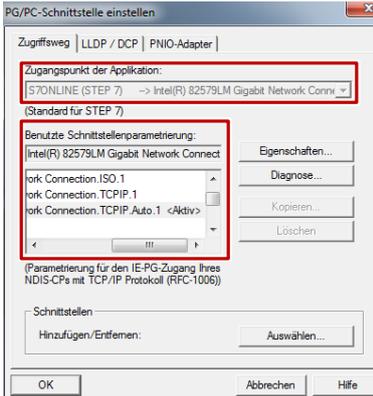
Table 5-2: Software installation IPC227D

No.	Action	Remarks
1.	WinAC RTX F 2010 SP1	Soft-SPS
2.	WinCC RT Advanced V13	Visualization
3.	SIMATIC NET V8.2 SP1	Information on the versions: http://support.automation.siemens.com/WW/view/en/36456189

5.3 Preparation for commissioning

5.3.1 Engineering / database PC: Interface

Table 5-3: Settings of the interfaces

No.	Action	Remarks
1.	Set the following Network addresses : IP address: 192.168.0.100 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 (STEP7)”	

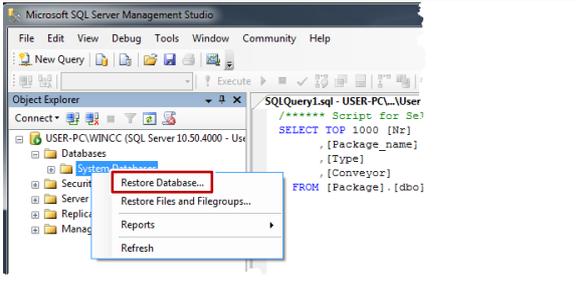
5.3.2 Engineering / database PC: MS SQL database

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”

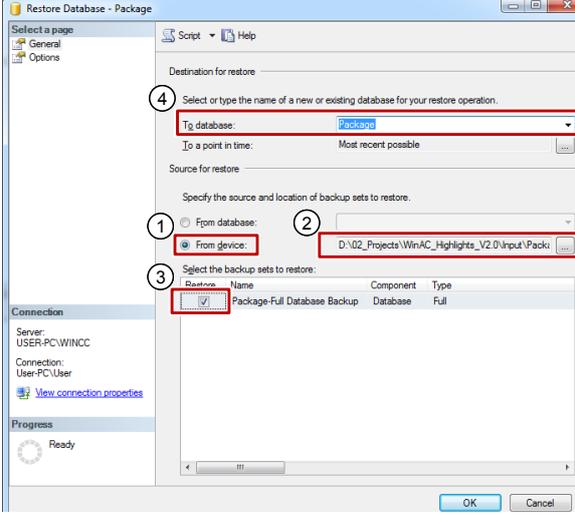
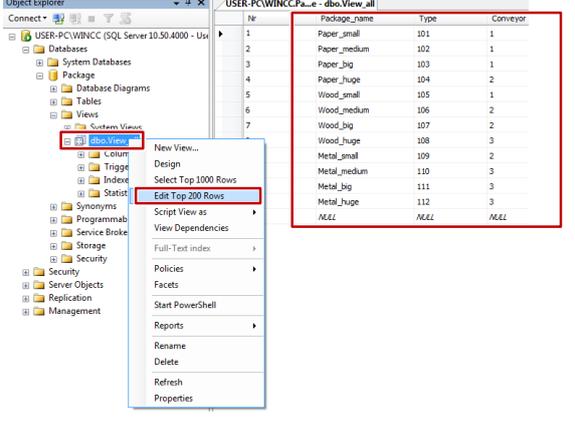
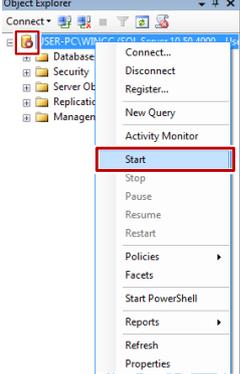
The example below illustrates how an “MS SQL database” is created with “Microsoft SQL Management Studio”.

Table 5-4: Creating an MS SQL database

No.	Action	Remarks
1.	Start the “Microsoft SQL Management Studio” on your PC. “Start > All Programs > Microsoft SQL Server 2008 R2 > SQL Server Management Studio”.	
2.	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”.	
3.	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. 	

5 Installation and Commissioning

5.3 Preparation for commissioning

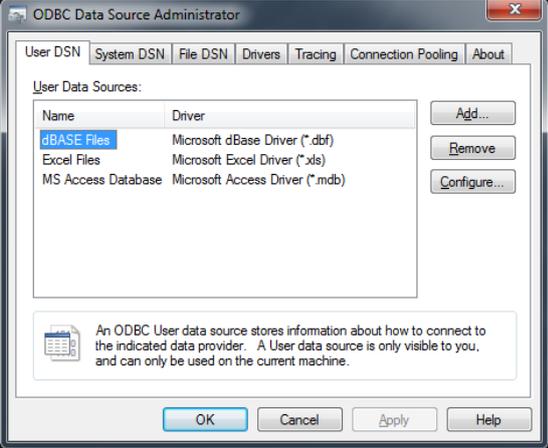
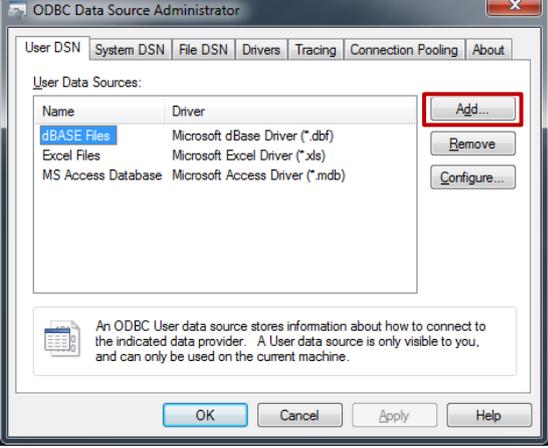
No.	Action	Remarks																																										
4.	<ol style="list-style-type: none"> 1. Select "From device:" 2. Enter the path to the "Package.bak" file. 3. Set the checkmark at "Restore" 4. Select "Package" at "To Database:" 5. Click on the "OK" button. 																																											
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 border="1" data-bbox="1093 869 1364 1086"> <thead> <tr> <th>Package_name</th> <th>Type</th> <th>Conveyor</th> </tr> </thead> <tbody> <tr><td>Paper_small</td><td>101</td><td>1</td></tr> <tr><td>Paper_medium</td><td>102</td><td>1</td></tr> <tr><td>Paper_big</td><td>103</td><td>1</td></tr> <tr><td>Paper_huge</td><td>104</td><td>2</td></tr> <tr><td>Wood_small</td><td>105</td><td>1</td></tr> <tr><td>Wood_medium</td><td>106</td><td>2</td></tr> <tr><td>Wood_big</td><td>107</td><td>2</td></tr> <tr><td>Wood_huge</td><td>108</td><td>3</td></tr> <tr><td>Metal_small</td><td>109</td><td>2</td></tr> <tr><td>Metal_medium</td><td>110</td><td>3</td></tr> <tr><td>Metal_big</td><td>111</td><td>3</td></tr> <tr><td>Metal_huge</td><td>112</td><td>3</td></tr> <tr><td>MEEL</td><td>MEEL</td><td>MEEL</td></tr> </tbody> </table>	Package_name	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	MEEL	MEEL	MEEL
Package_name	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																																										
MEEL	MEEL	MEEL																																										
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.

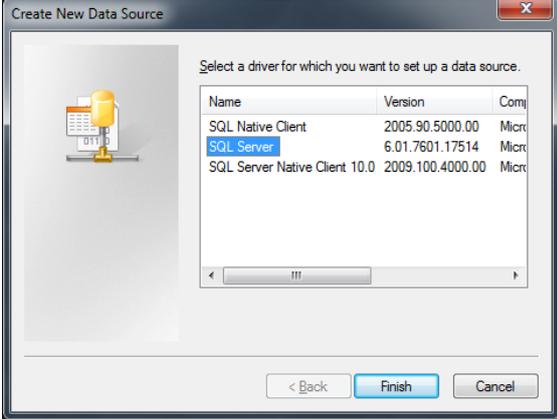
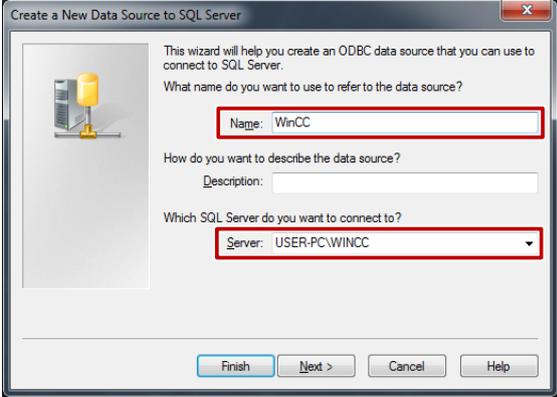
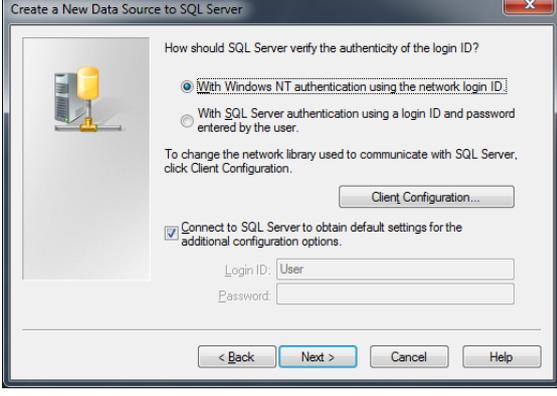
The ODBC setting is made on the database or the engineering PC.

Table 5-5: 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>	

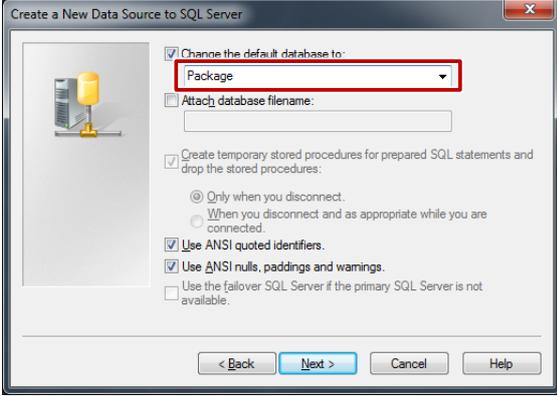
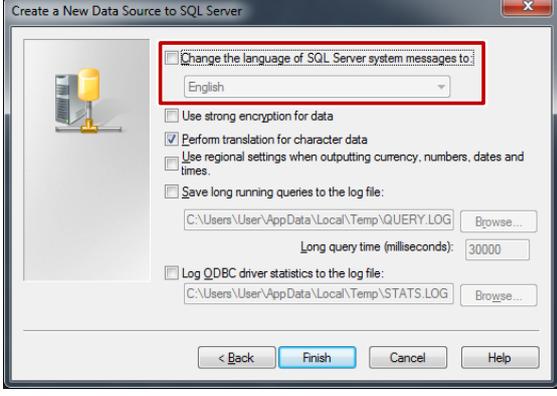
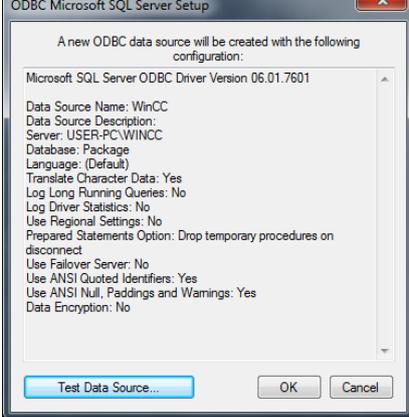
5 Installation and Commissioning

5.3 Preparation for commissioning

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 Runtime 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 Runtime Advanced.</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>	

5 Installation and Commissioning

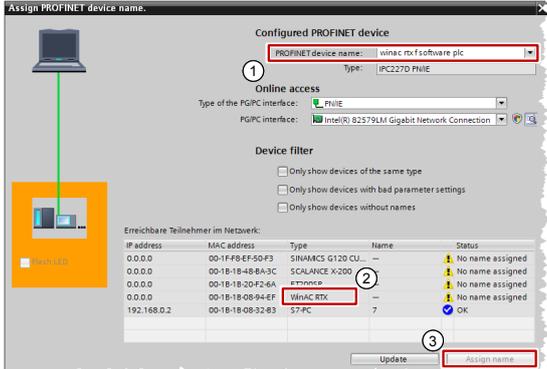
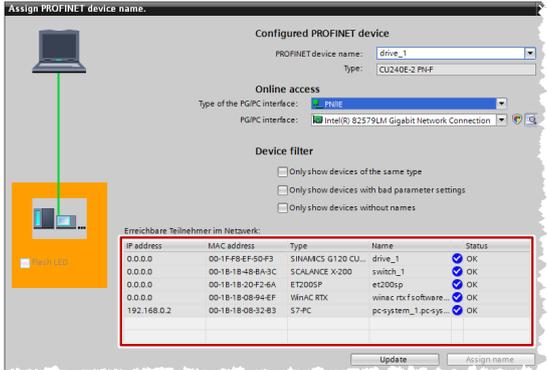
5.3 Preparation for commissioning

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 5-6: Instructions – PROFI-safe and PROFINET in the TIA Portal

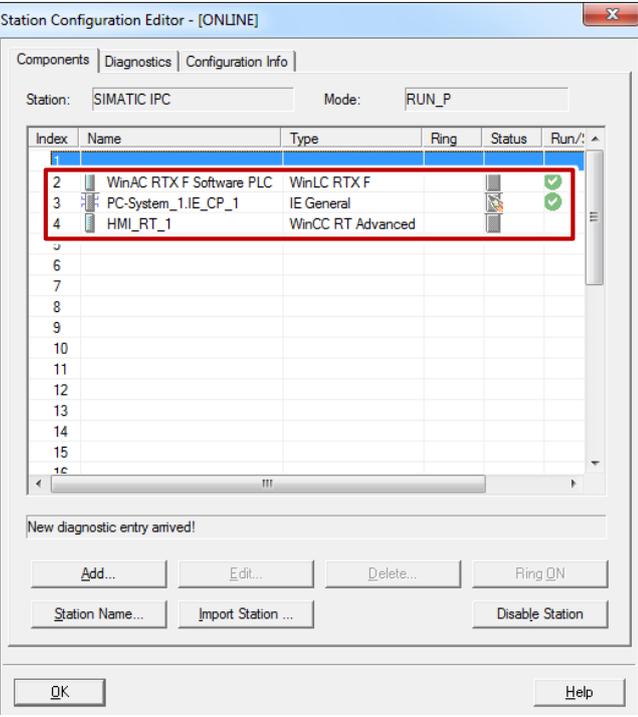
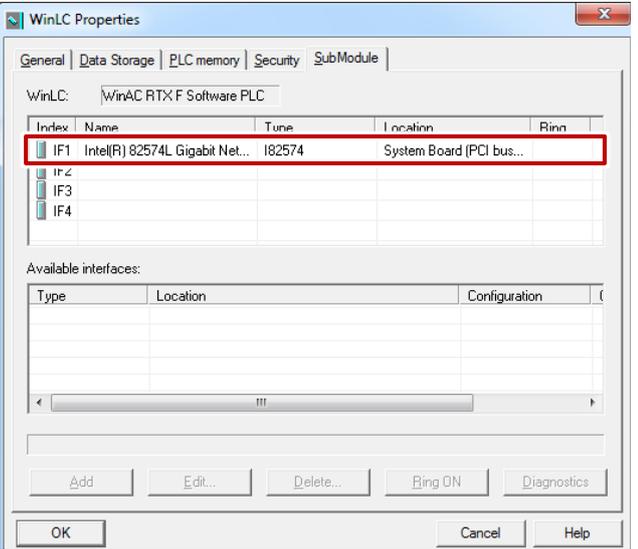
No.	Action	Remarks
1.	Start the TIA Portal and open the example project.	-
2.	Open " Devices & Network " and activate the " Network view ". Right-click on the PROFINET connection and select " Assign device name ".	
3.	In this window you assign the PROFINET device names to all of the devices. 1. Select 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 Installation and Commissioning

5.3 Preparation for commissioning

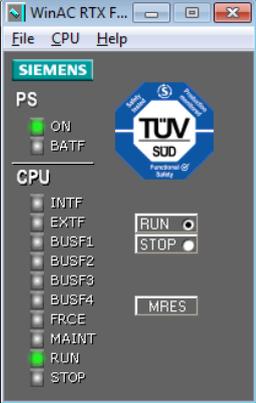
5.3.5 IPC227D: Station Configuration Editor

Table 5-7: Preparation with the “Station Configuration Editor”

No.	Action	Remarks
1.	<p>Open the “Station Configuration Editor” and configure the following slots:</p> <ol style="list-style-type: none"> 1. – 2. WinLC RTX F 3. IE General 4. WinCC RT Advanced 	
2.	<p>In the properties of WinLC you set the following “Sub modules”:</p> <p>IF1 Ethernet Network Card (This entry may vary depending on the hardware)</p>	

5 Installation and Commissioning

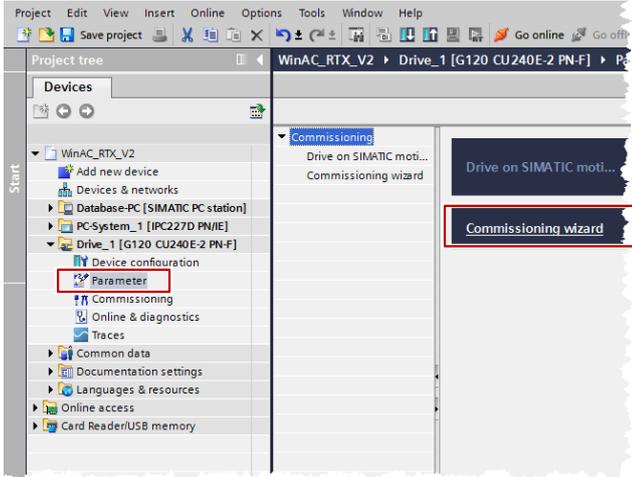
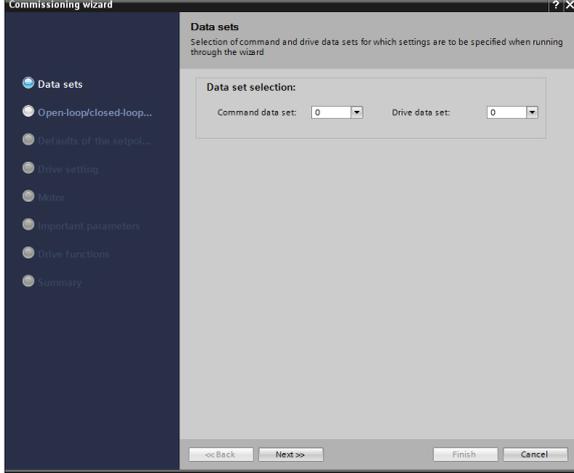
5.3 Preparation for commissioning

No.	Action	Remarks
3.	Close the “Station Configuration Editor” and start the WinLC RTX Controller .	
4.	Open the “WinCC Runtime Loader” and start the “Transfer”	
5.	WinCC Runtime can now be downloaded.	

5.3.6 SINAMICS G120 standard parameter configuration

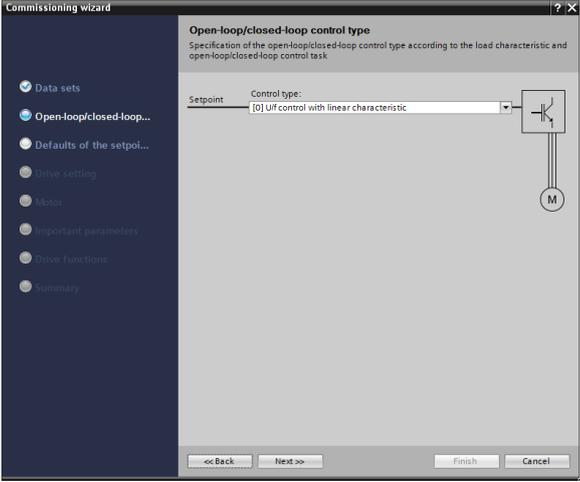
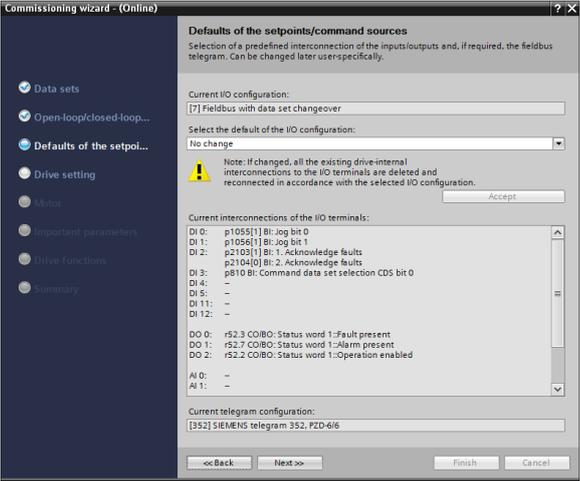
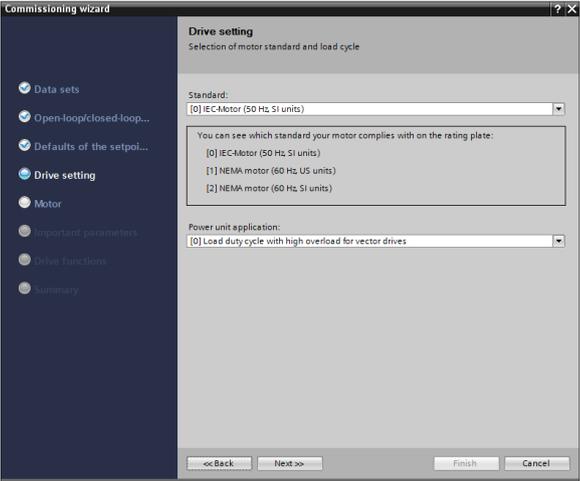
The following instruction needs not be performed since all standard parameters have already been set in the example project. It is only given for information purposes.

Table 5-8: Instruction - Standard parameters of SINAMICS G120

No.	Action	Remarks
1.	<p>In the project tree you navigate to “Drive_1 - Parameter”.</p> <p>Open the “Commissioning wizard”.</p>	
2.	<p>In the “Data sets” dialog you click on “Next”.</p>	

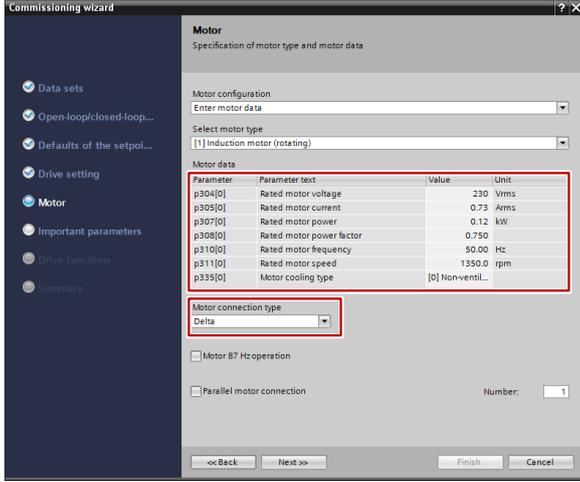
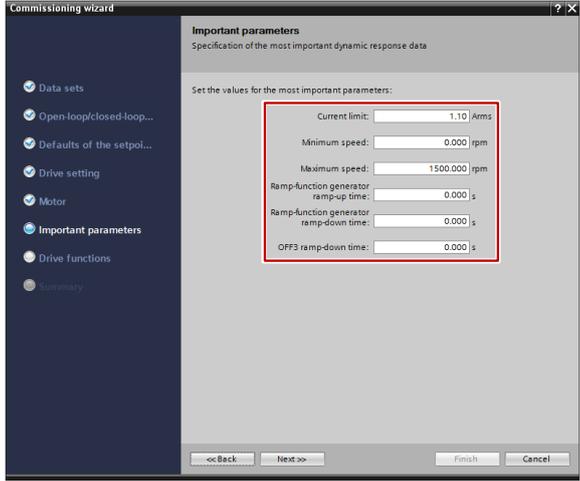
5 Installation and Commissioning

5.3 Preparation for commissioning

No.	Action	Remarks
3.	In the “ Open-loop/closed-loop control type ” you click on “ Next ”.	 <p>Commissioning wizard</p> <p>Open-loop/closed-loop control type Specification of the open-loop/closed-loop control type according to the load characteristic and open-loop/closed-loop control task</p> <p>Setpoint: [0] Uf control with linear characteristic</p> <p>Control type: [0] Uf control with linear characteristic</p> <p>Navigation: << Back, Next >>, Finish, Cancel</p>
4.	In the “ Defaults of the setpoints/command sources ” dialog you click on “ Next ”.	 <p>Commissioning wizard - (Online)</p> <p>Defaults of the setpoints/command sources Selection of a predefined interconnection of the inputs/outputs and, if required, the fieldbus telegram. Can be changed later userspecifically.</p> <p>Current I/O configuration: [7] Fieldbus with data set changeover</p> <p>Select the default of the I/O configuration: No change</p> <p>Note: If changed, all the existing drive-internal interconnections to the I/O terminals are deleted and reconnected in accordance with the selected I/O configuration.</p> <p>Current interconnections of the I/O terminals:</p> <ul style="list-style-type: none"> DI 0: p1056[1] Bit: Jog bit 0 DI 1: p1056[1] Bit: Jog bit 1 DI 2: p2103[1] Bit: 1: Acknowledge faults p2104[0] Bit: 2: Acknowledge faults DI 3: p810 Bit: Command data set selection CDS bit 0 DI 4: - DI 5: - DI 11: - DI 12: - <p>DO 0: r52.3 CO/BO: Status word 1:-Fault present DO 1: r52.7 CO/BO: Status word 1:-Alarm present DO 2: r52.2 CO/BO: Status word 1:-Operation enabled</p> <p>AI 0: - AI 1: -</p> <p>Current telegram configuration: [352] SIEMENS telegram 352, P2D-6/6</p> <p>Navigation: << Back, Next >>, Finish, Cancel</p>
5.	In the “ Drive settings ” dialog you click on “ Next ”.	 <p>Commissioning wizard</p> <p>Drive setting Selection of motor standard and load cycle</p> <p>Standard: [0] IEC-Motor (50 Hz, SI units)</p> <p>You can see which standard your motor complies with on the rating plate:</p> <ul style="list-style-type: none"> [0] IEC-Motor (50 Hz, SI units) [1] NEMA motor (60 Hz, US units) [2] NEMA motor (60 Hz, SI units) <p>Power unit application: [0] Load duty cycle with high overload for vector drives</p> <p>Navigation: << Back, Next >>, Finish, Cancel</p>

5 Installation and Commissioning

5.3 Preparation for commissioning

No.	Action	Remarks																																
6.	Set the motor data as in the screenshot and click on “Next” .	 <p>The screenshot shows the 'Motor' configuration dialog. The 'Motor data' table is as follows:</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Parameter text</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>p304[0]</td> <td>Rated motor voltage</td> <td>230</td> <td>Vrms</td> </tr> <tr> <td>p305[0]</td> <td>Rated motor current</td> <td>0.73</td> <td>Arms</td> </tr> <tr> <td>p307[0]</td> <td>Rated motor power</td> <td>0.12</td> <td>kW</td> </tr> <tr> <td>p308[0]</td> <td>Rated motor power factor</td> <td>0.750</td> <td></td> </tr> <tr> <td>p310[0]</td> <td>Rated motor frequency</td> <td>50.00</td> <td>Hz</td> </tr> <tr> <td>p311[0]</td> <td>Rated motor speed</td> <td>1350.0</td> <td>rpm</td> </tr> <tr> <td>p335[0]</td> <td>Motor cooling type</td> <td>[0] Non-ventil...</td> <td></td> </tr> </tbody> </table> <p>The 'Motor connection type' dropdown is set to 'Delta'.</p>	Parameter	Parameter text	Value	Unit	p304[0]	Rated motor voltage	230	Vrms	p305[0]	Rated motor current	0.73	Arms	p307[0]	Rated motor power	0.12	kW	p308[0]	Rated motor power factor	0.750		p310[0]	Rated motor frequency	50.00	Hz	p311[0]	Rated motor speed	1350.0	rpm	p335[0]	Motor cooling type	[0] Non-ventil...	
Parameter	Parameter text	Value	Unit																															
p304[0]	Rated motor voltage	230	Vrms																															
p305[0]	Rated motor current	0.73	Arms																															
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p308[0]	Rated motor power factor	0.750																																
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p311[0]	Rated motor speed	1350.0	rpm																															
p335[0]	Motor cooling type	[0] Non-ventil...																																
7.	Set the parameters as in the screenshot and click on “Next” .	 <p>The screenshot shows the 'Important parameters' dialog. The input fields are as follows:</p> <ul style="list-style-type: none"> Current limit: 1.10 Arms Minimum speed: 0.000 rpm Maximum speed: 1500.000 rpm Ramp-function generator ramp-up time: 0.000 s Ramp-function generator ramp-down time: 0.000 s OFF3 ramp-down time: 0.000 s 																																
8.	In the “Drive functions” dialog you click on “Next”	 <p>The screenshot shows the 'Drive functions' dialog. The 'Complete calculation' radio button is selected. A warning icon is present with the text: 'Includes the calculation of the motor, open-loop control and closed-loop control parameters depending on the entered motor data.'</p>																																

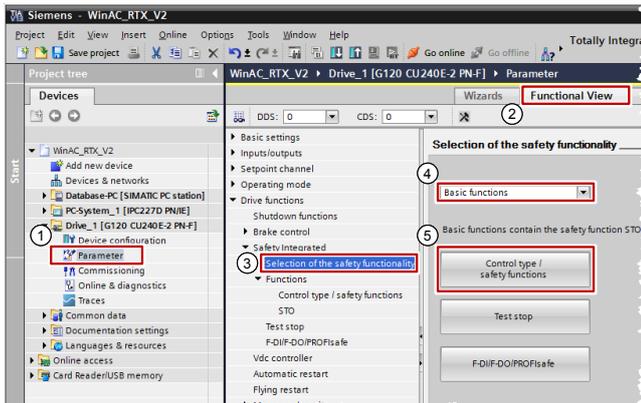
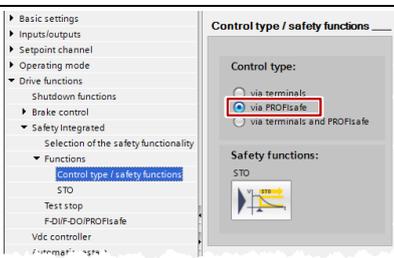
5 Installation and Commissioning

5.3 Preparation for commissioning

No.	Action	Remarks
9.	In the “ Summary ” dialog you click on “ Finish ”.	

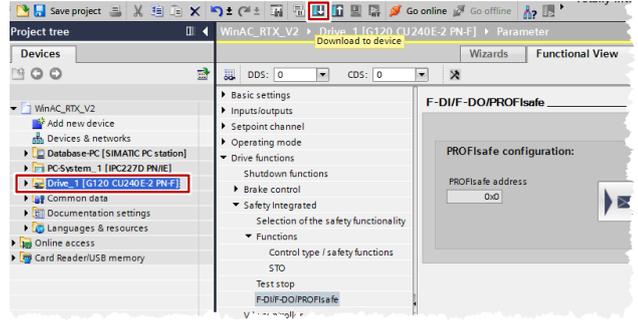
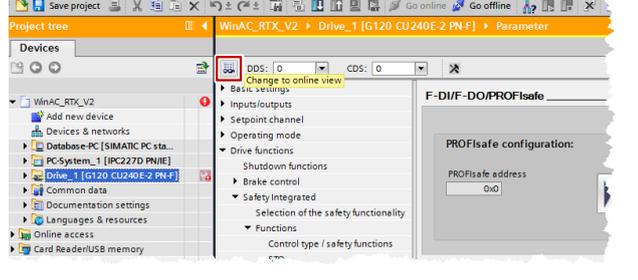
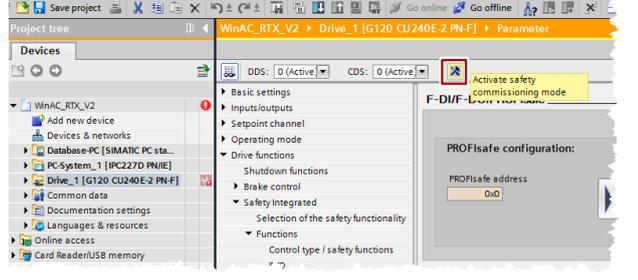
5.3.7 SINAMICS G120 safety parameter settings

Table 5-9: Instruction – Safety parameters of SINAMICS G120

No.	Action	Remarks
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>	

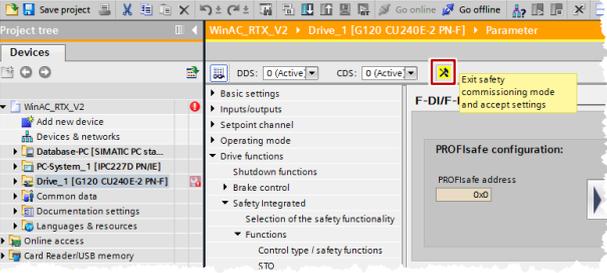
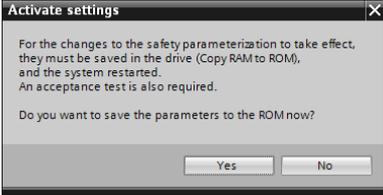
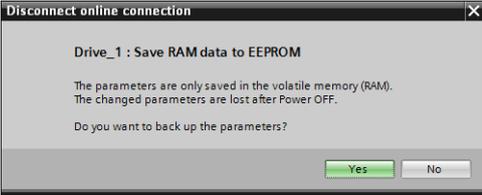
5 Installation and Commissioning

5.3 Preparation for commissioning

No.	Action	Remarks
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 “Change to Online View”.</p>	
6.	<p>Click on “Activate safety”.</p>	

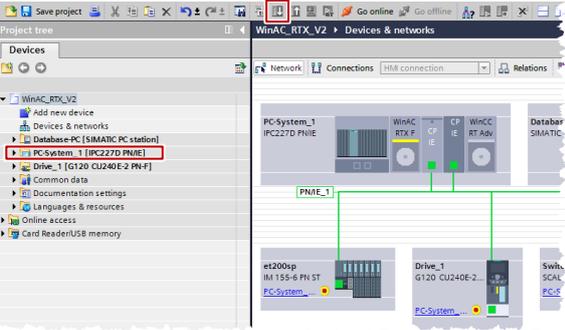
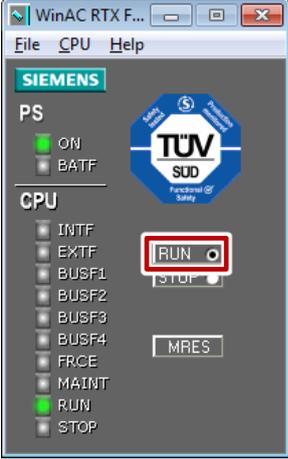
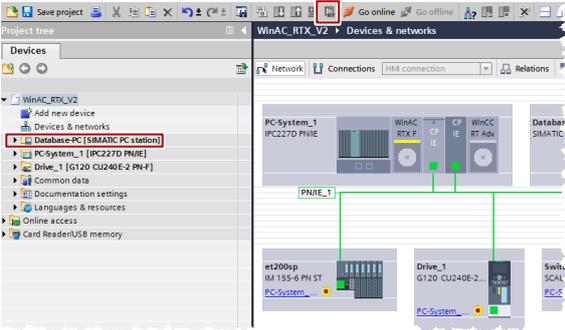
5 Installation and Commissioning

5.3 Preparation for commissioning

No.	Action	Remarks
7.	Enter the password. The default password is "0". Confirm the dialog with "OK".	
8.	Click on "Exit safety ...".	
9.	Confirm the dialog with "Yes".	
10.	Click on "Go offline".	-
11.	Confirm the dialog with "Yes".	
12.	Restart the drive by disconnecting and reconnecting the power supply.	-

5.4 Loading the project

Table 5-10: Loading the TIA Portal project onto the device

No.	Action	Remarks
1.	Open the “WinAC_RTX_V2” project with the TIA Portal.	
2.	Load “PC-System_1” into the device.	
3.	Set WinAC RTX to operating state “RUN”.	
4.	Start the Runtime of the “Database_PC”.	

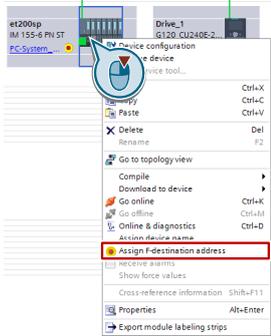
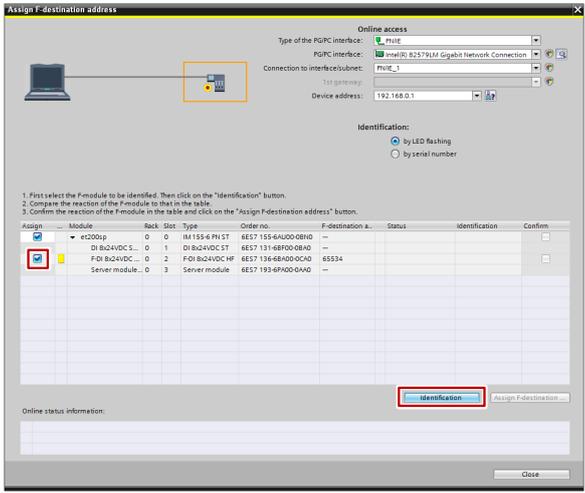
5.5 ET 200SP: Assign F-destination address for F-DI module

All F modules for ET 200SP have an F address which is transferred directly to the F module via the online connection. Proceed as follows.

Note

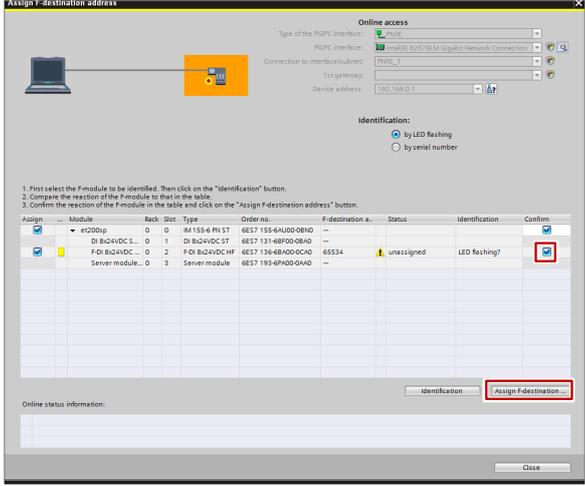
The F destination address is only assigned after the project has been downloaded.

Table 5-11: Instruction – Assigning an F-destination address

No.	Action	Remarks
1.	Open “ Devices & Network ” and activate the “ Network view ”. Right-click on the ET 200SP station and select “ Assign F-address ”.	
2.	Set the checkbox of the F-DI module and click on “ Identification ”.	

5 Installation and Commissioning

5.5 ET 200SP: Assign F-destination address for F-DI module

No.	Action	Remarks
3.	Activate the checkbox in “Confirm” and click on “Assign F-destination...” .	 <p>The screenshot shows the 'Assign F-destination address' dialog box. It includes fields for 'Online access' (Type of PG/PC interface, PG/PC interface, Connection to interface/subnet, IP gateway, Device address) and 'Identification' options (by LED flashing, by serial number). Below this is a table with columns: Assign, Module, Rack, Slot, Type, Order no., F-destination a., Status, Identification, and Confirm. The table contains three rows: 'DI B24VDC...', 'F-DI B24VDC...', and 'Server module...'. The 'Confirm' checkbox for the 'F-DI B24VDC...' row is checked. At the bottom right, the 'Assign F-destination...' button is highlighted with a red box.</p>
4.	Confirm the dialog and close the window by pressing “Close” .	-

6 Operating the Application

6.1 Preconditions

6.1.1 IPC227D (WinAC RTX F and WinCC RT Advance)

- The TIA Portal project must be loaded in IPC227D.
- WinAC RTX F must be in “RUN” mode.
- WinCC RT Advanced must be started.

6.1.2 SINAMICS G120

To be able to control the drive via WinAC RTX F, 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 Runtime 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 (IPC227D)

The entire application can be controlled by the visualization on WinCC Runtime 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:

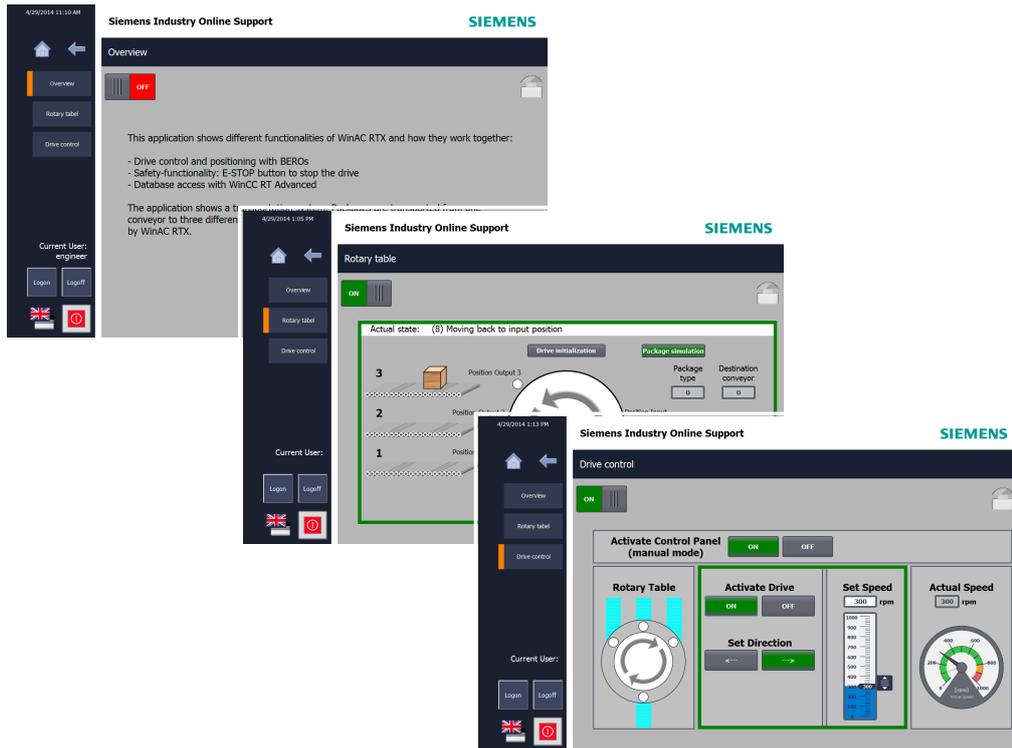
1. **Change language:** English / German
2. The **“Application example”** button takes you to the application.
3. The **“Siemens Industry Online Support”** button takes you to general information on the Siemens Industry Support.

6.2.2 Example Project

The following three HMI screens exist:

- “Overview”
- “Rotary table”
- “Drive control”

Figure 6-2: HMI screens of the application

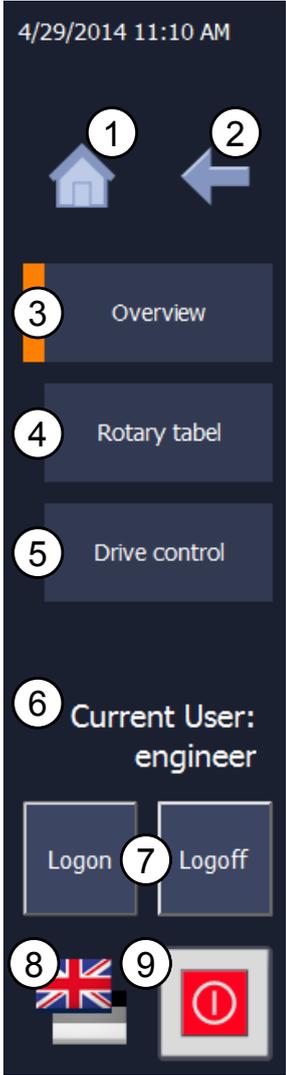


A detailed description is given on the next page.

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"> 1. The “House” icon takes you to the start screen. 2. The “Back” icon takes you to the previous screen. 3. The “Overview” icon takes you to the overview screen. 4. “Rotary table” takes you to the control screen of the rotary table. 5. “Drive control” takes you to the control screen of the drive. 6. “Current User” shows the currently logged on user. 7. “Logon” and “Logoff” is used for logging on and off. 8. The “Flag” icon is used for changing the language of the HMI interface (English / German) 9. The “Stop Runtime” icon is used for terminating the HMI interface. 	 <p>The screenshot shows a vertical navigation bar on a dark background. At the top, it displays the date and time '4/29/2014 11:10 AM'. Below this are several icons: a house icon (1), a left-pointing arrow icon (2), a blue bar with the text 'Overview' (3), a button labeled 'Rotary tabel' (4), a button labeled 'Drive control' (5), the text 'Current User: engineer' (6), two buttons labeled 'Logon' (7) and 'Logoff', a flag icon (8), and a red square with a white 'i' icon (9).</p>

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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

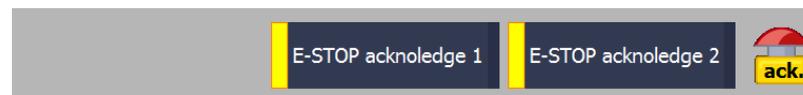
If the emergency-stop button is pressed, the emergency-stop symbol is blinking.

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:

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

Note

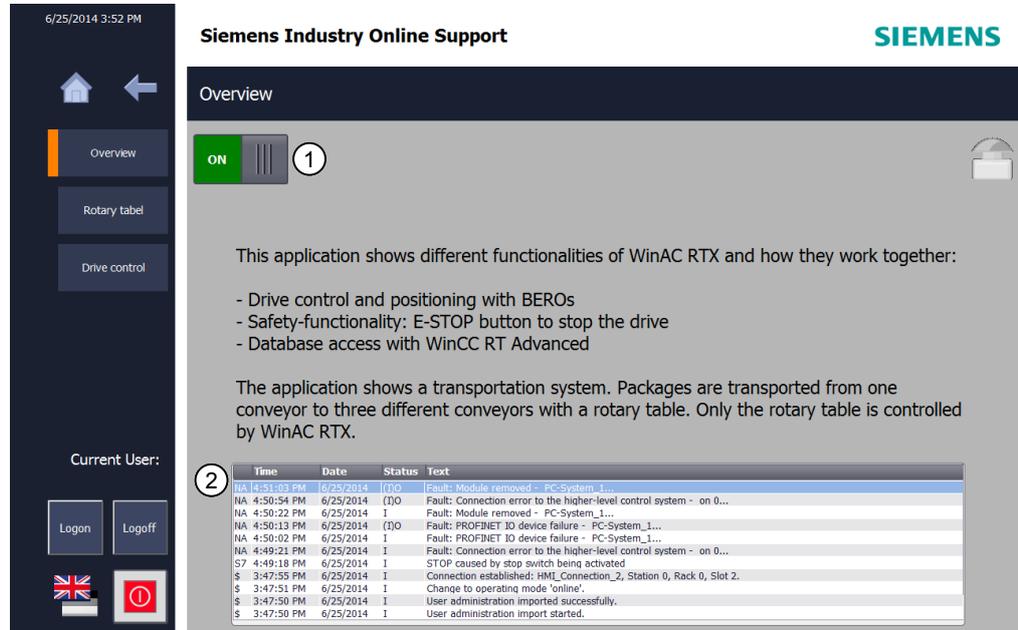
The emergency-stop acknowledgement is performed in the STEP 7 program via the “Ack_OP” block. For security reasons, this sequential acknowledgement is performed.

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

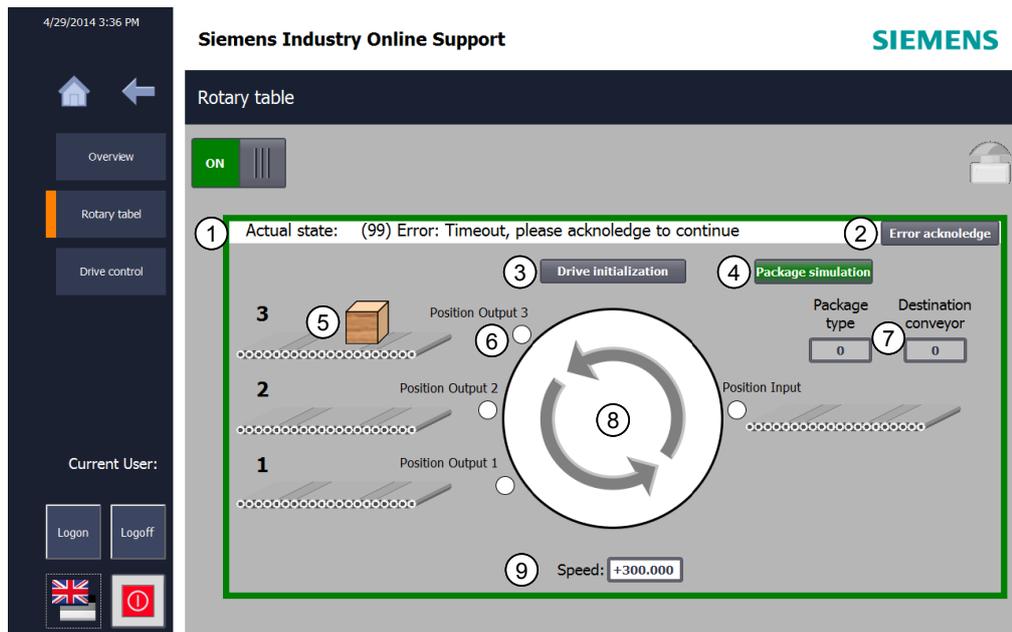


Table 6-2

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

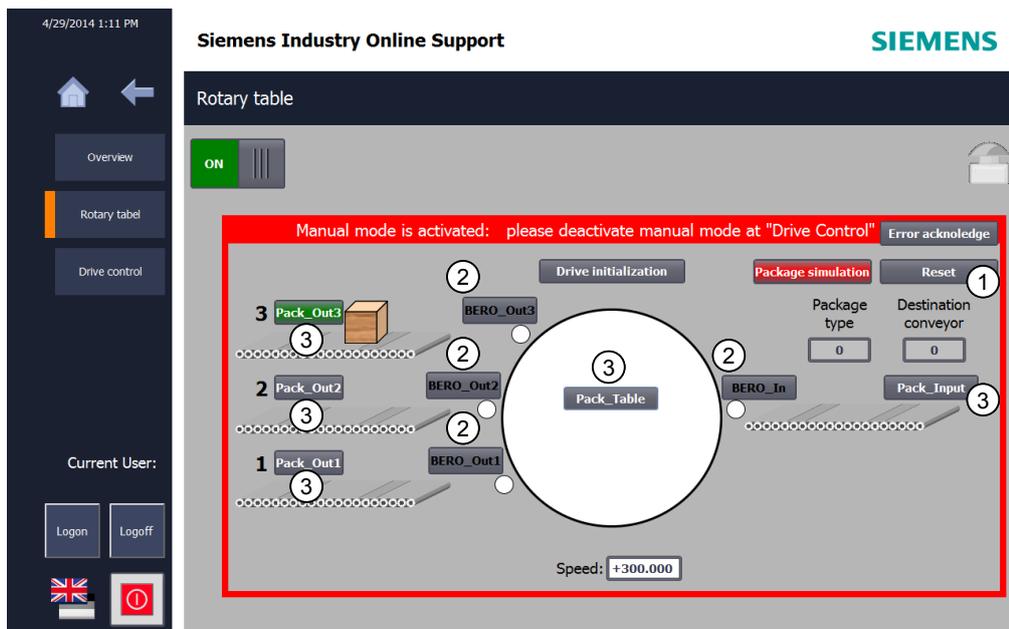


Table 6-3: Rotary table legend (deactivated package control)

No.	Description
1	Use the “ Package 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

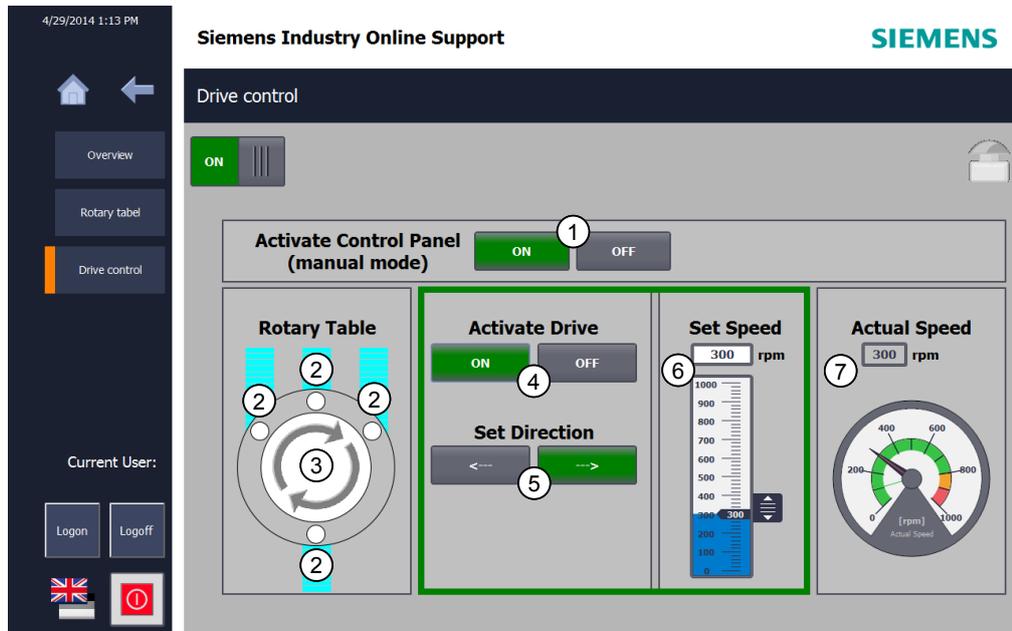


Table 6-4: Drive control legend

No.	Description
1	Button for activating/deactivating the manual mode
2	Display of the current rotation direction
3	Display of the BERO signals
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 IPC227D (see [Operation via WinCC Runtime Advance \(IPC227D\)](#)).

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:

<http://support.automation.siemens.com/WW/view/en/61883659>

Note

For the database PC, the same user administration is programmed as for WinCC Runtime in IPC227D.

Logon:

User: engineer

Password: 12345

The user is then automatically logged off after 1 minute.

7 Internet Link Specifications

This list is by no means complete and only presents a selection of suitable information.

Table 7-1

	Topic	Title
\1\	This application example	http://support.automation.siemens.com/WW/view/en/62521281
\2\	SINAMICS G: Speed control of a G120 using S7-300/400 (TIA-Portal) with PROFINET/PROFIBUS and Safety Integrated (not via PROFIsafe) and HMI	http://support.automation.siemens.com/WW/view/en/60140921
\3\	Safety Integrated Function Manual, SINAMICS G120, G120C and G120D	http://support.automation.siemens.com/WW/view/en/70235827
\4\	SIMATIC Safety - Getting Started	http://support.automation.siemens.com/WW/view/en/49972838
\5\	How do you log tags in an SQL database and read them out again with WinCC flexible?	http://support.automation.siemens.com/WW/view/en/24677043
\6\	How do you access an SQL database in WinCC Runtime Advanced using a script?	http://support.automation.siemens.com/WW/view/en/61883659
\7\	PC-based automation: Connection of Databases via open Interfaces Using OPC-Client, Programmed in C# .net	http://support.automation.siemens.com/WW/view/en/21576581
\8\	WinAC Link to an SQL Database	http://support.automation.siemens.com/WW/view/en/70984996
\9\	Security guideline for PC-based automation systems with Windows embedded operating systems.	http://support.automation.siemens.com/WW/view/en/55390879
\10\	PC-based automation An Overview of the Most Important Documents and Links	http://support.automation.siemens.com/WW/view/en/78025910
\11\	SIMATIC WinAC ODK (Open Development Kit)	http://www.automation.siemens.com/mcms/programmable-logic-controller/en/software-plc/simatic-winac-odk/Pages/Default.aspx
\12\	PC-based automation Reporting Process Values via E-Mail with WinAC RTX and WinAC ODK	http://support.automation.siemens.com/WW/view/en/20987360
\13\	WinAC Target: Add-on for MATLAB/Simulink for integrating and calling MATLAB/Simulink models using STEP 7 and WinAC ODK	http://support.automation.siemens.com/WW/view/en/56969417
\14\	PC-based automation applications	http://support.automation.siemens.com/WW/view/en/34677186/136000&csplfrm=10&cssw=0&csbinh=8
\15\	TIA Selection Tool	http://www.siemens.com/tia-selection-tool
\16\	SIMATIC IPC227D Bundles	http://support.automation.siemens.com/WW/view/en/63033667/133300
\17\	ET 200SP	http://support.automation.siemens.com/WW/view/en/84133942
\18\	SINAMICS G120 CU240E-2 PN-F	http://support.automation.siemens.com/WW/view/en/56649766
\19\	SINAMICS G120 INTELLIG.OPERAT.PANEL IOP	http://support.automation.siemens.com/WW/view/en/34797512
\20\	SINAMICS G120 INTELLIG.OPERAT.PANEL IOP	http://support.automation.siemens.com/WW/view/en/18689247/133200

7 Internet Link Specifications

	Topic	Title
\21\	Pepperl+Fuchs Homepage	http://www.pepperl-fuchs.com
\22\	TIA Portal - An Overview of the Most Important Documents and Links- Controller	http://support.automation.siemens.com/WW/view/en/65601780
\23\	SINAMICS Startdrive	http://support.automation.siemens.com/WW/view/en/68034568
\24\	SIMATIC Industrial PC SIMATIC IPC227D	http://support.automation.siemens.com/WW/view/en/51924060
\25\	Microsoft User Account Control Step-by-Step Guide	http://technet.microsoft.com/us-en/library/cc709691(v=ws.10).aspx
\26\	Microsoft Group Policy	http://technet.microsoft.com/us-en/windowsserver/bb310732.aspx
\27\	Manuals: SIMATIC WinAC RTX F	http://support.automation.siemens.com/WW/view/en/37560771/133300
\28\	SIMATIC Windows Automation Center RTX Supplementary information on WinAC RTX (F) 2010 SP1	http://support.automation.siemens.com/WW/view/en/45993764
\29\	Updates for STEP 7 V13 and WinCC V13	http://support.automation.siemens.com/WW/view/en/90466591
\30\	What is the connection between version designations of the SIMATIC NET PC software?	http://support.automation.siemens.com/WW/view/en/36456189

8 History

Table 8-1

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