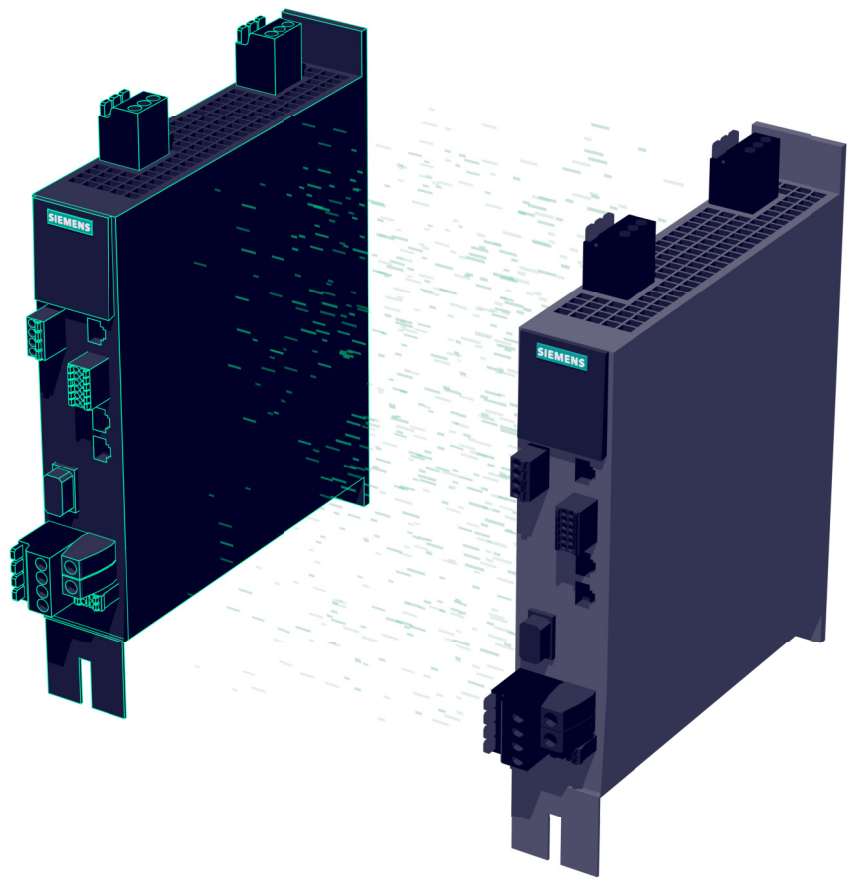




Edition

10/2025

FUNCTION MANUAL

DriveSim Engineer

Digital Drivetrain

For SINAMICS converters
www.siemens.com

SIEMENS

DriveSim Engineer

Function Manual

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Edition 10/2025, valid for version 2.1

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.
--

WARNING
--

indicates that death or severe personal injury may result if proper precautions are not taken.

CAUTION
--

indicates that minor personal injury can result if proper precautions are not taken.
--

NOTICE

indicates that property damage can result if proper precautions are not taken.
--

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified persons are those who, because of their training and experience, are familiar with the installation, assembly, commissioning, operation, decommissioning and disassembly of the product and can recognize risks and avoid possible hazards.

Proper use of Siemens products

Note the following:

WARNING
--

Siemens products may only be used for the application described in the catalog and the associated usage information. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.
--

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Disclaimer of Liability

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

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Introduction

1.1 About Digital Drivetrain

Description

The product portfolio of Digital Drivetrain includes drive simulation solutions and efficient engineering tools as well as the simple connection of drives to the corresponding platforms, smart analytics and drive system services.

More information

You can find more information on the Internet: Digital Drivetrain (<https://www.siemens.com/global/en/products/drives/digital-drivetrain.html>)

1.2 About this manual

1.2.1 Content

Description

The Function Manual provides comprehensive guidance on the DriveSim Engineer software product and its integration with the Siemens drive commissioning tool, Startdrive. In addition to introducing the software's functionality, it offers step-by-step instructions for installing, repairing, and upgrading DriveSim Engineer. The manual also details the process of creating and commissioning a DriveSim instance after activating DriveSim TIA Portal Add-In within Startdrive.

To illustrate possible application areas for our products, typical use cases are listed in this product documentation and in the online help. These are purely exemplary and do not constitute a statement on the suitability of the respective product for applications in specific individual cases. Unless explicitly contractually agreed, Siemens assumes no liability for such suitability. Suitability for a particular application in specific individual cases must be assessed by the user, taking into account all technical, legal, and other requirements on a case-by-case basis. Always observe the descriptions of the technical properties and the relevant constraints of the respective product contained in the product documentation.

1.2.2 Standard scope

The functions of the system as delivered can only be found in the order documents.

Further functions may be executable in the system, which are not explained in this documentation. However, there is no entitlement to these functions in the case of a new delivery or service.

This documentation does not contain all detailed information on all types of the product. Furthermore, this documentation cannot take into consideration every conceivable type of installation, operation and service/maintenance.

The machine manufacturer must document any additions or modifications they make to the product themselves.

1.2.3 Target group

Description

This manual is intended for persons who perform different tasks in the drive environment. The intended target groups include, but are not limited to the following:

- Configuration engineers
- Technologists (of machine manufacturers)
- Commissioning engineers (for systems or machines)
- Programmers

1.2.4 What's new

Description

What's new in DriveSim Engineer V2.1

The following features are new for DriveSim Engineer V2.1:

- Ability to simulate the following converters in one DriveSim Engineer version:
 - SINAMICS G220 converter (firmware V6.2 and V6.4)
 - SINAMICS S210 (New) converter (firmware V6.4)
- Ability to create instances with holding brakes
- Enhanced load settings configuration capabilities:
 - Ability to adjust load settings for a DriveSim instance without the need to re-create the instance
 - Ability to import load settings designed in the TIA Selection Tool
 - Easier two-mass oscillator configuration with calculation assistance
- Ability to simulate signals from the encoders connected to option modules
- Support for Startdrive V20 SP1 and SIMATIC S7-PLCSIM Advanced V7

1.2.5 Websites of third-party companies

This document may contain hyperlinks to third-party websites. Siemens is not responsible for and shall not be liable for these websites and their content. Siemens has no control over the information which appears on these websites and is not responsible for the content and information provided there. The user bears the risk for their use.

1.3 Service and Support

You can find additional information about the product:

- via ID link
- using the Siemens Industry Online Support
 - Website: SIOS (<https://support.industry.siemens.com/cs/ww/en/>)
 - App Industry Online Support (for Apple iOS and Android)

Product-specific information via ID link

The QR code on your product and on the product packaging contains the ID link.

ID link is a globally unique identifier according to IEC 61406-1.

You can use the ID link to access product data, manuals, Declarations of Conformity, certificates and other information about your product.



Figure 1-1 QR code with ID link included

The ID link is characterized by a frame with a black corner at the bottom right.

Content of Siemens Online Support

- Product support
- Global forum for information and best practice sharing between users and specialists
- Local contact persons via the contact person database (→ Contact)
- Product information
- FAQs (frequently asked questions)
- Application examples
- Manuals
- Downloads

- Compatibility tool
- Newsletter with product selection
- Catalogs/brochures
- Certificates

1.4 Important product information

1.4.1 Open-source software (OSS)

Description

The installation package of DriveSim Engineer includes the license conditions and copyright information of the open-source software components used by SINAMICS DriveSim Core, DriveSim TIA Portal Add-In, and DriveSim Manager. You can find the ReadMe_OSS file under the installation path of DriveSim Engineer: "%ProgramFiles%\Siemens\Automation".

The license conditions and copyright information of the open-source software components used by the SINAMICS device are saved on the device itself. You can download license and copyright information onto your PC via the support page of the integrated Web server.

1.4.2 Compliance with the General Data Protection Regulation

Description

Siemens complies with the principles of the **General Data Protection Regulation (EU)**, in particular the principle of data minimization ("privacy by design"). For this SINAMICS product, this means:

- **User management and access control (UMAC)**

The product processes or stores the following personal data:

- Login data for user management and access control:
User name, group, password, role, rights.

The data for user management and access control is stored in the converter and optionally on a memory card.

- **Support data (optional)**

For optimal support in service cases, the end user or machine manufacturer (OEM) can optionally store contact data (header, email address, telephone number, homepage) in the converter.

If this data is created, the author must give thought to data protection consent for this optional data. Siemens takes no responsibility for this data.

This support contact data can be read and is freely accessible in, for example, the user interface as well as in the diagnostics report. This data is not encrypted.

This data is used for user management and access control (UMAC) and for the support function. The storage of this data is appropriate and limited to what is necessary, as it is essential to identify the authorized operators and service contact.

The personal data is also available as part of the backup system to ensure fast recovery of use cases.

The above-mentioned personal data cannot be stored anonymously or pseudonymized, as it serves the purpose of identifying the operating personnel. The anonymization or pseudonymization, e.g. of the login data, must be performed using suitable login names and contact data by the plant/machine operator.

Our product does not provide any functions for automatically deleting personal data. Individual UMAC data can be deleted manually by authorized personnel as soon as this is deemed recommended/required.

Fundamental safety instructions

2.1 General safety instructions

 WARNING
Danger to life if the safety instructions and residual risks are not observed If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur. • Observe the safety instructions given in the hardware documentation. • Consider the residual risks for the risk evaluation.

 WARNING
Malfunctions of the machine as a result of incorrect or changed parameter settings As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death. • Protect the parameterization against unauthorized access. • Handle possible malfunctions by taking suitable measures, e.g. EMERGENCY STOP or EMERGENCY OFF.

2.2 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment, or any eventuality which may arise. Application examples do not represent customer-specific solutions, but merely serve to provide assistance with typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

2.3 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

2.3 Cybersecurity information

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit
<https://www.siemens.com/cybersecurity-industry>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
<https://new.siemens.com/cert>.

Further information is provided on the Internet:

Configuration Manual Industrial Cybersecurity (<https://support.industry.siemens.com/cs/ww/en/view/109975311>)



WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a state-of-the-art, integrated industrial cybersecurity concept for the installation or machine.
- Make sure that you include all installed products in the integrated industrial cybersecurity concept.
- Protect files stored on exchangeable storage media from malicious software with suitable protection measures, e.g. virus scanners.
- Carefully check all cybersecurity-related settings once commissioning has been completed.

Additional safety instructions

3.1 Protection of sensitive data in DriveSim Engineer projects

NOTICE

Data manipulation due to access without user authentication
--

DriveSim Engineer does not provide any user authentication mechanisms for its control elements. This may lead to, for example, manipulation of the parameters stored in the DriveSim Engineer project, potentially resulting in data loss or damage to equipment.
--

- | |
|--|
| <ul style="list-style-type: none"> • Prevent unauthorized persons from accessing the DriveSim Engineer software and project. • Observe the user authentication instructions in the customer documentation for the relevant converters. |
|--|

Note

Extraction of sensitive data for unprotected transfer of projects

The parameters of the SINAMICS drives contain your know-how and sensitive configuration data as well as the configuration for protection against modifications for some drive functions like Safety Integrated. After an upload from the device this configuration is stored in the project. If a project is transferred unencrypted via unprotected channels (e.g. email) or stored in an unencrypted form (e.g. in cloud storage), unauthorized persons can extract this configuration from the project files.

- Activate the project protection in SINAMICS Startdrive to encrypt all drive parameters in the project.
 - Encrypt the exported files and project files with some other software.
 - To prevent access to relevant data memory by unauthorized persons, implement access restrictions (e.g. password protection) and also observe the warning instructions described in Chapter "Unsafe configuration after importing and downloading files from unknown or untrustworthy sources (Page 14)".
-

3.2 Unsafe configuration after importing and downloading files from unknown or untrustworthy sources

WARNING

Unsafe configuration after importing and downloading files from unknown or untrustworthy sources

If you use project files or files (e.g. from EPLAN, Microsoft Excel) from unknown or untrustworthy sources or import such files into your DriveSim Engineer project, inconsistencies in the project or malfunctions may result. If the appropriate safety precautions are not observed, any untested changes in the system can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

If project files or imported files are transferred unsigned via unprotected channels (e.g. email) or stored without access protection (e.g. in cloud memories or local memories), unauthorized persons can change the system configuration, thus causing unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Only use projects and files from sources that you know to be trustworthy.
- Check whether the machine behavior with the changed system configuration meets your expectations and perform an acceptance test of the Safety Integrated Functions on the real devices to ensure and document the safe operation of the system.

3.3 Authenticity and integrity through digital signatures

Overview

To ensure the authenticity and integrity of the DriveSim Engineer software package, the DriveSim Engineer-specific .dll and .exe files in the package are digitally signed by Siemens with a certificate issued by DigiCert. You can verify the digital signatures in Windows Explorer or by third-party software tools that are included in the software allow-list.

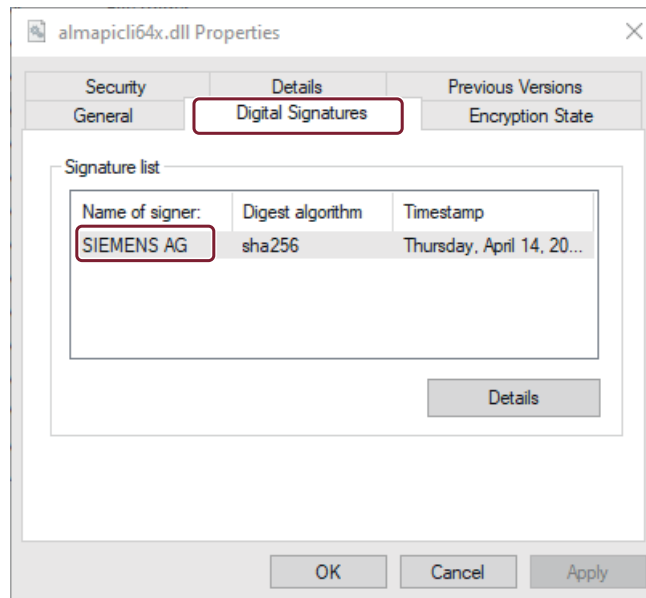
Requirement

You have downloaded the DriveSim Engineer software package.

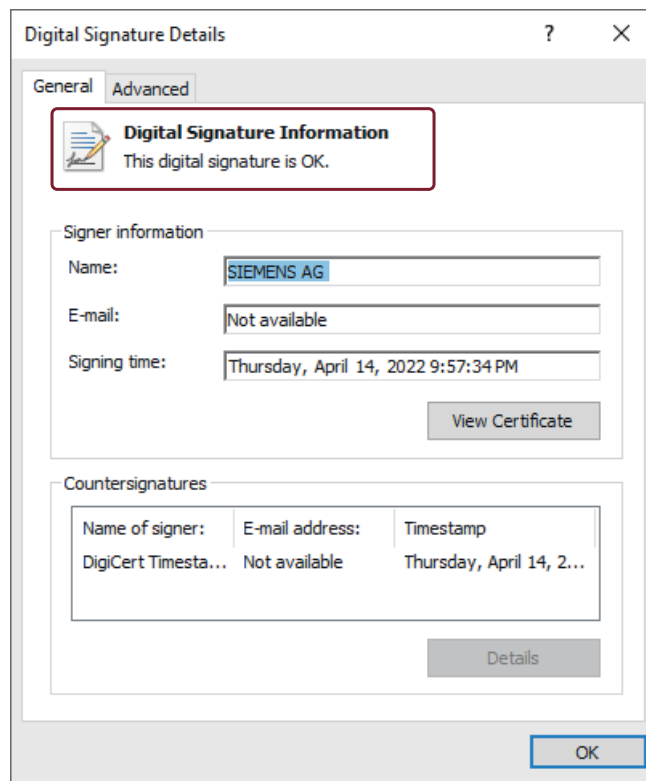
Procedure

Proceed as follows to verify the digital signature of DriveSim Engineer files:

1. In Windows Explorer, select the DriveSim Engineer file to be verified and check its properties.
2. View the digital signature of the file. The file must contain the digital signature "Siemens AG".



3. Double-click the signature to view detailed information.



3.4 Log files

Overview

DriveSim Engineer generates encrypted log files for internal troubleshooting.

Description of function

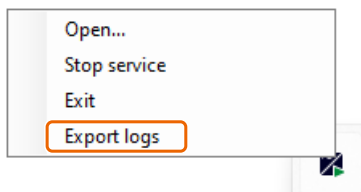
The log files contain the following information:

- Settings of the DriveSim instance
- Environmental variables for controlling the interaction of the DriveSim Engineer components
- Troubleshooting information collected during the ramp-up, operation, and ramp-down of the DriveSim instance
- Setup information

If DriveSim Engineer stops working properly, Siemens recommends that you send the log files to Product Support (Page 7).

You can get the log files with either of the following methods:

- Navigate to the following directories:
 - %ProgramData%\Siemens\Automation\DriveSim Engineer
 - %ProgramData%\Siemens\Automation\SinamicsWinHost\Logs
- In the shortcut menu of the DriveSim Manager tray application, select "Export logs" and save the DriveSimLogs.zip file to your computer



3.5 Ports and protocols

Description of function

The following protocols and services are used for communication:

Name	Port number	(2) Link layer (4) Transport layer	Function	Description
http Hypertext Transfer Protocol	8080 ¹⁾	(4) TCP	Hypertext transfer protocol	http is used for the communication with the CU-internal Web server. http is open in the delivery state and cannot be deactivated. The respective settings in the engineer tools have no effect on DriveSim Engineer.
https Secure Hypertext Transfer Protocol	8443 ¹⁾	(4) TCP	Secure Hypertext transfer protocol	https is used for the communication with the CU-internal Web server via Transport Layer Security (TLS). https is open in the delivery state and cannot be deactivated. The respective settings in the engineer tools have no effect on DriveSim Engineer.
RFC 1006	102	(4) TCP	S7 communication	Communication to the drive unit via Ethernet/PROFINET for commissioning and diagnostic purposes.
ISO on TCP (according to RFC 1006)		(4) TCP	ISO-on-TCP protocol	ISO on TCP (according to RFC 1006) is used for the message-oriented data exchange to a remote CPU, WinAC, or devices of other suppliers. Communication with ES, HMI, etc. ISO on TCP is open in the delivery state and is always required.
Internal protocol	5188	(4) TCP	Server/incoming	Communication with commissioning tools for downloading project data.
ALM	4410	(4) TCP	License service	This service provides the complete functionality for software licenses and is used by both the Automation License Manager as well as all license-related software products.
PROFIdrive	34964	(4) UDP	Data set communication	Establishment of communication to the drive unit via Ethernet/PROFINET for commissioning and diagnostic purposes.
PROFIdrive	49152 ... 65535	(4) UDP	Data set communication	Communication to the drive unit via Ethernet/PROFINET for commissioning and diagnostic purposes.
Reserved		(4) TCP (4) UDP	-	Dynamic port area that is used for the active connection endpoint if the application does not specify the local port.
DriveSim Manager	28734	(4) TCP	Server/incoming	Default port for the communication between the DriveSim TIA Portal Add-In and the Web API of the DriveSim Manager.
DriveSim Manager service	5001	(4) TCP	Remote Procedure Call	Communication between the DriveSim Manager tray application and service.

¹⁾ When the port is used by another application, DriveSim Engineer uses the next available port for the communication.

3.6 Guidelines for secure operation and account management

Description

Observe the following guidelines when you use DriveSim Engineer:

- DriveSim TIA Portal Add-In and the DriveSim Manager tray application are executed with the privileges of the local user.
- The DriveSim Manager service and the DriveSim instances run with the system privileges of the LocalSystem account. It's the default configuration and cannot be changed.
- Local administrator rights are required to manage the DriveSim Manager service, DriveSim instances, and the generated data.
For example, the DriveSim Manager service runs automatically upon system startup. To stop or restart the service, you need to log on as local administrator.
- The Web API of the DriveSim Manager does not support client authentication in the current version; therefore, it is accessible to all local users without any form of authentication. Remote access to the Web API of the DriveSim Manager is blocked for all users.

Web API access verification

To verify that the Web API is restricted only to local access, follow the steps below:

1. Conduct a local access test.

On the local computer where DriveSim Engineer is running, open a Web browser and enter the API address of DriveSim Manager (default address for local access: <https://drivesim-manager.local:28734/DriveSimManager>) . A successful response as shown below confirms that local access is successful.

Service

This is a Windows® Communication Foundation service.

Metadata publishing for this service is currently disabled.

2. Conduct a remote access test.

From a separate remote computer, open a Web browser and enter the API address that includes the IP address of the local computer where DriveSim Engineer is running (<https://<IP address of the local computer running DriveSim Engineer>:28734/DriveSimManager>). A connection failure prompt confirms that the remote access is restricted.

Only if the local access test succeeds and the remote access test fails, can you confirm that the Web API of DriveSim Manager is restricted only to local access.

Note that the port number 28734 is the default one, but it can be changed.

3.7 Security events

Description

DriveSim Engineer does not generate any security events in the Windows operating system.

You can open Windows "Event Viewer" and navigate to "Windows Logs" in the left pane of the window to view events generated for DriveSim Engineer.

Functionality

4.1 Overview

Overview

DriveSim Engineer is a Windows-based simulation program that provides a virtual simulation of supported SINAMICS drive systems by using a digital-twin approach. It is integrated with TIA Portal (SINAMICS Startdrive) and provides advanced customization and detail functions to quickly simulate different operating conditions and scenarios. DriveSim Engineer additionally supports interaction with PLC simulation software SIMATIC S7-PLCSIM Advanced to simulate PLC behavior with the virtual drive.

Simulation instances created with DriveSim Engineer are drive instances (DriveSim instances), and those created with SIMATIC S7-PLCSIM Advanced are known as PLC instances.

Requirement

Required software

- TIA Portal V20, with TIA Openness installed
- Commissioning tool "Startdrive" (V20 or V20 SP1)
- Automation License Manager (V6.0 or later)
- DriveSim Engineer License (article number for one-year license: 9SV1210-3AA00-0AA0)
- DriveSim Engineer V2.1 setup package, which includes the following items:
 - DriveSim Engineer V2.1 bundled software:
 - SINAMICS DriveSim Core V6.2
 - SINAMICS DriveSim Core V6.4
 - DriveSim Manager V2.1
 - DriveSim TIA Portal Add-In V2.1
 - .NET runtimes V8.0.8
- SIMATIC S7-PLCSIM Advanced (V6 Upd1 or V7), required only if you want to perform commissioning with a virtual PLC

Supported devices

DriveSim Engineer V2.1 supports the following drive systems only:

- SINAMICS S210 (New) drive system with firmware version 6.4
- SINAMICS G220 drive systems with firmware versions 6.2 and 6.4

4.1 Overview

Drive system	SINAMICS G220	SINAMICS S210 (New)
Applicable DriveSim Core	• DriveSim Core V6.2 • DriveSim Core V6.4	DriveSim Core V6.4
Converter	• SINAMICS G220 converter (6SL4112-0... and 6SL4113-0...), firmware version 6.2 • SINAMICS G220 converter (6SL4112-0... and 6SL4113-0...), firmware version 6.4*	SINAMICS S210 (New) converter (6SL5...), firmware version 6.4
Motor	• Siemens induction motors 1PC1, 1PH8 • Siemens reluctance motors 1FP1, 1FP3, 1PH8 • Innomotics synchronous motors 1FZ1, 1FZ3 • Innomotics induction motors 1LE1, 2KJ3	Siemens synchronous motors 1FS2, 1FK2, 1FT2
Encoder	• DRIVE-CLiQ encoder • HTL/TTL encoder • SIN/COS encoder • SSI encoder • Resolver*	DRIVE-CLiQ encoder
Option module	• OM-DQ • OM-IloT • OM-SMT • OM-ENC* • OM-AIO* • OM-DIO*	Not applicable
Communications module	• CM-PN* • CM-DP* • CM-RS485*	Not applicable
Other components	Voltage Sensing Module VSM10*	Not applicable

: Items with an asterisk ("") are supported only by DriveSim Core V6.4.

Note

Each DriveSim Core version only supports drive systems with matching firmware versions.

- To simulate the S210 (New) drive system with firmware version 6.1, use DriveSim Engineer V1.0 or V1.2 with DriveSim Core V6.1. Note that DriveSim Core V6.1 is included only in the DriveSim Engineer V1.0 installation package.

More information can be found in DriveSim Engineer Function Manual, Edition 05/2024, valid for versions 1.0 and 1.2 (<https://support.industry.siemens.com/cs/us/en/view/109975701>).

Note

DriveSim Engineer allows the creation of instances that include the following option modules but does not simulate the functionalities of these modules:

- OM-IIoT
- OM-SMT
- OM-AIO
- OM-DIO

More information can be found in chapter "Simplifications of physics parts (Page 23)".

Description of function

DriveSim Engineer provides digital twins of simulated SINAMICS drive systems.

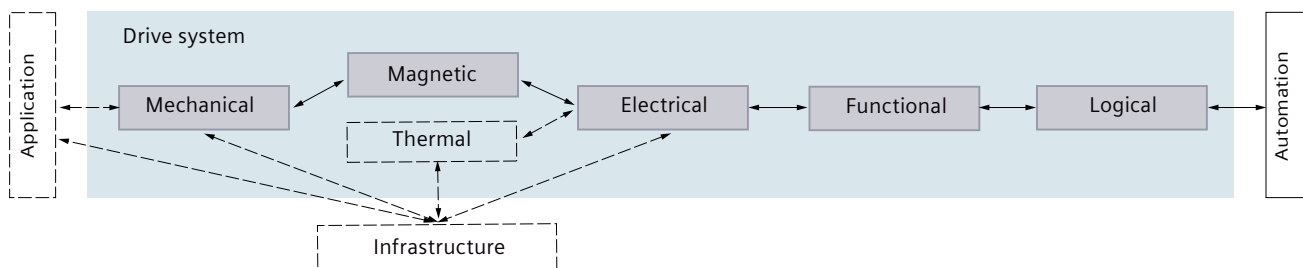


Figure 4-1 DriveSim Engineer function overview

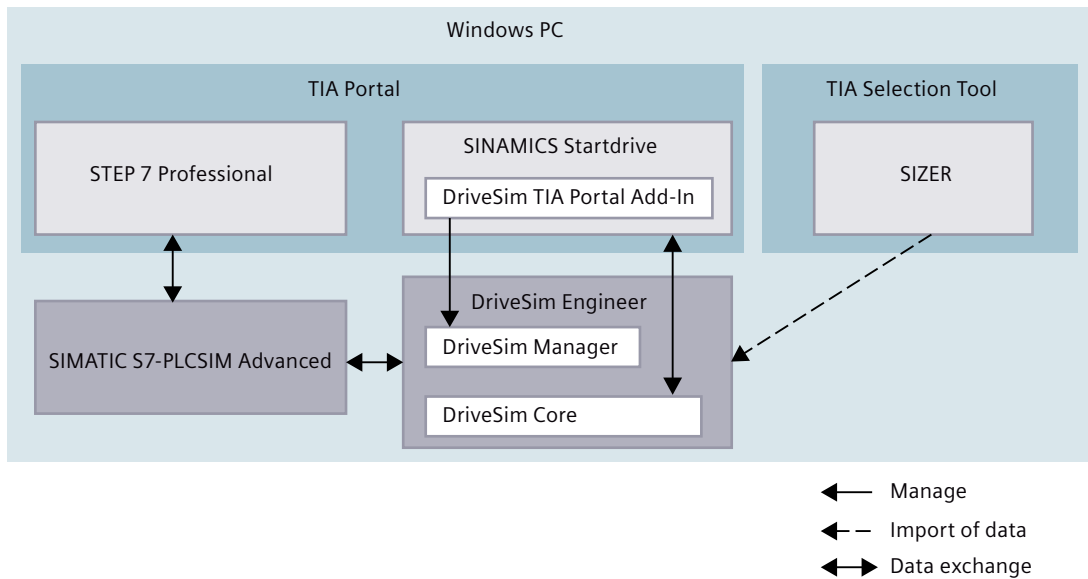
- **Application:** environment element, reflecting the mechanical application driven by the drive system. The interaction is established via elements of the mechanical domain such as torque, speed, and position. The interaction with external machines is not supported by this model; however, DriveSim Engineer offers a configurable internal load model for the simulation of mechanical load.
- **Infrastructure:** environment element, reflecting real effects and objects such as power supply, cooling medium, vibration, and electrical applications. The interaction with external infrastructure is not supported by this model; however, DriveSim Engineer offers an internal supply model for the essential functionality of power supply and infeed.
- **Mechanical:** physics model, covering the physics domain of mechanical features (such as motor speed)
- **Thermal:** physics model, covering the thermal domain of the drive system (such as temperature and heat flow). In the real system, the thermal domain interacts with other domains. For example, its interaction with the environment reflects the ambient temperature and the heat exchange of the cooling medium. The thermal domain is not supported by the current DriveSim Engineer version; therefore, its interaction with other domains is not covered in the model.
- **Electrical and magnetic:** physics model, covering the physics domain of electrical and magnetic features (such as current and fluxes)
- **Functional:** control loop with setpoint channels and monitoring and diagnostics features

- Logical: signal interconnections and periphery connections (such as the interconnection of digital inputs)
- Automation: environment element, representing the PLC and other higher-level controls and usually communicating with the drive system via fieldbus.

DriveSim Engineer includes the following three components:

- **SINAMICS DriveSim Core**
SINAMICS DriveSim Core is a component inside DriveSim Engineer and does the simulation of the SINAMICS drive system.
- **DriveSim TIA Portal Add-In**
DriveSim TIA Portal Add-In enables SINAMICS DriveSim Core to be integrated in Startdrive in the form of a Startdrive add-in.
- **DriveSim Manager**
DriveSim Manager is a stand-alone Windows program for managing all DriveSim instances.

The following figure shows how these three components of DriveSim Engineer interact with other software.



Example

DriveSim Engineer has the following typical use cases:

- Validation of drive features before real device selection
- Virtual commissioning of a drive
- Virtual demonstration of drive features
- Diagnostics of problems in customer projects
- Validation of user-defined pages for SINAMICS Web server

More information

For more information about downloading the required software, see Chapter "Downloading installation packages (Page 30)".

For more information about DriveSim Manager, see Chapter "Managing DriveSim instances with DriveSim Manager (Page 59)".

4.2 Range of validity

Note

Range of validity

The DriveSim Engineer model is based on the original firmware of the SINAMICS drives and therefore inherits their features; however, some restrictions exist in the current release, limiting the set of usable features. This will change in the future versions of DriveSim Engineer.

4.2.1 Simplifications of physics parts

Description

Boundary conditions of DriveSim Engineer

The drive system model of DriveSim Engineer is based on the following environmental conditions:

- Ambient temperature: -20 °C to +40 °C
- Installation altitude: ≤ 1000 m
- Relative humidity: $\leq 55\%$ at 40 °C
- Concentration of oxygen in the atmosphere: typically 21%

Simplification of the power supply model

The mains supply voltage, the infeed voltage, and the DC link voltage for the drive are assumed to be constant in the model and the actual voltage depends on the device type and configuration. The effects of supply voltage fluctuations on the drive, the effects of drive performance on the supply voltage, the resistance of cables, or the effects of the Motor Module load on the DC link voltage are not considered in the model. This means that the model only shows the ideal behavior and some limitations of the actual drive system do not apply to the DriveSim instance. For instance, the ramp-down operation of the DriveSim instance is faster than that observed in the physical drive system.

Simplification of the drive model

The component data that DriveSim Engineer uses to create and validate a drive configuration comes from product catalogs and specific customer specifications; therefore, the model does not cover the manufacturing tolerances, the status of electronic components (for example,

the saturation of inductors and IGBT valves), and the wear and tear of physical components (for example, the motor tolerance data). To increase the control quality of drive control, Siemens recommends that you perform drive optimization on real devices after the drive configuration, creation, and validation with DriveSim Engineer.

Thermal domain of the drive

Drive features enabled by temperature sensors are not covered by the model of DriveSim Engineer.

Connection of external components including option modules

DriveSim Engineer does not support the simulation of external components (for example, external contactors and braking resistors) and therefore cannot correctly simulate all drive features depending on these components.

In the case of the G220 converter model, option modules are configurable; however, their signals and functions are not covered by the model. The only exception to this limitation is the option modules connected to encoders. The encoder signals are utilized in the simulation.

Encoder characteristics

DriveSim Engineer supports the simulation of signals from the encoder, including those connected to the option modules; however, it cannot simulate specific encoder properties, such as the quality of encoder signals.

Magnetic motor model

DriveSim Engineer supports the magnetic model of the bare motor but does not simulate the magnetic effects of other motor components (for example, motor holding brake). The motor characteristics model is valid for operation at around nominal operating points, with the temperature of motor winding at 20 °C.

The magnetic model uses technical data defined based on the motor's article number. The simulation accuracy depends on the motor type. Generally for permanent magnet synchronous motors used with the SINAMICS S210 (New) converter, consider a 10% variance in simulation accuracy to allow for the manufacturing tolerance of the motor and the magnetization of the permanent magnets. For motors used with the SINAMICS G220 converter, the model does not account for the manufacturing tolerance of the motor and the inductance of connected cables, and during simulation these factors cannot be compensated for through motor data identification at standstill or with rotating measurements as they would in actual scenarios; therefore, the variance in simulation accuracy can be up to 40%. Future versions of DriveSim Engineer will reduce the variance.

In addition, the model assumes that the temperature of the motor winding is 20 °C. If the actual temperature of the motor winding is not 20 °C, the real current consumption may differ due to a deviating winding resistance.

Mechanical model for the motor and motor load

DriveSim Engineer supports the simulation of the motor and motor load based on the following two load models:

- A load characteristics-based model
You can specify the load torque as either a constant value or a function of the motor speed. For all newly created instances, the load characteristics-based model is enabled by default.
- A two-mass oscillator model

The used model is determined by the parameterization of the instance load settings in DriveSim Manager.

4.2.2 Restrictions with software features

Description

Simulation of unsupported functions and devices

DriveSim Engineer does not support the simulation of the following features:

- Basic positioner (EPOS) function
- PROFIsafe configuration
- Parallel connection of motors
- Second encoder
- Encoder gear ratio
- Expansion rack for option modules
- Telegrams other than 105 when used with SIMATIC S7-PLCSIM Advanced to simulate the connection between S210 (New) drives and S7-1500 CPUs
- Connection to motors and encoders not supported by corresponding DriveSim Cores
For the list of devices supported by each DriveSim Core version, see chapter "Overview (Page 19)".

DriveSim Engineer blocks the creation of an instance when the unsupported features are active in the project configuration. If these unsupported features are activated on an instance after creation (for example, through online parameter changes or downloading a modified project), the simulation may not work properly.

Features with limited simulation support

When the following features are active, DriveSim Engineer does not block the creation of an instance but provides limited simulation of functionality:

- Syslog
- OPC UA
- Holding brakes
- Drive Control Chart (DCC)
- Changing star/delta wiring (Page 50): Available for synchronous reluctance motors in encoderless control mode only. In all other cases, the Power Module must be selected according to the default motor connection type (p0133[0].0) in Startdrive.

Simulation of reinforced brakes

DriveSim Engineer does not support the simulation of reinforced brakes. Downloading project data to an instance configured with a reinforced brake is not permissible.

Simulation of Technology Extensions

The DriveSim Engineer model does not offer interfaces to Technology Extensions. Even if a Technology Extension for a particular SINAMICS drive is released, it cannot be installed or loaded in the DriveSim instance.

Safety acceptance tests must always be performed on real devices

A safety configuration includes hardware elements that might not be covered by DriveSim Engineer or might not be identical between the virtual configuration and the physical safety configuration (for example, safety function relevant terminal connections). To ensure the correct safety acceptance test result, make sure that you perform the safety acceptance test on real devices.

Interaction of multiple drives

The DriveSim Engineer model does not offer interfaces to other drives.

Increased resource utilization when running multiple simulation instances

DriveSim Engineer supports running multiple instances in parallel. On a system with the minimum hardware requirements of DriveSim Engineer, it is guaranteed to run up to three drive instances.

When SIMATIC S7-PLCSIM Advanced is used together, on a system with the minimum hardware requirements of SIMATIC S7-PLCSIM Advanced, it is guaranteed to run one drive instance with one PLC instance.

The minimum hardware configurations do not guarantee that the simulation will run at real-time speed compared to the actual device operation; however, the quality of the simulation is still ensured.

Use of DriveSim Engineer on virtual machines

DriveSim Engineer generally supports operation on virtual machines; however, on virtual machines with only one core allocated, DriveSim TIA Portal Add-In may not function properly.

If you experience problems with activating and using DriveSim TIA Portal Add-In on a virtual machine, check to make sure that sufficient resources (at least two cores) are allocated to the virtual machine.

Connection to a higher-level control

DriveSim Engineer offers interfaces for connecting to a simulated higher-level control when used with SIMATIC S7-PLCSIM Advanced. The feature has the following restrictions:

- Only the S210 (New) drive system and the S7-1500 CPU are supported.
- You can connect only one S210 (New) instance to one S7-1500 instance.
- Telegram 105 is selected for communication between the instances.

Data exchange between the PLC instance and the drive instance is simulated. Cyclic communication between the instances is synchronized with the operation of the actual PLC and drive system.

More information

For more information about hardware requirements of DriveSim Engineer, see Chapter "Preconditions (Page 29)".

Installing

5.1 Preconditions

Description

Minimum hardware requirements

The following table shows the minimum hardware requirements that must be met for the installation of the DriveSim Engineer software package:

	DriveSim Engineer only	DriveSim Engineer used with S7-PLCSIM Advanced
Processor	A minimum CPU of Intel® Core™ i5-11400 processor (dual-core mobile processor) or equivalent CPU from other manufacturers	A minimum CPU of Intel® Core™ i7-11700 processor (dual-core mobile processor) or equivalent CPU from other manufacturers
RAM	16 GB	16 GB

For more information about the system requirements for S7-PLCSIM Advanced, see Chapter "Installing" in the SIMATIC S7-PLCSIM Advanced Function Manual (<https://support.industry.siemens.com/cs/ww/en/view/109955578>).

Supported operating systems (64-bit versions)

- Windows 10
 - Windows 10 Professional Version 22H2
 - Windows 10 Enterprise Version 21H2
 - Windows 10 Enterprise Version 22H2
 - Windows 10 Enterprise 2019 LTSC
 - Windows 10 Enterprise 2021 LTSC
- Windows 11
 - Windows 11 Home Version 22H2
 - Windows 11 Home Version 23H2
 - Windows 11 Professional Version 22H2
 - Windows 11 Professional Version 23H2
 - Windows 11 Enterprise 22H2
 - Windows 11 Enterprise 23H2
- Windows Server
 - Windows Server 2019 Standard (full installation)
 - Windows Server 2022 Standard (full installation)

Note

As a non-Microsoft Store published application, DriveSim Engineer is subject to the application installation policy in Windows.

Before installing DriveSim Engineer, make sure that the installation of the MSIX package is enabled. By default, the installation of the MSIX package is enabled in Windows 10 and 11 but disabled in Windows Server. You can enable the installation with either of the following methods:

- Turn on Developer Mode in system settings
- Set the option "Choose where to get apps" to "Anywhere" in advanced app settings

After installing DriveSim Engineer, you can restore the default settings of your Windows.

License requirements

To use DriveSim Engineer, the DriveSim Engineer license is required.

5.2 Downloading installation packages

Requirement

None

Procedure

Proceed as follows to download all the required installation packages to your computer:

1. Download the setup package for Startdrive (<https://support.industry.siemens.com/cs/ww/en/ps/13438/dl>).
2. Download the setup package for DriveSim Engineer (<https://support.industry.siemens.com/cs/document/109821163>).
3. If you want to perform commissioning with a virtual PLC, download the setup package for SIMATIC S7-PLCSIM Advanced (<https://support.industry.siemens.com/cs/ww/en/ps/24442/dl>).

More information

For more information about the required software, see Chapter "Overview (Page 19)".

5.3 Installing the setup package for DriveSim Engineer

Note

Compatibility of DriveSim Engineer versions

You cannot install different DriveSim Engineer versions in parallel, because they are incompatible to one another. To install a version different from the current one, make sure that you uninstall the current version first.

Note

.NET runtimes required for DriveSim Engineer V2.1

To run DriveSim Engineer V2.1, you must have the following .NET runtimes installed on your computer:

- Microsoft .NET Runtime (8.0 or later)
- Microsoft ASP.NET Core Runtime (8.0 or later)
- Microsoft .NET Desktop Runtime (8.0 or later)

The setup package for DriveSim Engineer V2.1 includes only one supported version of the required .NET runtimes. Alternatively, you can download and install the latest version from Internet when installing DriveSim Engineer V2.1. Note that Siemens does not provide any update or maintenance for the .NET runtimes.

To ensure proper operation of DriveSim Engineer, observe the following guidelines when updating or maintaining the .NET runtimes:

- Follow the standard Microsoft software update process for software updates and maintenance. For more information, visit the Web site of ASP.NET Core (<https://dotnet.microsoft.com/en-us/apps/aspnet>).
 - Make sure that all .NET runtime components are updated to the versions that are compatible with one another.
 - Follow any prompt messages to download the required .NET runtime versions when you encounter a .NET runtime version error.
-

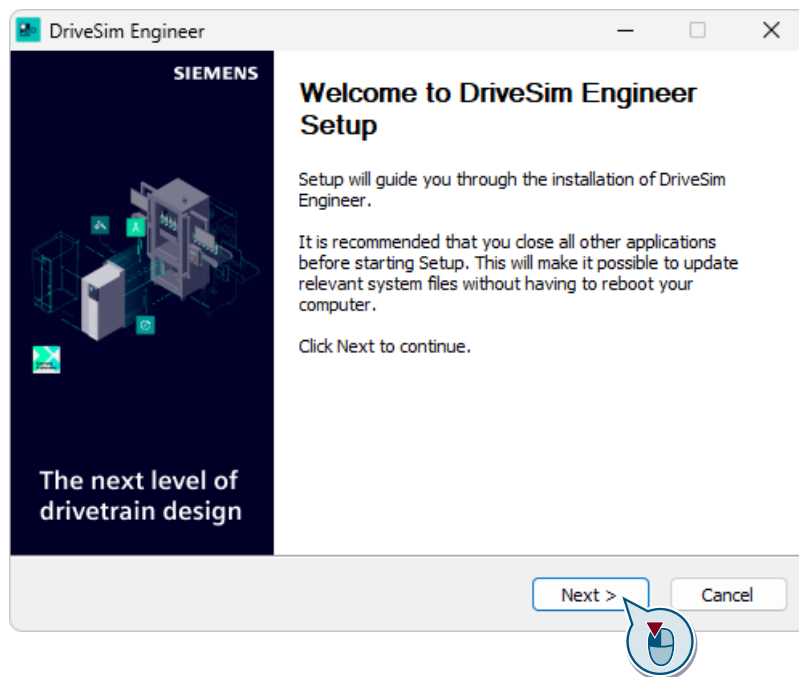
Requirement

- Your computer meets the minimum computer hardware and system requirements.
- You have administrator rights on your computer.
- You have downloaded the setup package (Page 30) for DriveSim Engineer to your computer.
- You have installed the required Startdrive and TIA Portal Openness.

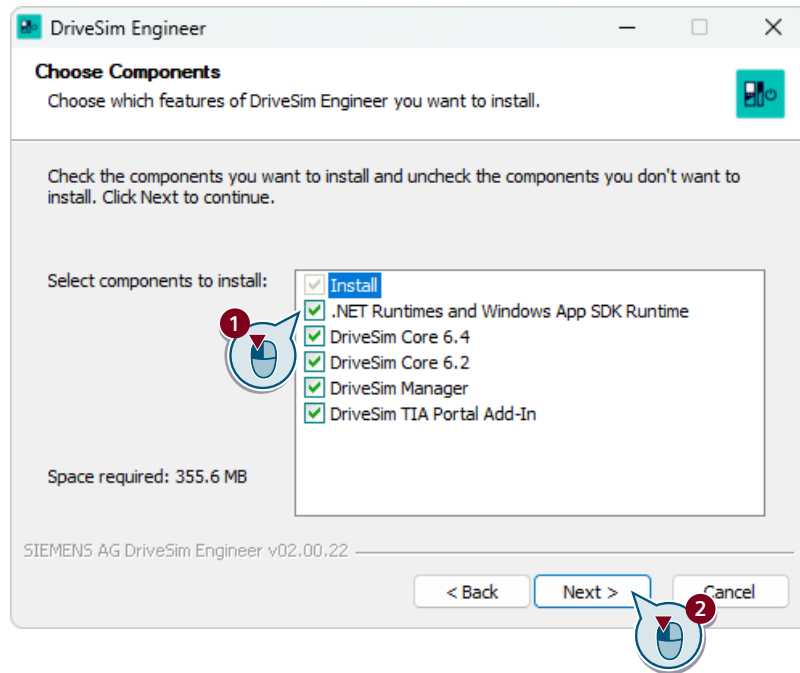
Procedure

Proceed as follows to install DriveSim Engineer V2.1:

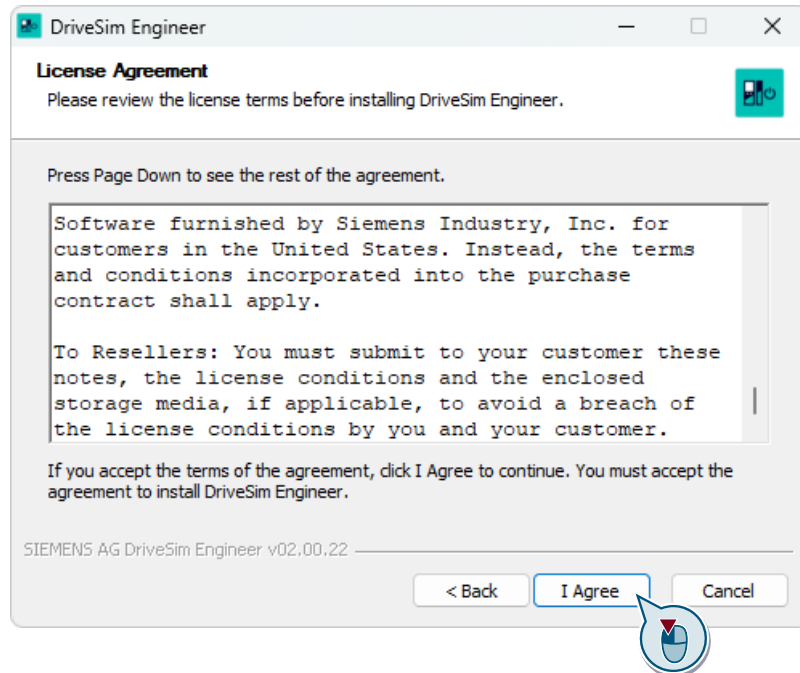
1. Double-click Setup_DriveSim Engineer.exe. The DriveSim Engineer setup wizard opens.
2. In the DriveSim Engineer setup wizard, click "Next".



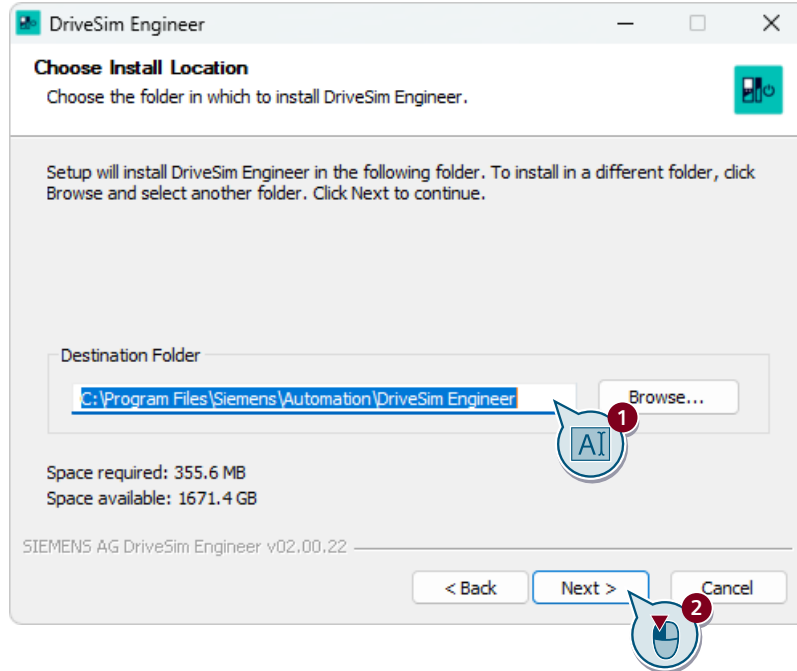
- Specify the components that you want to install. The first check box is required only if you do not have compatible .NET runtimes (Page 31) installed on your computer. DriveSim Core V6.2 is valid for the SINAMICS G220 drive system with firmware version V6.2, and DriveSim Core V6.4 is valid for both the SINAMICS G220 drive system with firmware version V6.4 and the S210 (New) drive system with firmware version V6.4. Selecting the last two check boxes is mandatory.



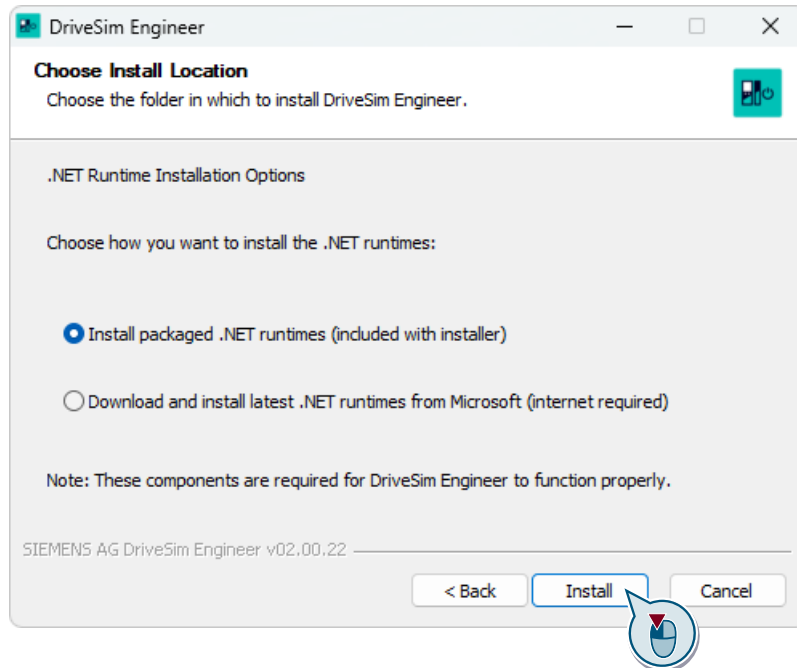
- Confirm the license agreement.



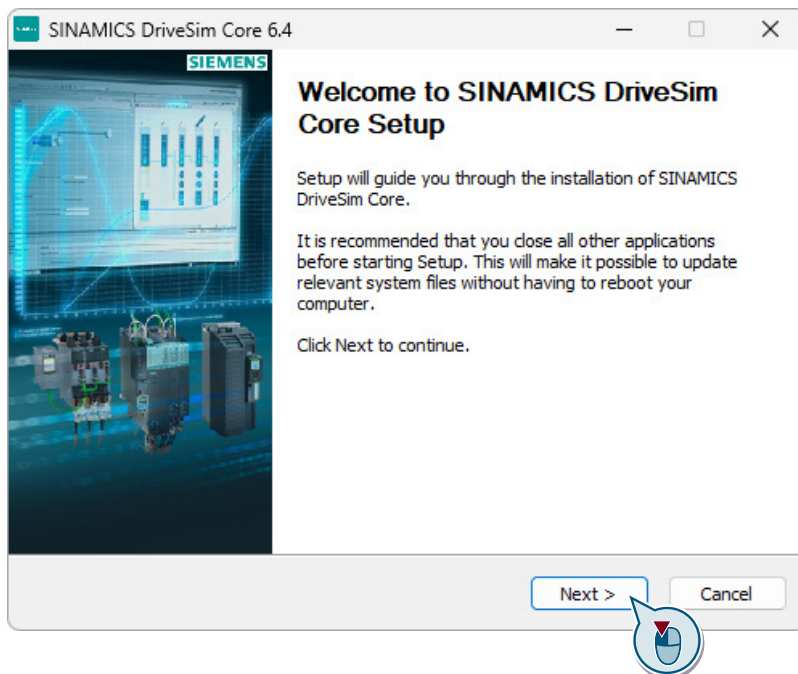
- Specify an installation path and then click "Install" to start the installation. The setup wizard guides you through the installation of all the selected software components one after another.



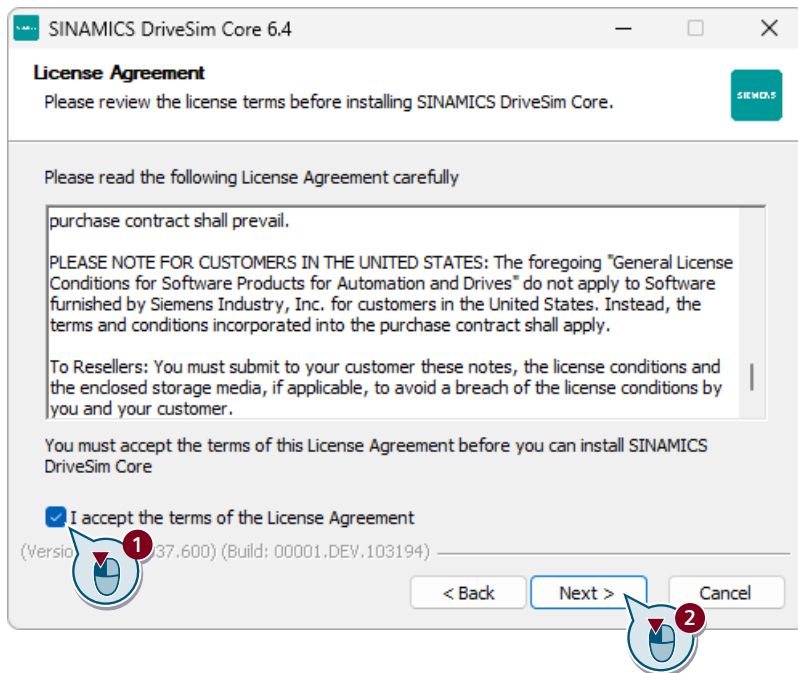
- If you have selected the check box for .NET runtimes in Step 3, a .NET setup wizard opens. Select your preferred method for installing the runtimes and follow the step-by-step wizard to complete the installation.



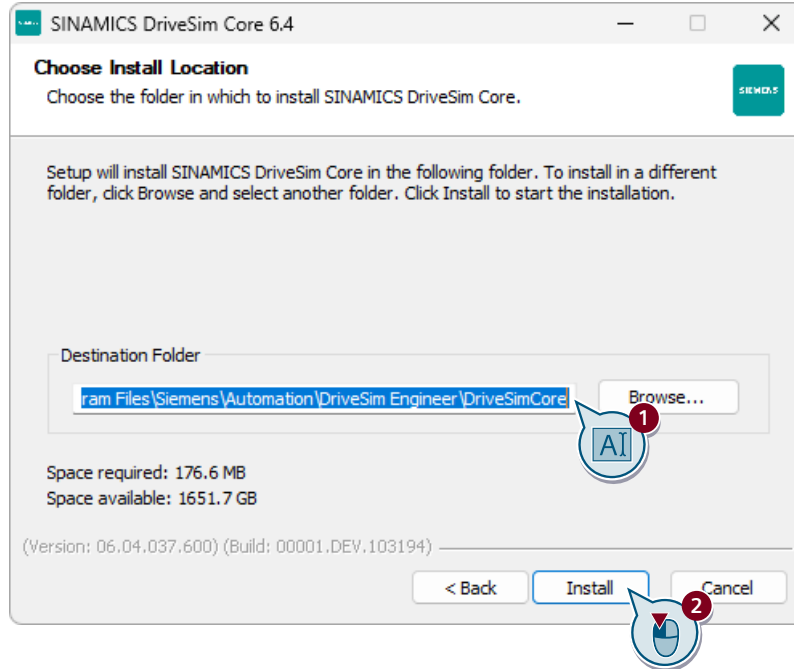
7. The SINAMICS DriveSim Core setup wizard opens. In the setup wizard, click "Next".



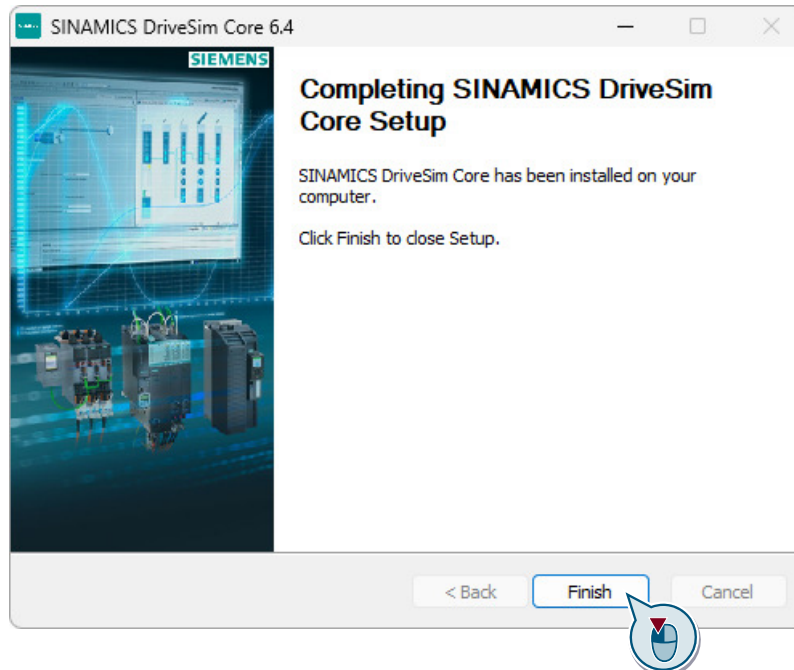
8. Confirm the license agreement.



- Specify an installation path and then click "Install" to start the installation. The setup wizard displays the status of the installation.

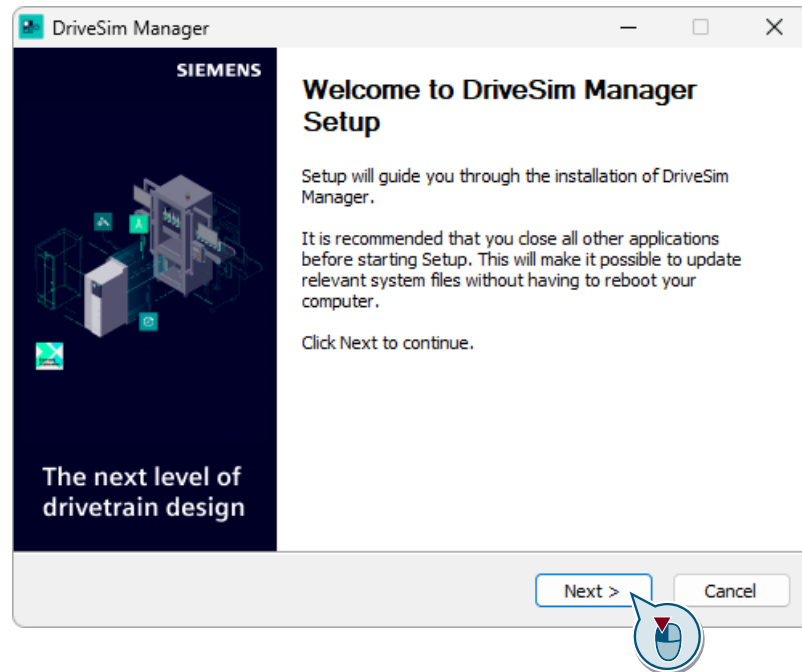


- When the installation is complete, click "Finish" to dismiss the SINAMICS DriveSim Core setup wizard.

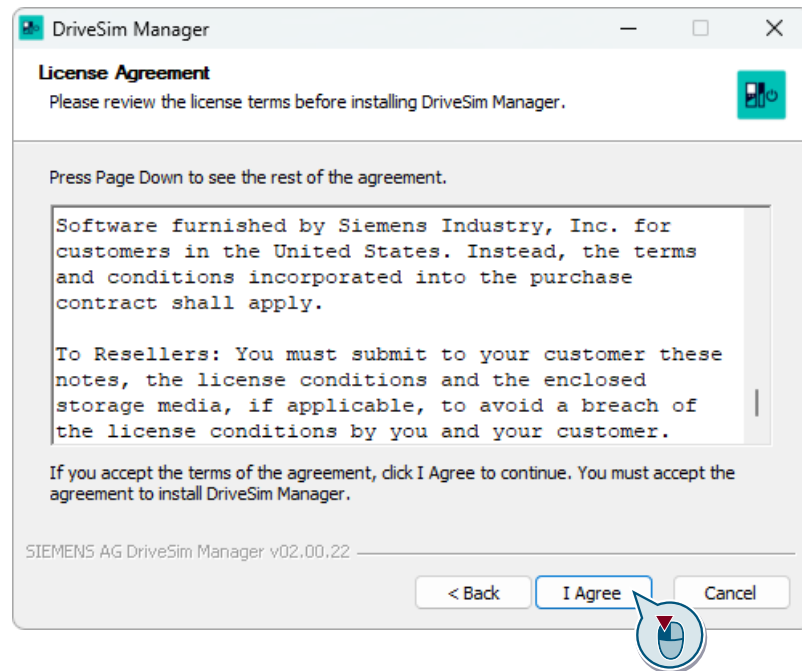


- If you have selected both of the SINAMICS DriveSim Core versions, repeat the installation procedure for another SINAMICS DriveSim Core.

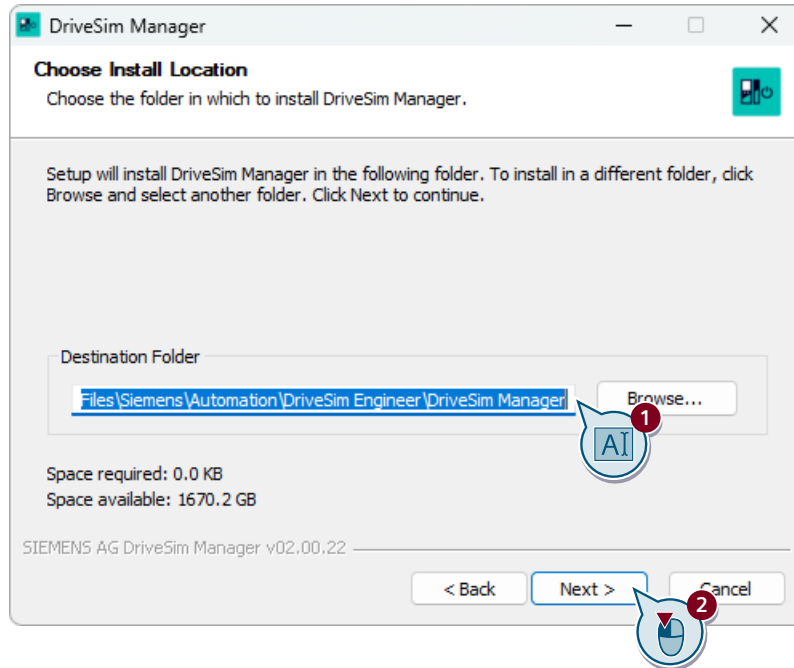
12. The DriveSim Manager setup wizard opens. In the setup wizard, click "Next".



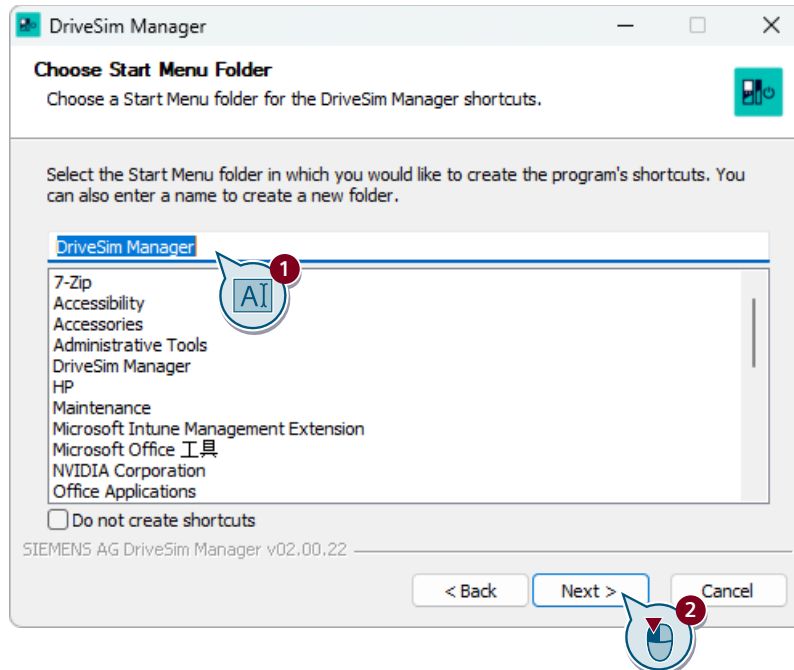
13. Confirm the license agreement.



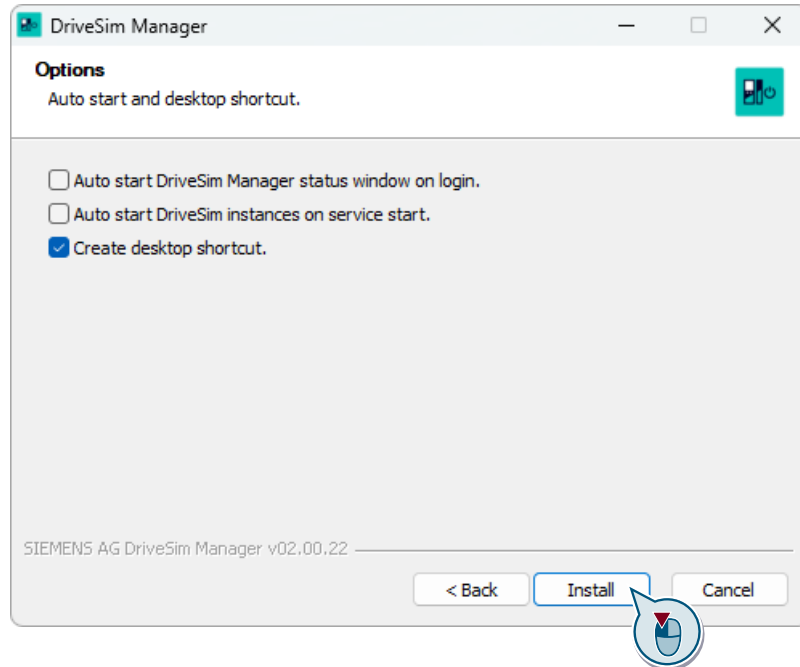
14. Specify the installation path and then click "Next".



15. This step creates a shortcut to DriveSim Manager. If you do not want to create a shortcut, select the check box at the bottom of the wizard; otherwise, use the given Start Menu folder or create a desired new Start Menu folder to place the shortcut. Click "Next" to proceed.



16. Specify whether you want to enable the autostart of both the DriveSim Manager tray application each time at logon and DriveSim instances on service start, as well as whether to create a desktop shortcut. You then click "Install" to start the installation. The setup wizard displays the status of the installation.



Note

By default, the autostart functionality is disabled. If you install DriveSim Manager with default settings but later want to enable the autostart, you must reinstall the setup package for DriveSim Engineer to select the check boxes for the autostart options.

Note

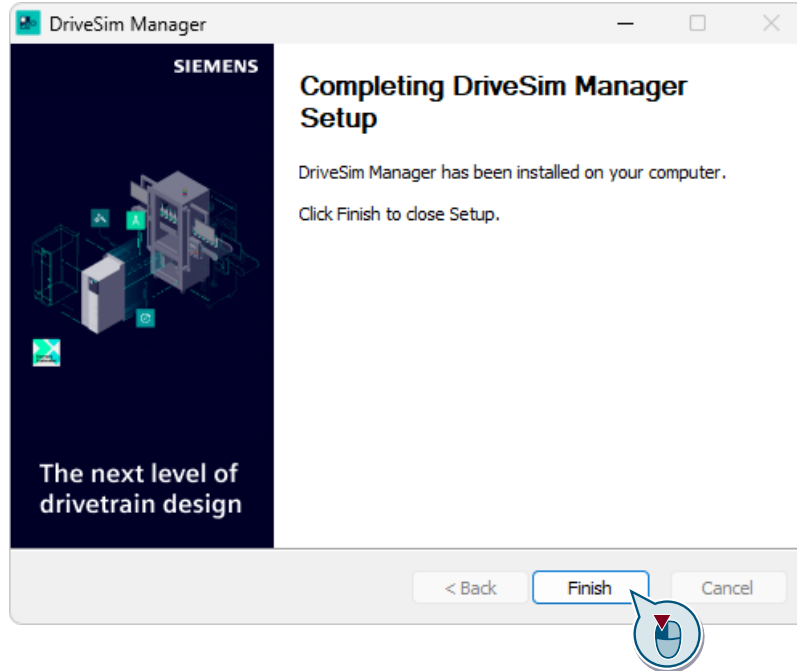
The autostart of the DriveSim instance depends on the instance status when the DriveSim Manager service is stopped (for example, the system shutdown or restart) and whether you enable the instance autostart functionality when installing DriveSim Manager.

If the autostart of the DriveSim instance is enabled on the DriveSim Manager service start and the DriveSim instance is running when the DriveSim Manager service is stopped, the DriveSim Manager service will automatically restart the DriveSim instance upon next DriveSim Manager start (for example, the system startup). This behavior can lead to unwanted high CPU usage.

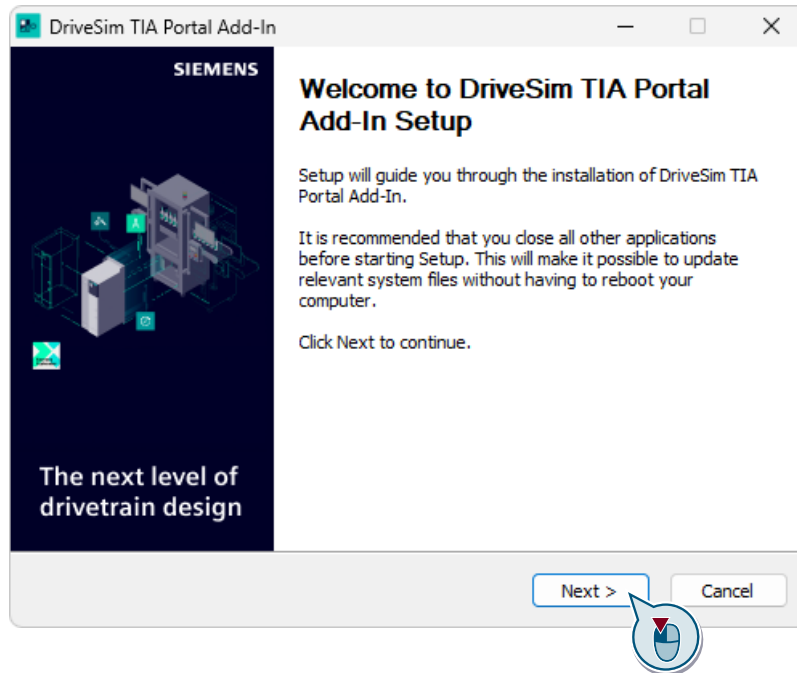
To avoid restarting the DriveSim instances upon system startup, use either of the following methods:

- Install DriveSim Manager with the autostart of the DriveSim instance disabled.
 - Stop the instances via DriveSim Manager before you shut down or restart the system.
-

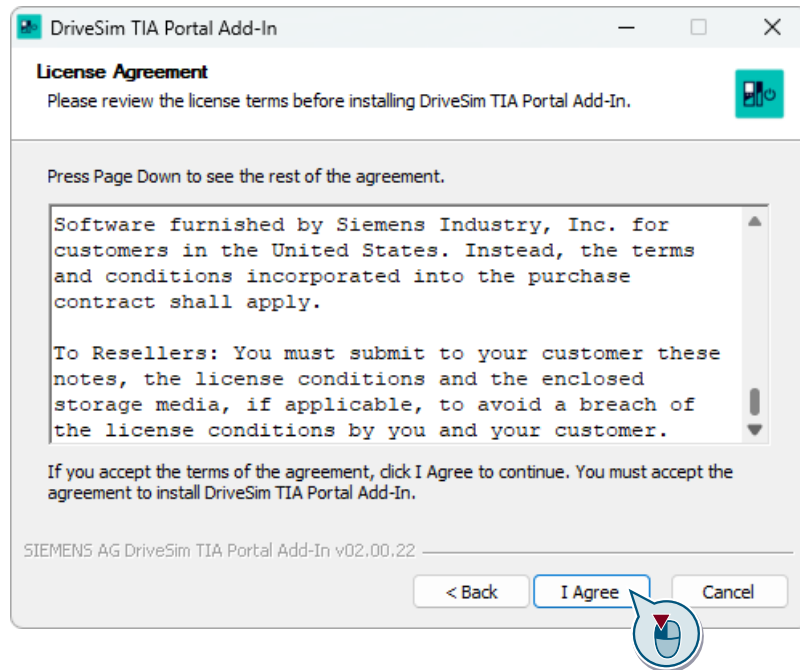
17. When the installation is complete, click "Finish" to dismiss the DriveSim Manager setup wizard.



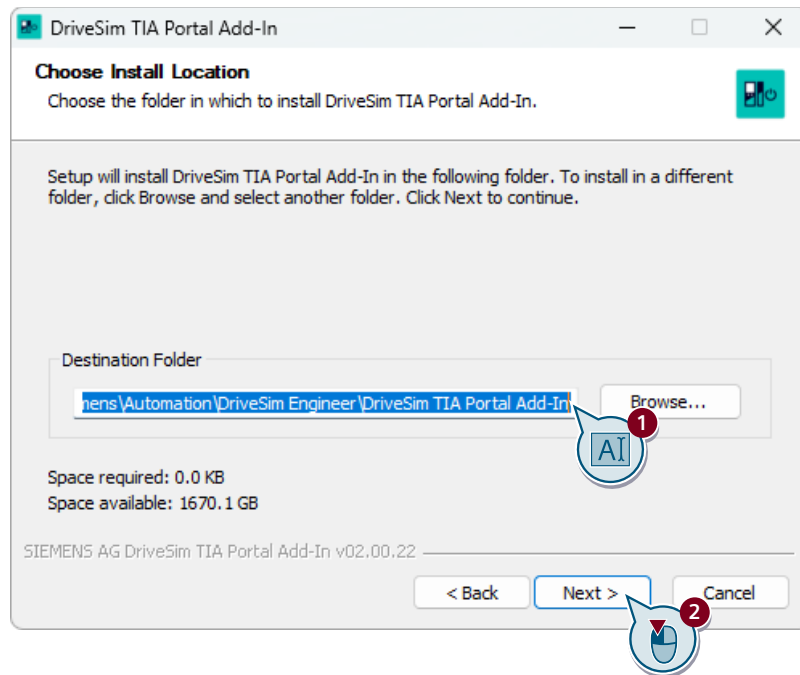
18. The DriveSim TIA Portal Add-In setup wizard opens. In the setup wizard, click "Next".



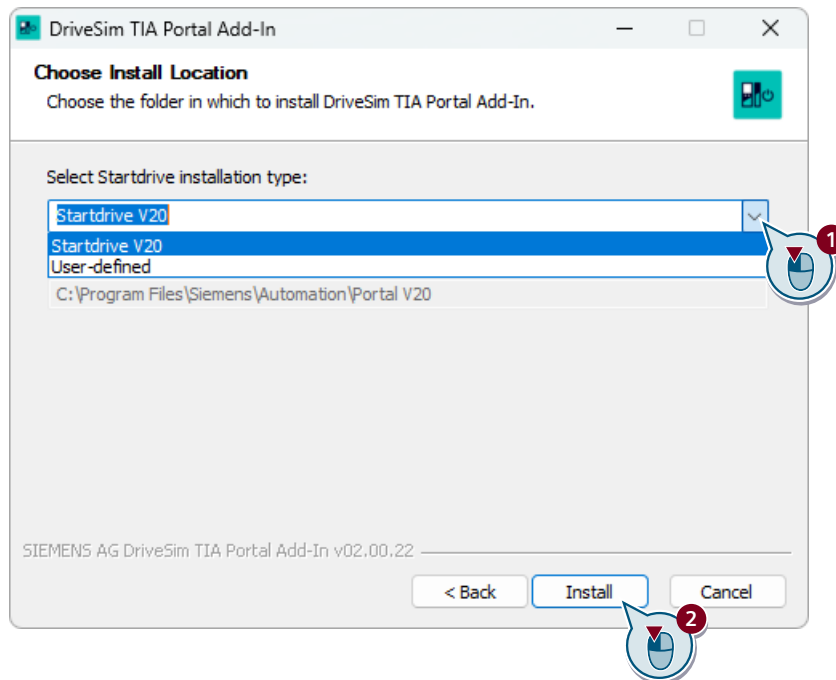
19. Confirm the license agreement.



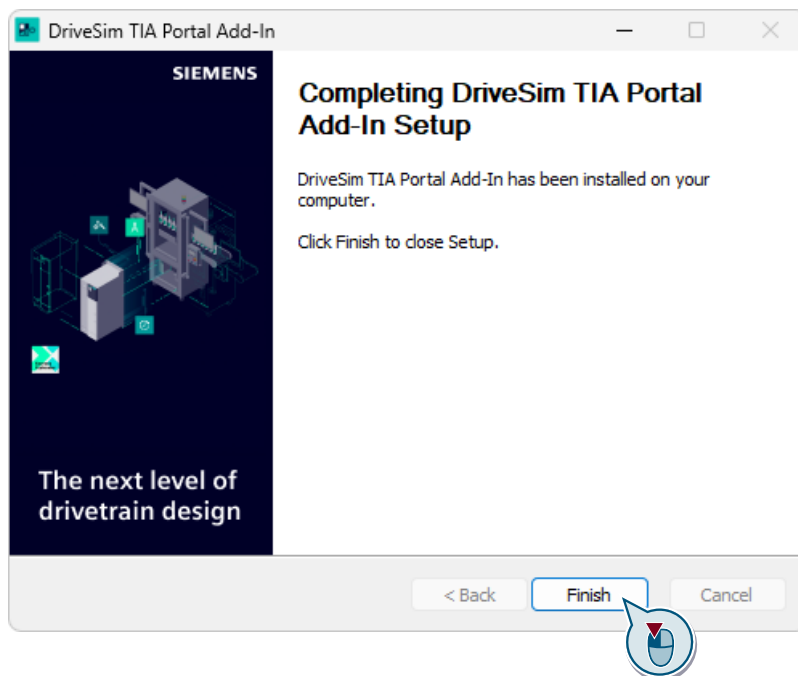
20. Specify the installation path and then click "Next".



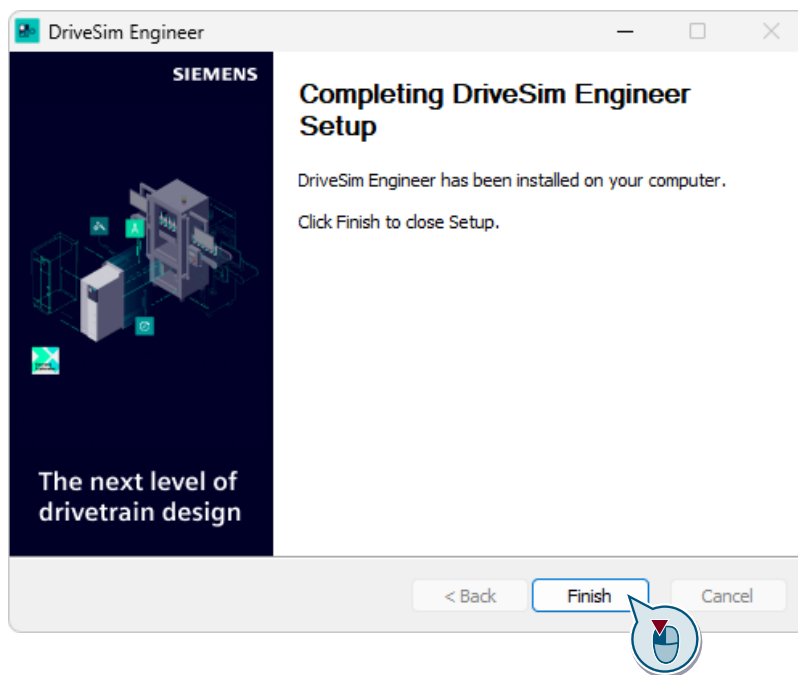
21. Select the desired Startdrive version from the drop-down list. The storage location is specified automatically. You can also specify a storage location different from the default one in the list. Click "Install" to start the installation. The setup wizard displays the status of the installation.



22. When the installation is complete, click "Finish" to dismiss the DriveSim TIA Portal Add-In setup wizard.



23. Click "Finish" to dismiss the DriveSim Engineer setup wizard.



Result

You have installed DriveSim Engineer on your computer.

Activating DriveSim TIA Portal Add-In in Startdrive

Requirement

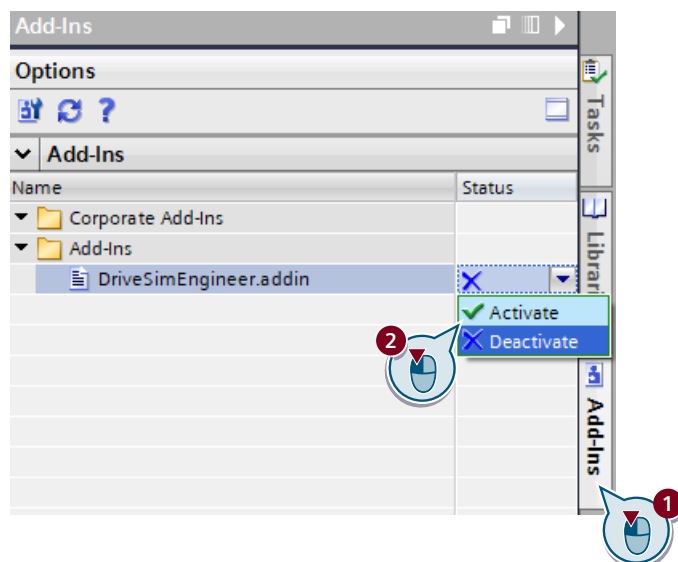
You have successfully installed DriveSim TIA Portal Add-In on your computer and activated the DriveSim Engineer license.

For more information about activating the DriveSim Engineer license, see relevant chapters of the Automation License Manager information system.

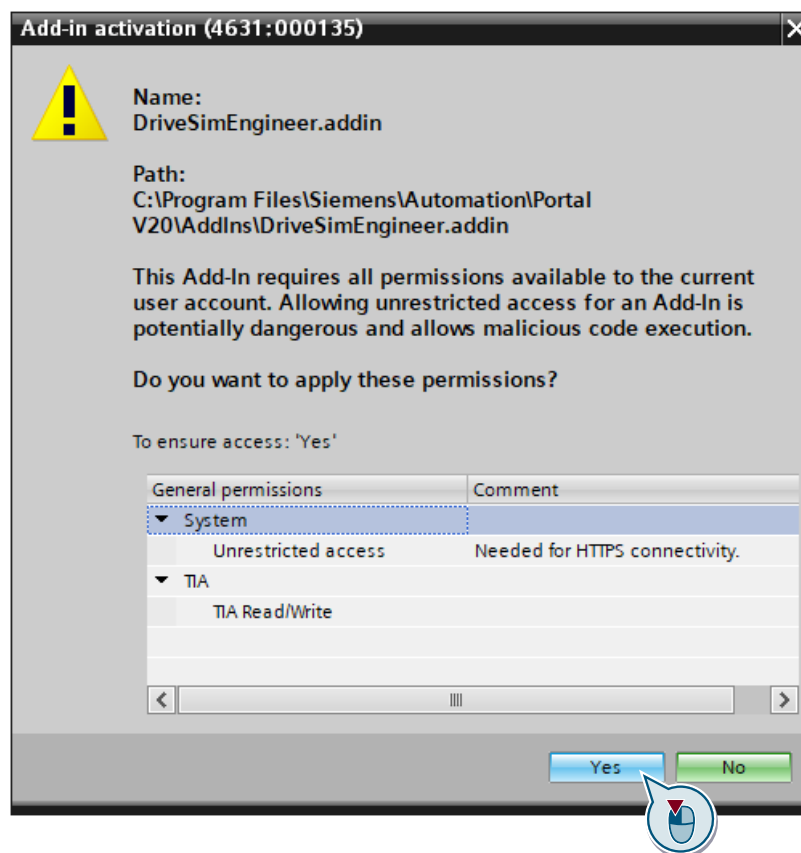
Procedure

Proceed as follows to activate the SINAMICS add-in program in your computer:

1. Open the task card for add-in programs.
2. Activate the DriveSim TIA Portal Add-In program.



3. Grant permissions to DriveSim TIA Portal Add-In for running unmanaged code.



If the program shows a timeout error message, proceed as follows to configure the timeout settings of TIA Portal add-ins:

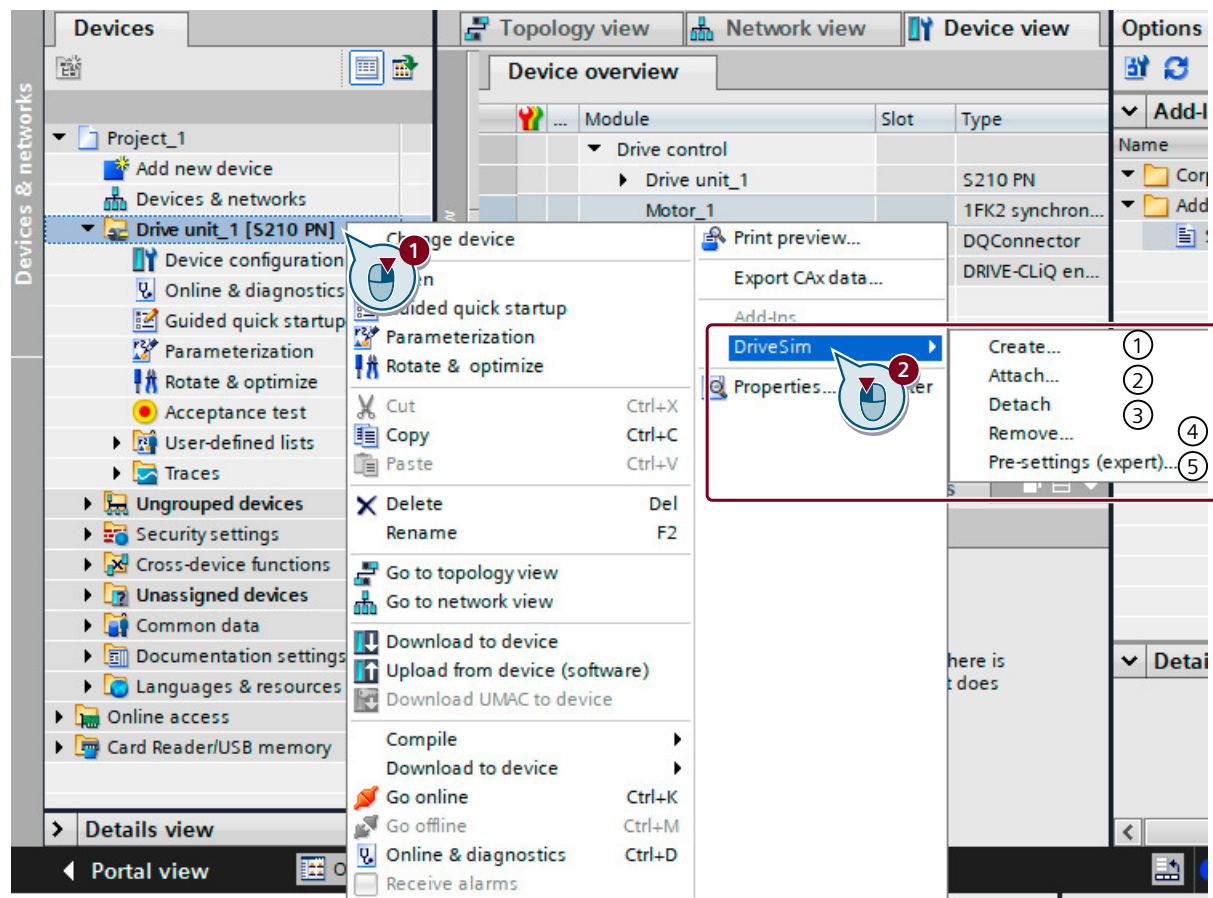
1. Open the file "Siemens.Automation.Opns.AddIn.Impl.dll.config" in the "Bin" folder under the TIA installation path.
2. Update the timeout value. The recommended value is 10000.
3. Restart the TIA Portal for the change to take effect.
4. Activate the DriveSim TIA Portal add-In program.

Result

You have successfully activated the DriveSim TIA Portal Add-In program in Startdrive. The program is available in the form of an add-in menu in Startdrive.

Example

With the integrated DriveSim TIA Portal Add-In menu, you can perform the virtual simulation of physical drives in DriveSim Engineer.



- ① Creates a DriveSim instance based on the selected device configuration (Page 54)
- ② Connects a DriveSim instance to the selected drive (Page 57)
- ③ Disconnects a DriveSim instance from the selected drive (Page 84)
- ④ Deletes the attached DriveSim instance (Page 86)
- ⑤ Changes the preset parameters of the DriveSim instance (Page 50)

Figure 6-1 DriveSim TIA Portal Add-In menu

Simulating a drive with DriveSim Engineer

7.1 General workflow

Overview

The flowchart provided in this chapter illustrates how to simulate a drive with DriveSim Engineer and transfer the commissioning results to the real device.

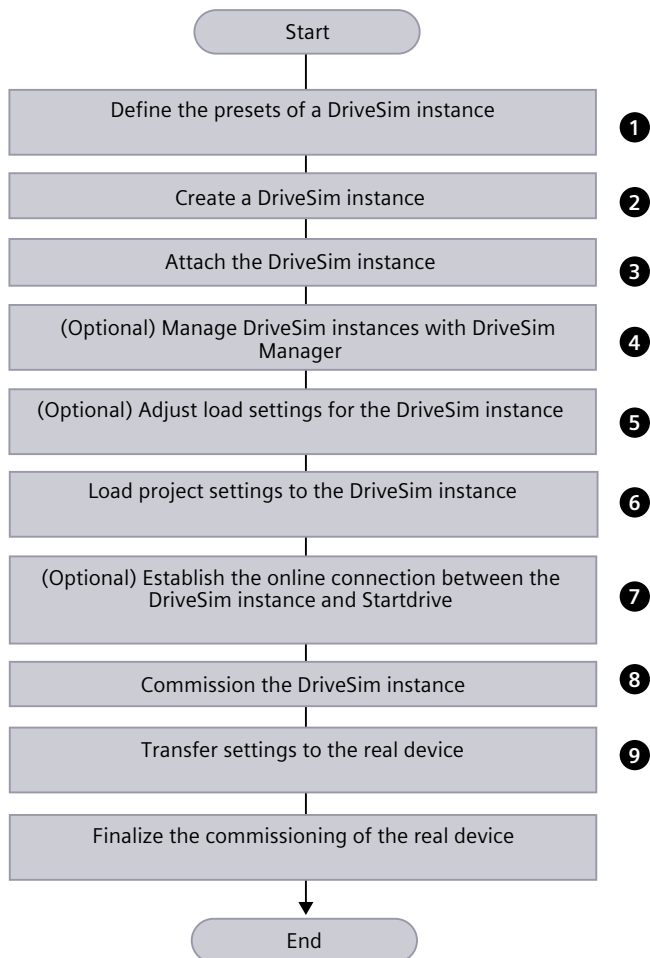
The workflow generally applies to the following situations:

- A standalone drive system (using DriveSim Engineer only)
- A drive system with a PLC (using DriveSim Engineer with PLCSIM Advanced)

Requirement

- You have made appropriate configurations in the Startdrive project, added all relevant components, and completed offline commissioning.
 - To simulate a standalone drive system, ensure that the devices configured in the Startdrive project are supported by the installed DriveSim Core.
 - To simulate a drive system with a PLC, additional configurations are required compared to standalone drive simulation. For details, see Chapter "Commissioning a DriveSim instance with a simulated PLC (Page 80)".

Description of function



For detailed information, see individual chapters below:

- ① Defining the presets of a DriveSim instance (Page 50)
- ② Creating a DriveSim instance (Page 54)
- ③ Attaching a DriveSim instance (Page 57)
- ④ Managing DriveSim instances with DriveSim Manager (Page 59)
- ⑤ Adjusting load settings for a DriveSim instance (Page 62)
- ⑥ Loading project settings to a DriveSim instance (Page 71)
- ⑦ Establishing connection between Startdrive and the DriveSim instance (Page 75)
- ⑧ Commissioning a DriveSim instance (Page 78)
- ⑨ Transferring the settings from a DriveSim instance to the real device (Page 84)

7.2 Defining the presets of a DriveSim instance

Overview

The preset parameters are specific simulation parameters that define the DriveSim instance. You can specify the preset parameters and save the parameter settings to a local file before creating a new DriveSim instance.

Requirement

You have installed and activated the DriveSim TIA Portal Add-in program.

Note

Restrictions on DriveSim pre-settings

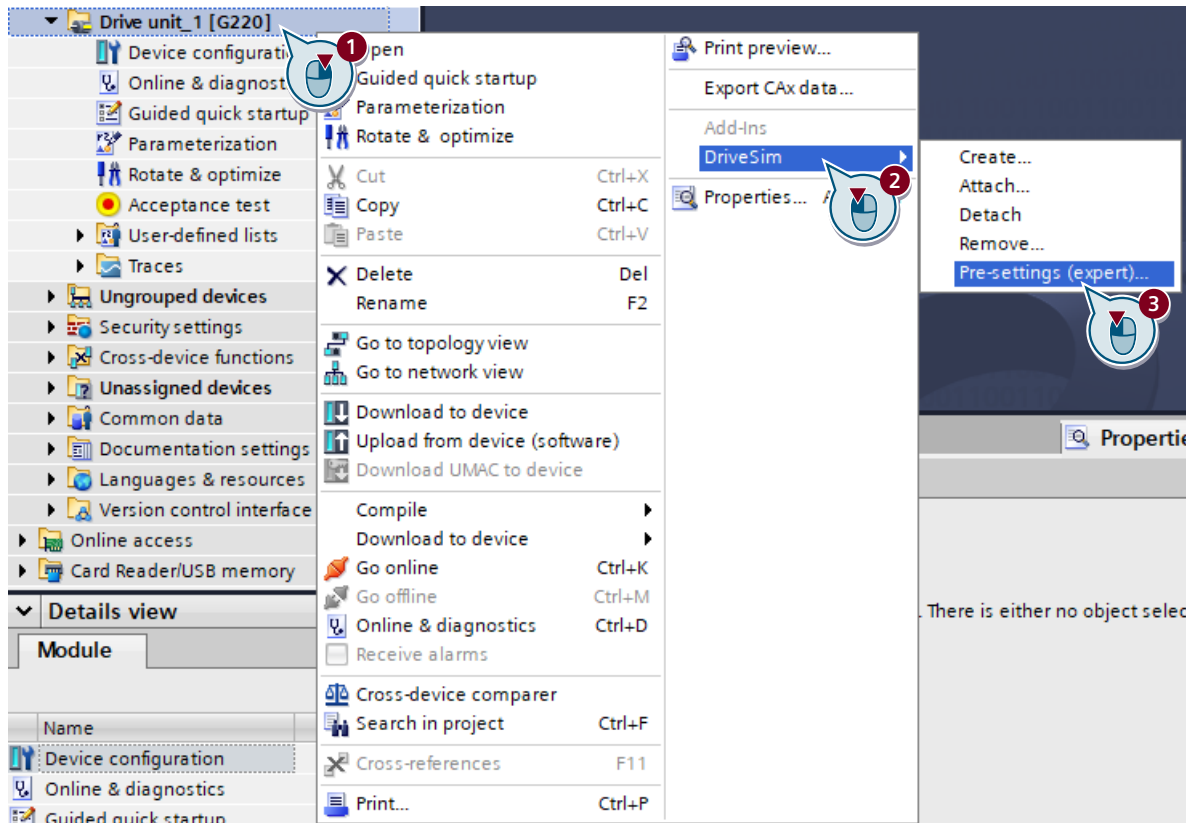
DriveSim Engineer does not support changing presets after the creation of a DriveSim instance.

- Before creating a DriveSim instance, ensure that you have properly defined the presets.
 - If you want to change the presets, create a new instance to apply the new configuration.
-

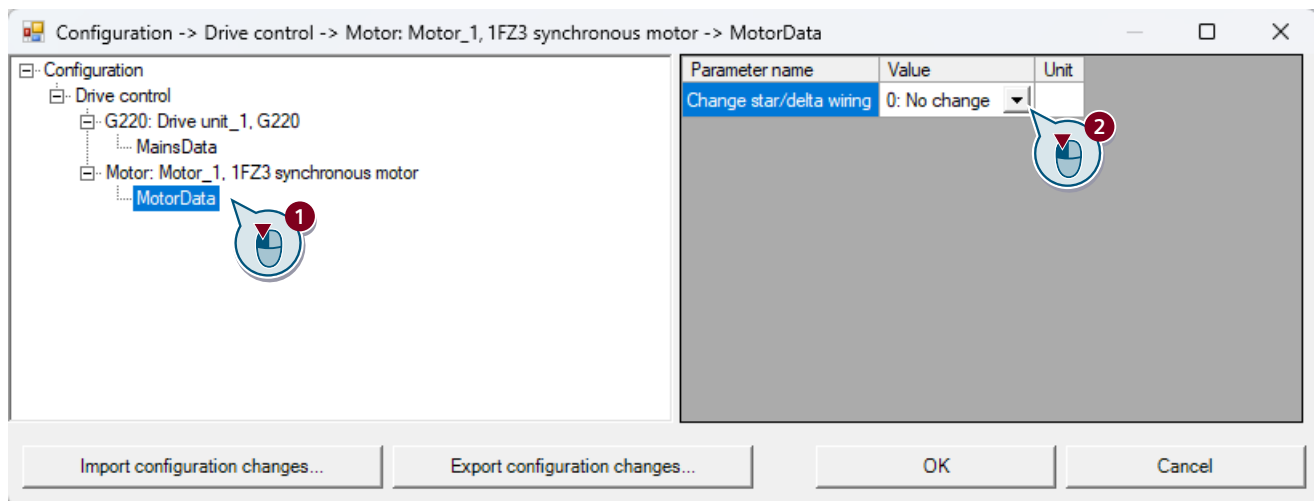
Procedure

Proceed as follows to define the presets of a DriveSim instance.

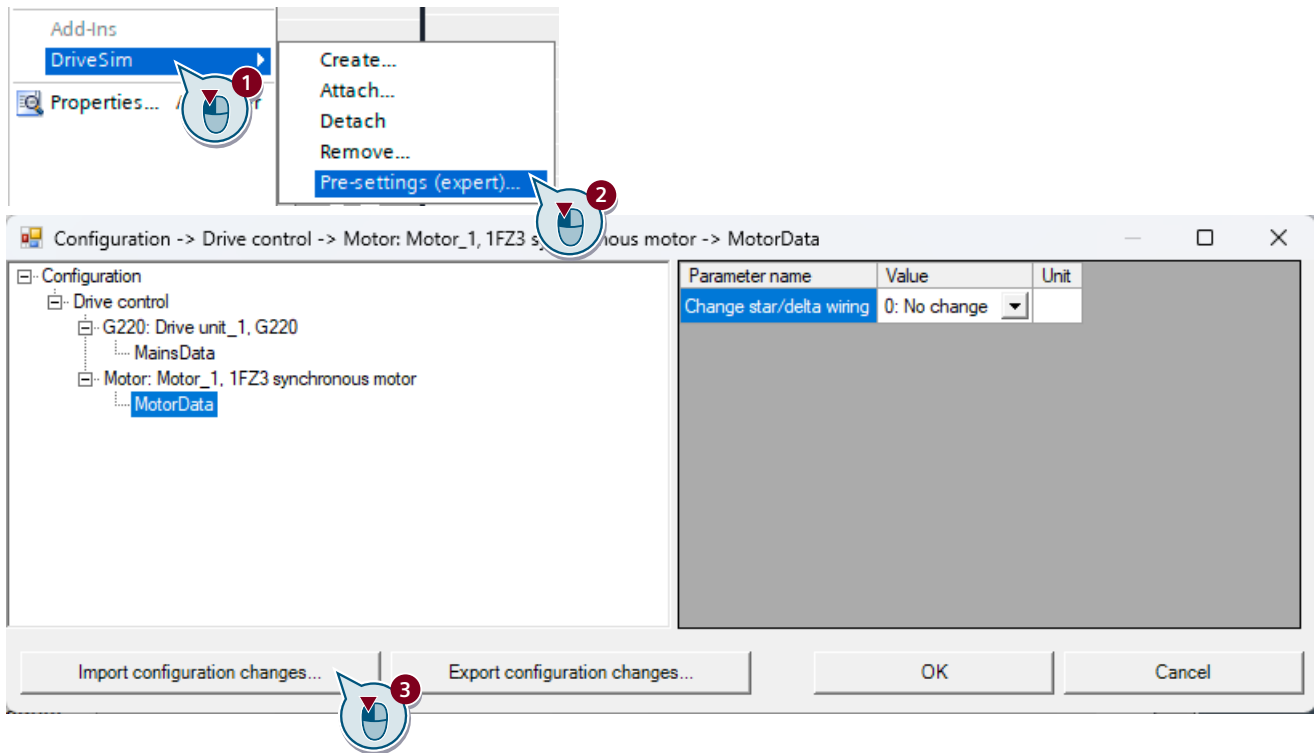
1. Right-click a device based on which you change the preset parameters. Make sure that the device you select is supported by DriveSim Engineer and you have previously fully configured all drive components in the Startdrive project.



2. In the pre-settings configuration window, configure the preset parameters including the mains data and motor data using one of the following methods:
 - Change the preset parameters manually



- Import and change a previously exported pre-settings configuration file
This method requires that you have previously exported a pre-settings configuration file from another instance.



With the export function, you can select whether to export any updated configurations for future use.

To view the default values of preset parameters, click the parameter value and press <Ctrl+Z>.

The following table shows all the preset parameters of DriveSim Engineer. The actual preset parameters for a DriveSim instance vary depending on the device you select.

Parameter	Unit	Value range	Factory setting	Description
Mains data				
Device supply voltage	V	0 ... 1000	G220: 220 or 400 S210 (New): 230 or 400	Sets the voltage of the mains supply network. The typical value varies depending on the selected converter type: - S210 (New): 230 V or 400 V - G220: 220 V or 400 V

Parameter	Unit	Value range	Factory setting	Description
Motor data (visible only for the simulated G220 drive system)				
Change star/delta wiring	-	0 ... 1	0: No change	Updates the star or delta wiring configuration of the simulated motor instance to ensure consistency with the motor details configured in Startdrive. Motors are initially assigned a default connection type when added to a project. Set the value to 1 if you have changed the motor connection type from its default in Startdrive. Note: In the current version, this parameter is only relevant for synchronous reluctance motors in encoderless control mode. For details, see Chapter "Restrictions with software features (Page 25)".

Result

You have defined the preset parameter settings.

7.3 Creating a DriveSim instance

Overview

Creating a DriveSim instance establishes a simulation environment that operates as a background service. This process utilizes data from the offline Startdrive project of the selected drive and the simulation presets defined in the previous step.

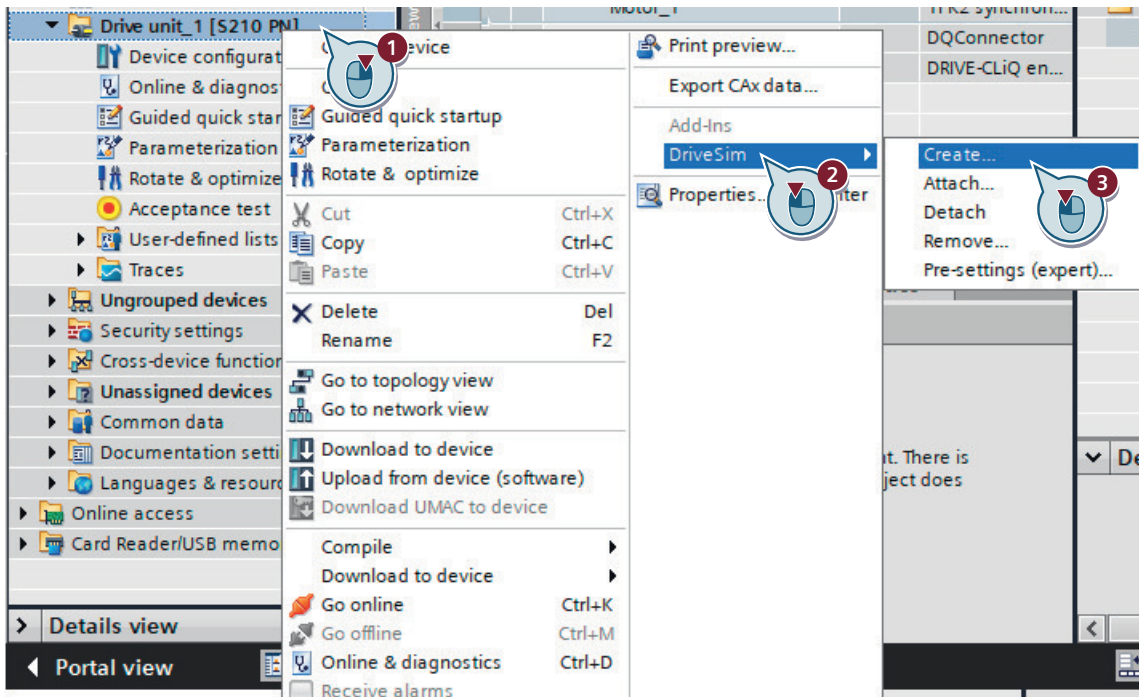
Requirement

- You have installed and activated the DriveSim Portal TIA Add-In program.
- You have verified the simulation presets and adjusted them if necessary.

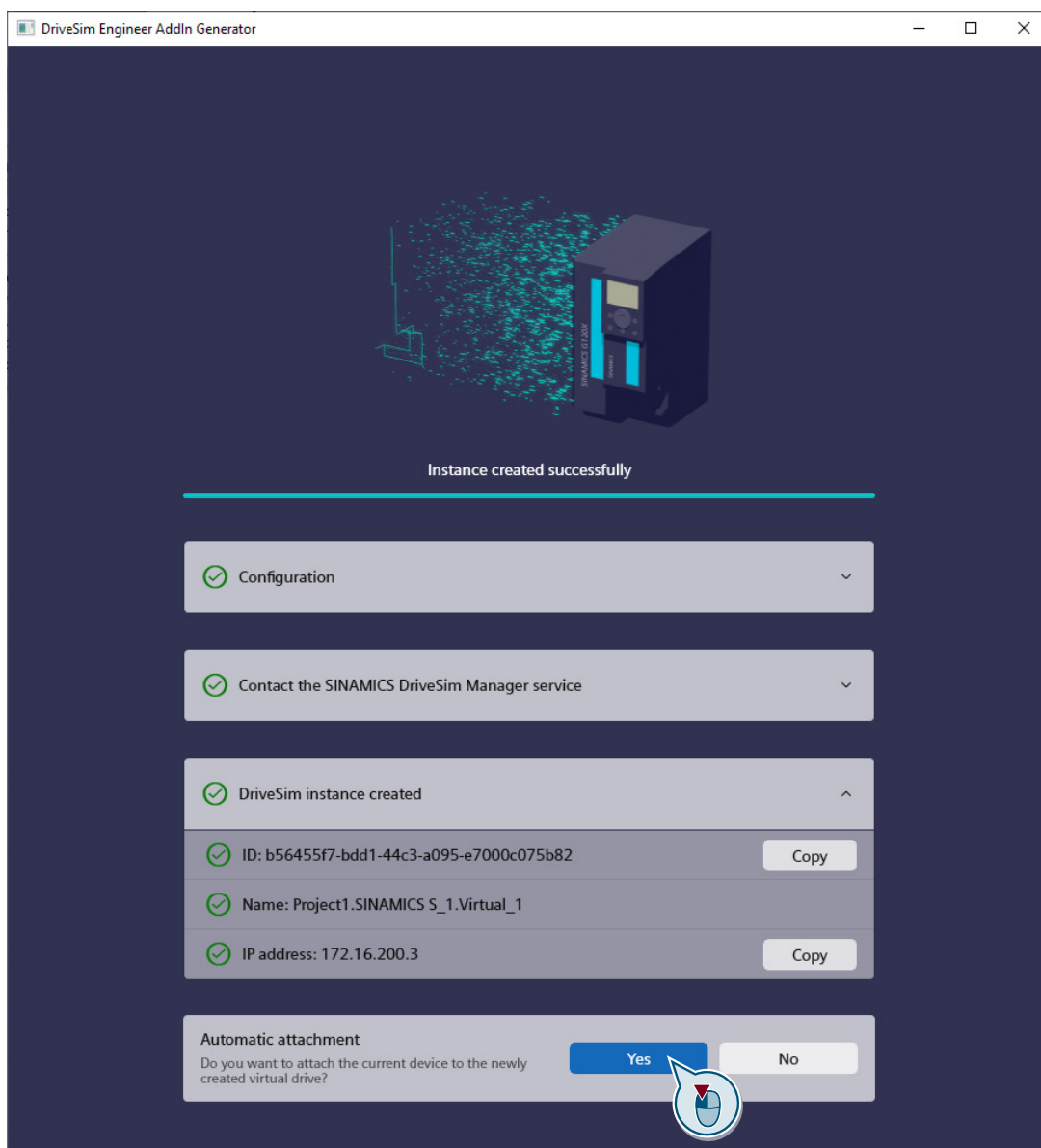
Procedure

Proceed as follows to create a DriveSim instance:

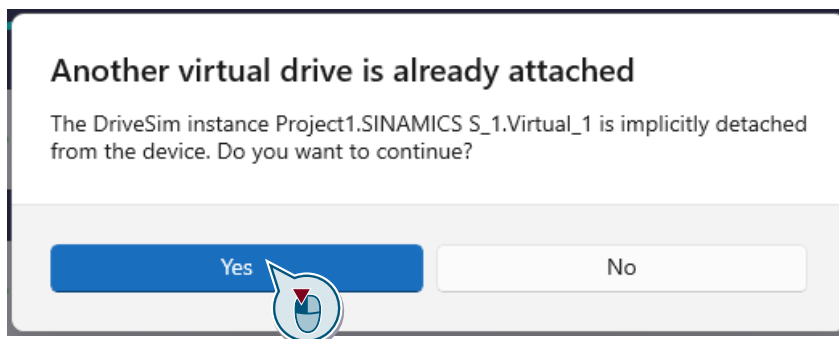
1. In Startdrive, select a target device to be simulated. Make sure that the device you select is supported by DriveSim Engineer and you have previously fully configured all drive components in the Startdrive project.
2. Right-click the device to create its DriveSim instance.
A dialog box for generating the DriveSim instance pops up.



3. Wait for a few seconds until the message for automatic attachment appears. Specify whether to attach the newly-created instance to the device.
Click  to view more details.



If there is already an attached instance for the device, the following dialog box appears. To detach the previously attached instance and attach the new one, click "Yes".



The dialog box for generating the DriveSim instance automatically closes when the device is successfully attached. In all other cases, manually close the dialog box.

Result

You have created a DriveSim instance with an automatically assigned IP address and name. The default settings for the instance are derived directly from your project configuration, representing a setup without load. You can view and manage the instance in DriveSim Manager.

Note

The firmware version of a created DriveSim instance cannot be changed. To simulate with a different firmware version, create a new instance configured with the desired firmware.

7.4 Attaching a DriveSim instance

Overview

Attaching a DriveSim instance changes the drive's X127 IP address into that of the DriveSim instance.

Requirement

You have created the DriveSim instance.

Procedure

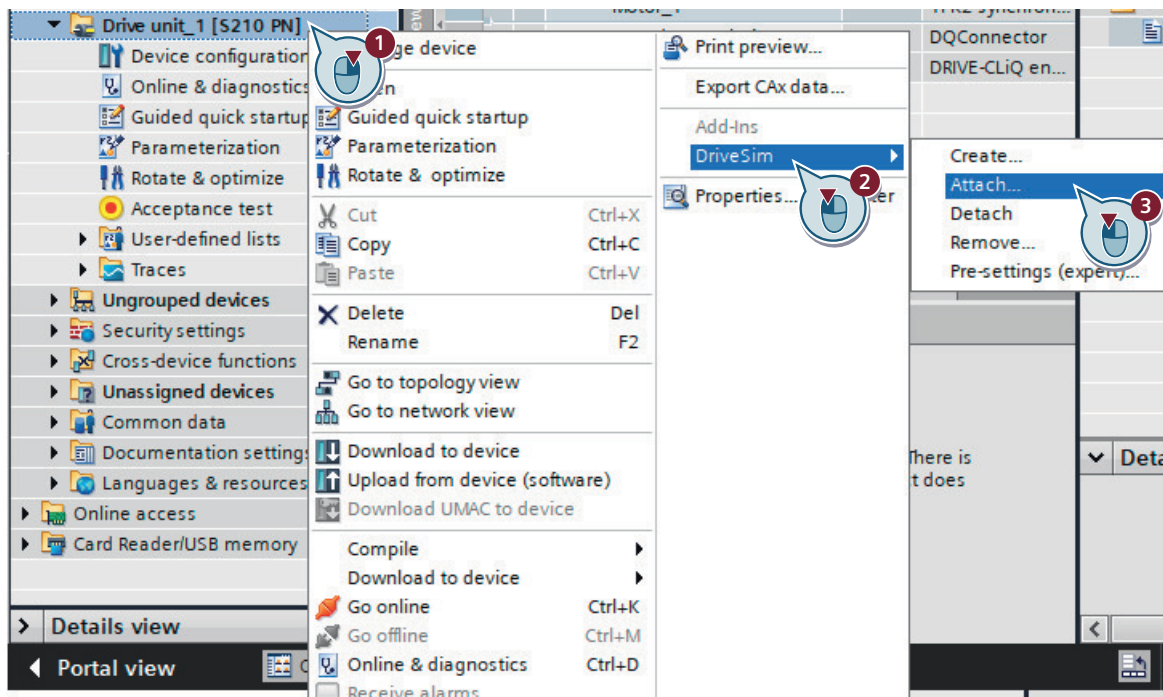
Attaching a newly-created DriveSim instance

You can attach a DriveSim instance when creating the instance.

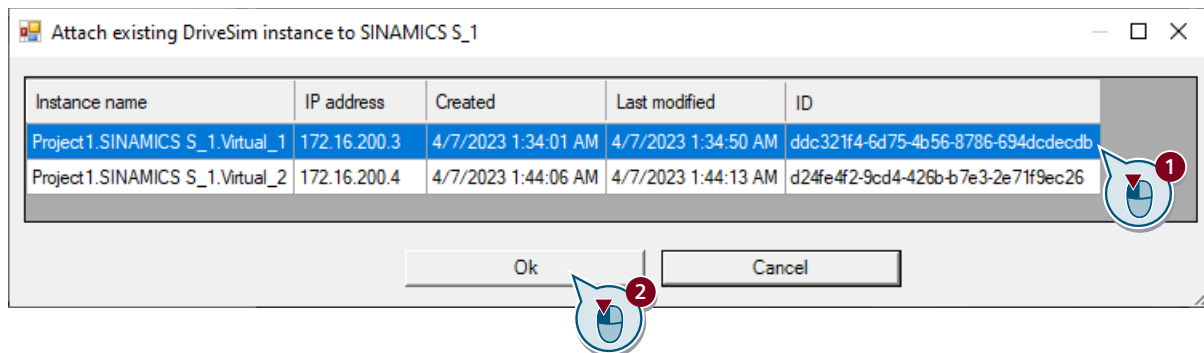
For more information, see Chapter "Creating a DriveSim instance (Page 54)".

Attaching an existing DriveSim instance

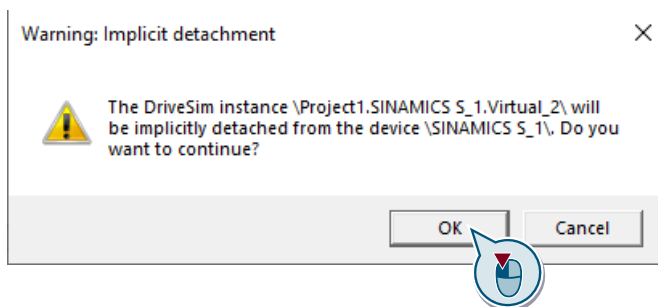
1. Right-click the device to attach the DriveSim instance.



2. Attach the target DriveSim instance.



If you have attached an instance to the device but want to attach the selected instance instead, the following dialog box appears. Click "OK" to detach the previously-attached instance.



Result

You have attached the DriveSim instance to the drive. The previously attached instance is detached.

More information

For more information about detaching a DriveSim instance, see related steps in Chapter "Transferring the settings from a DriveSim instance to the real device (Page 84)".

7.5 Managing DriveSim instances with DriveSim Manager

Overview

DriveSim Manager is a stand-alone application of DriveSim Engineer for managing DriveSim instances.

After Installing the setup package for DriveSim Engineer (Page 31), the software icon  appears in the system tray of the Windows taskbar. Double-clicking  opens the application.

Note

If the icon  does not appear in the system tray, double-click the desktop icon to open the application. For more information about tray application settings, see Chapter "Installing the setup package for DriveSim Engineer (Page 31)".

Description of function

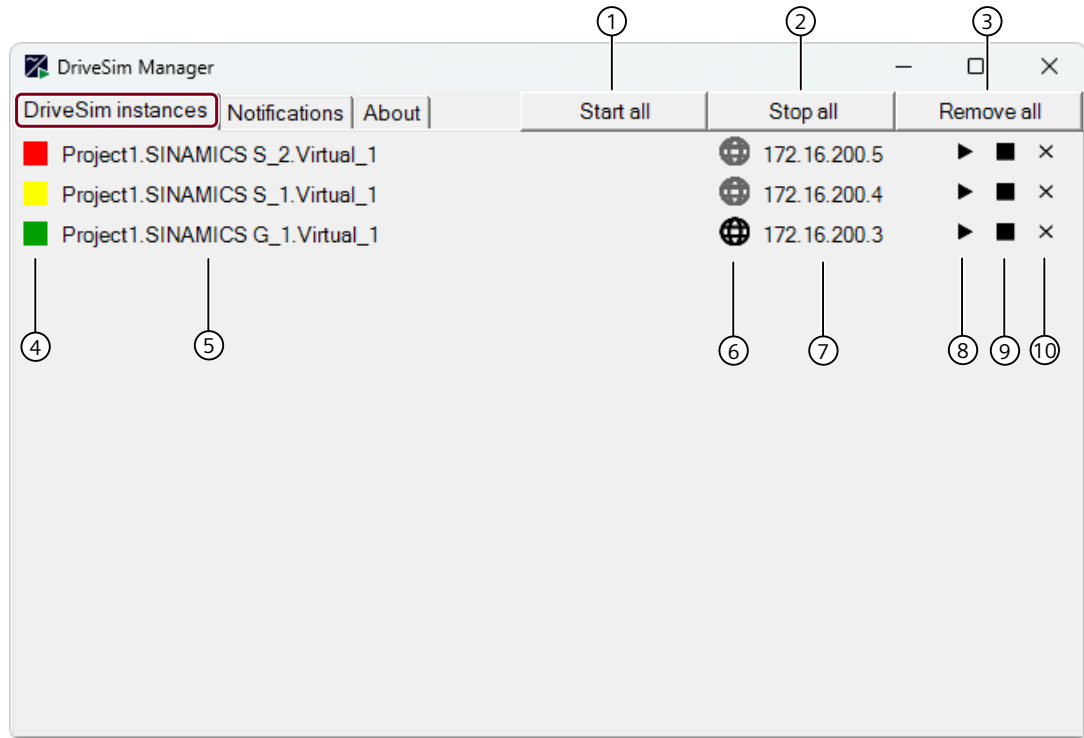
With DriveSim Manager, you can perform the following tasks:

- View the statuses of DriveSim instances
- View and copy the IP addresses of DriveSim instances
- Start, stop or remove DriveSim instances
- View recorded actions
- View detailed version information about DriveSim Manager and DriveSim Core
- Configure digital inputs of DriveSim instances
- Configure load settings of DriveSim instances

DriveSim Manager user interface

The DriveSim Manager user interface includes three tabbed pages.

- First tab: used for managing DriveSim instances

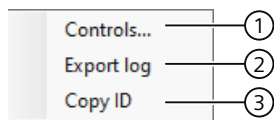


- ① Starts all DriveSim instances
- ② Stops all DriveSim instances
- ③ Removes all DriveSim instances
- ④ Displays the status of the DriveSim instance
 - The DriveSim instance is stopped.
 - The DriveSim instance is initiating.
 - The DriveSim instance is running.
 - The DriveSim instance is running and the connection to the PLC instance is active.
- ⑤ Displays the name of the DriveSim instance
- ⑥ Copies the Web server address

The icon is activated only when the DriveSim instance is running.
- ⑦ Displays the IP address of the DriveSim instance
- ⑧ Starts the stopped DriveSim instance
- ⑨ Stops the running or initializing DriveSim instance
- ⑩ Removes the DriveSim instance

The first tab also provides you with the possibility to configure the digital inputs and load settings of DriveSim instances.

Right-click a target DriveSim instance and DriveSim Manager shows the following shortcut menu:



- ① Configures digital inputs and load settings of the DriveSim instance
For more information about configuring the digital input, see Chapter "Commissioning a DriveSim instance (Page 78)".
For more information about configuring the load settings, see Chapter "Adjusting load settings for a DriveSim instance (Page 62)".
- ② Exports logs for enhanced troubleshooting with Siemens service and maintenance personnel
- ③ Copies the ID of the DriveSim instance

- Second tab: used for viewing notifications about the following recorded actions

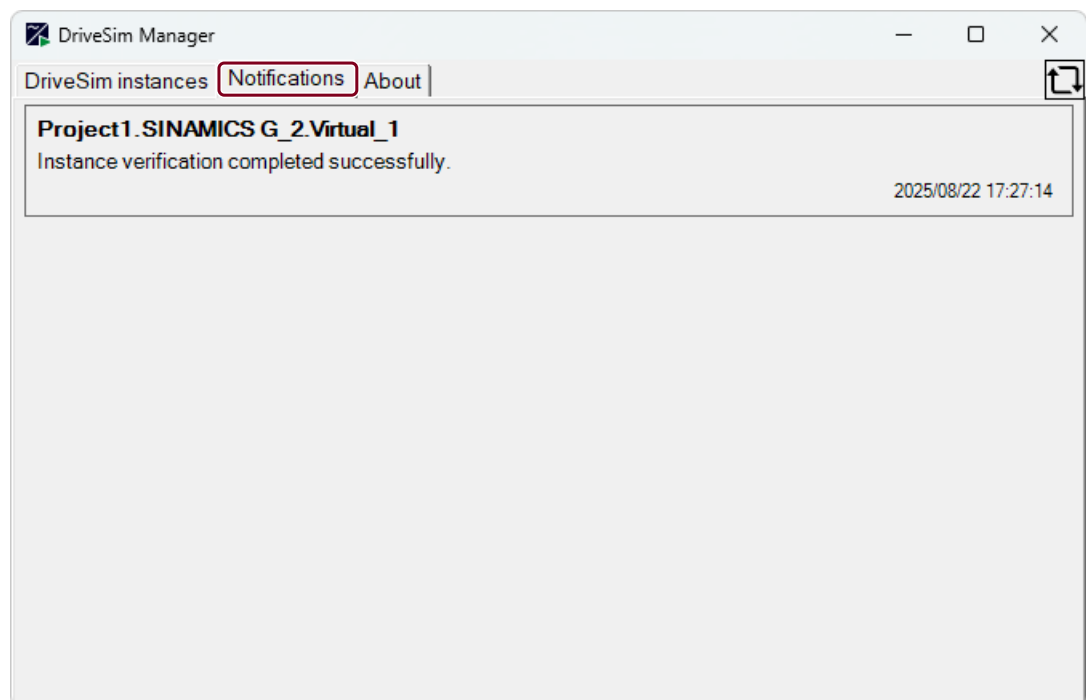
- The verification of the started DriveSim instance is complete successfully.
- The DriveSim instance has stopped responding.

Note that this tab is only applicable to the SINAMICS G220 drive system with firmware version 6.2 supported by DriveSim Engineer V2.1.

To view the latest notifications, click  to refresh the notifications. To clear the notifications, restart DriveSim Manager by right-clicking the icon  in the system tray of the Windows taskbar, selecting "Stop service", and then clicking "Start service".

Note

The "Stop service" or "Start service" option in the shortcut menu is visible only when you have administrator rights on your computer. For more information about the service options, see Chapter "Guidelines for secure operation and account management (Page 18)".



- Third tab: used for viewing DriveSim Manager and DriveSim Core version information

7.6 Adjusting load settings for a DriveSim instance

This tab also provides you with a more detailed list of internal software versions to support troubleshooting.

If no DriveSim Engineer license is found and a trial license has not been installed, the "Activate trial period" button appears on this tab. Click this button to activate a trial license. For more information about the trial license, visit the following link (<https://support.industry.siemens.com/cs/us/en/view/109821163>).



7.6 Adjusting load settings for a DriveSim instance

7.6.1 Changing and applying the load settings

Overview

By default, the configuration of a newly created instance represents a scenario that includes only the motor, its holding brake, and related friction, with no additional load applied.

To ensure that the simulation accurately reflects the practical performance of your drive system, you can adjust the load settings in the tab "Load settings" of DriveSim Manager.

The tab for load settings includes the following two parameter tables:

- Upper table
Includes load torque parameters which can only be changed manually based on your specific load scenario.
- Lower table
Includes parameters for setting the moments of inertia and further parameters for configuring the two-mass oscillator. You can change these parameters manually, or alternatively use the import function to import either the inertias from the TIA Selection Tool or an empty load setting configuration file from DriveSim Engineer. This empty configuration file provides calculation aid to make your load setting calculations easier.

The detailed information about the configurable parameters in this tab can be found in Chapter "Available parameters for load settings configuration (Page 68)".

Requirement

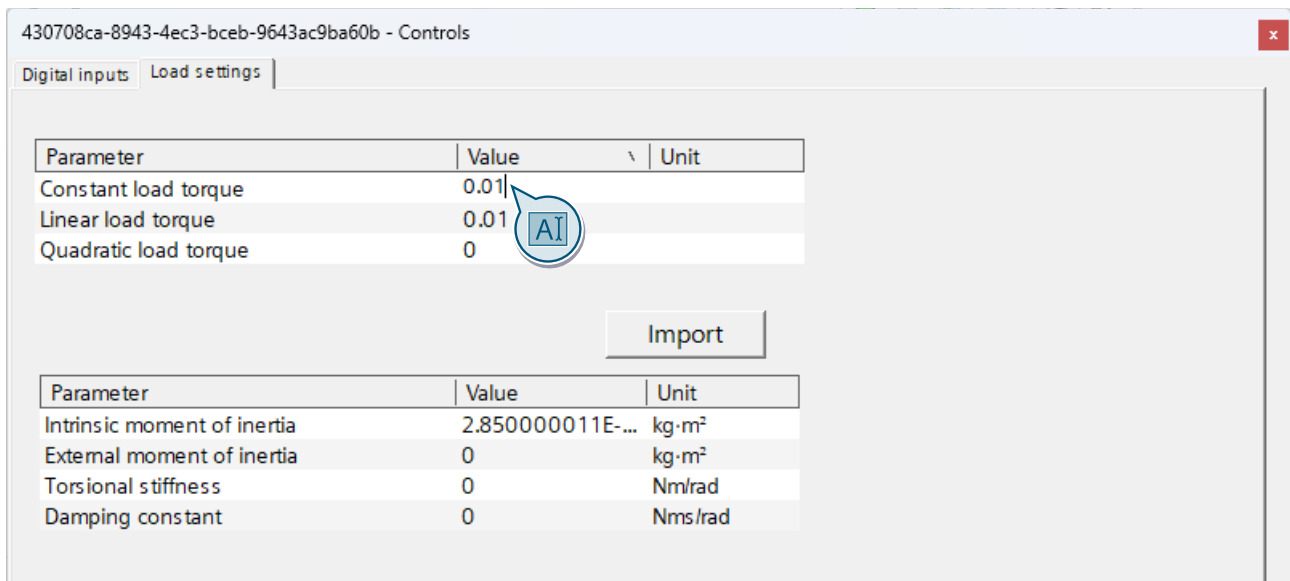
You have opened the tab "Load settings" for a target DriveSim instance by right-clicking the instance in DriveSim Manager and selecting "Controls" from the shortcut menu.

Procedure

The following methods are provided to modify the load settings for an instance:

Method 1: Manually change the parameters

1. Double-click the value that you want to modify.
2. Enter a new value and press <Enter> to confirm the change.
Values changed are highlighted in blue.

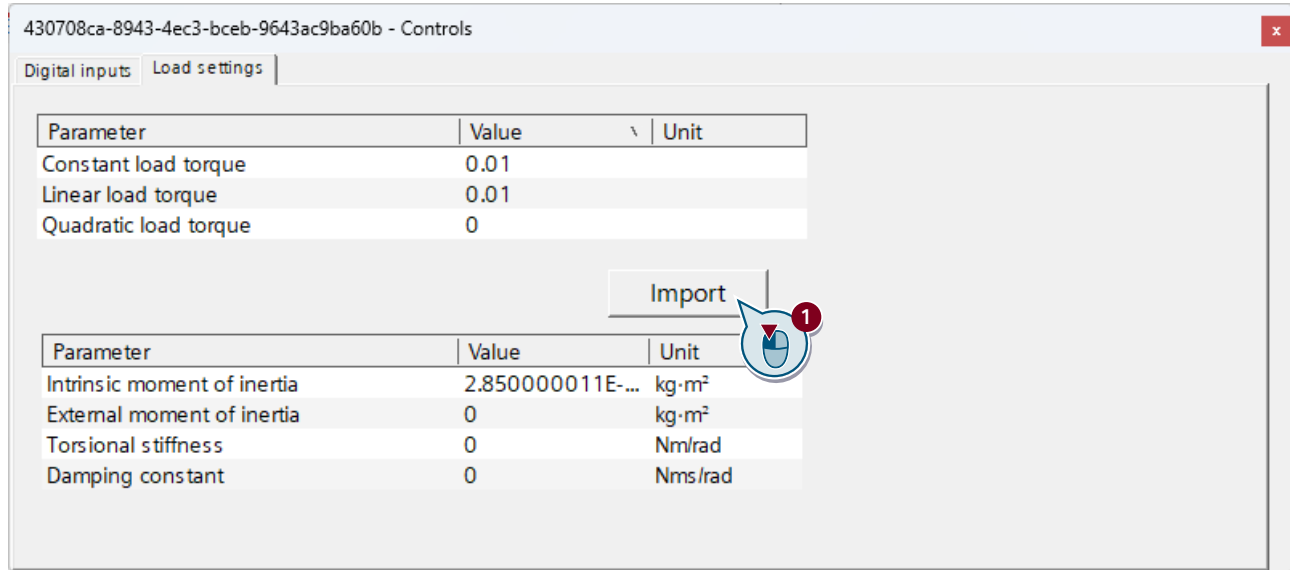


3. Restart the instance to apply the new parameterization.

Method 2: Change the parameters using the import function

This method is applicable only to the parameters located in the lower table of the tab and cannot change the parameters in the upper table.

1. Click "Import" to open the file selection dialog box.

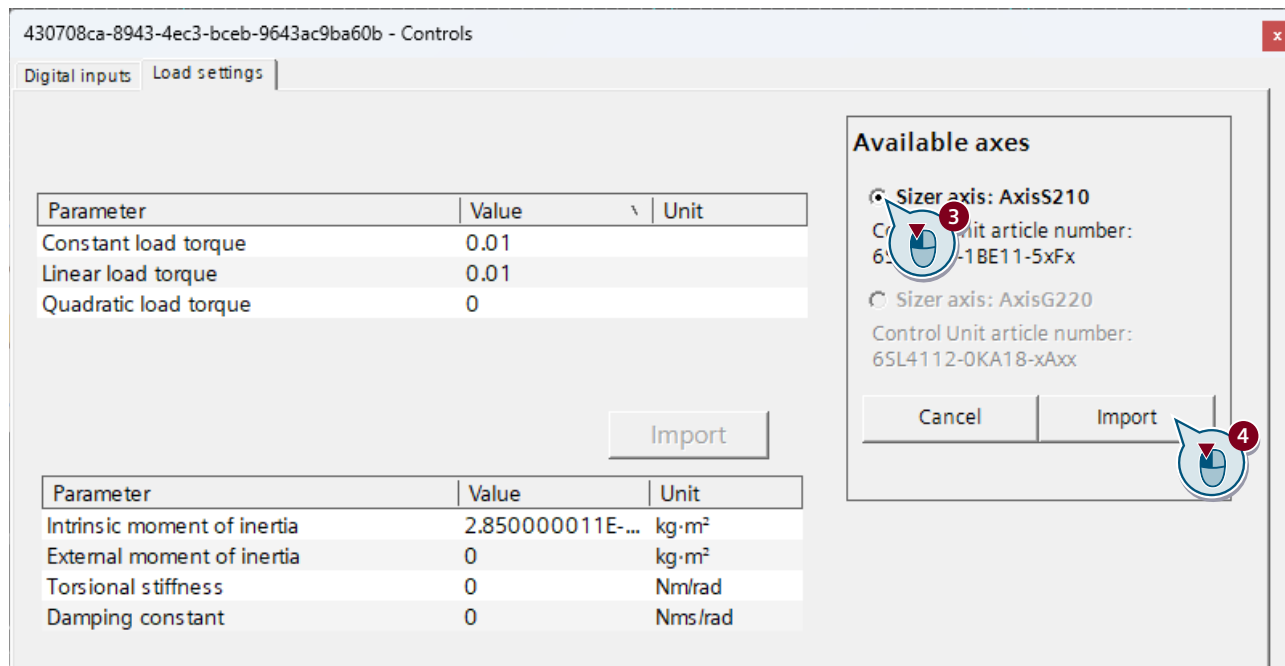


2. Select a configuration file for import:
 - Importing from the TIA Selection Tool
Navigate to the target file and bring it into DriveSim Manager.
 - Importing the empty configuration file with calculation aid
Navigate to the "Import.xml" file located in the "Examples" folder of the DriveSim Manager installation directory and bring it into DriveSim Manager.

DriveSim Manager identifies and lists all axes available in the configuration file.

3. Select the specific axis configuration that you want to apply to your instance.
Axes that do not match the target instance appear dimmed and cannot be selected.

4. Click "Import" in the dialog box for available axes.



5. For the configuration file from the TIA Selection Tool, check the values imported and modify them if necessary.
For the empty configuration file, enter the desired inertia values and the calculation results are automatically displayed.

6. Click "OK" to confirm the value settings.

430708ca-8943-4ec3-bceb-9643ac9ba60b - Controls

Digital inputs | Load settings

Parameter	Value	Unit
Constant load torque	0.01	
Linear load torque	0.01	
Quadratic load torque	0	

Import

Parameter	Value	Unit
Intrinsic moment of inertia	2.850000011E-...	kg·m ²
External moment of inertia	0	kg·m ²
Torsional stiffness	0	Nm/rad
Damping constant	0	Nms/rad

You selected the axis below

AxisS210

Imported parameters

Intrinsic moment of inertia

0.000126 kgm²

External moment of inertia

0.00325 kgm²

Inertia ratio

25.79365079365079

Further parameters

Absorber frequency

50 Hz

Torsional stiffness

320.76214303540416 Nm/rad

Damping factor

0.3

Damping constant

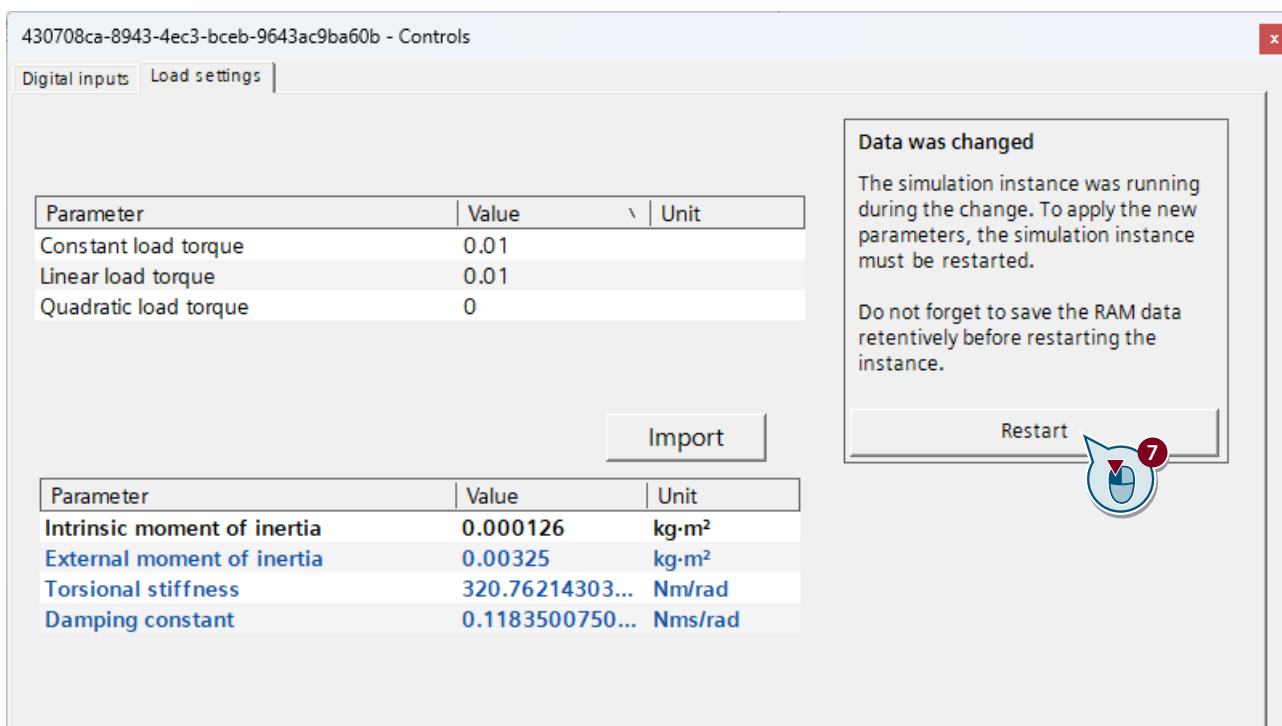
0.118350075042323 Nms/rad

Resonance frequency

258.81291888954655 Hz

Cancel OK

7. Restart the instance to apply the new parameterization.



Result

You have changed and applied the load settings for the target instance.

Note

For the new load conditions applied, Siemens recommends that you perform a re-optimization for the drive system, for example, through "Rotate & optimize" in Startdrive.

7.6.2 Available parameters for load settings configuration

Overview

DriveSim Engineer offers the following load models that represent your mechanical system:

- Single-inertia model
- Two-mass oscillator model

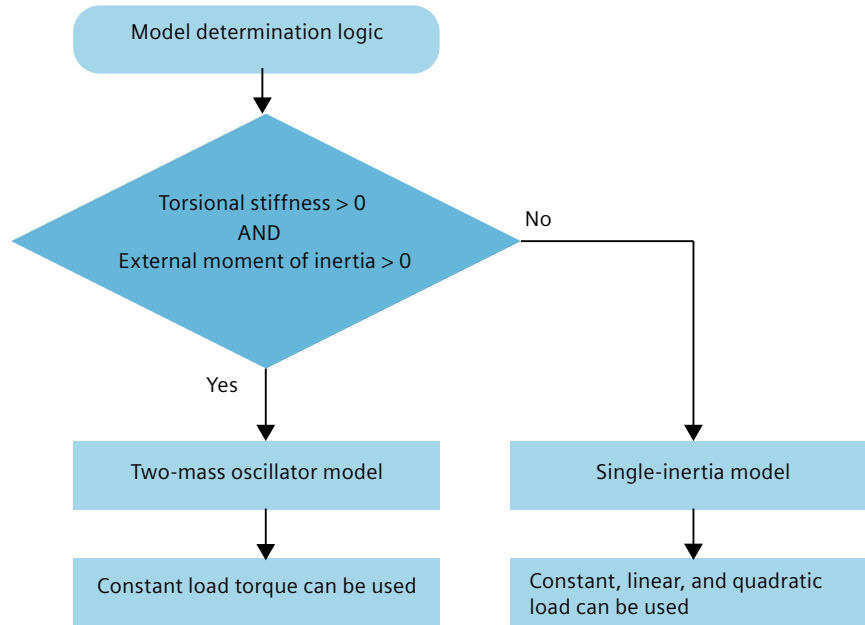


Figure 7-1 DriveSim model determination logic

Description of function

The following parameters are available for characterizing the mechanical load of a DriveSim instance, and are used differently depending on the load model selected.

Parameter name	Unit	Value range	Factory setting	Description
Constant load torque	-	-100 ... 100	0.01 ¹⁾	Sets the ratio between the passive load torque and the rated motor torque. A positive ratio ($\neq 1$) results in a braking torque independent of the motor direction of rotation. When the value is set to 1, the motor runs at the rated torque. If parameterized, the constant load torque is added up to the total load torque of the DriveSim instance.
Linear load torque	-	-100 ... 100	0.01 ¹⁾	Defines the passive load torque as a function of the motor speed. The braking torque increases proportionally to the motor speed. When the value is set to 1, the motor runs with a braking torque equal to its rated torque at the rated speed. If parameterized, the linear load torque is added up to the total load torque of the DriveSim instance. Dependency: This parameter is inactive when the two-mass oscillator model is used (torsional stiffness > 0)
Quadratic load torque	-	-100 ... 100	0	Defines the passive load torque as a function of the motor speed. The braking torque increases quadratically with the motor speed. When the value is set to 1, the motor runs with a braking torque equal to its rated torque at the rated speed. If parameterized, the quadratic load torque is added up to the total load torque of the DriveSim instance. Dependency: This parameter is inactive when the two-mass oscillator model is used (torsional stiffness > 0).
Intrinsic moment of inertia	kgm ²	10 ⁻⁶ ... 10 ⁶	-2)	Sets the total inertia on the motor side, including the inertias of the motor and all components rigidly coupled to it (e.g. motor brake, motor-side coupling).
External moment of inertia	kgm ²	0 ... 10 ⁶	0	Sets the total inertia on the load side either for the two-mass oscillator model or for the single-inertia model, dependent on the value of torsional stiffness.
Absorber frequency	Hz	0 ... 8000	50	Defines the absorber frequency of the two-mass oscillator model. Dependency: This parameter maintains a bidirectional calculation relationship with torsional stiffness. Modifying absorber frequency automatically recalculates torsional stiffness. For details on the calculation of absorber frequency, see the "Mechanical Guide".
Damping	-	0 ... 1	0.3	Sets the modal damping to calculate the damping constant in the two-mass oscillator model. For details, see the "Mechanical Guide".

7.6 Adjusting load settings for a DriveSim instance

Parameter name	Unit	Value range	Factory setting	Description
Torsional stiffness	Nm/rad	0 ... 10 ⁶	0	Sets the stiffness of the spring element in the two-mass oscillator model. Dependency: Setting this parameter to 0 converts the two-mass oscillator model into a single-inertia model. A value greater than 0 activates the two-mass oscillator model and deactivates the linear and quadratic load torque settings.
Damping constant	Nms/rad	0 ... 10 ⁶	0	Sets the damping of the damper element in the two-mass oscillator model.

- 1) The factory setting represents an estimated friction value in the drive system. This default setting is generally sufficient, but it may require adjustment for specific applications.
- 2) The factory setting varies depending on the configured motor.

Example

The following figures shows the typical use cases of the load models.

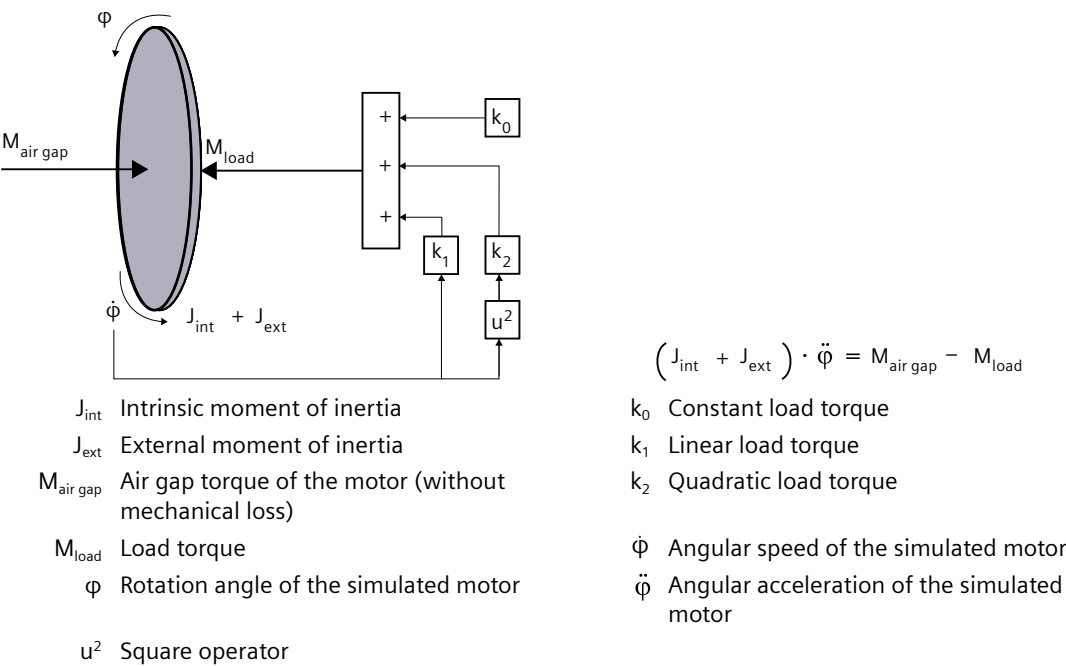
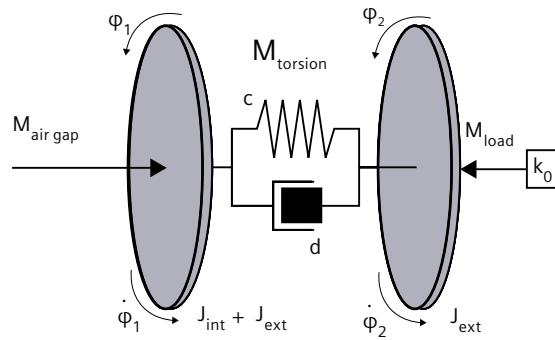


Figure 7-2 Single-inertia model with constant, linear, or quadratic motor load



$$J_{int} \cdot \ddot{\phi}_1 = M_{air\ gap} - M_{torsion}$$

$$J_{ext} \cdot \ddot{\phi}_2 = M_{torsion} - M_{load}$$

$$M_{torsion} = c \cdot (\phi_1 - \phi_2) + d \cdot (\dot{\phi}_1 - \dot{\phi}_2)$$

J_{int} Intrinsic moment of inertia
 $M_{air\ gap}$ Air gap torque of the motor (without mechanical loss)
 M_{load} Load torque¹⁾

c Torsional stiffness
 d Damping constant

J_{ext} External moment of inertia
 ϕ_2 Rotation angle of the simulated load
 $\dot{\phi}_2$ Angular speed of the simulated load
 $\ddot{\phi}_2$ Angular acceleration of the simulated load

$M_{torsion}$ Torque created by the difference in the rotation angle and angular speed of the simulated motor and load
 ϕ_1 Rotation angle of the simulated motor
 $\dot{\phi}_1$ Angular speed of the simulated motor
 $\ddot{\phi}_1$ Angular acceleration of the simulated motor
 k_0 Constant load torque ratio

¹⁾ The two-mass oscillator model calculates the load torque based on the constant torque ratio (k_0). It does not support calculation based on linear or quadratic load torque.

Figure 7-3 Two-mass oscillator model with constant motor load

More information

For more examples of setting load characteristics for a DriveSim instance, see the "Mechanical Guide" provided in the product note (<https://support.industry.siemens.com/cs/us/en/view/109821163>).

7.7 Loading project settings to a DriveSim instance

Requirement

- The DriveSim instance has been attached.
- The DriveSim instance has been verified after startup in DriveSim Manager.
- The DriveSim instance is running.

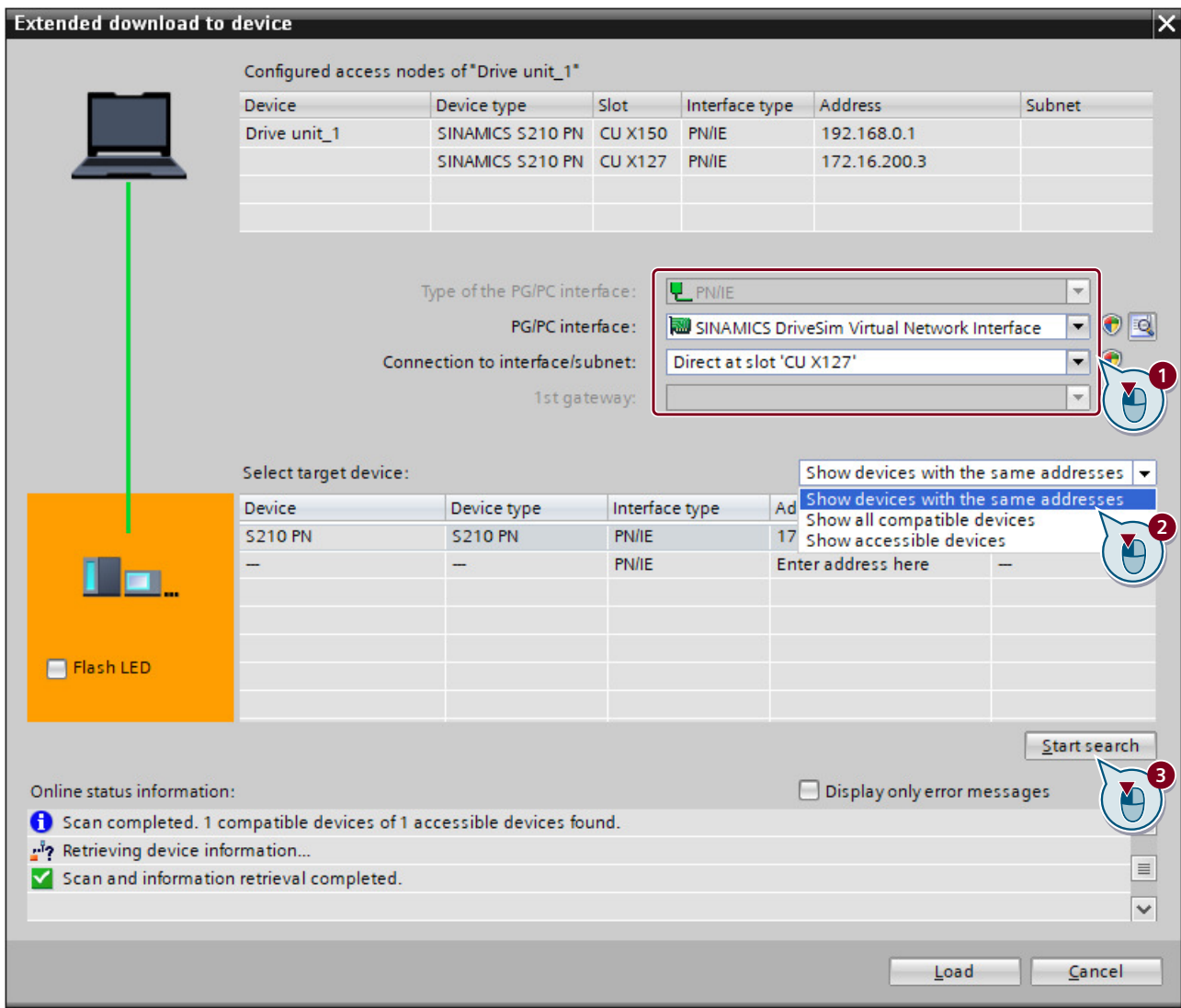
Note

A DriveSim instance is accessible only within the IP address range from 172.16.200.3 to 172.16.200.32, regardless of which interface (X127 or X150) it is connected to. To access the DriveSim instance via the PROFINET interface X150, configure X150 with the IP address automatically assigned to X127.

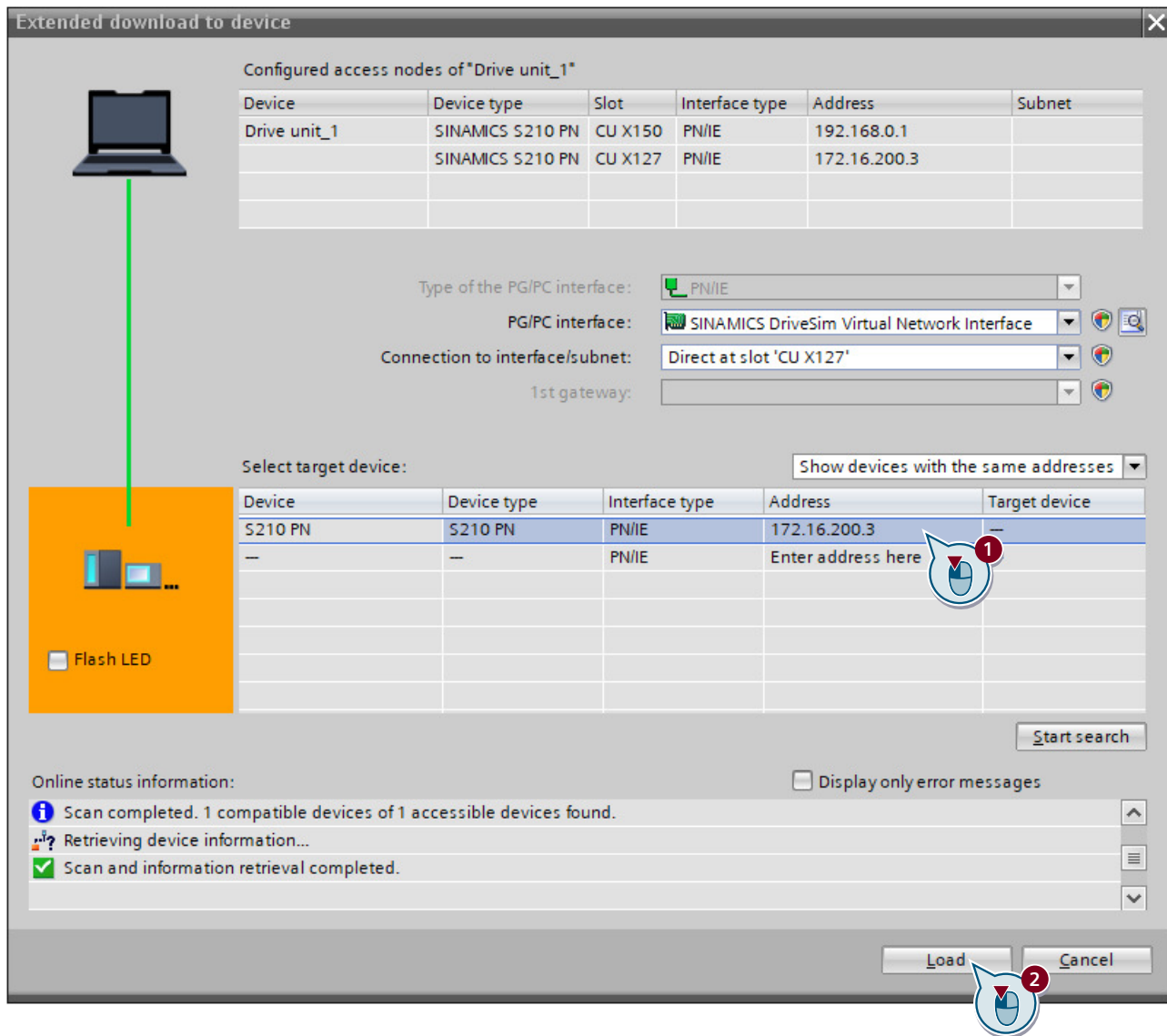
Procedure

Proceed as follows to load settings from a Startdrive project to the DriveSim instance:

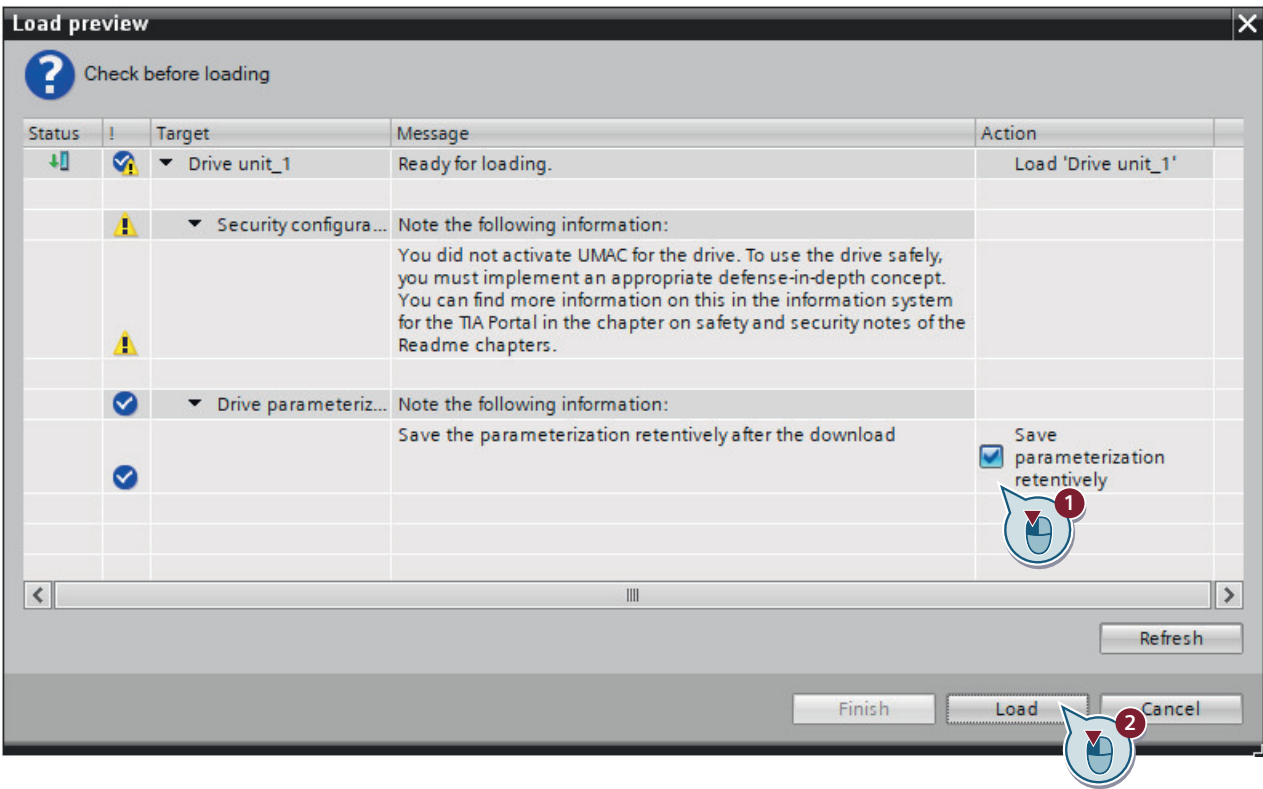
1. Select the DriveSim instance and click  to download the settings from the Startdrive project.
2. Configure the access nodes of the DriveSim instance.
 - Specify the PG/PC interface of your computer or the DriveSim Virtual Network Interface.
 - Set the connection interface of the DriveSim instance to X127.
 - From the list for target device selection, select to show devices with the same addresses and then start search for the target devices.



3. Select the DriveSim instance from the target device list.



4. Select the settings you want to load to the DriveSim instance and start the loading process. The process may take a few minutes.



Result

You have transferred the settings from the project to the DriveSim instance.

7.8 Establishing connection between Startdrive and the DriveSim instance

Overview

To commission the DriveSim instance, the online connection between the DriveSim instance and Startdrive is necessary to establish.

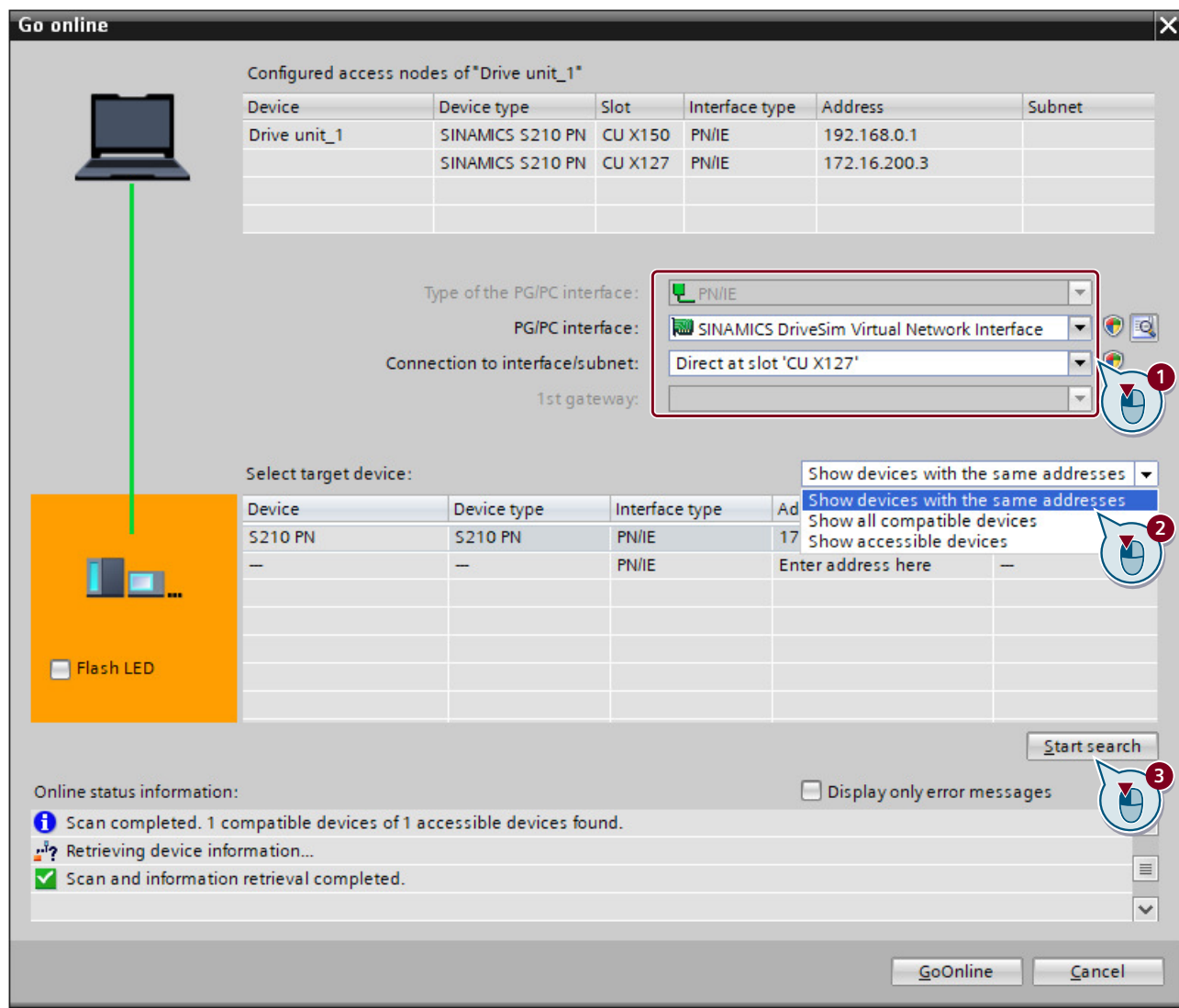
Requirement

- The DriveSim instance is attached.
- The DriveSim instance is running.

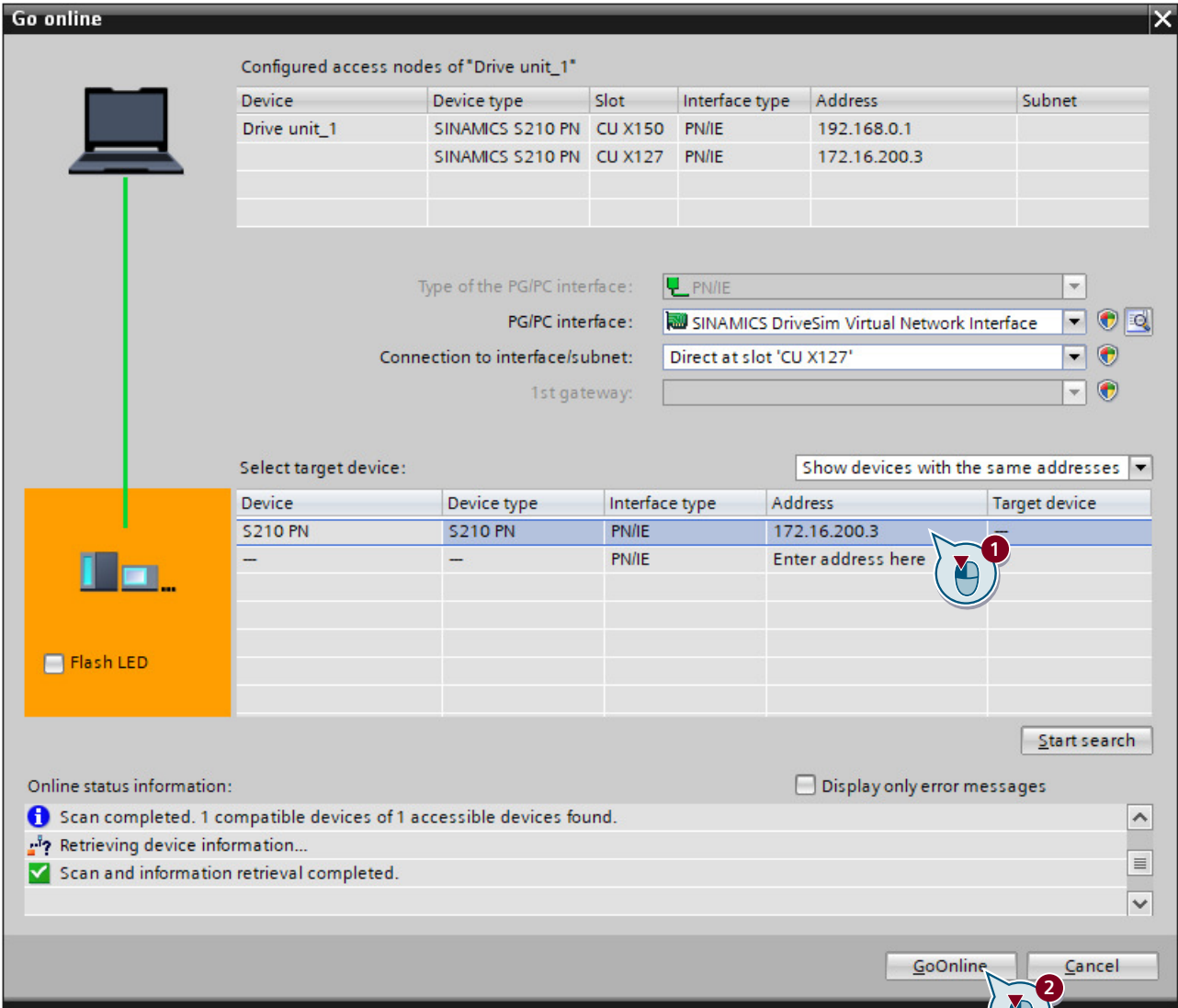
Procedure

Proceed as follows to establish an online connection between Startdrive and the DriveSim instance:

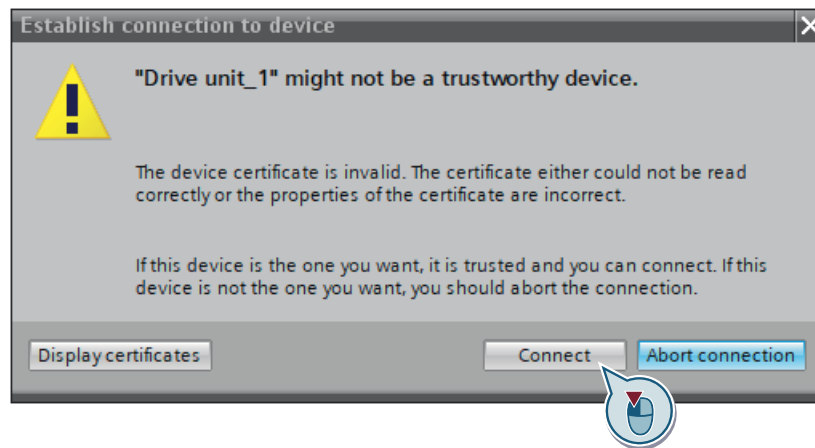
1. In Startdrive, select the DriveSim instance and click .
2. Configure the access nodes of the DriveSim instance as shown below:
 - Specify the PG/PC interface of your computer or the DriveSim Virtual Network Interface.
 - Set the connection interface of the DriveSim instance to X127.
 - From the list for target device selection, select to show devices with the same addresses and then start search for the target devices.



3. Select the DriveSim instance from the target device list and connect the DriveSim instance online.



4. Dismiss the security warning.



Result

The online connection between Startdrive and the DriveSim instance is established.

7.9 Commissioning a DriveSim instance

Overview

DriveSim Engineer supports the commissioning of the DriveSim instance both in Startdrive and via the Web server.

To access the Web server of the DriveSim instance, enter the following address in a supported browser:

https://172.16.200.xxx:8443

"172.16.200.xxx" stands for the IP address of the corresponding instance. You can also click  to copy the Web server address of an instance.

This chapter takes Startdrive as an example.

Requirement

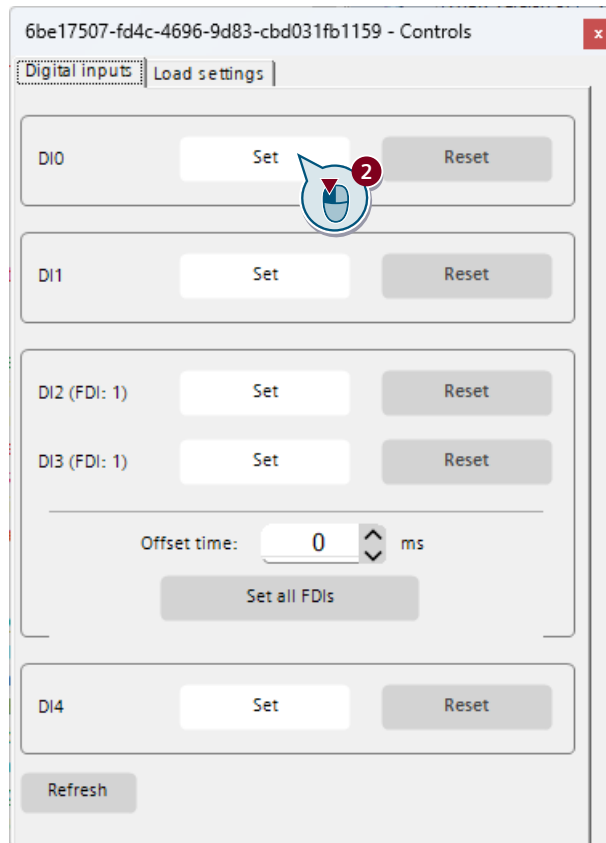
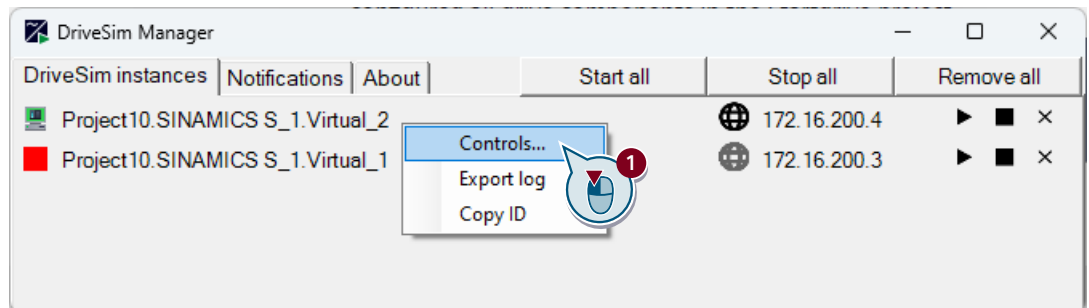
- The online connection between Startdrive and the DriveSim instance is established.
- The ports for communication are not used by another application.
- To test functions that require licensing on a DriveSim instance, you must activate Trial License mode. Do not activate a paid license on the DriveSim instance.

Procedure

Proceed as follows to commission a DriveSim instance:

1. Set the basic parameters for the DriveSim instance.
2. Call the window for input signal configuration in either of the following ways and assign the input signals:
 - Double-click the instance.
 - Right-click the instance and select "Controls..."

You can set the status of input signals in DriveSim Manager and observe how the DriveSim instance responds.



Optionally, you can configure the offset time to define the allowed discrepancy time of F-DI signals. The number of configurable F-DI signals depends on the type of instance you use.

During the offset time, the DriveSim instance tolerates the inconsistency of the set F-DI signals. When the discrepancy time of the signals exceeds the offset time, the DriveSim instance reports a safety message.

3. Configure drive functions.
4. Set Safety Integrated Functions.
5. Optimize parameter settings.

Note

To ensure proper operation of the G220 DriveSim instance, Siemens recommends that you perform the stationary measurement and, if necessary, the rotating measurement.

Result

You have commissioned the DriveSim instance.

More information

For more information about drive commissioning, see relevant chapters of the TIA Portal information system.

For more information about restrictions in commissioning the instance, see Chapter "Range of validity (Page 23)".

7.10 Commissioning a DriveSim instance with a simulated PLC

Overview

Used together with SIMATIC S7-PLCSIM Advanced, DriveSim Engineer supports simulating the connection between an S210 (New) drive and an S7-1500 PLC via telegram 105.

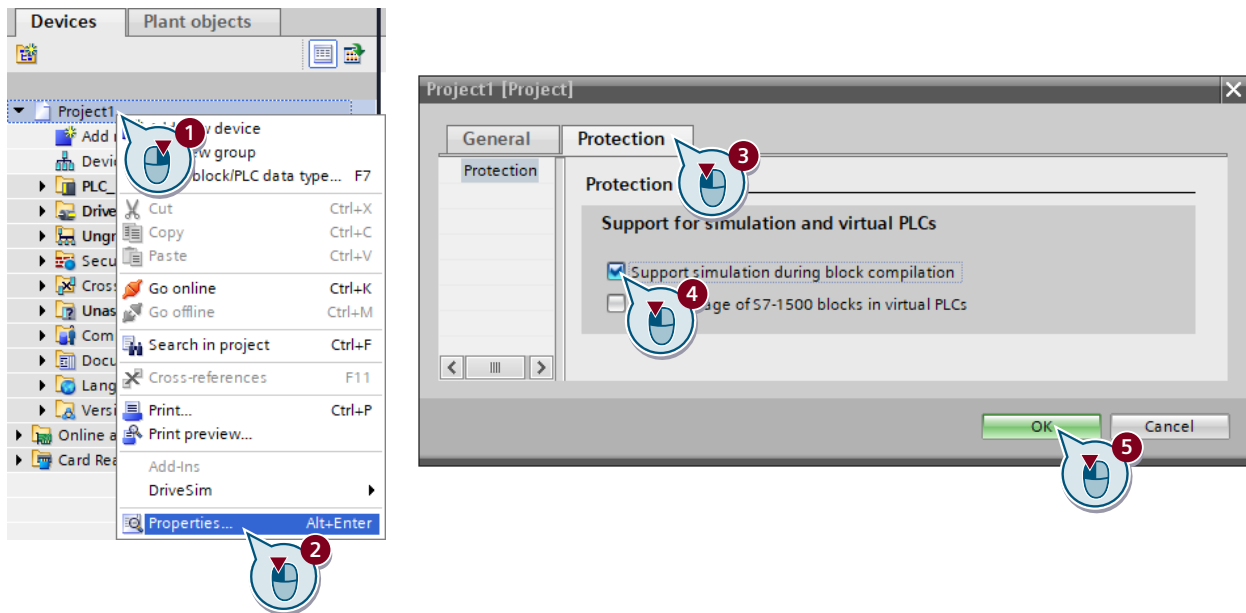
Requirement

- You have installed and launched a compatible SIMATIC S7-PLCSIM Advanced (Page 19) and DriveSim Engineer V2.1.
 - Make sure that both DriveSim Engineer and SIMATIC S7-PLCSIM Advanced have no running simulation instances.
- You have configured and connected an S7-1500 PLC and an S210 (New) drive in a Startdrive project.
 - Make sure that the devices are placed directly under the project, rather than in group folders of the project.
 - You have selected telegram 105 for communication.

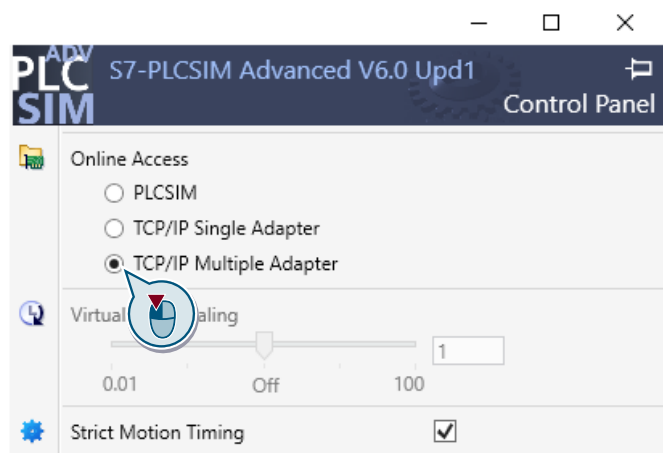
Procedure

Proceed as follows to commission a DriveSim instance with a simulated PLC:

1. Follow the illustrated steps below to enable the support for simulation during block compilation.



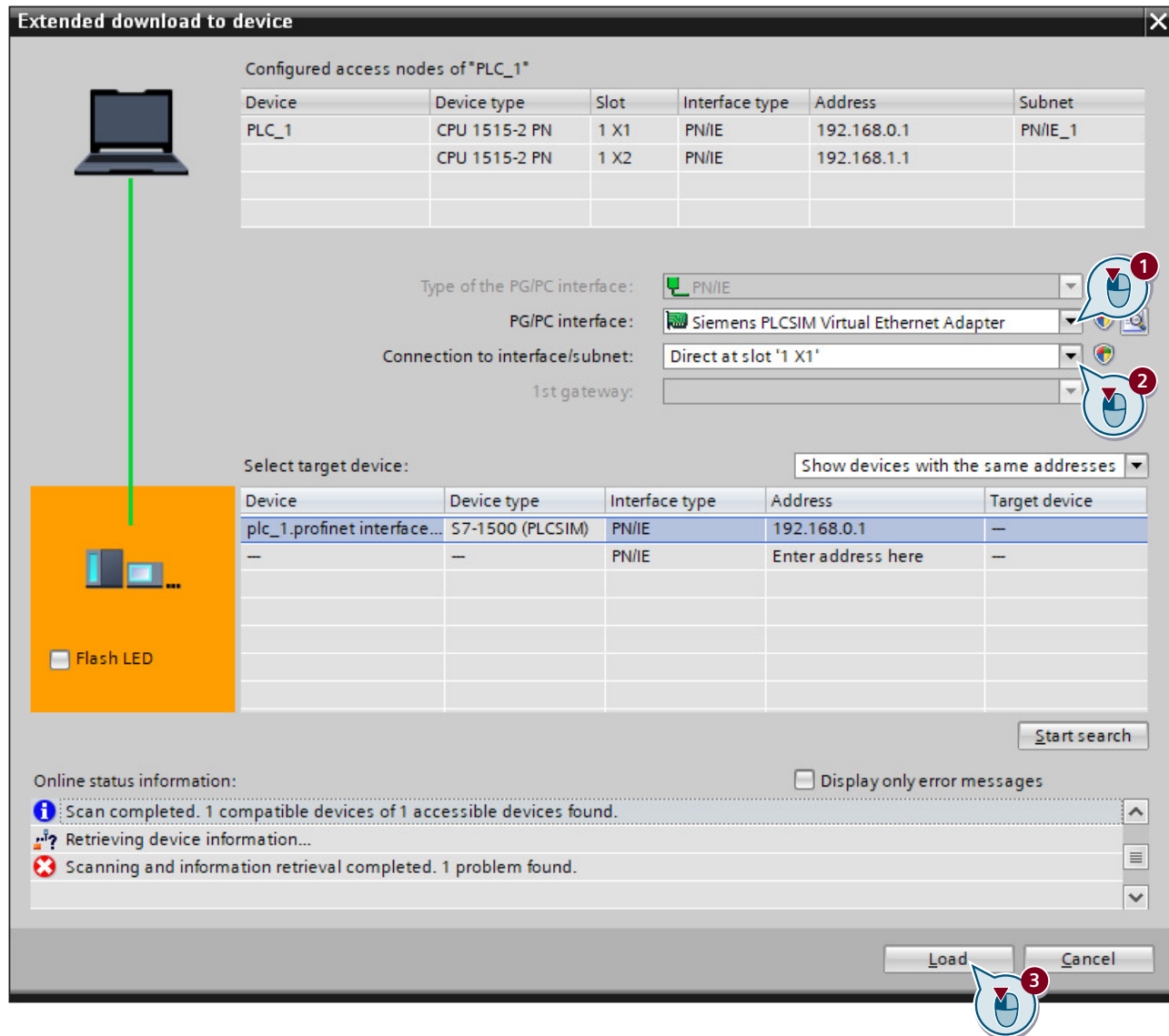
2. In S7-PLCSIM Advanced Control Panel, set the communication interface to "TCP/IP Single Adapter" or "TCP/IP Multiple Adapter" to enable the communication of the S7-1500 instance with the drive instance in Startdrive.
For better performance in a corporate network, Siemens recommends that you use "TCP/IP Multiple Adapter".



3. In Startdrive, create a DriveSim instance following the procedure described in Chapter "Creating a DriveSim instance (Page 54)".
When DriveSim Engineer creates a drive instance, it automatically interacts with SIMATIC S7-PLCSIM Advanced to prepare an S7-1500 instance. If there is an S7-1500 instance present in SIMATIC S7-PLCSIM Advanced Control Panel, DriveSim Engineer activates the existing S7-1500 instance; otherwise, DriveSim Engineer creates a new S7-1500 instance.

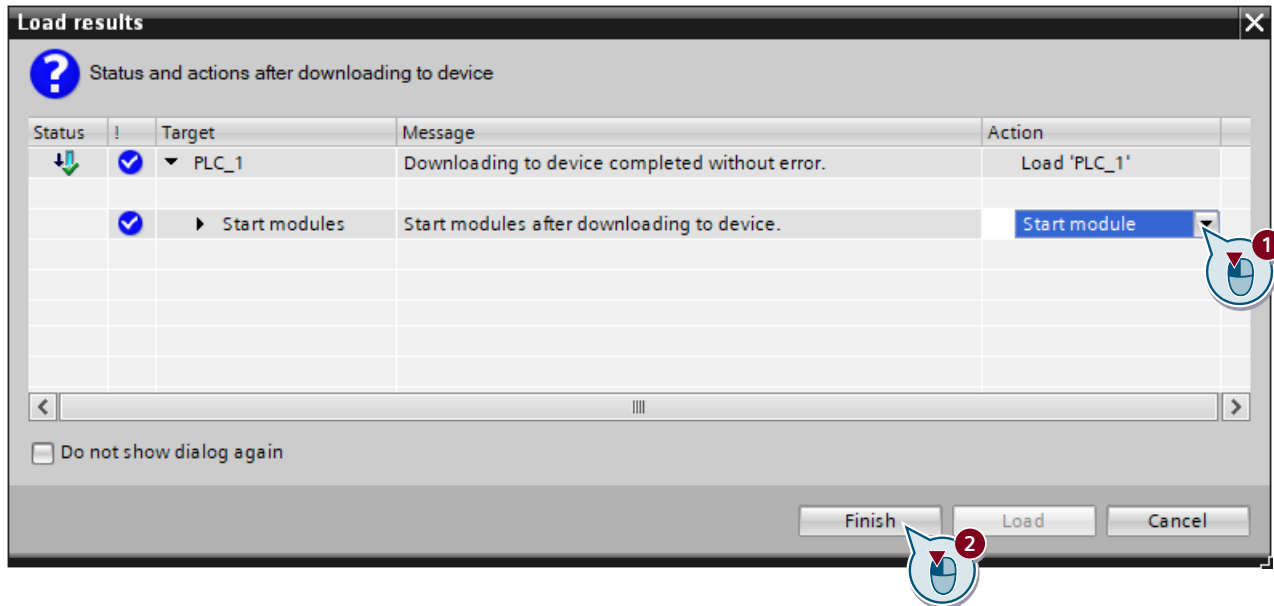
7.10 Commissioning a DriveSim instance with a simulated PLC

4. Select the target PLC in the Startdrive project tree and click  to load the PLC configuration to the S7-1500 instance.
The dialog box for extended download opens.
5. Specify the download settings in the dialog box.
 - Select "Siemens PLCSIM Virtual Ethernet Adapter" as the PG/PC interface.
 - Specify the connection interface of the PLC instance.
 - Click "Load".



6. Follow any additional prompts or instructions provided by the Startdrive to complete the download.

7. Specify whether you want to start the S7-1500 instance immediately after the download, and then click "Finish".



8. Click  to establish an online connection between Startdrive and the S7-1500 instance.
9. If required, configure the drive instance and establish an online connection for the drive instance.

Note

The network adapters used are virtual, which might behave slightly different from physical network adapters.

10. Perform commissioning.

Result

You have commissioned the drive instance with the S7-1500 instance.

More information

For more information about SIMATIC S7-PLCSIM Advanced, see SIMATIC S7-PLCSIM Advanced Function Manual (<https://support.industry.siemens.com/cs/ww/en/view/109955578>).

7.11 Transferring the settings from a DriveSim instance to the real device

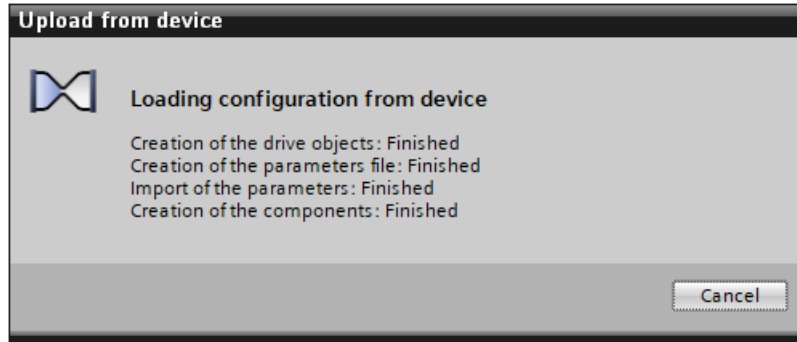
Requirement

- The online connection between Startdrive and the DriveSim instance is established.
- The real device and the DriveSim instance have the same firmware version.
- The verification of the DriveSim instance has been finished.

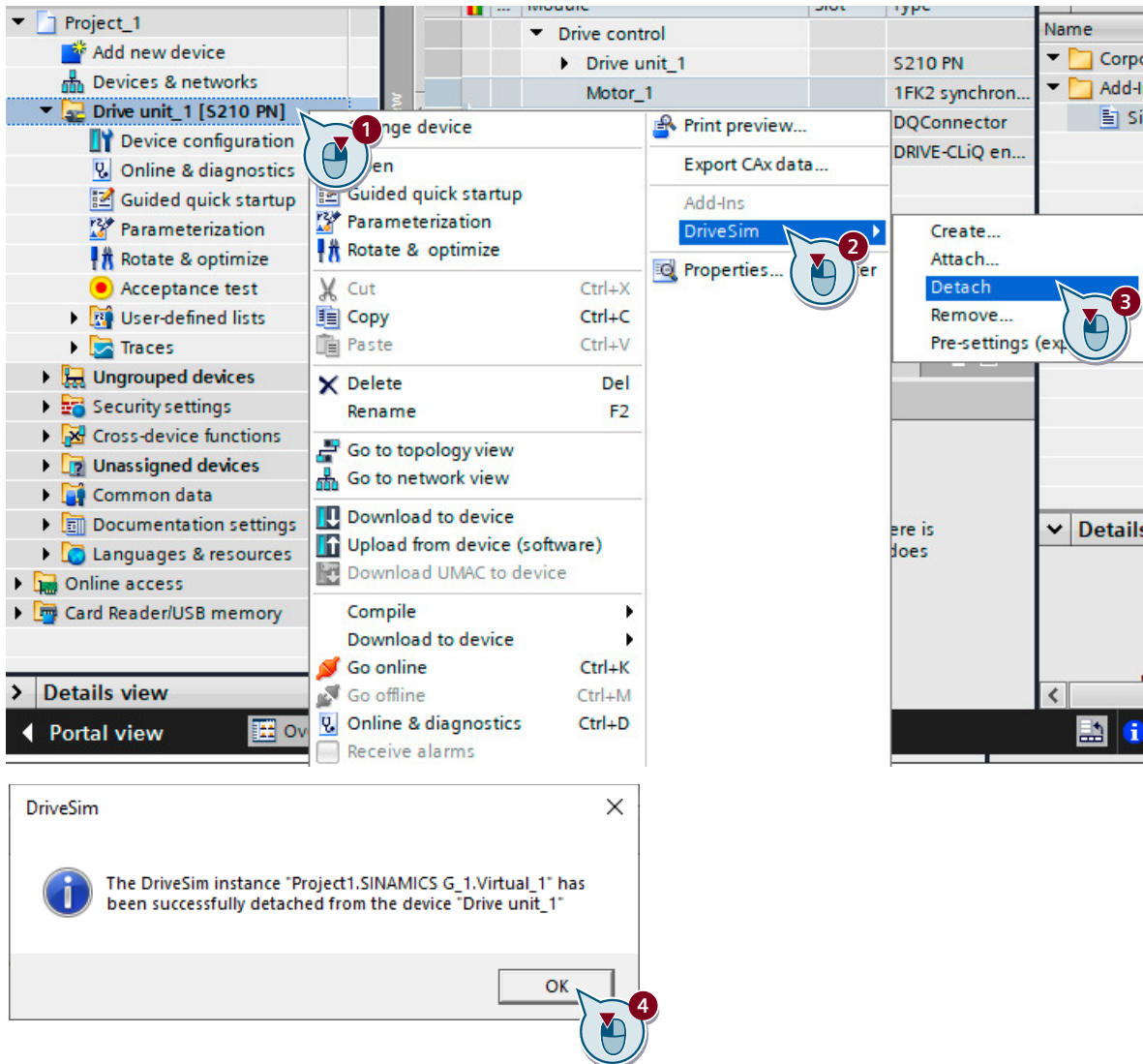
Procedure

Proceed as follows to transfer settings from a DriveSim instance to the real device:

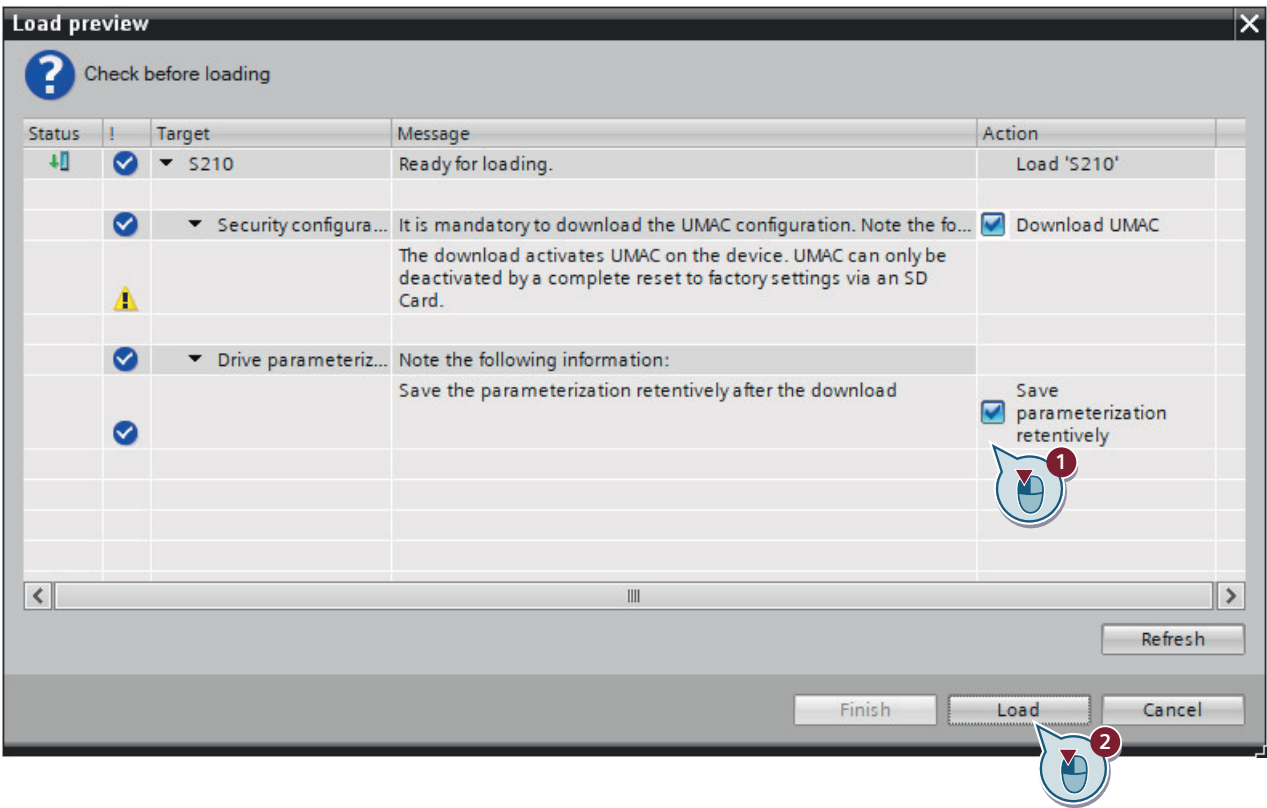
1. Disconnect the DriveSim instance from Startdrive by clicking .
2. Select the DriveSim instance and click  to upload its settings to the Startdrive project.



3. Detach the DriveSim instance from the project.



4. Configure the connection settings of the real device in Startdrive and click  to download the settings from the Startdrive project. The process may take a few minutes.



Result

You have transferred the settings from the DriveSim instance to the real device. You can finalize the commissioning of the real device now.

7.12 Deleting a DriveSim instance

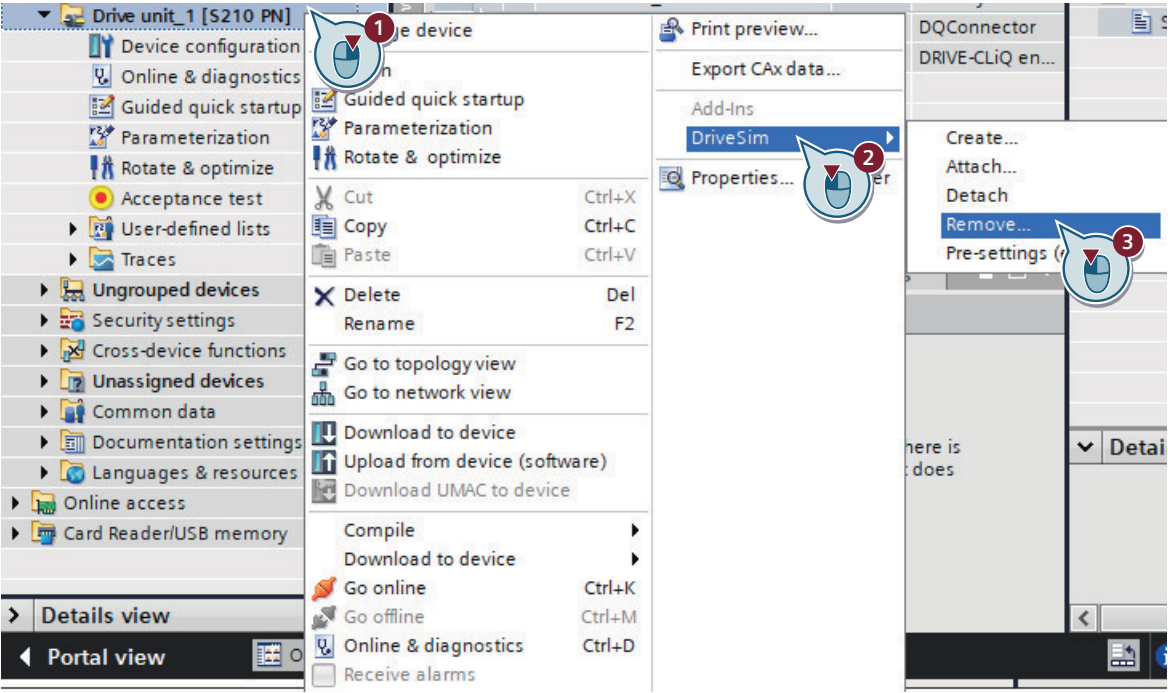
Requirement

The DriveSim instance has been created.

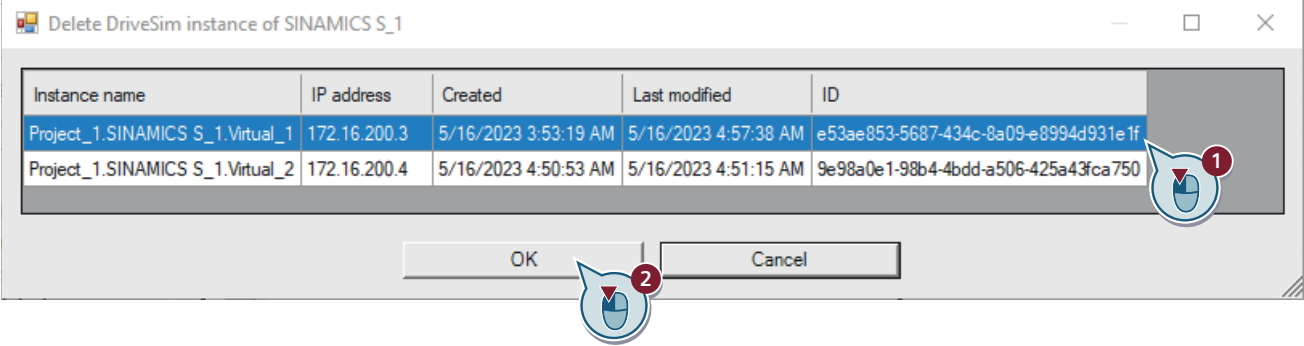
Procedure

Deleting a DriveSim instance in Startdrive

1. In Startdrive, select the targeted device to delete DriveSim instances.

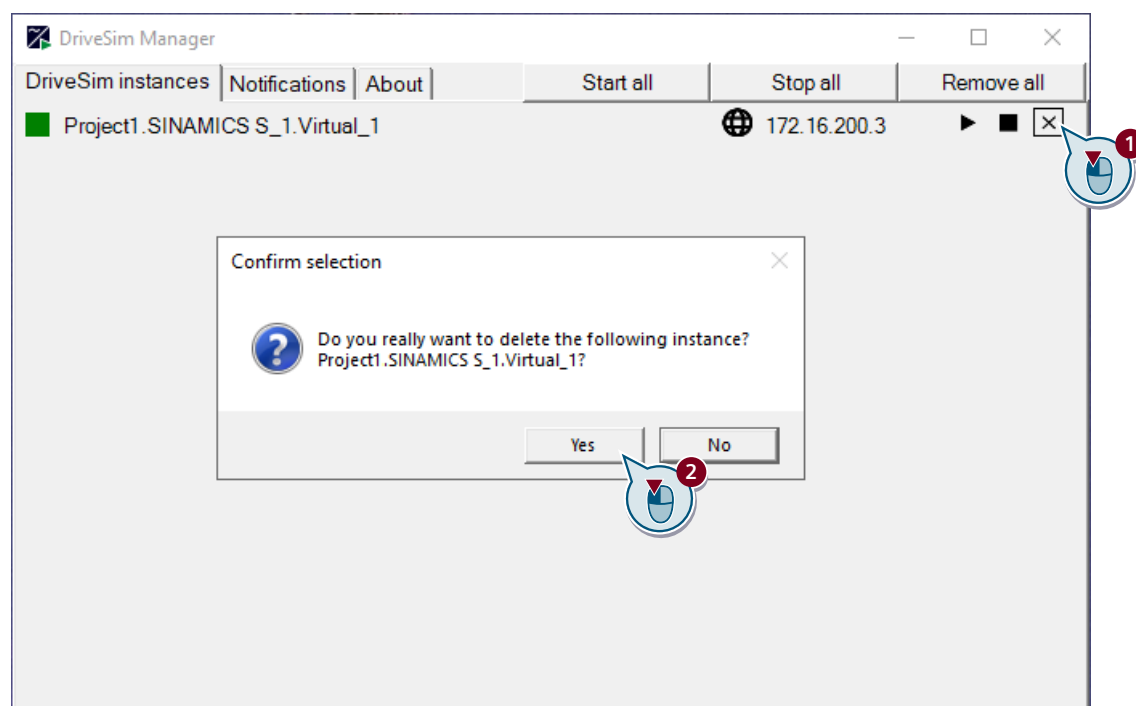


2. Select the instance you want to delete.



Deleting a DriveSim instance in DriveSim Manager

In DriveSim Manager, select and delete the target DriveSim instance.



Result

You have deleted the DriveSim instance. The IP address of the deleted DriveSim instance will be re-assigned to a new instance.

Additional information

8.1 Repairing DriveSim Engineer

Overview

The function of repairing is used when the installation encounters errors or when certain system settings are changed.

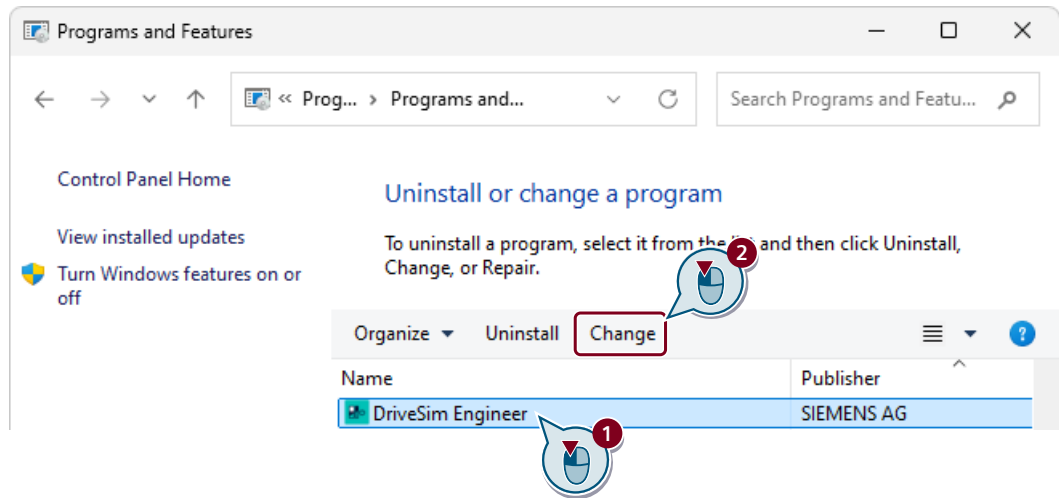
Requirement

- You have installed DriveSim Engineer on your computer.
- You have administrator rights on your computer.
- You have stopped DriveSim Manager.

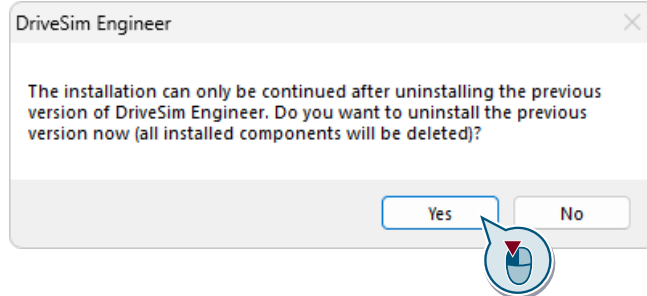
Procedure

Proceed as follows to repair DriveSim Engineer:

1. Choose one of the following two methods to start repairing.
 - Double-click Setup_DriveSim_Engineer.exe in the software package.
 - Open "Control Panel" on your computer. Specify "DriveSim Engineer" in "Programs and Features" and then click "Change".



2. Click "Yes" to uninstall DriveSim Engineer.



3. Wait a few minutes until the DriveSim Engineer setup wizard automatically opens.
4. Follow the installation procedure described in Chapter "Installing the setup package for DriveSim Engineer (Page 31)" to reinstall the software.

Result

You have finished repairing the software on your computer.

8.2 Upgrading DriveSim Engineer

Overview

You can install newer versions of the DriveSim Engineer components (SINAMICS DriveSim Core, DriveSim Manager, and DriveSim TIA Portal Add-In) to upgrade the software.

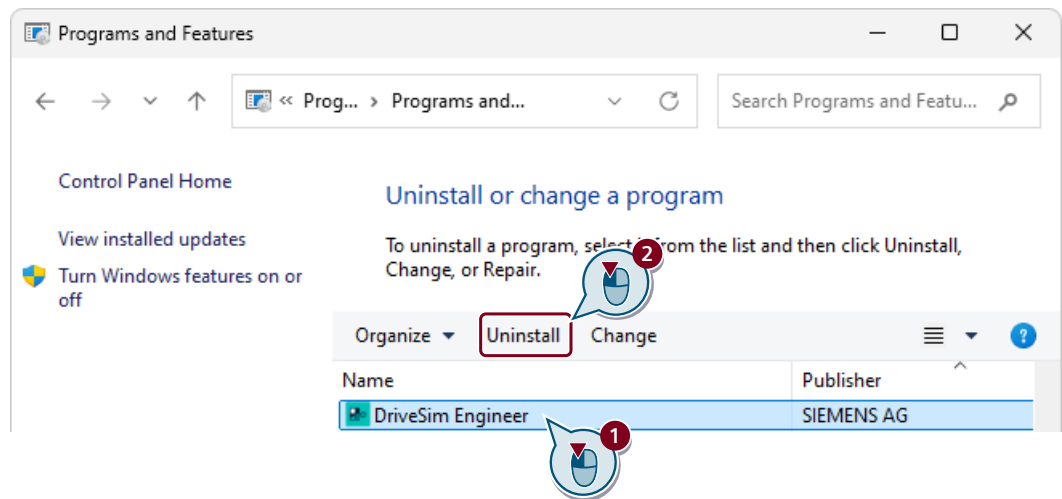
Requirement

- You have installed DriveSim Engineer on your computer.
- You have administrator rights on your computer.
- You have stopped DriveSim Manager.

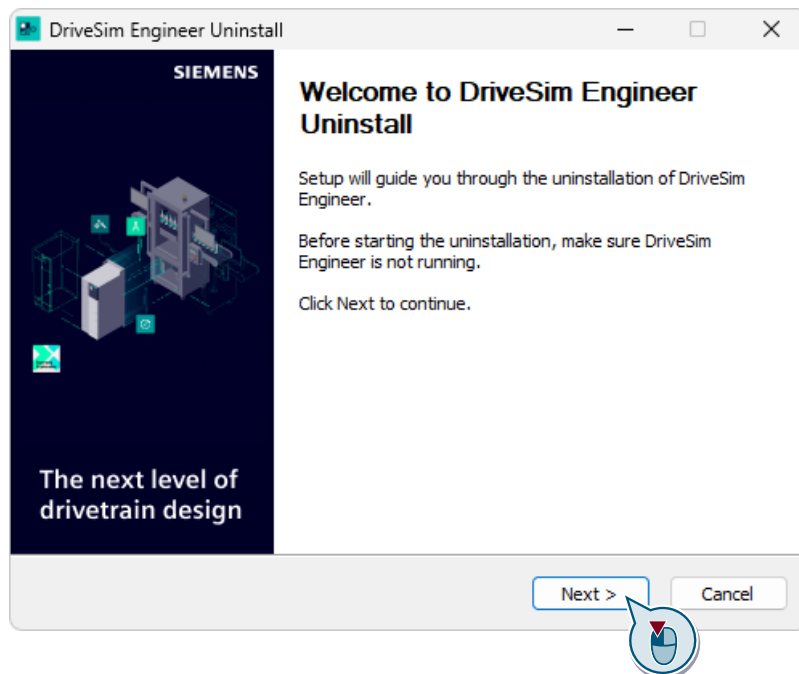
Procedure

Proceed as follows to upgrade DriveSim Engineer:

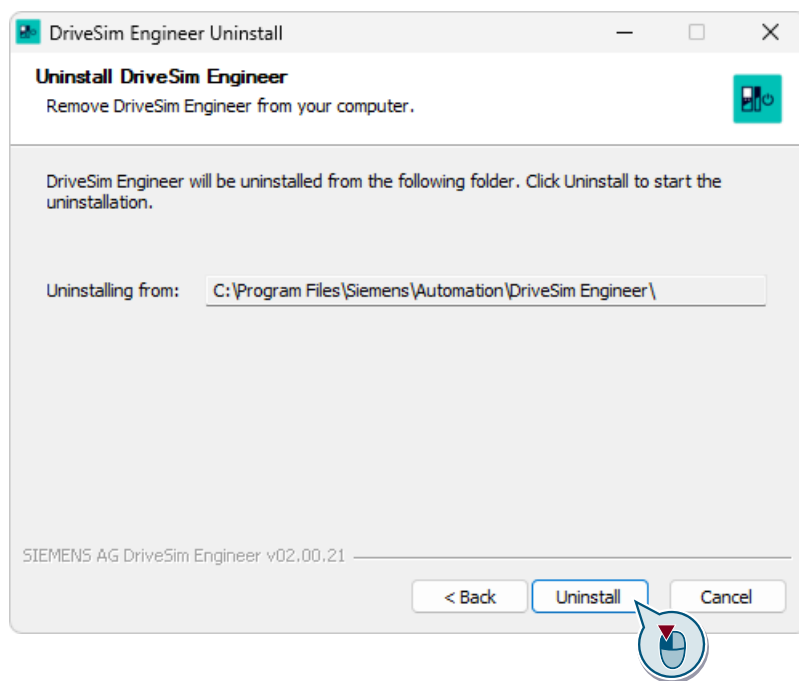
1. Open "Control Panel" on your computer.
2. Specify "DriveSim Engineer" in "Programs and Features", and then click "Uninstall".



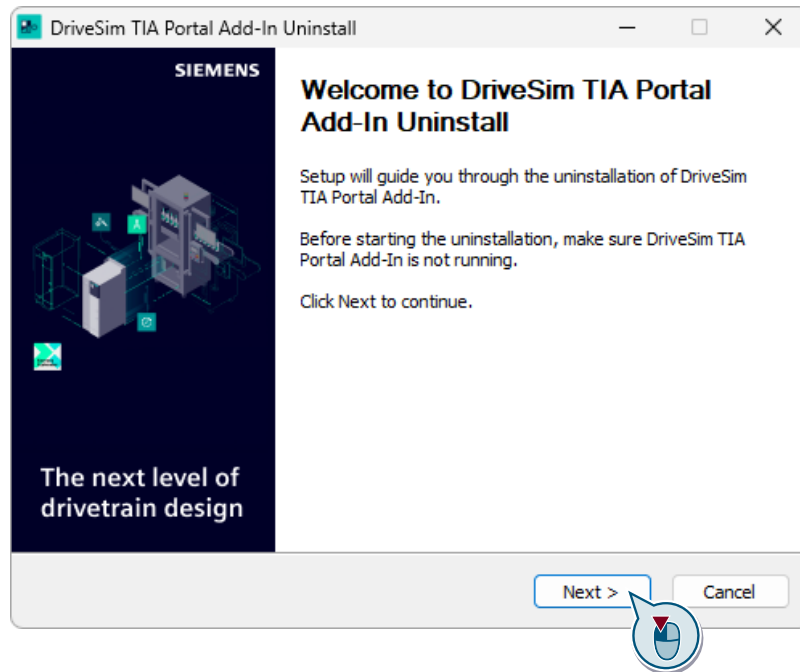
3. The DriveSim Engineer uninstall wizard opens. Click "Next".



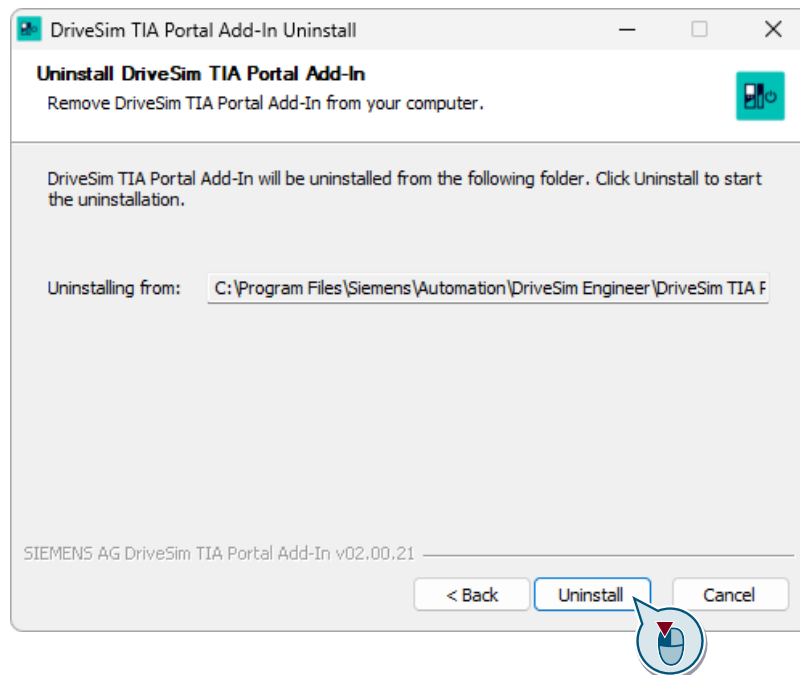
4. Click "Uninstall" to start the uninstallation. The uninstall wizard displays the status of the uninstallation.



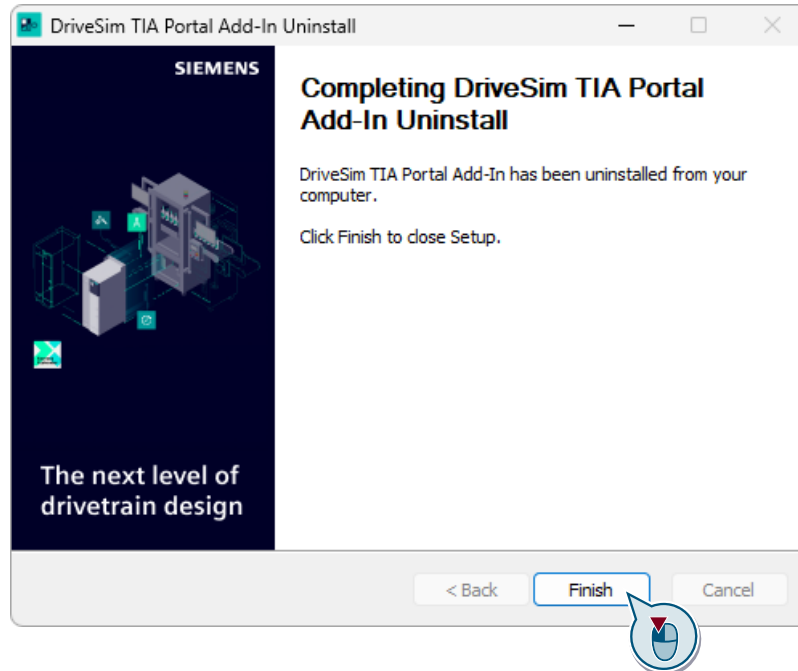
5. The DriveSim TIA Portal Add-In uninstall wizard opens. Click "Next".



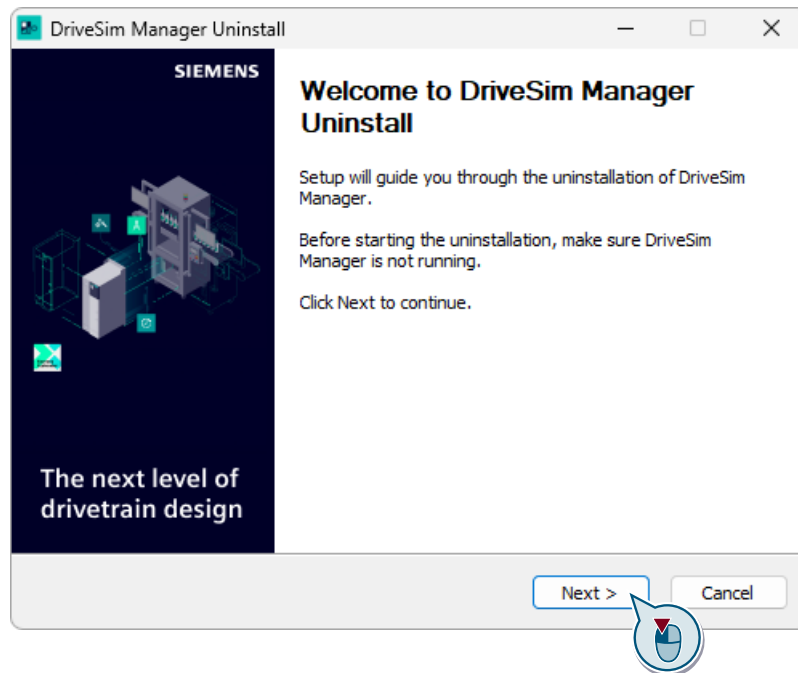
6. Click "Uninstall" to start the uninstallation. The uninstall wizard displays the status of the uninstallation.



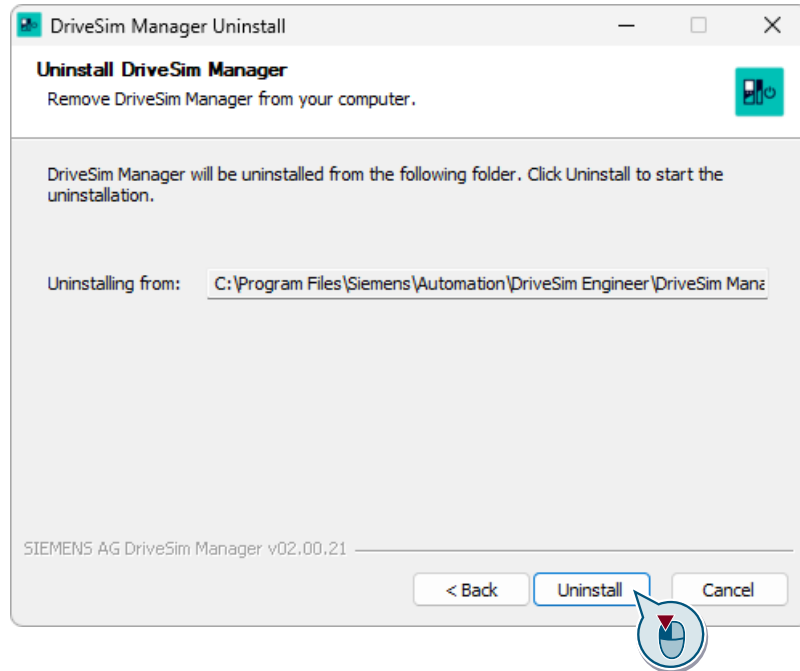
- When the uninstallation is complete, click "Finish" to dismiss the DriveSim TIA Portal Add-In uninstall wizard.



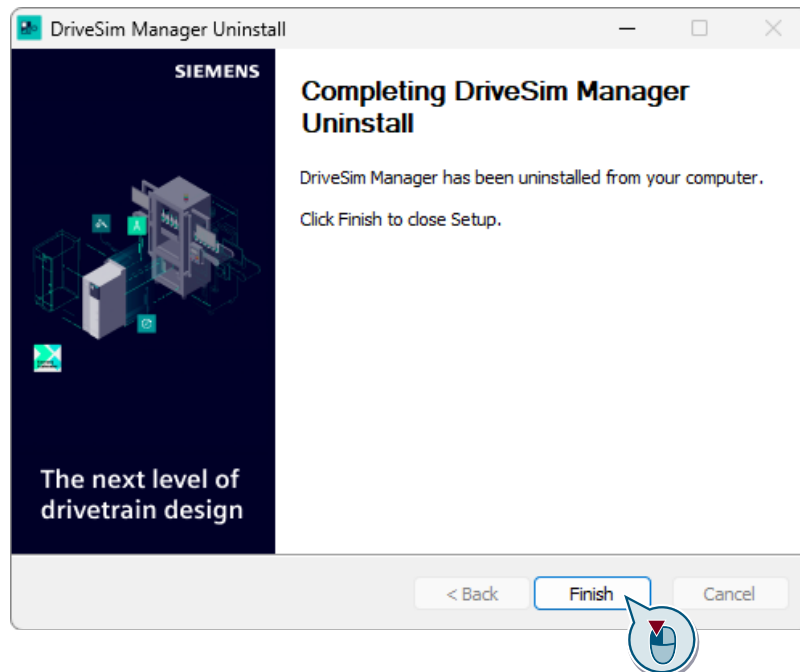
- The DriveSim Manager uninstall wizard opens. Click "Next".



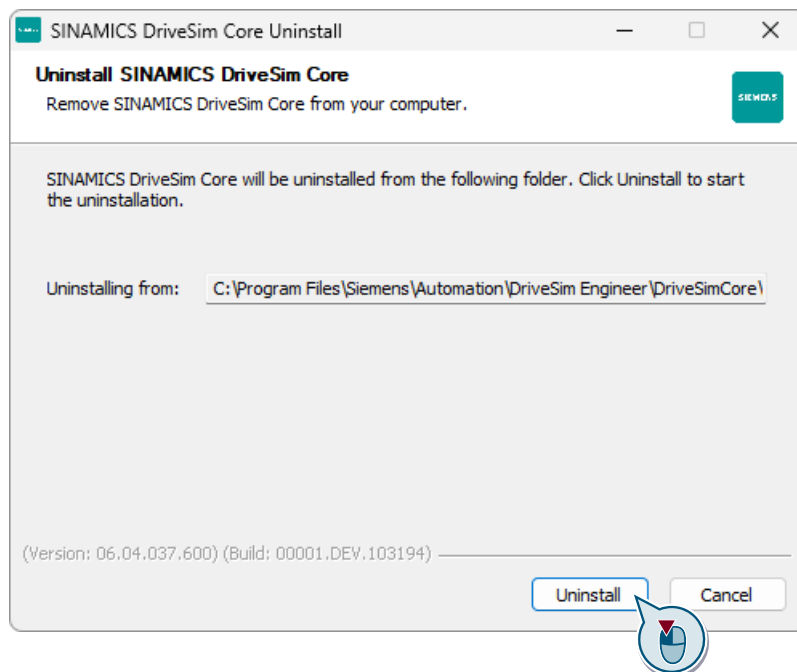
- Click "Uninstall" to start the uninstallation. The uninstall wizard displays the status of the uninstallation.



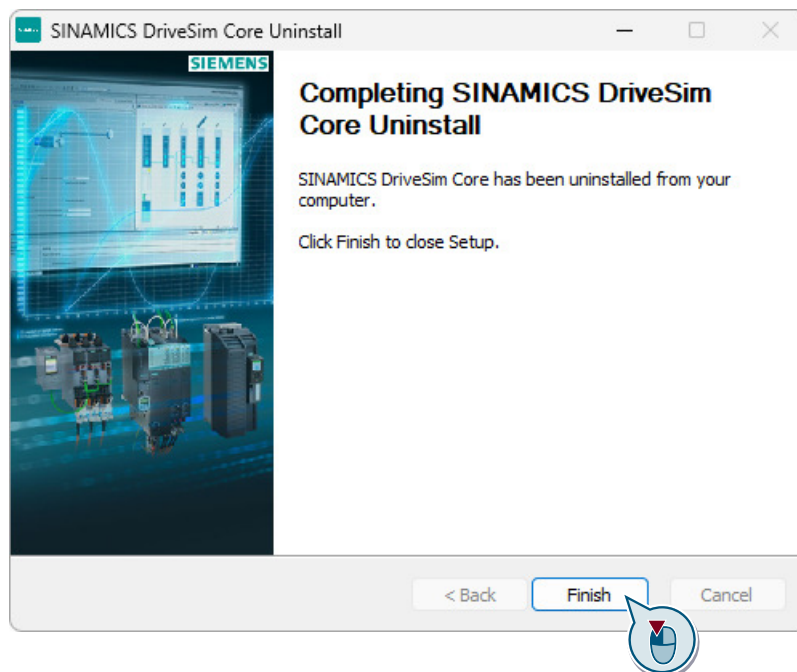
- When the uninstallation is complete, click "Finish" to dismiss the DriveSim Manager uninstall wizard.



11. The SINAMICS DriveSim Core uninstall wizard opens. Click "Uninstall" to start the uninstallation. The uninstall wizard displays the status of the uninstallation.



12. When the uninstallation is complete, click "Finish" to dismiss the SINAMICS DriveSim Core uninstall wizard.



13. If you have installed both SINAMICS DriveSim Core versions, repeat the uninstallation procedure for the other SINAMICS DriveSim Core.

Note**Delete log files manually**

Some log files are not automatically deleted after the uninstallation. You can find these files in the following directories and delete them manually:

- %ProgramData%\Siemens\Automation\DriveSim Engineer
- %ProgramData%\Siemens\Automation\SinamicsWinHost\Logs

For more information about log files, see Chapter "Log files (Page 16)".

14. Download the latest version of the installation package at the following link:
DriveSim Engineer installation package (<https://support.industry.siemens.com/cs/document/109821163>)
15. Follow the installation procedure described in Chapter "Installing the setup package for DriveSim Engineer (Page 31)" to finish the installation of the latest software version on your computer.

Result

You have finished the software upgrade on your computer.

Get more information

DriveSim Engineer:
www.siemens.com/drivesim-engineer

Industry Mall:
www.siemens.com/industrymall

Industry Online Support:
www.siemens.com/online-support