**FUNCTION MANUAL**

# DriveSim Engineer

## Digital Drivetrain

For SINAMICS converters
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# DriveSim Engineer

**Function Manual**

Edition 12/2024, valid for version 2.0

# 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 personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

## Proper use of Siemens products

Note the following:

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

## Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

## Disclaimer of Liability

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

# Table of contents

# Introduction

<span style="float:right; font-size:3em; font-weight:bold;">1</span>

## 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.

## 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 drive simulation instance after activating the DriveSim TIA 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 V2.0**

The following features are new for DriveSim Engineer V2.0:

- Ability to simulate the SINAMCIS S210 (New) converter (firmware version 6.4) and its compatible motors that do not have holding brakes
- Ability to simulate the communication between S210 (New) and S7-1500 via telegram 105 (SIMATIC S7-PLCSIM Advanced required)
- Support for TIA Portal V20
- Use of bundled software installation package for DriveSim Engineer V2.0, eliminating the need for separate component installation as required in previous versions
- Information relevant to previous DriveSim Engineer versions V1.0 and V1.2 removed from the current manual

## 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

### 1.3.1 ID link and Siemens Online 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 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

## 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.

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)

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⚠ **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 by with suitable protection measures, e.g. virus scanners.
- Carefully check all cybersecurity-related settings once commissioning has been completed.

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# Additional safety instructions

<div style="text-align: right; font-size: 2em;">3</div>

## 3.1 Protection of sensitive data in DriveSim Engineer projects

| NOTICE |
| --- |
| **Protecting parameters in the DriveSim Engineer project** |
| The parameters stored in the DriveSim Engineer project can be read out by unauthorized third parties without protection. Unauthorized persons can therefore cause damage. |
| • Prevent unauthorized persons from accessing your plants and systems. Implement access restrictions and take the precautions described in Chapter "Additional safety instructions (Page 13)". |

**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 take the precautions described in Chapter "Additional safety instructions (Page 13)".

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

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⚠ **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.
- Take the precautions described in Chapter "Additional safety instructions (Page 13)".

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## 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.
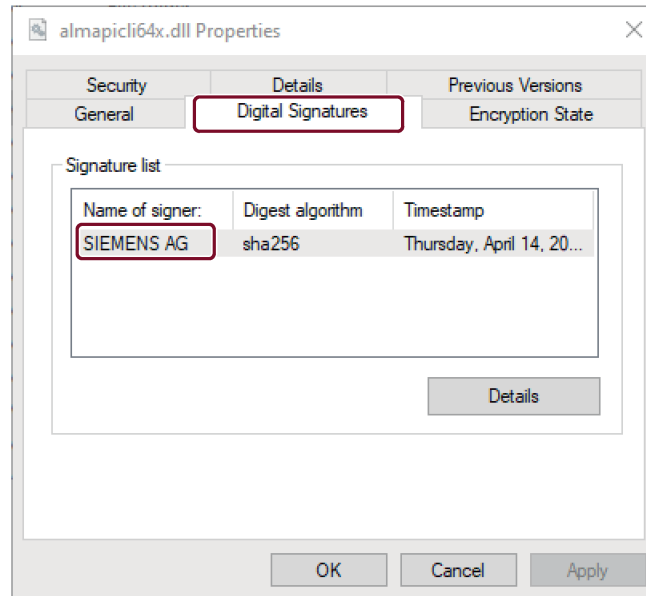
**Requirement**

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.
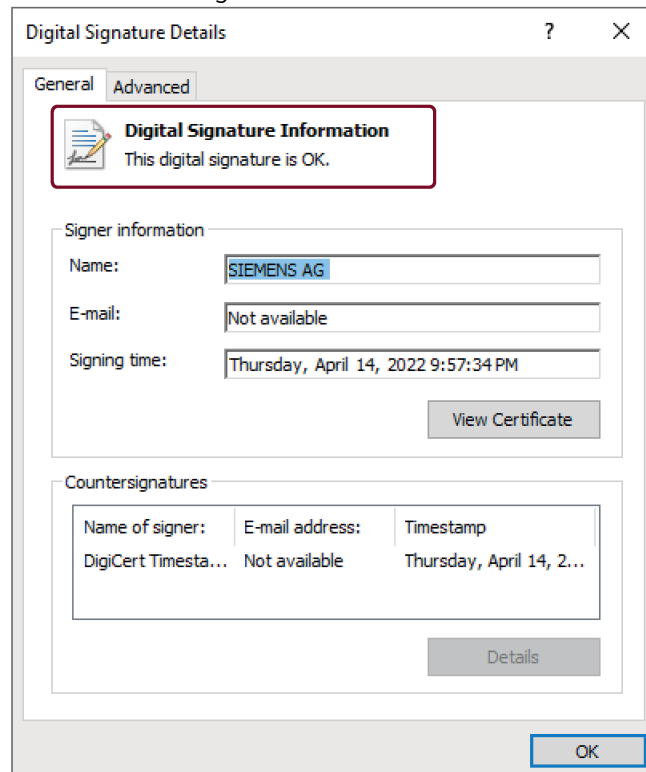
## 3.4　　　Log files

**Overview**

DriveSim Engineer generates encrypted log files for internal troubleshooting.

**Description of function**

The log files contain the following information:

- Settings of the simulation 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 simulated drive

If DriveSim Engineer stops working properly, Siemens recommends that you send the log files to Product Support (Page 7). You can find the log files in the following directory: "%ProgramData%\Siemens\Automation\SinamicsWinHost\Logs".

## 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. |
| ISO on TCP (according to RFC 1006) | 102 | (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. |
| 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. |
| Internal protocol | 5188 | (4) TCP | Server/incoming | Communication with commissioning tools for downloading project data. |
| Reserved | 49152...65535 | (4) TCP (4) UDP | - | Dynamic port area that is used for the active connection endpoint if the application does not specify the local port. |
| ALM | 4410 | 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. |
| RFC 1006 | 102 | TCP | S7 communication | Communication to the drive unit via Ethernet/PROFINET for commissioning and diagnostic purposes. |
| PROFIdrive | 34964 | UDP | Data set communication | Establishment of communication to the drive unit via Ethernet/PROFINET for commissioning and diagnostic purposes. |
| PROFIdrive | 49152 to 65535 | UDP | Data set communication | Communication to the drive unit via Ethernet/PROFINET for commissioning and diagnostic purposes. |
| DriveSim Manager | 28734 | TCP | Server/incoming | Default port for the communication between the DriveSim TIA Add-in and the web API of the DriveSim Manager. |
| DriveSim Manager service | 5001 | 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 Add-in and the DriveSim Manager tray application are executed with the privileges of the local user.

- The DriveSim Manager service and the simulation 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, simulation 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 is blocked for all users.

**Note**

**High CPU usage due to the running simulation instances upon system startup**

If the DriveSim Manager service is stopped with the simulation instances still running, the DriveSim Manager service restarts the simulation instances automatically upon system startup. This can cause high CPU usage.

To avoid restarting the simulation instances upon system startup, make sure that you stop the instances via DriveSim Manager before you shut down or restart the system.

## 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

<div style="text-align: right; font-size: 2em; font-weight: bold;">4</div>

## 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.

**Requirement**

**Required software**

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

**Note**

**.NET runtimes required for DriveSim Engineer V2.0**

To run DriveSim Engineer V2.0, 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 V2.0 includes only one supported version of the required .NET runtimes. Siemens does not provide any update or maintenance for the required .NET runtimes. You can follow the standard Microsoft software update process to perform the software update and maintenance.

**Supported devices**

DriveSim Engineer V2.0 is valid for the following devices:

SINAMICS S210 (New) servo drive system, which includes the following drive components:

- SINAMICS S210 (New) converter (6SL5…), firmware version 6.4
- Configurable SIMOTICS S-1FS2 motor, without holding brake
- Configurable SIMOTICS S-1FK2 motor, without holding brake
- Configurable SIMOTICS S-1FT2 motor, without holding brake

**Note**

DriveSim Engineer V2.0 only supports the SINAMICS S210 (New) drive system with firmware version 6.4.

- To simulate the G220 drive system with firmware version 6.2 HF3, use DriveSim Engineer V1.2 with DriveSim Core V6.2.
- 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.

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)

## Description of function

DriveSim Engineer provides digital twins of simulated SINAMICS drive systems.
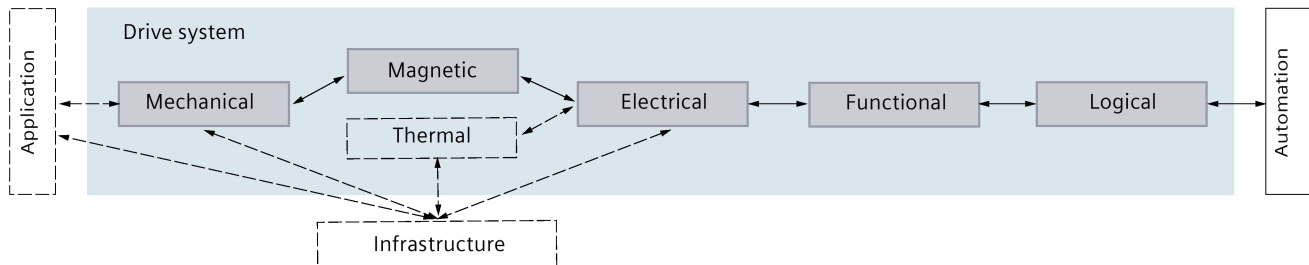


Figure 4-1      DriveSim Engineer function overview

- 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 Add-in

  DriveSim TIA 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 simulation instances.

**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 28)".

For more information about DriveSim Manager, see Chapter "Managing simulation instances with DriveSim Manager (Page 56)".

## 4.2     Range of validity

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**Note**

**Range of validity**

The DriveSim Engineer model is based on the original firmware of the 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.

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### 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: ≤ 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 simulation instance. For instance, the ramp-down operation of the simulation 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.

**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. 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.

- A two-mass oscillator model

The used model is parameterizable; however, the load value and the inertia are invariable during simulation.

## 4.2.2 Restrictions with software features

**Description**

### 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 simulated drive.

### Basic positioner function of the drive

DriveSim Engineer does not support the simulation of the basic positioner (EPOS) function.

### 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 with a speed comparable to the real device.

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 at a speed comparable to the real devices.

### 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 Add-in may not function properly.

If you experience problems with activating and using DriveSim TIA 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 27)".

# Installing 5

## 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. DriveSim Engineer V1.0, V1.2, and V2.0 are incompatible to one another. To install a version different from the current one, make sure that you uninstall the current version first.

---

### 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 28) for DriveSim Engineer to your computer.

- You have installed the required Startdrive and TIA Portal Openness.

### Procedure

Proceed as follows to install DriveSim Engineer V2.0:

1. Double-click Setup_DriveSim Engineer.exe. The DriveSim Engineer setup wizard opens.

2. In the DriveSim Engineer setup wizard, click "Next".
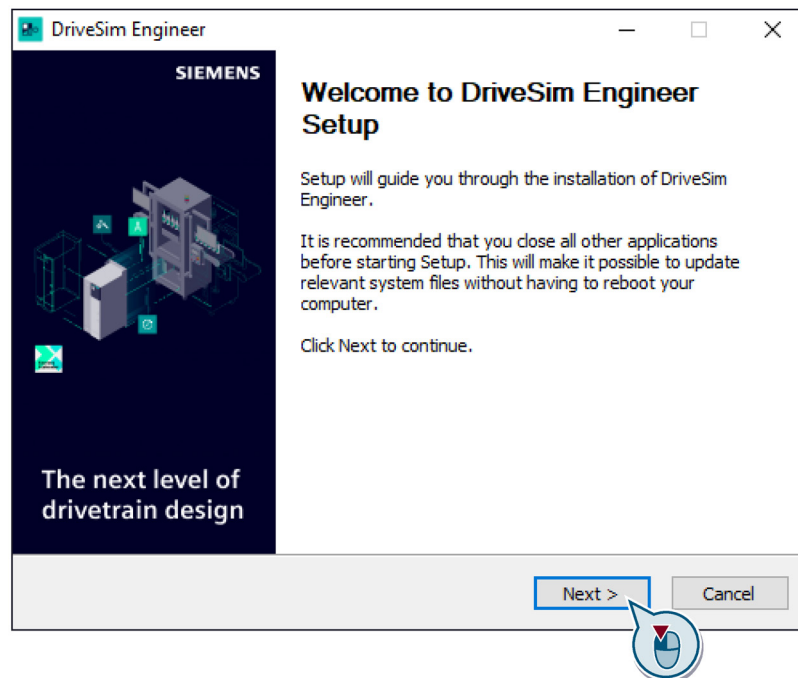
3. Specify the components that you want to install. The first check box is required only if you do not have compatible .NET runtimes (Page 19) installed on your computer. For other components listed, they must all be selected.
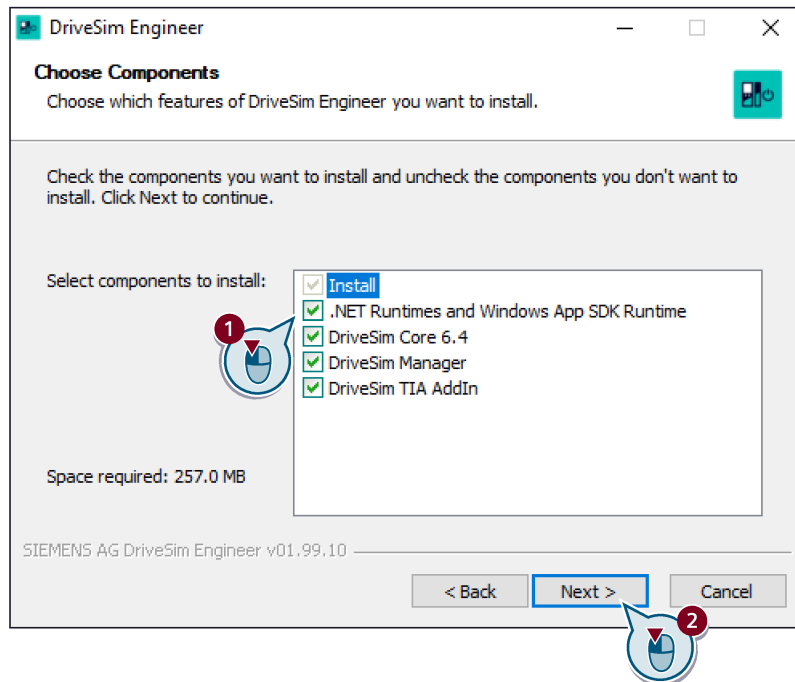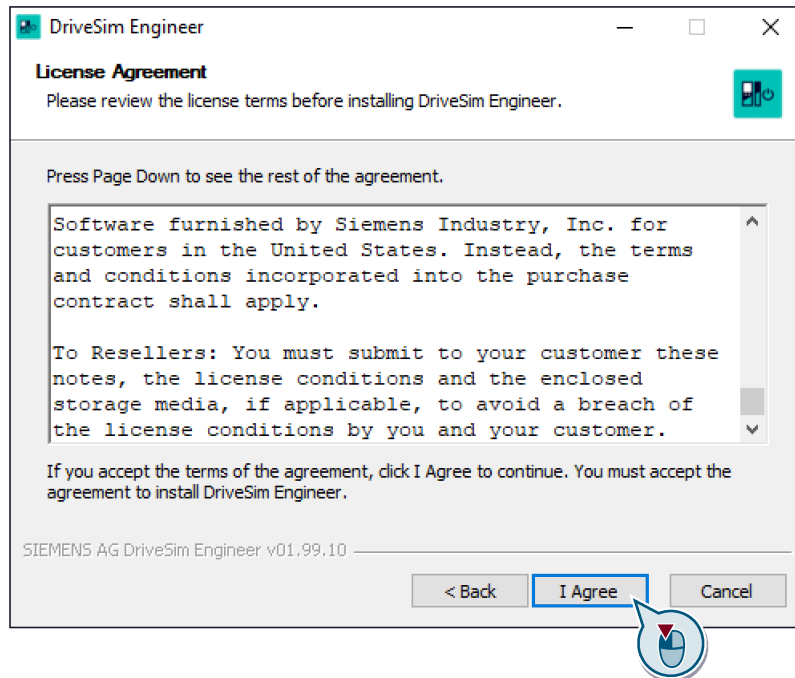


4. Confirm the license agreement.

5. 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.
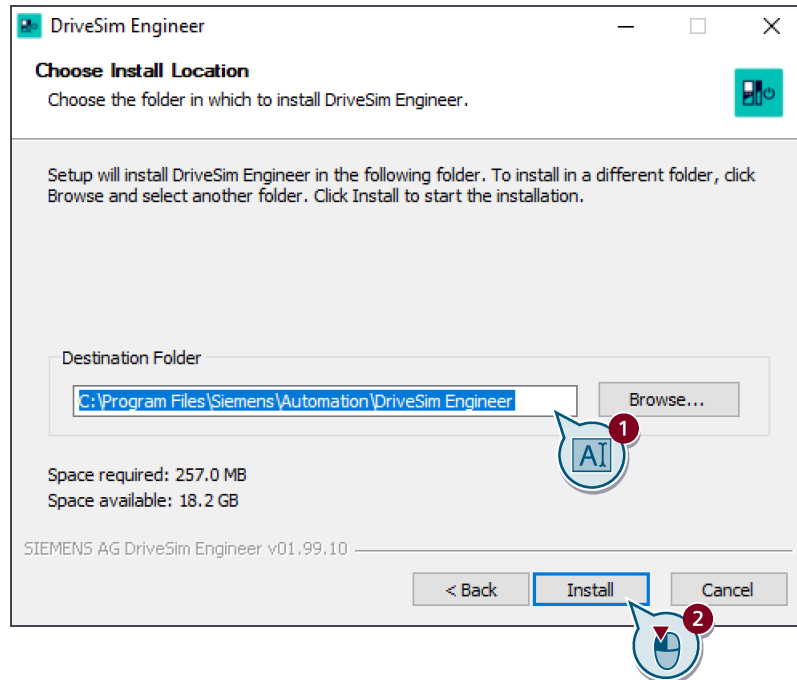


6. If you have selected the check box for .NET runtimes in Step 3, a .NET setup wizard opens. You can follow the online guide to install the runtimes.

7. The SINAMICS DriveSim Core 6.4 setup wizard opens. In the setup wizard, click "Next".
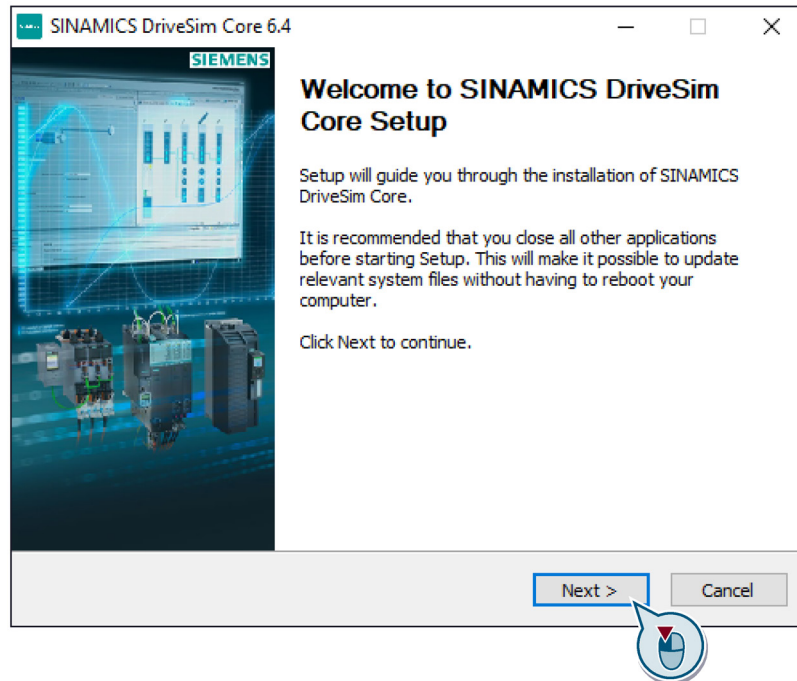
8. Confirm the license agreement.
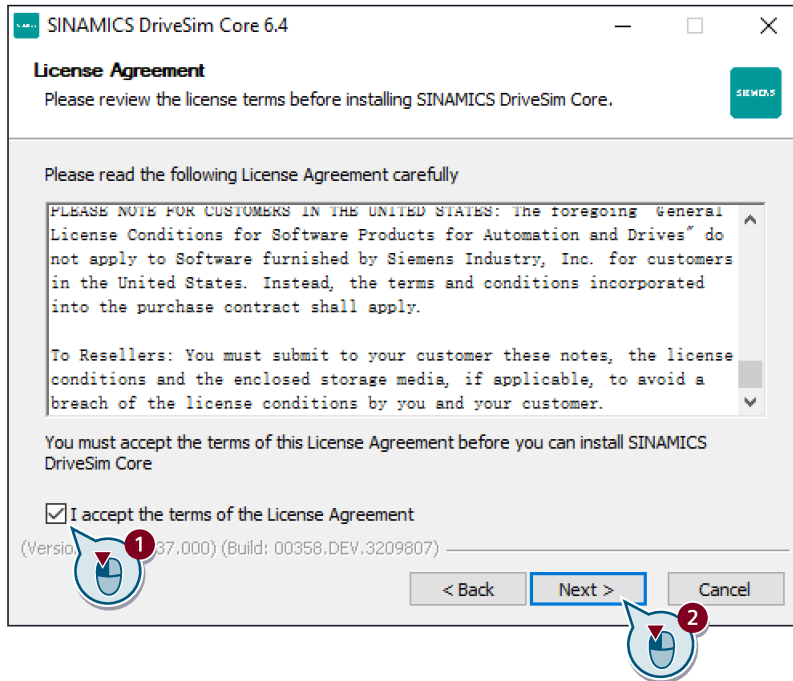


9. Specify an installation path and then click "Install" to start the installation. The setup wizard displays the status of the installation.
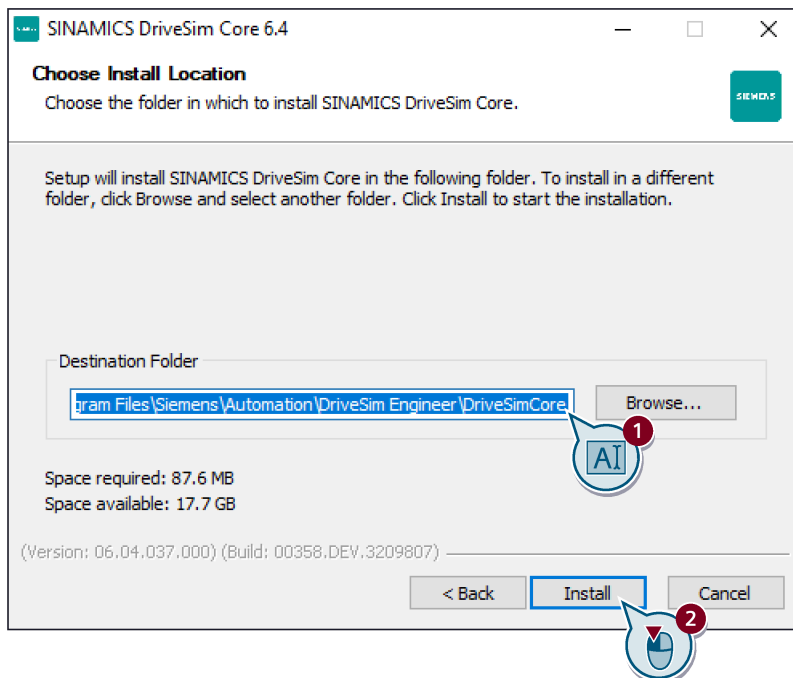
10. When the installation is complete, click "Finish" to dismiss the SINAMICS DriveSim Core 6.4 setup wizard.
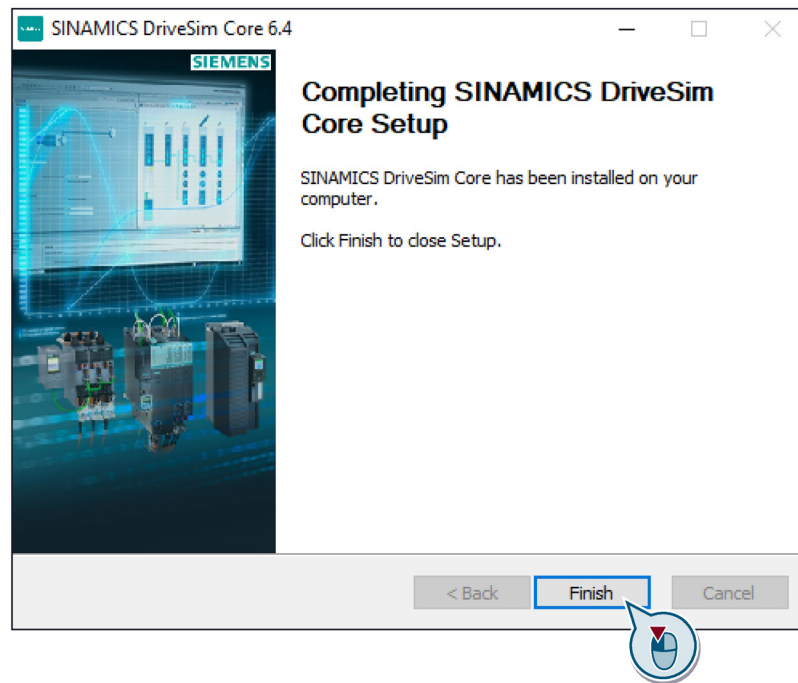


11. The DriveSim Manager setup wizard opens. In the setup wizard, click "Next".
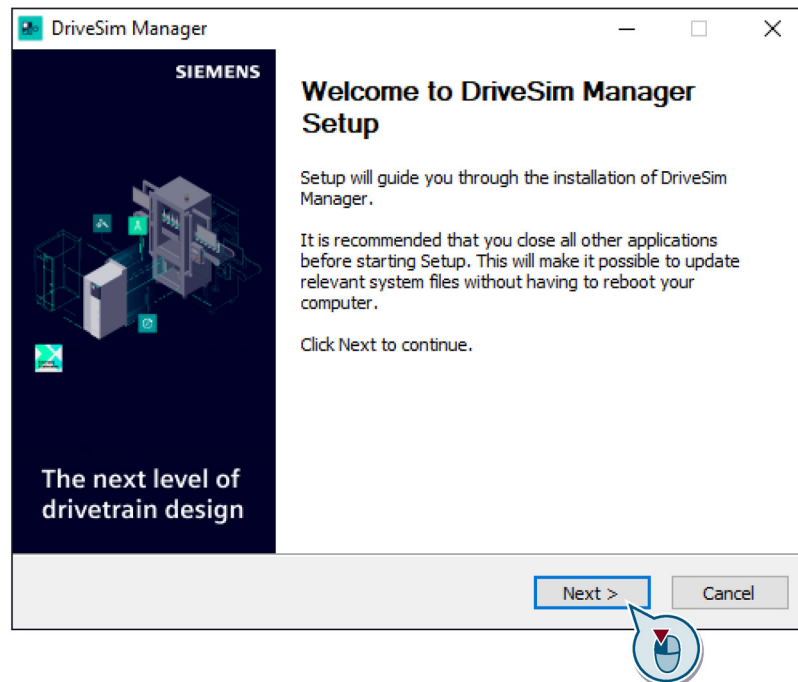
12.Confirm the license agreement.
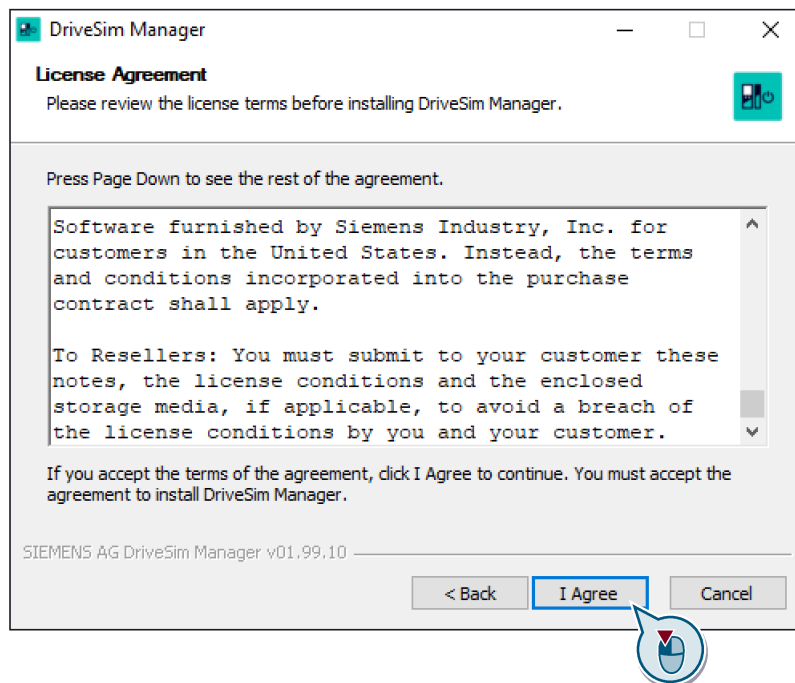


13.Specify the installation path and then click "Next".
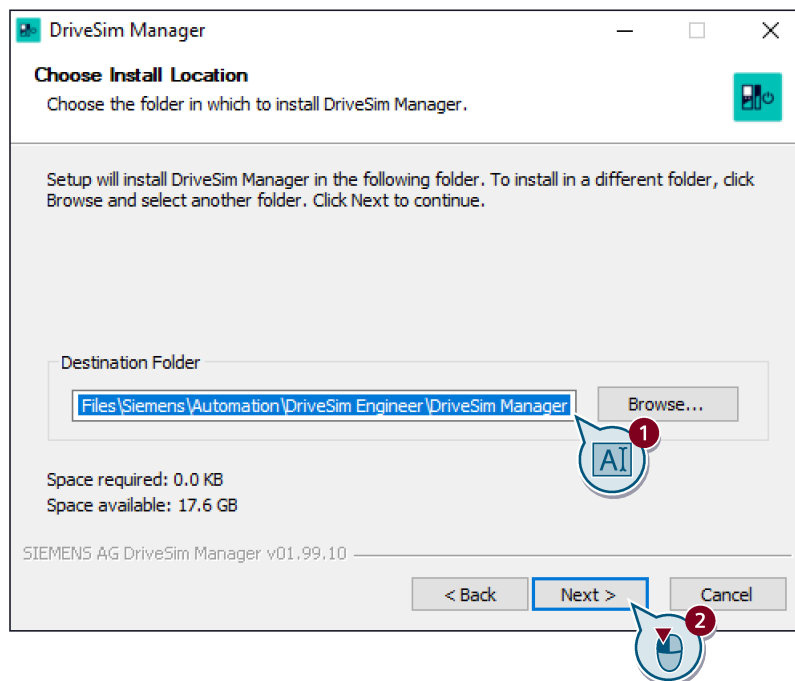
14. This step creates a shortcut to DriveSim Manager. If you do not want to create a shortcut, select the check box at the bottom of the wizard; otherwise, use the given Start Menu folder or create a desired new Start Menu folder to place the shortcut. Click "Next" to proceed.
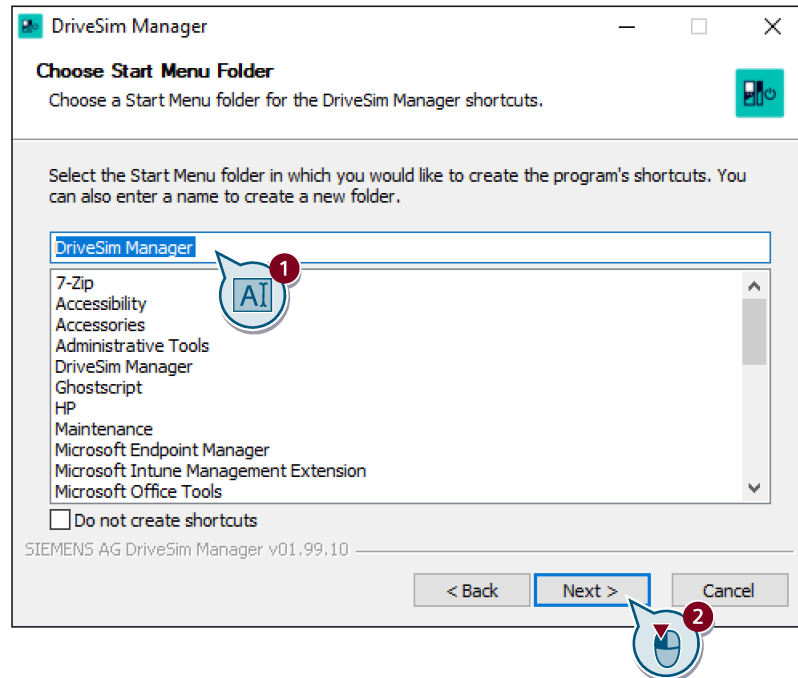
15.Specify whether you want to launch the DriveSim Manager tray application every time at logon and whether you want to create a shortcut on the desktop. You then click "Install" to start the installation. The setup wizard displays the status of the installation.
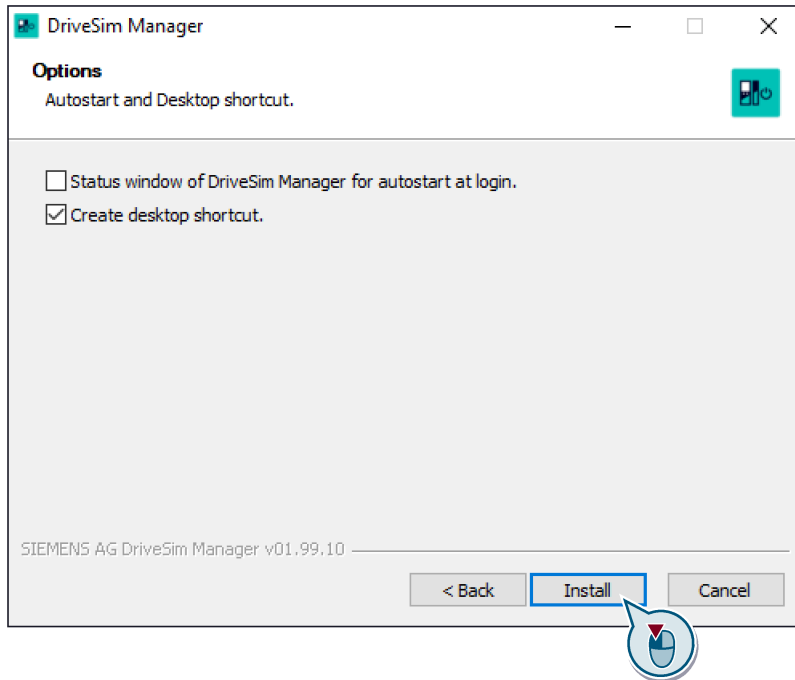


**Note**

By default, the autostart of the DriveSim Manager tray application is disabled. If you install DriveSim Manager with default settings but later want to enable the autostart at logon, you must reinstall the setup package for DriveSim Engineer to select the check box for this autostart option.

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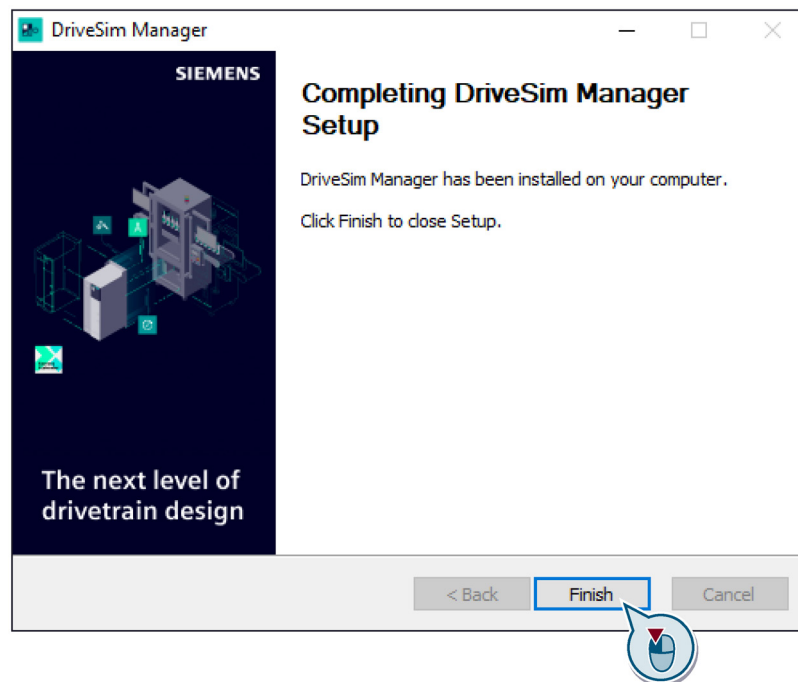


17. The DriveSim TIA Add-in setup wizard opens. In the setup wizard, click "Next".
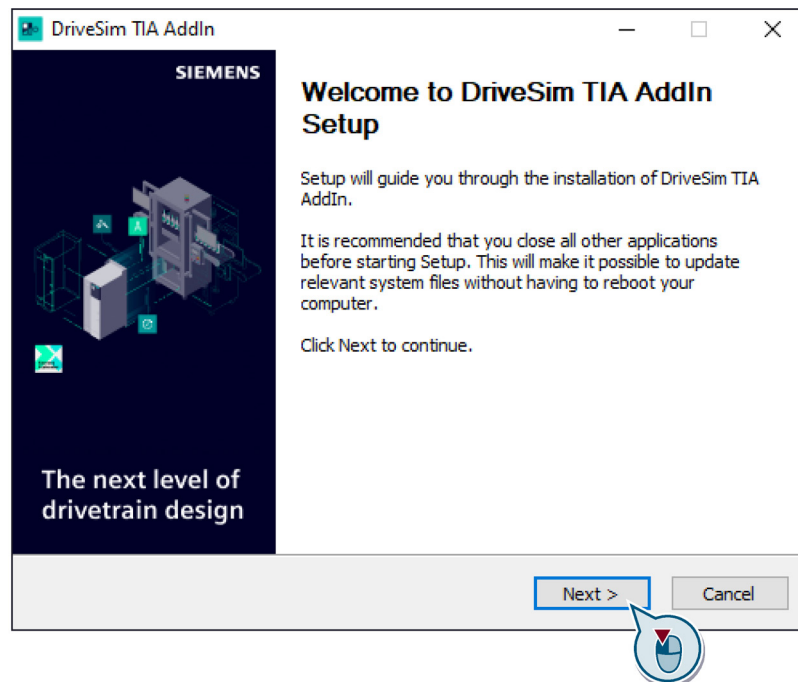
18.Confirm the license agreement.
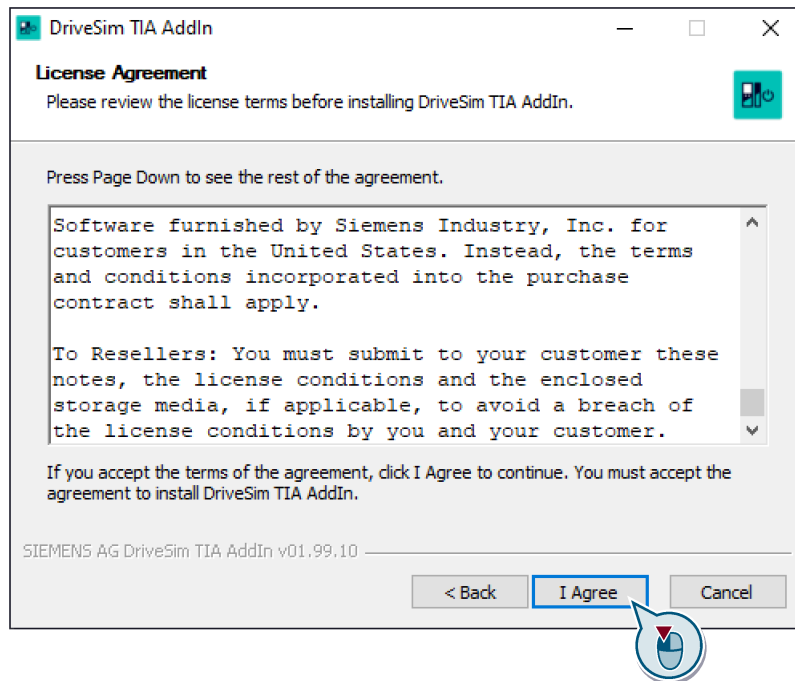


19.Specify the installation path and then click "Next".
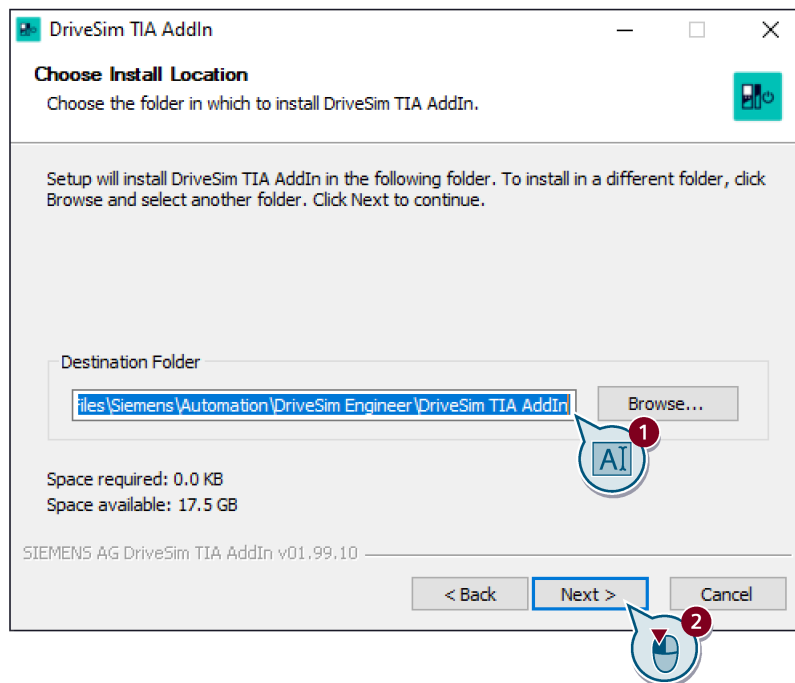
20. Select the desired Startdrive version from the drop-down list. The storage location is specified automatically. You can also specify a storage location different from the default one in the list. Click "Install" to start the installation. The setup wizard displays the status of the installation.
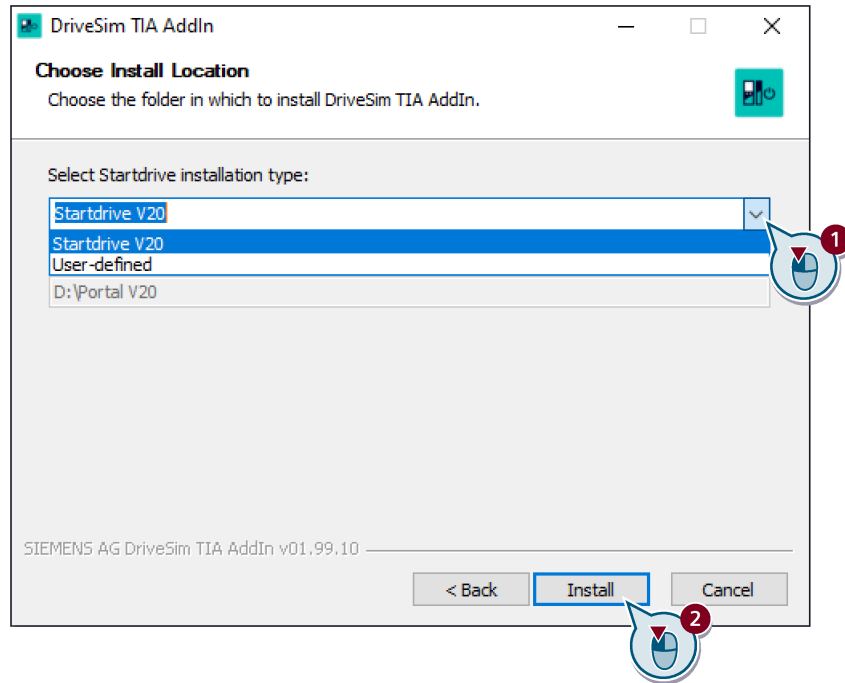
21. When the installation is complete, click "Finish" to dismiss the DriveSim TIA Add-in setup wizard.
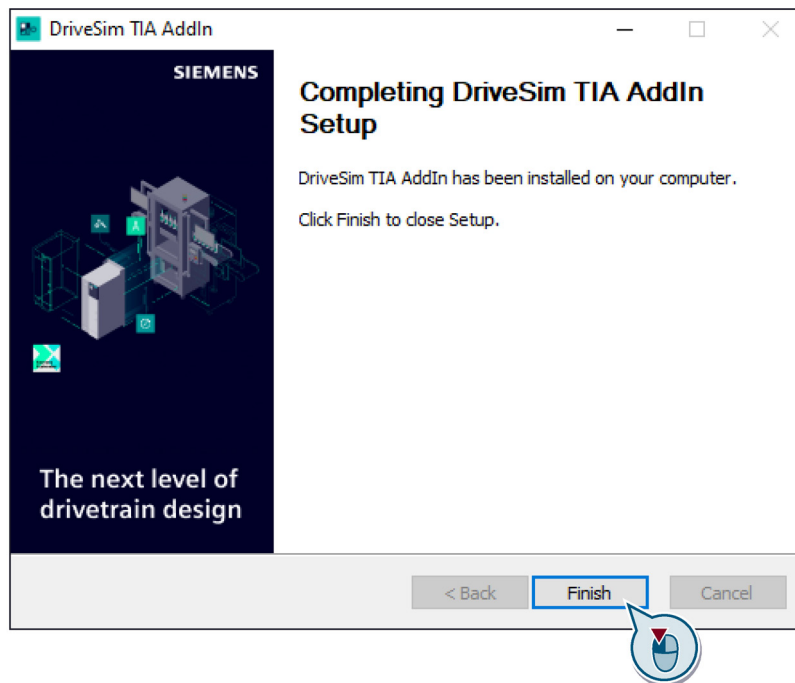


22. Click "Finish" to dismiss the DriveSim Engineer setup wizard.
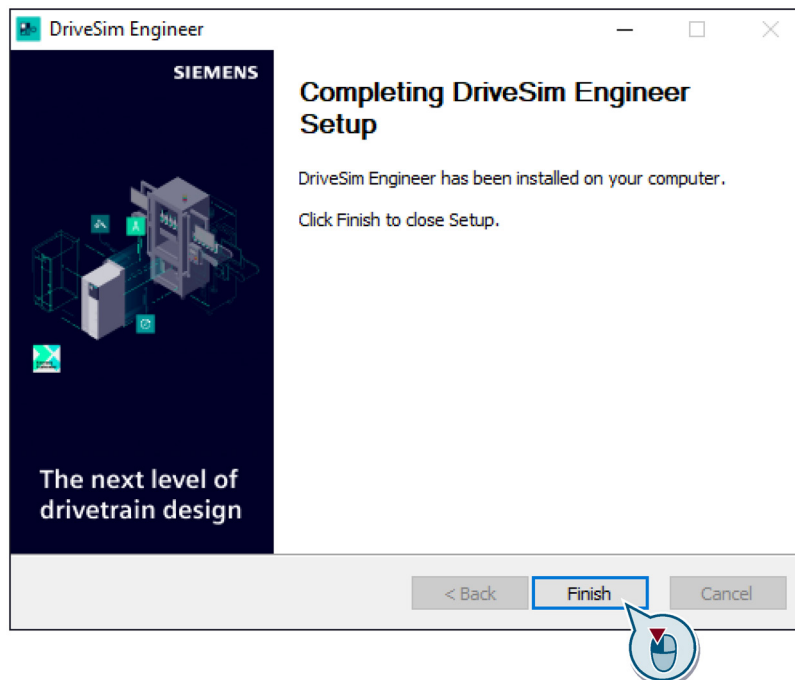


**Result**

You have installed DriveSim Engineer on your computer.

# Activating DriveSim TIA Add-in in Startdrive

**6**

**Requirement**

You have successfully installed DriveSim TIA 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 Add-in program.
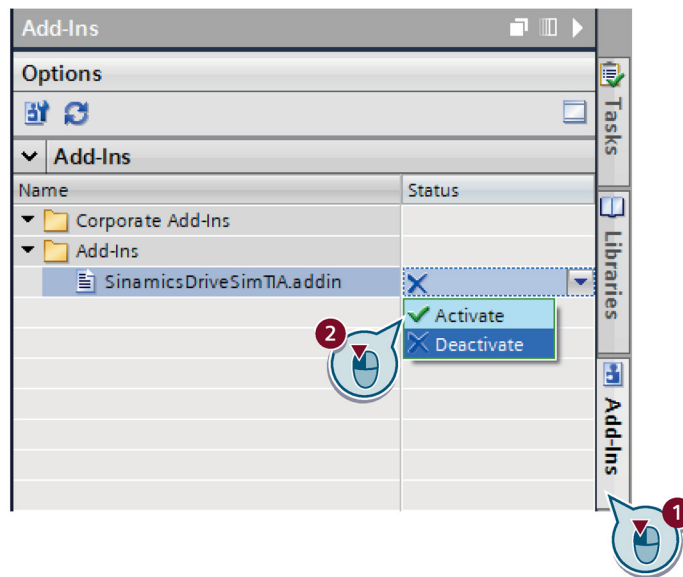
3. Grant permissions to DriveSim TIA Add-in for running unmanaged code.
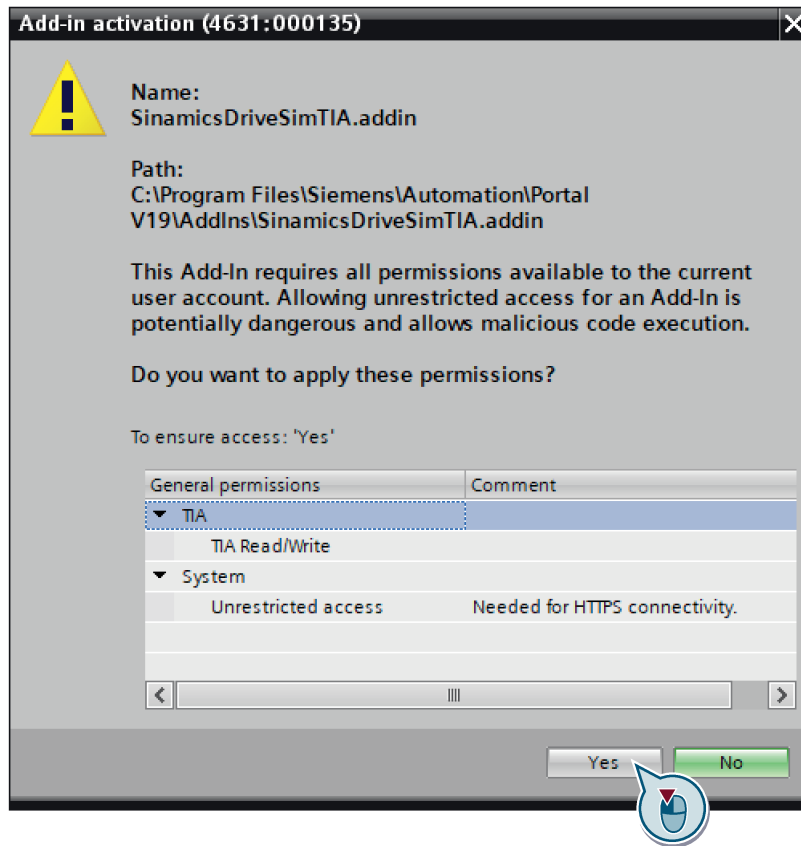


If the program shows a timeout error message, proceed as follows to configure the timeout settings of TIA Add-ins:

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 Add-in program.

**Result**

You have successfully activated the DriveSim TIA 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 Add-in menu, you can perform the virtual simulation of physical drives in DriveSim Engineer.
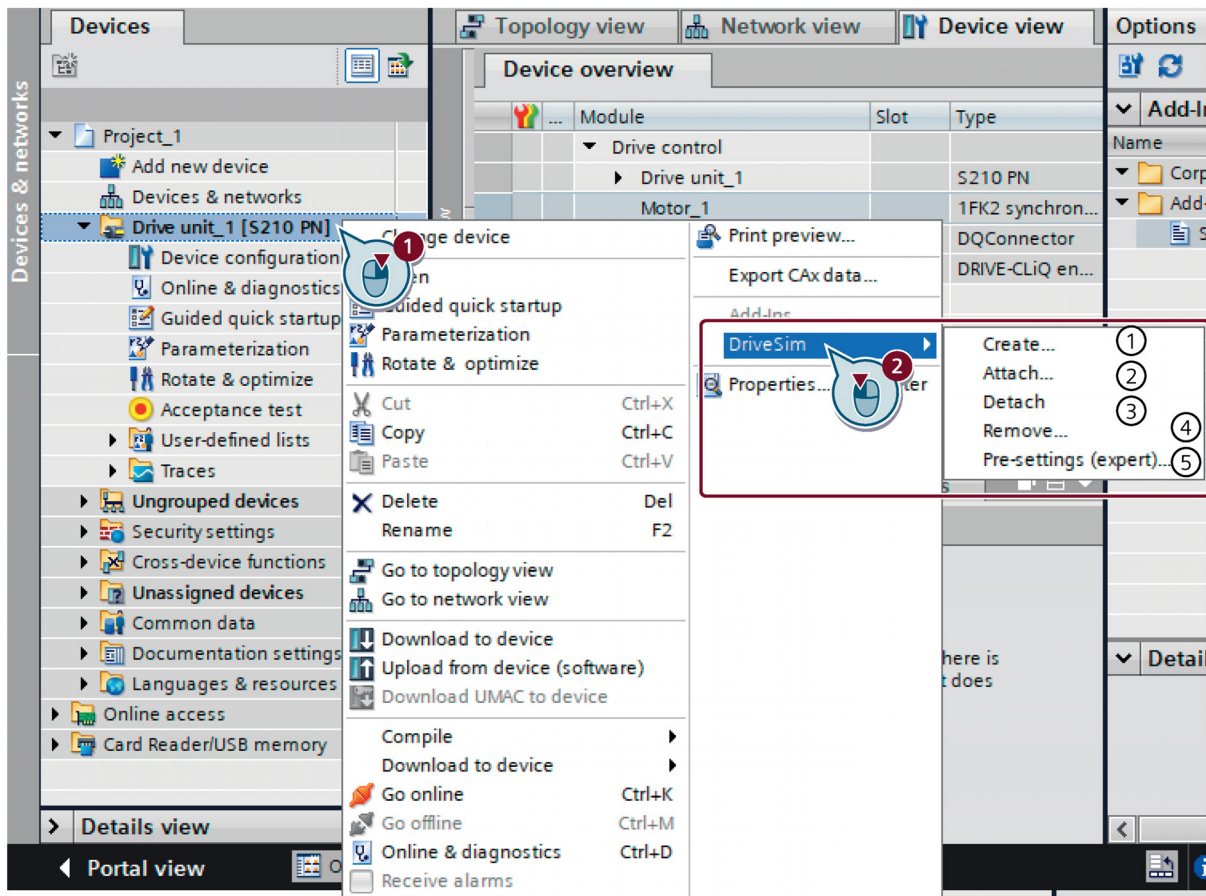


| ① | Creates a simulation instance based on the selected device configuration (Page 52) |
| ② | Connects a simulation instance to the selected drive (Page 60) |
| ③ | Disconnects a simulation instance from the selected drive (Page 73) |
| ④ | Deletes the attached simulation instance (Page 76) |
| ⑤ | Changes the preset parameters of the simulation instance (Page 47) |

Figure 6-1     DriveSim TIA Add-in menu

# Simulating a drive with DriveSim Engineer

<div align="right">

# 7

</div>

## 7.1 General workflow

**Overview**

To simulate a drive with DriveSim Engineer and transfer the commissioning results to the real device, take the subsequently listed steps.

## Description of function

```
                        ┌──────────────┐
                        │    Start     │
                        └──────┬───────┘
                               │
                    ┌──────────┴──────────┐
         Yes        │      Create a       │
    ┌───────────────┤ simulated drive with│
    │               │ default configuration?│
    │               └──────────┬──────────┘
    │                          │ No
    │               ┌──────────┴──────────┐
    │               │ Define the presets of a simulated drive │  ❶
    │               └──────────┬──────────┘
    │                          │
    └──────────────►┌──────────┴──────────┐
                    │ Create a simulated drive │  ❷
                    └──────────┬──────────┘
```

| | |
|---|---|
| Define the presets of a simulated drive | ❶ |
| Create a simulated drive | ❷ |
| Managing simulation instances with DriveSim Manager | ❸ |
| Attach the simulated drive | ❹ |
| If required: load project settings to the simulated drive | ❺ |
| Establish the online connection between the simulated drive and Startdrive | ❻ |
| Commission the simulated drive | ❼ |
| If required: commission the simulated drive with a simulated PLC | ❽ |
| Transfer settings to the real device | ❾ |
| Finalize the commissioning of the real device | |

End

① Defining the presets of a simulated drive (Page 47)
② Creating a simulated drive (Page 52)
③ Managing simulation instances with DriveSim Manager (Page 56)
④ Attaching a simulated drive (Page 60)
⑤ Loading project settings to a simulated drive (Page 61)
⑥ Establishing connection between Startdrive and the simulation instance (Page 64)
⑦ Commissioning a simulated drive (Page 67)
⑧ Commissioning a simulated drive with a simulated PLC (Page 69)
⑨ Transferring the settings from a simulated drive to the real device (Page 73)

Figure 7-1    General workflow

## 7.2          Defining the presets of a simulated drive

### Overview

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

### Requirement

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

> **Note**
> **Restrictions on DriveSim pre-settings**
> DriveSim Engineer does not support changing presets after the creation of a drive instance. Additionally, presets that reflect real load scenarios may lead to deviations from the real commissioning workflow when using One Button Tuning, resulting in inaccurate optimization results.
> • Before creating a drive 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 simulation 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.
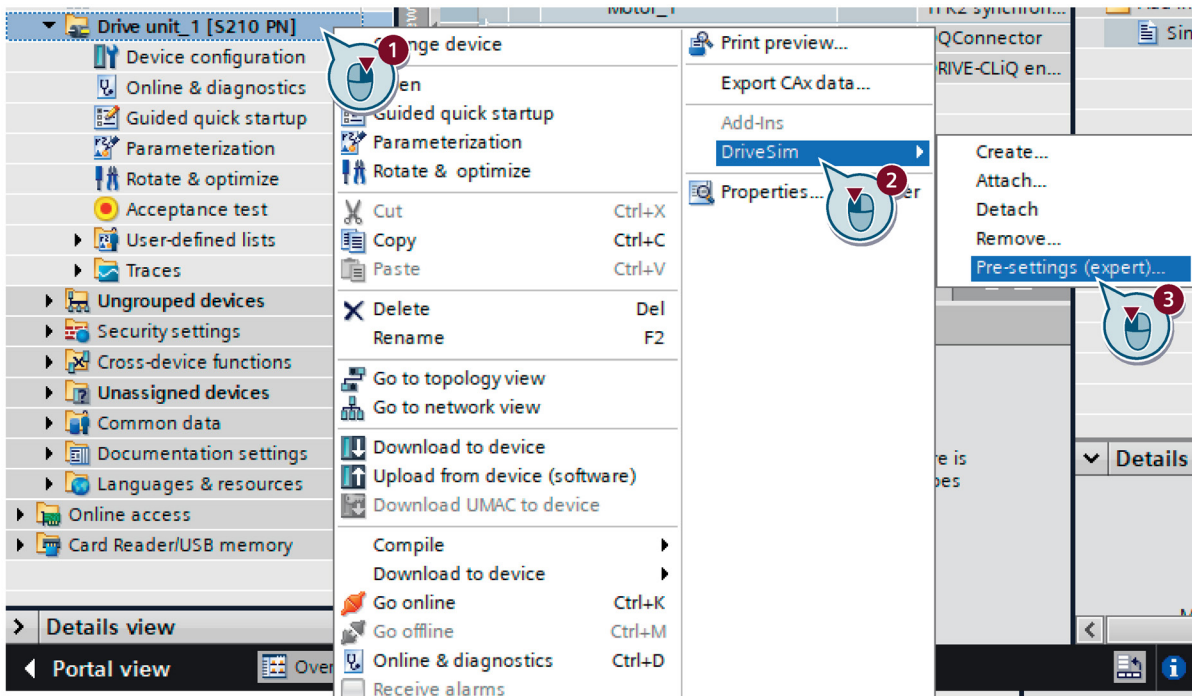
2. In the pre-setting configuration window, specify the values of the preset parameters including the mains data, motor mechanical data, and motor load data. Then save the settings to a local file.

   To view the default values of preset parameters, click the parameter value and press <Ctrl+Z>. For more information about editable parameters, see Section "Parameters".
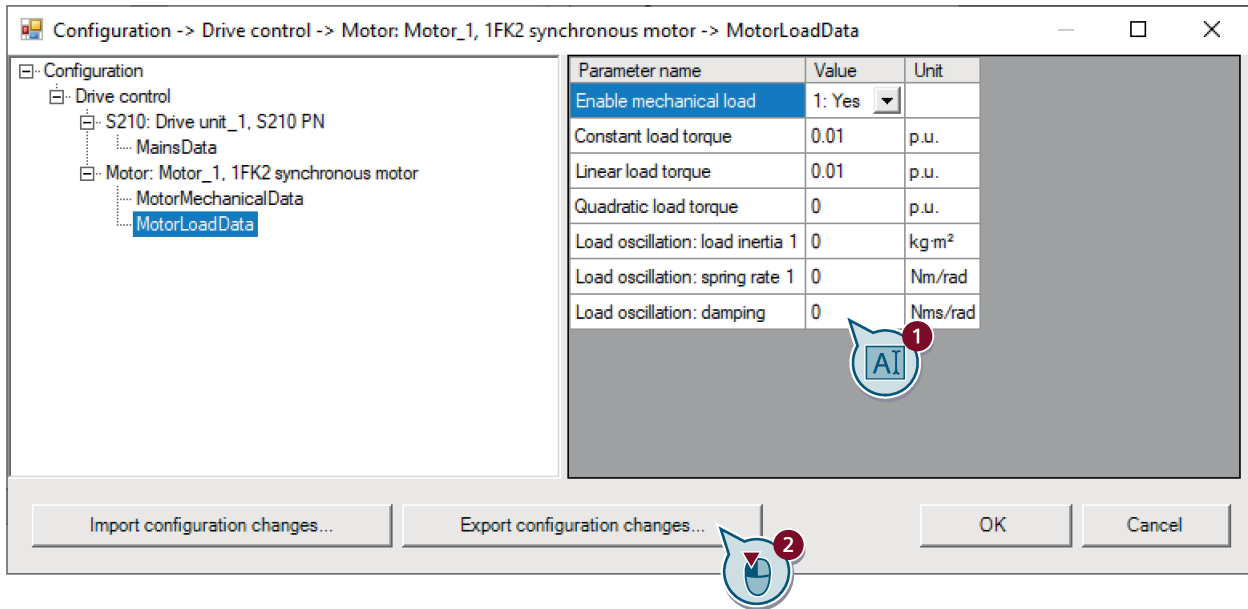


**Result**

You have saved the preset parameter settings to a local file.

**Parameters**

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

**Mains data**

| Parameter | Unit | Value range | Factory setting | Description |
|---|---|---|---|---|
| Device supply voltage | V | 0 ... 1000 | 230 or 400 | Sets the voltage of the mains supply network. |

**Motor mechanical data**

| Parameter | Unit | Value range | Factory setting | Description |
|---|---|---|---|---|
| Total moment of inertia | kgm$^2$ | $10^{-6}$... $10^6$ | -[1] | Sets the total inertia of the drive train in a stiff mechanical system. For a two-mass spring load system, the parameter sets only the motor moment of inertia. |
| Inertia factor | p.u. | 0 ... 1000 | 5 | Sets the scaling factor of the total inertia.<br>Setting the value to 1.0 means that the total inertia remains unchanged.<br>If the total inertia setting represents the motor inertia, the scaled total inertia can be used to simulate the external moment of inertia. Consider the fact that in typical mechanical arrangements the external moment of inertia is greater than the motor inertia, set this parameter to a value greater than 2.0. |

[1]   The factory setting varies depending on the configured motor.

**Motor load data**

- Settings for no motor load

  Enable mechanical load = 0

  Load inertia = 0

- Settings for constant, linear, or quadratic motor load

  Enable mechanical load = 1

  Load inertia = 0
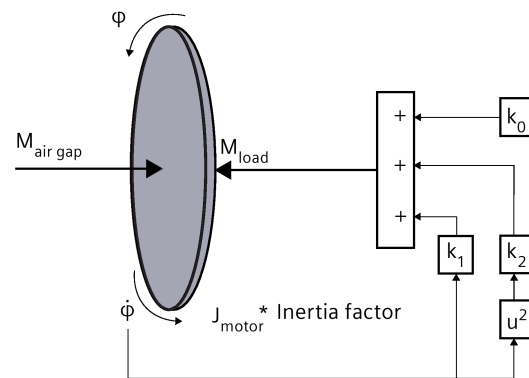


| $J_{motor}$ | Total moment of inertia | | $k_0$ | Constant load torque ratio |
|---|---|---|---|---|
| $M_{air\ gap}$ | Air gap torque of the motor (without mechanical loss) | | $k_1$ | Linear load torque |
| $M_{load}$ | Load torque | | $k_2$ | Quadratic load torque |
| $\varphi$ | Rotation angle of the simulated motor | | $\dot{\varphi}$ | Angular speed of the simulated motor |
| $u^2$ | Square operator | | | |

Figure 7-2     Model for constant, linear, and quadratic motor loads

| Parameter | Unit | Value range | Factory setting | Description |
|---|---|---|---|---|
| Constant load torque ratio | p.u. | -100 ... 100 | 0.01[1] | Sets the ratio between the passive load torque and the rated motor torque.<br>A positive ratio (≠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.<br>If parameterized, the constant load torque is added up to the total load torque of the simulation instance.<br>**Dependency**: When the load inertia parameter is set to a value greater than 0 or the load enable parameter is set to 0, the load torque settings become invalid. |
| Linear load torque | p.u. | -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.<br>If parameterized, the linear load torque is added up to the total load torque of the simulation instance.<br>**Dependency**: When the load mass inertia parameter is set to a value greater than 0 or the load enable parameter is set to 0, the load torque settings become invalid. |
| Quadratic load torque | p.u. | -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.<br>If parameterized, the quadratic load torque is added up to the total load torque of the simulation instance.<br>**Dependency**: When the load mass inertia parameter is set to a value greater than 0 or the load enable parameter is set to 0, the load torque settings become invalid. |

[1] The factory setting is determined in consideration of the friction in the drive system.

- Settings for the two-mass oscillator model

Enable mechanical load = 1

Load inertia > 0
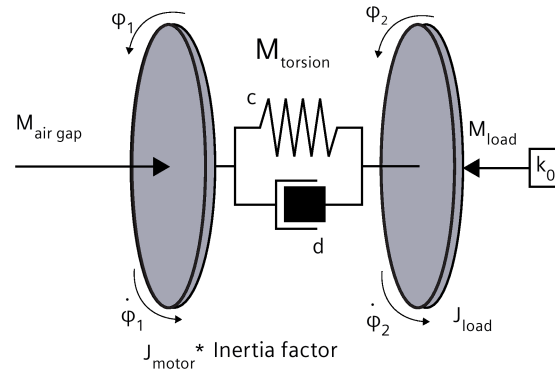


$J_{motor}$    Total moment of inertia      $c$    Spring rate

$M_{air\ gap}$    Air gap torque of the motor (without mechanical loss)    $d$    Damping

$M_{load}$    Load torque[1]    $M_{torsion}$    Torque created by the difference in the rotation angle and angular speed of the simulated motor and load

$J_{load}$    Load inertia    $\varphi_1$    Rotation angle of the simulated motor

$\varphi_2$    Rotation angle of the simulated load    $\dot{\varphi}_1$    Angular speed of the simulated motor

$\dot{\varphi}_2$    Angular speed of the simulated load    $k_0$    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

| Parameter | Unit | Value range | Factory setting | Description |
|---|---|---|---|---|
| Load inertia | kgm$^2$ | 0 ... 10$^6$ | 0 | Sets the load moment of inertia.<br>Setting this parameter to a value greater than 0 enables the two-mass spring load and disables the load torque settings. |
| Spring rate | Nm/rad | 0 ... 10$^6$ | 0 | Sets the stiffness of the motor shaft and other transmission elements between the motor and the load. |
| Damping | Nms/rad | 0 ... 10$^6$ | 0 | Sets the mechanical damping of the two-mass spring load. |

# 7.3 Creating a simulated drive

**Requirement**

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

**Procedure**

Proceed as follows to create a simulation 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. To create a simulated drive with the default configuration, skip this step and proceed to Step 3.

   To create a simulated drive based on the presets from a local file, right-click the device to import the preset parameters.
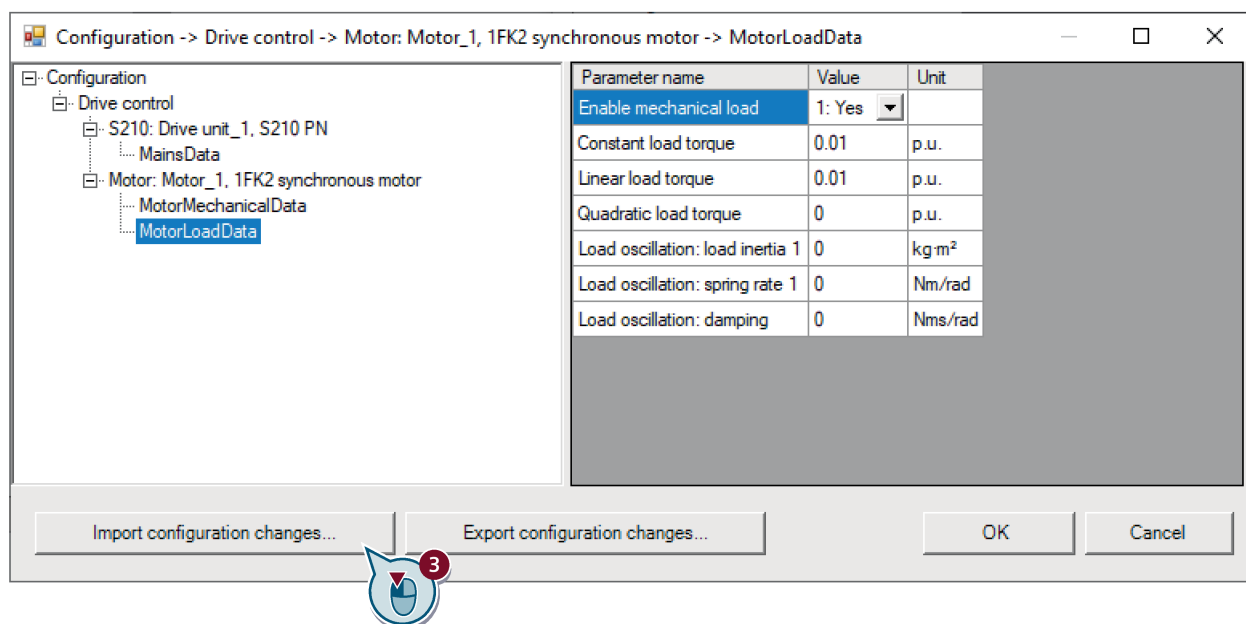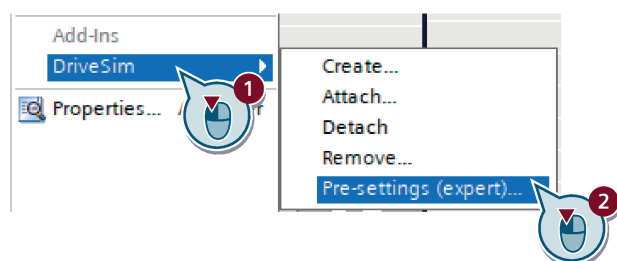
3. Right-click the device to create its simulation instance.

   A dialog box for generating the drive instance pops up.
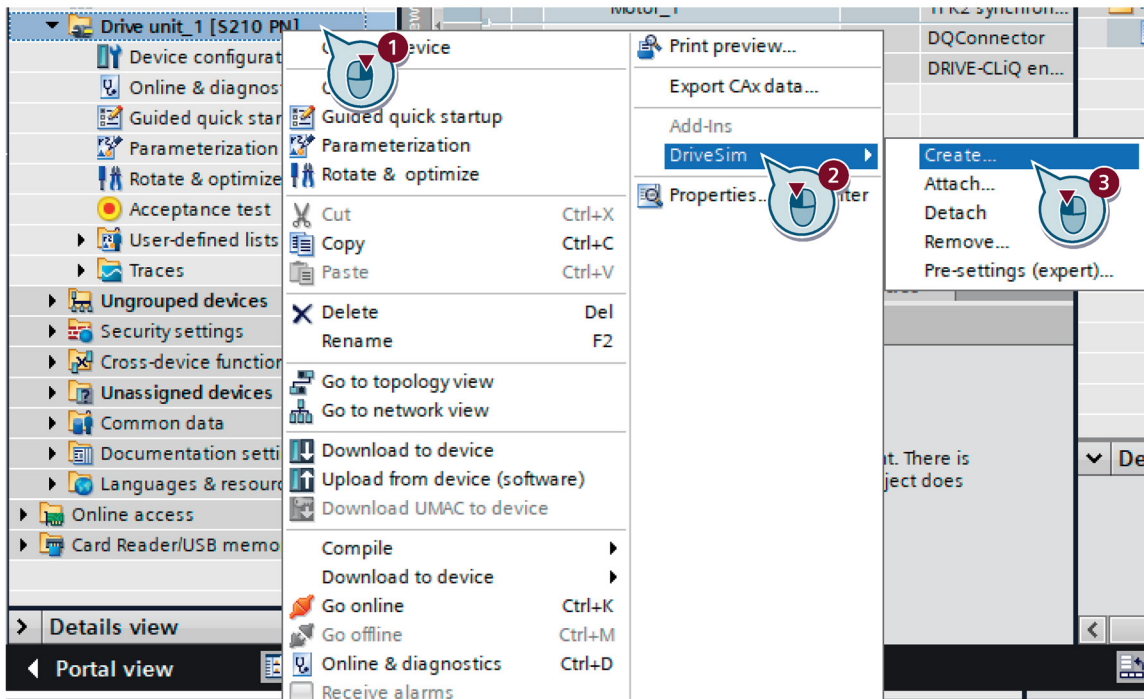
4. Wait for a few seconds until the message for automatic attachment appears. Specify whether to attach the newly-created instance to the device.

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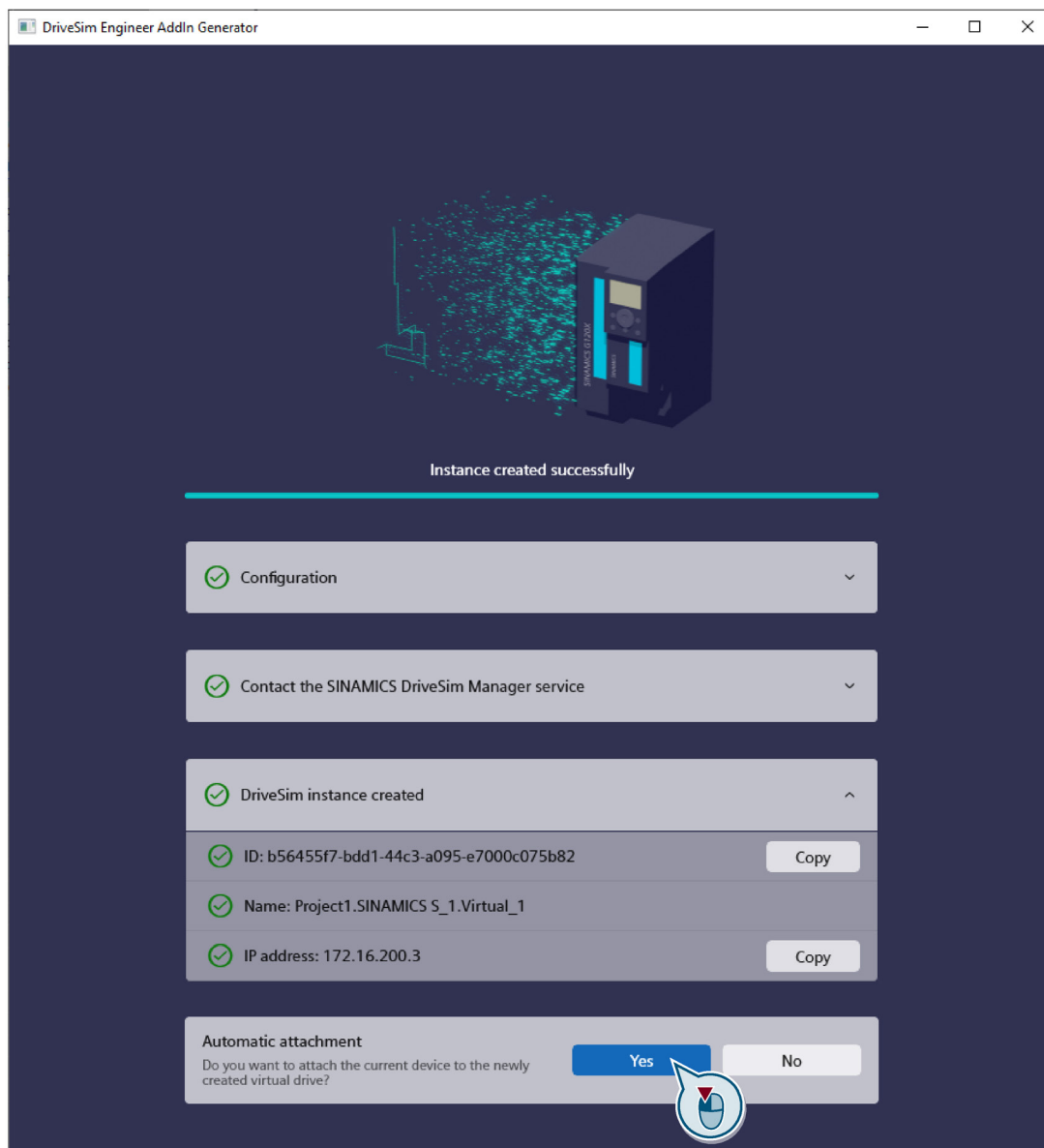
If there is already an attached instance for the device, the following dialog box appears. To detach the previously attached instance and attach the new one, click "Yes".
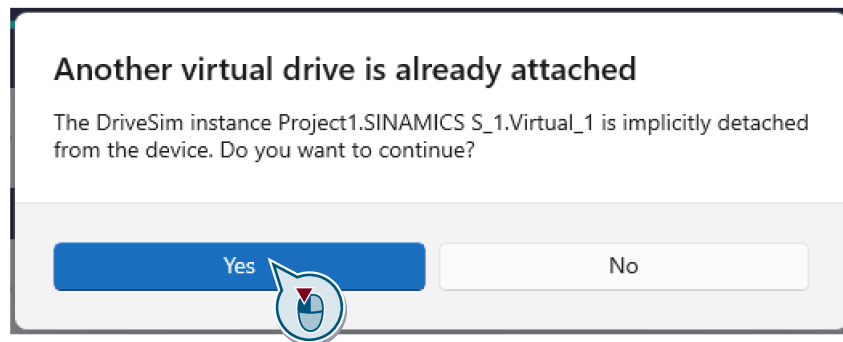


The dialog box for generating the drive instance automatically closes when the device is successfully attached. In all other cases, manually close the dialog box.

**Result**

You have created a simulation instance. The IP address and name of the instance are assigned automatically. You can view the status of the simulation instance in DriveSim Manager.

# 7.4 Managing simulation instances with DriveSim Manager

## Overview

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

After Installing the setup package for DriveSim Engineer (Page 29), 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 29)".

## Description of function

With DriveSim Manager, you can perform the following tasks:

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

**DriveSim Manager user interface**

The DriveSim Manager user interface includes three tabbed pages.

- First tab: used for managing simulation instances
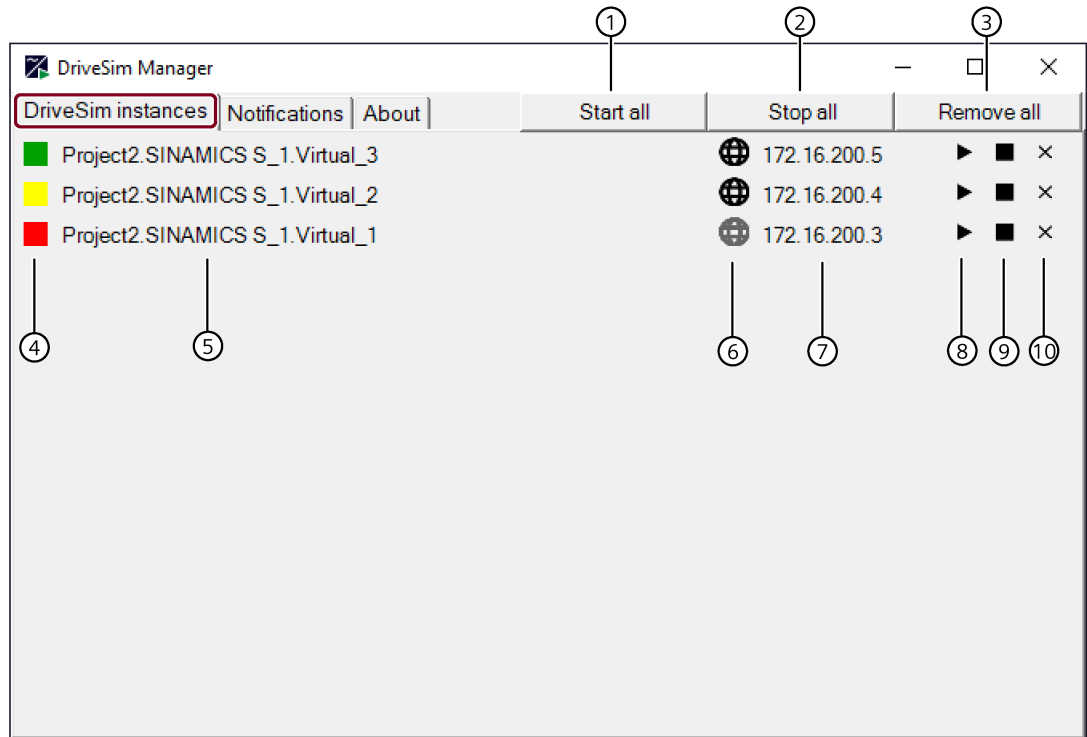


① Starts all simulation instances
② Stops all simulation instances
③ Removes all simulation instances
④ Displays the status of the simulation instance
- Red: the simulation instance is stopped.
- Yellow: the simulation instance is initiating.
- Green: the simulation instance is running.
- 🖳: the simulation instance is running and the connection to the PLC instance is active.
⑤ Displays the name of the simulation instance
⑥ Copies the Web server address
  The icon is activated only when the simulation instance is running.
⑦ Displays the IP address of the simulation instance
⑧ Starts the stopped simulation instance
⑨ Stops the running or initializing simulation instance
⑩ Removes the simulation instance

The first tab also provides you with the possibility to configure the digital inputs of simulated instances.

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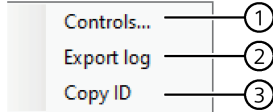


| ① | Configures digital inputs of the simulation instance |
| | For more information, see Chapter "Commissioning a simulated drive (Page 67)". |
| ② | Exports logs for troubleshooting |
| ③ | Copies the ID of the simulation instance |

- Second tab: used for viewing notifications about the following recorded actions
  - The verification of the started simulation instance is complete successfully.
  - The simulation instance has stopped responding.

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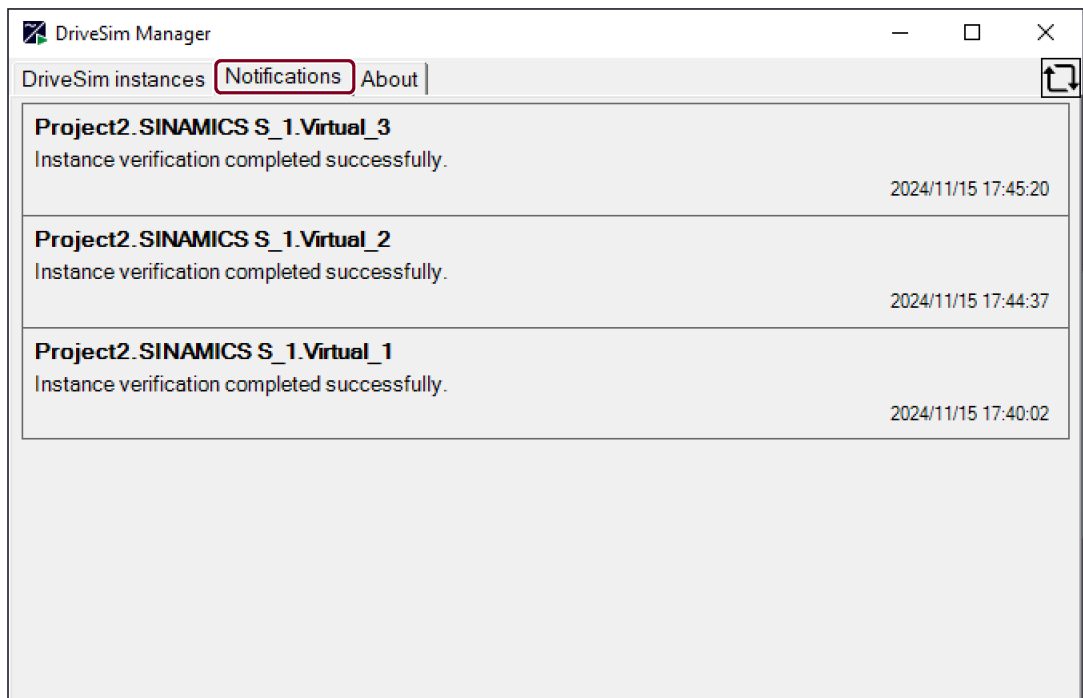
- Third tab: used for viewing DriveSim Manager and DriveSim Core version information

  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).



**Note**

**Restarting Fieldbus Connector manually**

Fieldbus Connector connects DriveSim Engineer with S7-PLCSIM Advanced and only starts automatically when you create a drive instance that connects to a PLC instance. Fieldbus Connector does not start automatically when DriveSim Manager starts.

Under the following circumstances, you can restart Fieldbus Connector manually using the DriveSim Manager tray application to resume the connection between drive and PLC instances:

- The drive and PLC instances are running, but the status icon 🖥 disappears from DriveSim Manager.
- DriveSim Manager was closed completely due to, for example, a system restart; and you want to use the previously connected drive and PLC instances.

  Note that the PLC instance disappears after the system restarts. When you restart Fieldbus Connector, the previously connected PLC instance reappears. Make sure that you start the reappearing PLC instance to resume its connection to the drive instance.

# 7.5 Attaching a simulated drive

**Overview**

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

**Requirement**

You have created the simulation instance.

**Procedure**

**Attaching a newly-created simulation instance**

You can attach a simulation instance when creating the instance.

For more information, see Chapter "Creating a simulated drive (Page 52)".

**Attaching an existing simulation instance**

1. Right-click the device to attach the simulation instance.
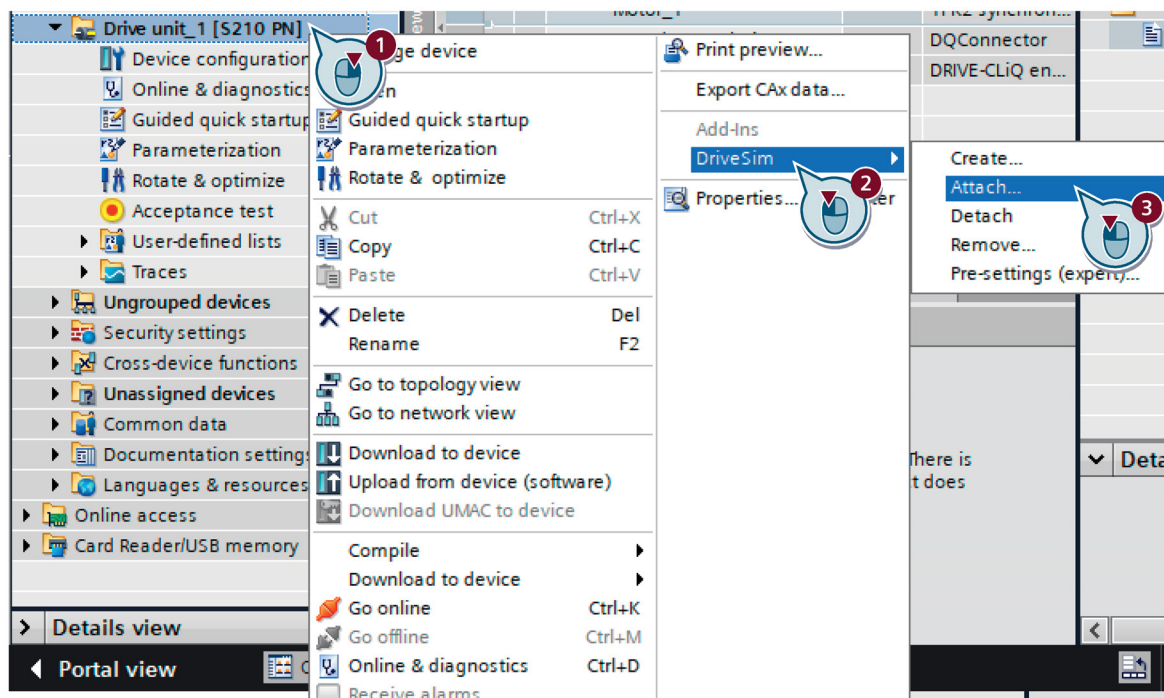
2. Attach the target simulation instance.
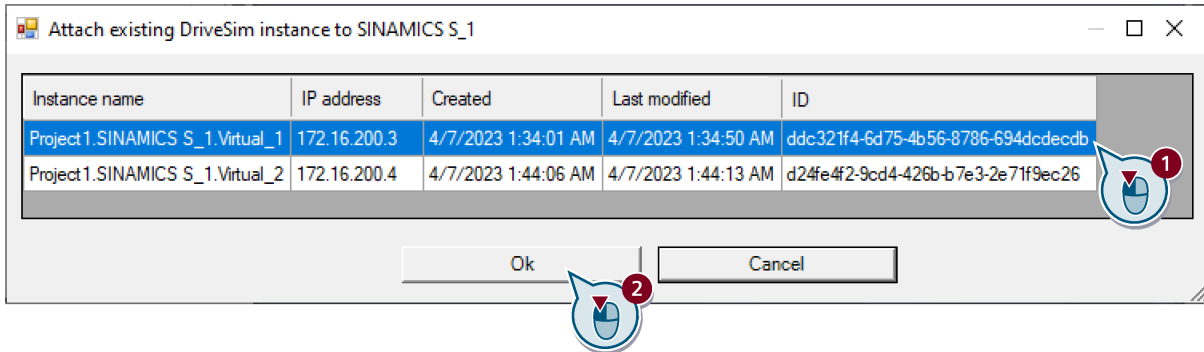


If you have attached an instance to the device but want to attach the selected instance instead, the following dialog box appears. Click "OK" to detach the previously-attached instance.
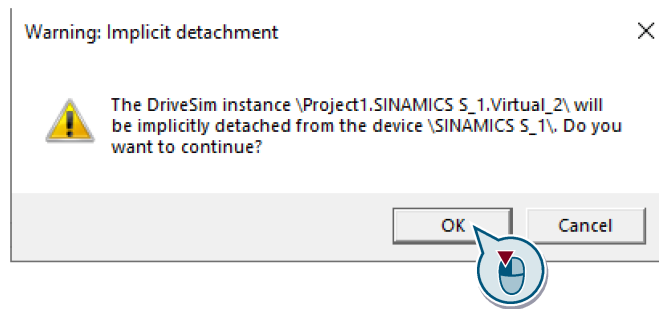


### Result

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

### More information

For more information about detaching a simulation instance, see related steps in Chapter "Transferring the settings from a simulated drive to the real device (Page 73)".

## 7.6 Loading project settings to a simulated drive

### Requirement

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

**Procedure**

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

1. Select the simulation instance and click 🔃 to download the settings from the Startdrive project.

2. Configure the access nodes of the simulation instance.
   - Specify the PG/PC interface of your computer or the DriveSim Virtual Network Interface.
   - Set the connection interface of the simulation 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.
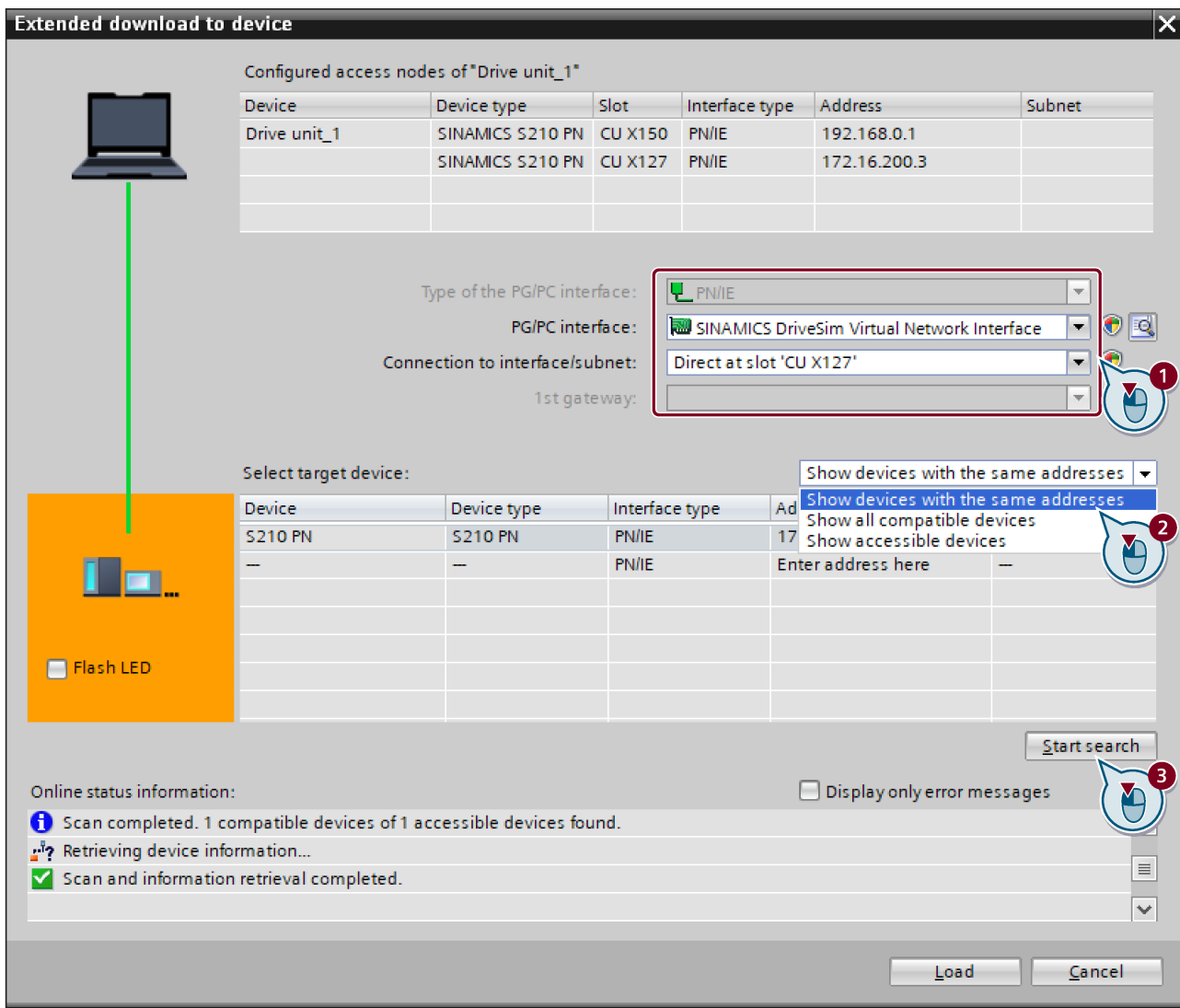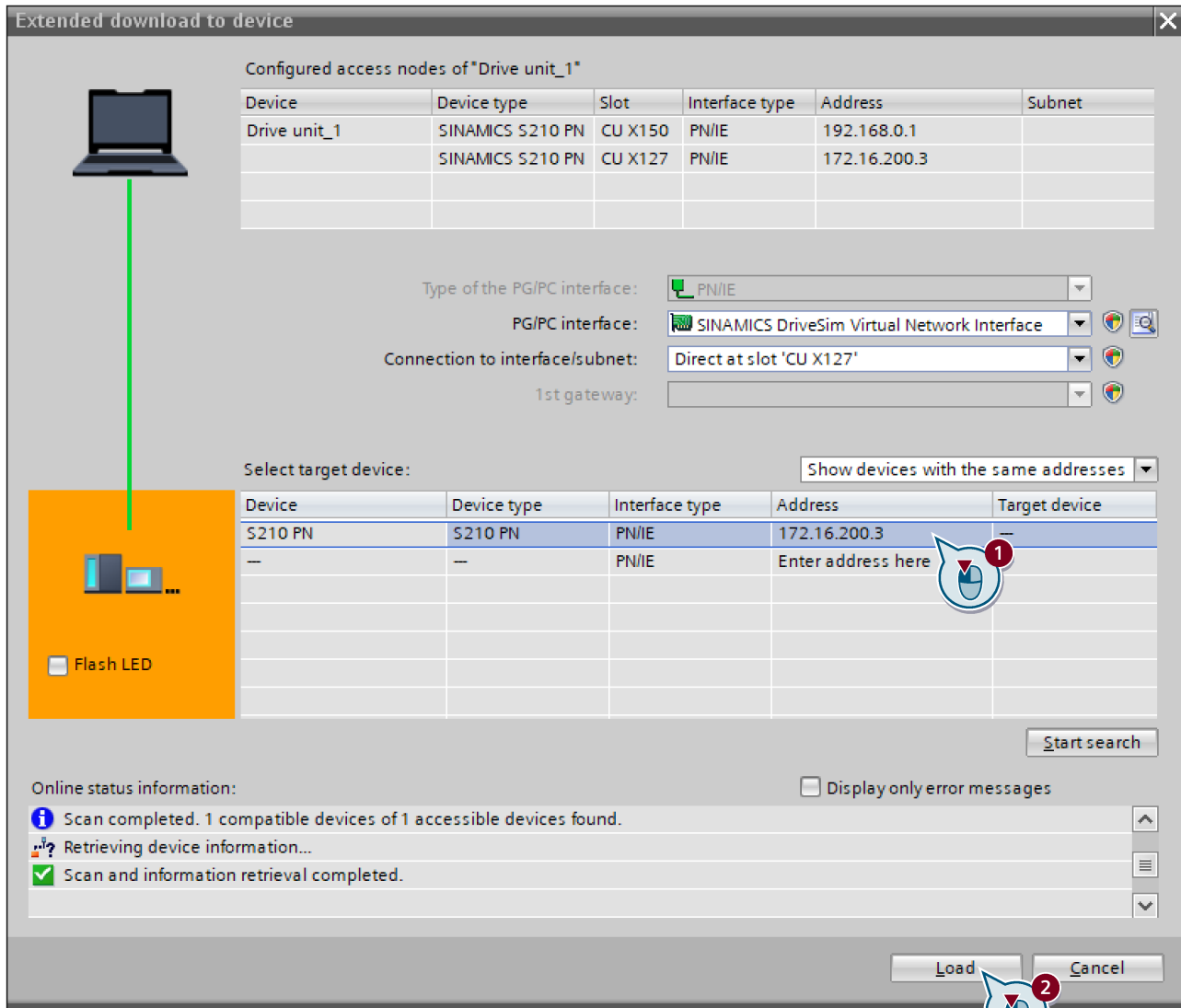
3.  Select the simulation instance from the target device list.

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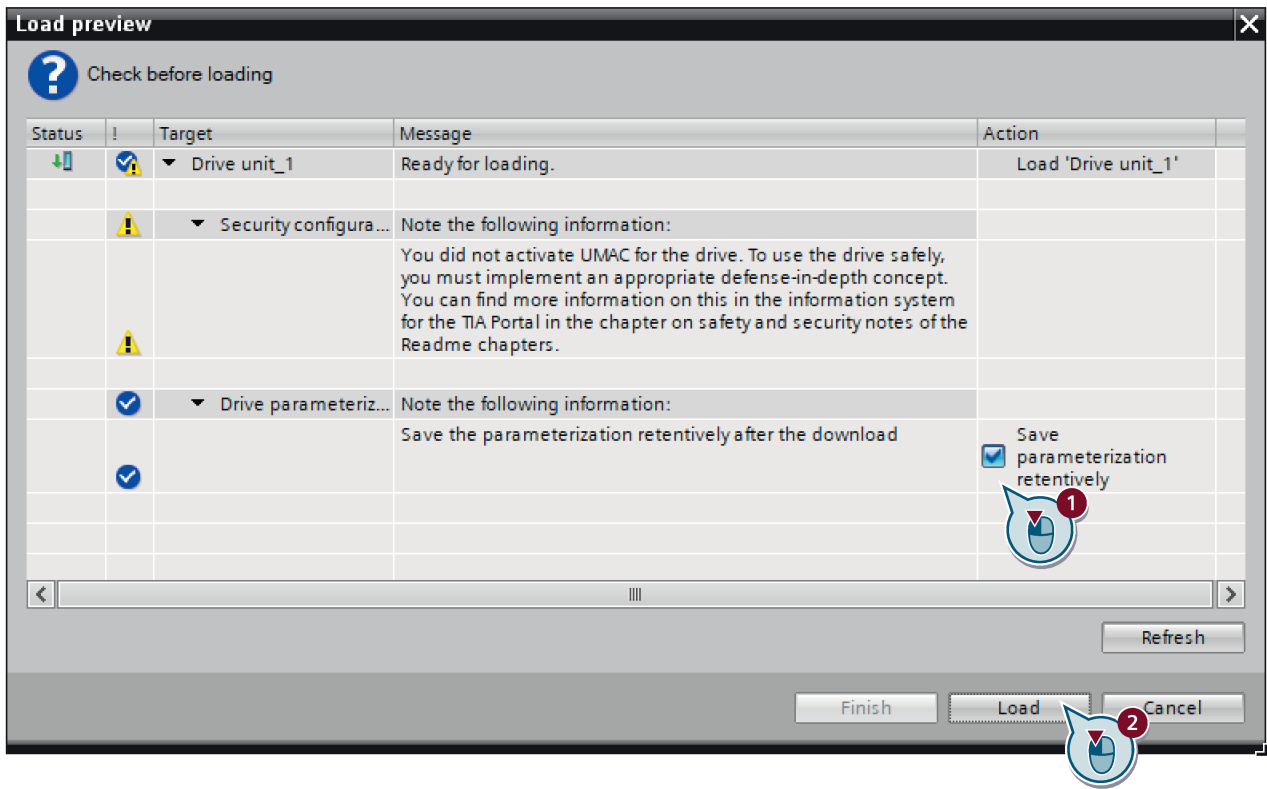


## Result

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

## 7.7 Establishing connection between Startdrive and the simulation instance

### Overview

To commission the simulated device, the online connection between the simulation instance and Startdrive is necessary to establish.

### Requirement

The simulation instance is attached.

**Procedure**

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

1.  In Startdrive, select the simulation instance and click 🖉 .

2.  Configure the access nodes of the simulation instance as shown below:
    - Specify the PG/PC interface of your computer or the DriveSim Virtual Network Interface.
    - Set the connection interface of the simulated device 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.
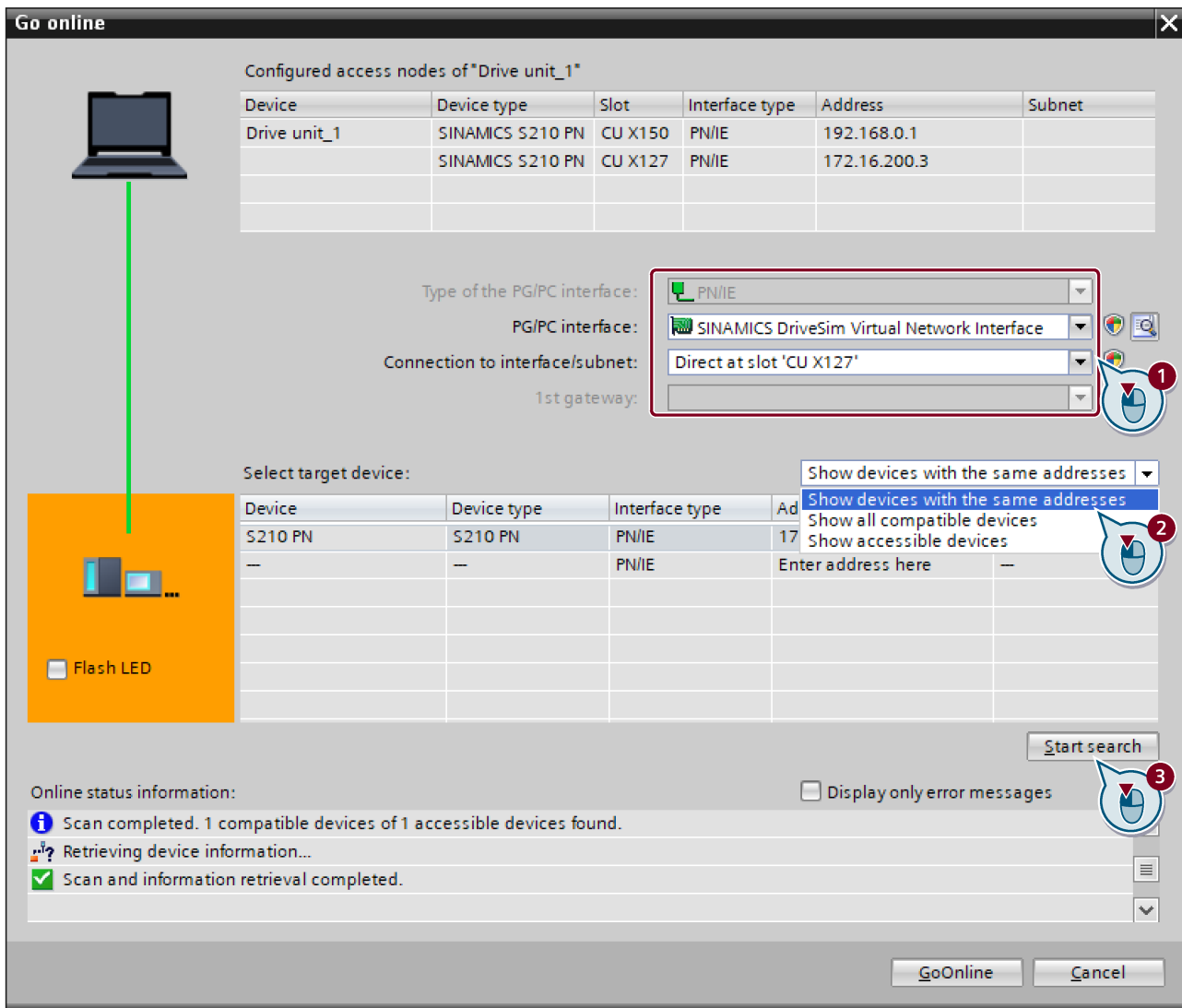
3. Select the simulation instance from the target device list and connect the simulation instance online.
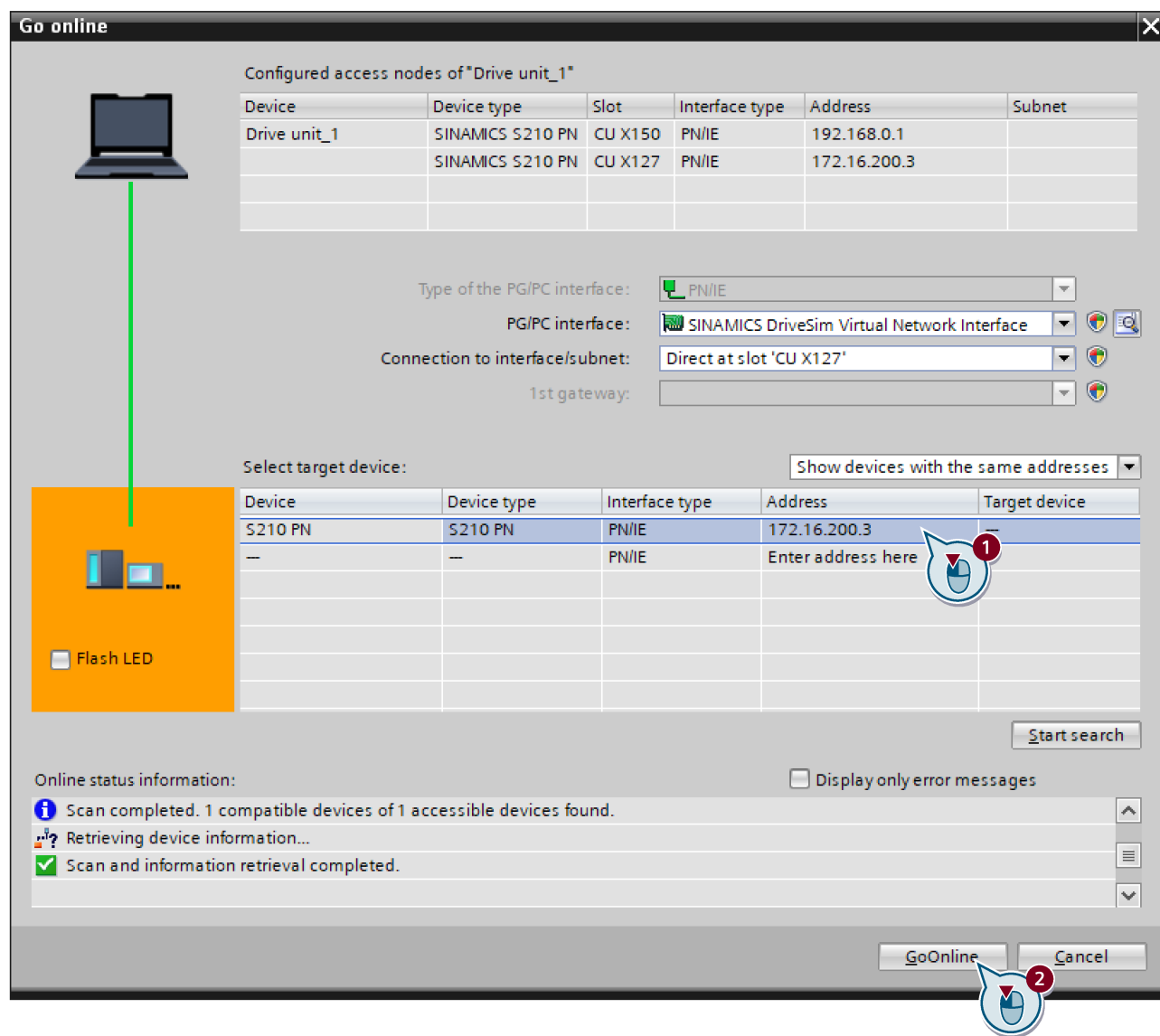
4.  Dismiss the security warning.
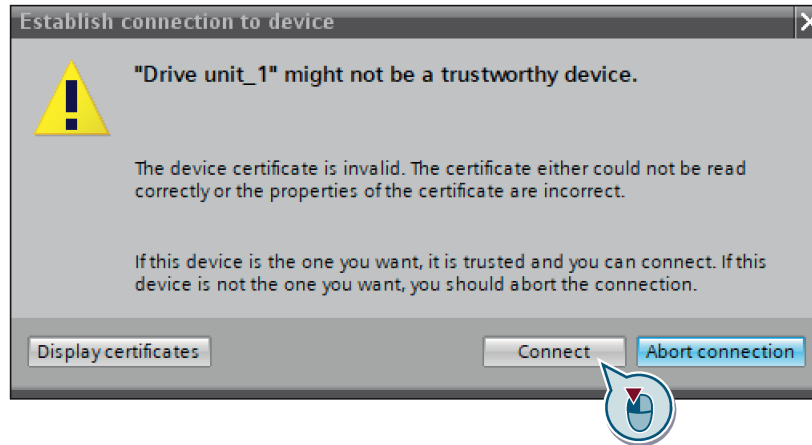


### Result

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

## 7.8 Commissioning a simulated drive

### Overview

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

To access the Web server of the simulation 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 simulation instance is established.
*   The ports for communication are not used by another application.
*   To test functions that require licensing on a simulated device, you must activate Trial License mode. Do not activate a paid license on the simulated device.

**Procedure**

Proceed as follows to commission a simulation instance:

1. Set the basic parameters for the simulation 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 simulation instance responds.
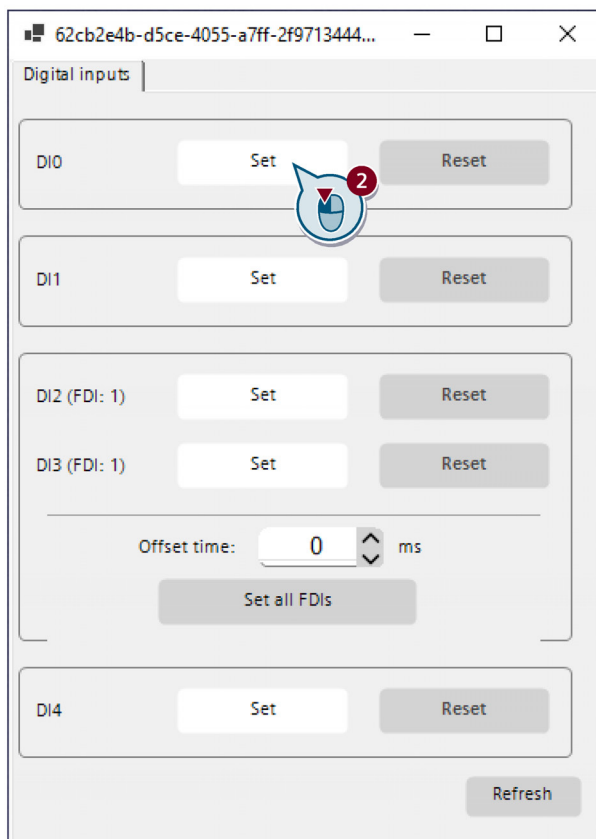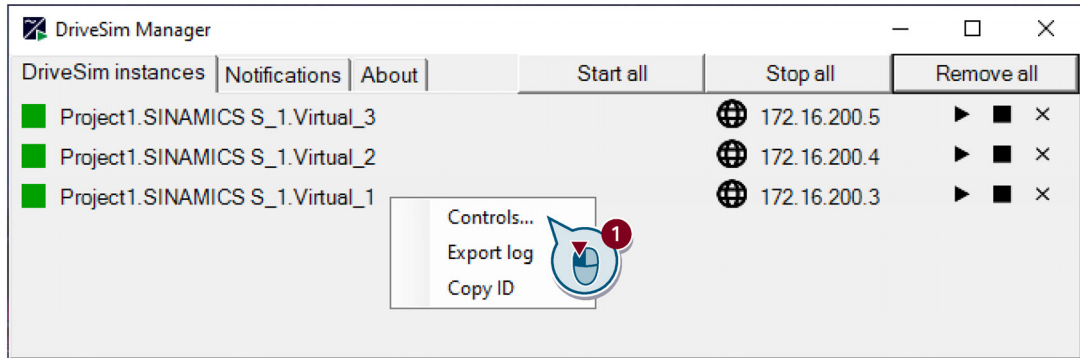


Optionally, you can configure the offset time to define the allowed discrepancy time of F-DI signals. During the offset time, the simulated drive tolerates the inconsistency of the set F-DI signals. When the discrepancy time of the signals exceeds the offset time, the simulated drive reports a safety message.

3. Configure drive functions.

4. Set Safety Integrated Functions.

5. Optimize parameter settings.

### Result

You have commissioned the simulation 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)".

## 7.9 Commissioning a simulated drive with a simulated PLC

### Overview

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

### Requirement

- You have installed and launched S7-PLCSIM Advanced V6.0 Upd1 and DriveSim Engineer V2.0.
  - Make sure that both DriveSim Engineer and S7-PLCSIM Advanced have no running simulation instances.
- You have configured and connected an S7-1500 PLC and an S210 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 simulated drive with a simulated PLC:

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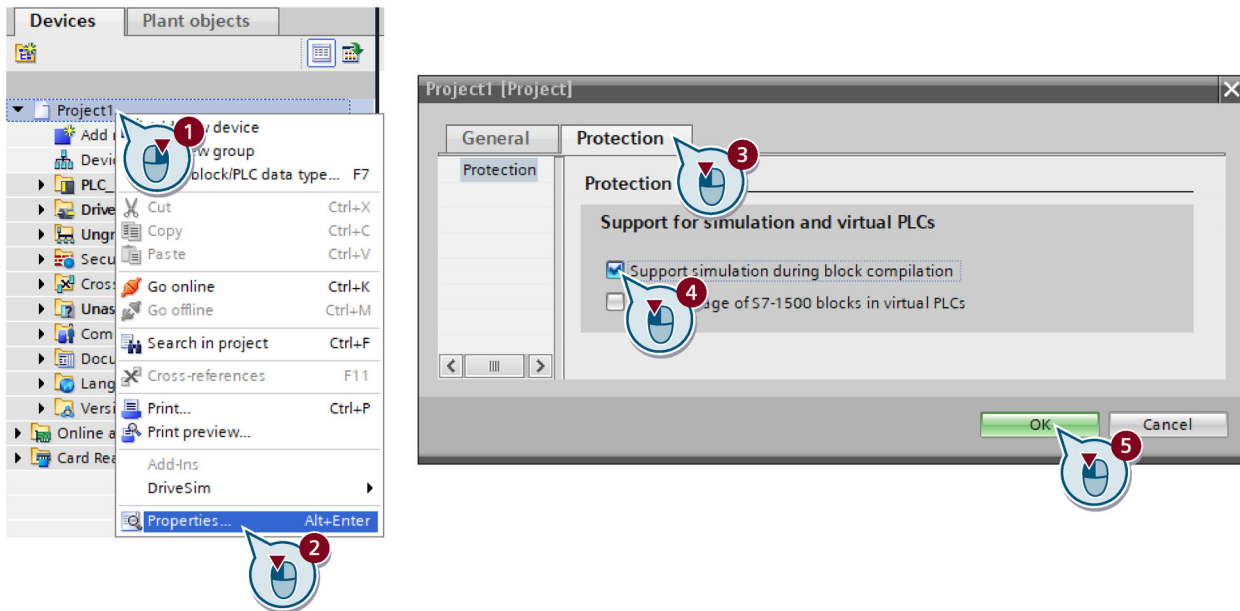


2. In S7-PLCSIM Advanced Control Panel, set the communication interface to "TCP/IP Single Adapter" or "TCP/IP Multiple Adapter" to enable the communication of the S7-1500 instance with the drive instance in Startdrive.
   For better performance in a corporate network, Siemens recommends that you use "TCP/IP Multiple Adapter".
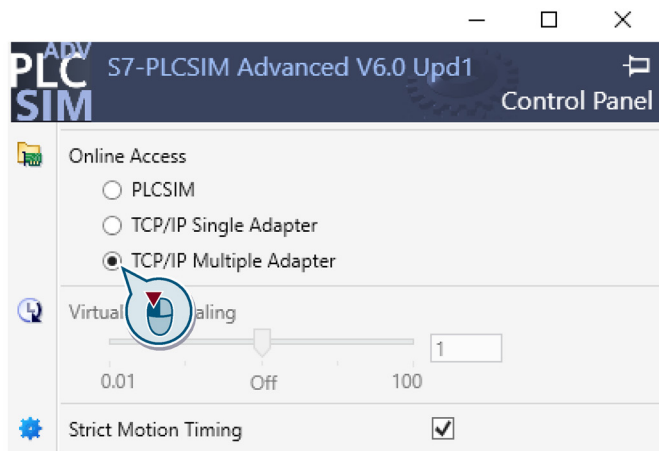
3. In Startdrive, create a simulation instance for the drive following the procedure described in Chapter "Creating a simulated drive (Page 52)".

   When DriveSim Engineer creates a simulation instance for the drive, it automatically interacts with S7-PLCSIM Advanced to prepare an S7-1500 instance. If there is an S7-1500 instance present in S7-PLCSIM Advanced Control Panel, DriveSim Engineer activates the existing instance; otherwise, DriveSim Engineer creates a new S7-1500 instance.

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 simulation instance.
   – Click "Load".
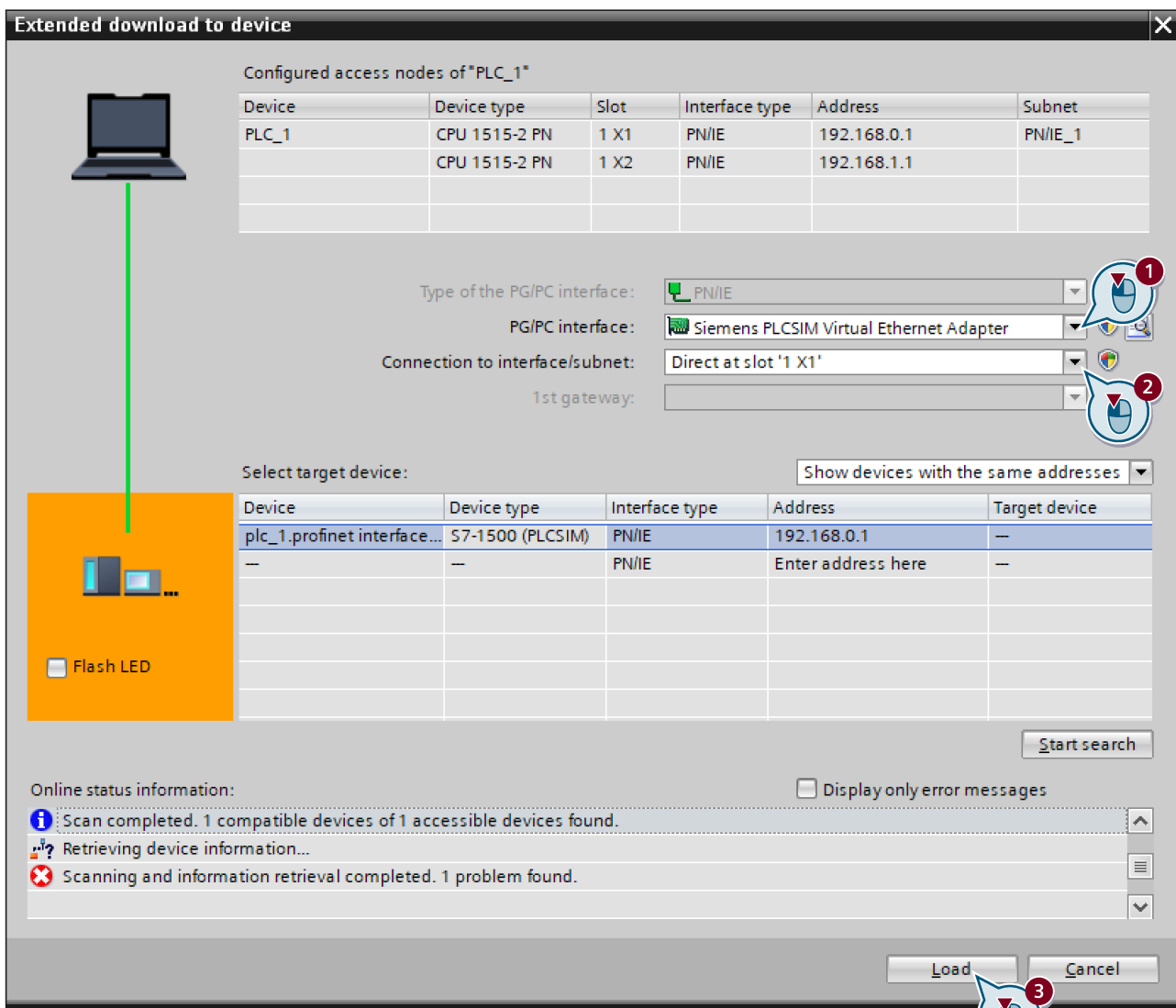
6. Follow any additional prompts or instructions provided by the Startdrive to complete the download.

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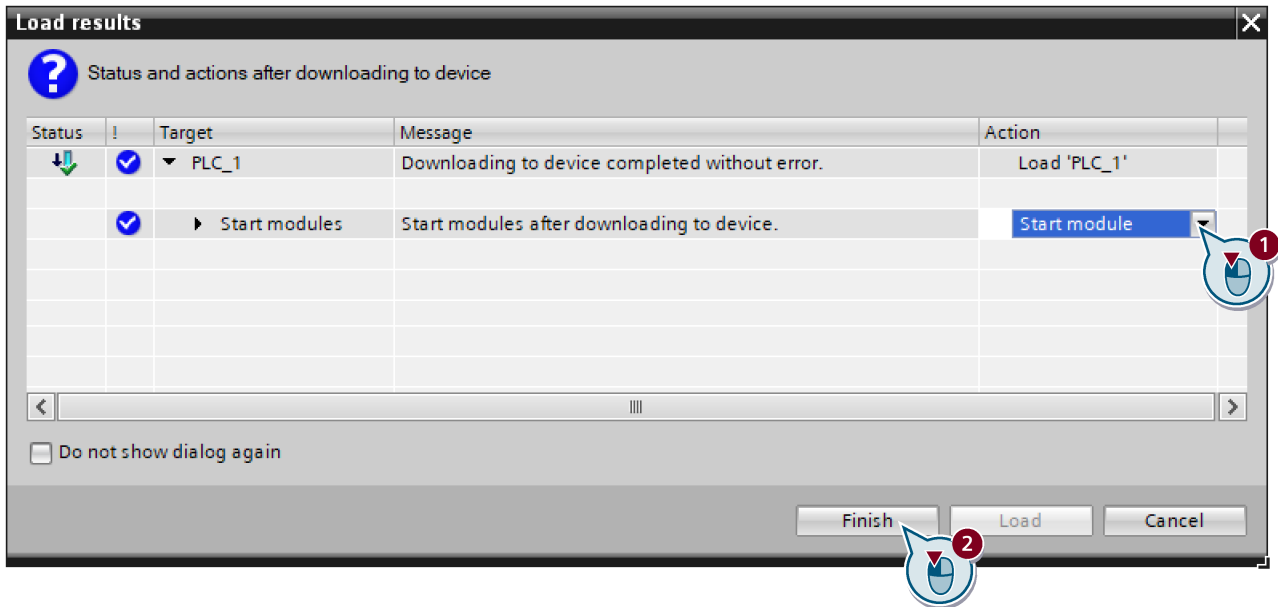


8. Click 🖉 to establish an online connection between Startdrive and the S7-1500 instance.

9. If required, configure the drive simulation instance and establish an online connection for the drive instance.

10. Perform commissioning.

**Result**

You have commissioned the drive simulation 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).

## 7.10      Transferring the settings from a simulated drive to the real device

**Requirement**

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

**Procedure**

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

1. Disconnect the simulation instance from Startdrive by clicking ⬚.

2. Select the simulation instance and click ⬚ to upload its settings to the Startdrive project.
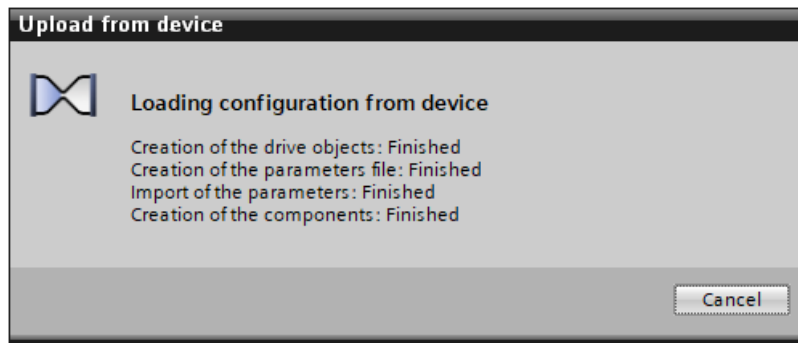
3. Detach the simulation instance from the project.
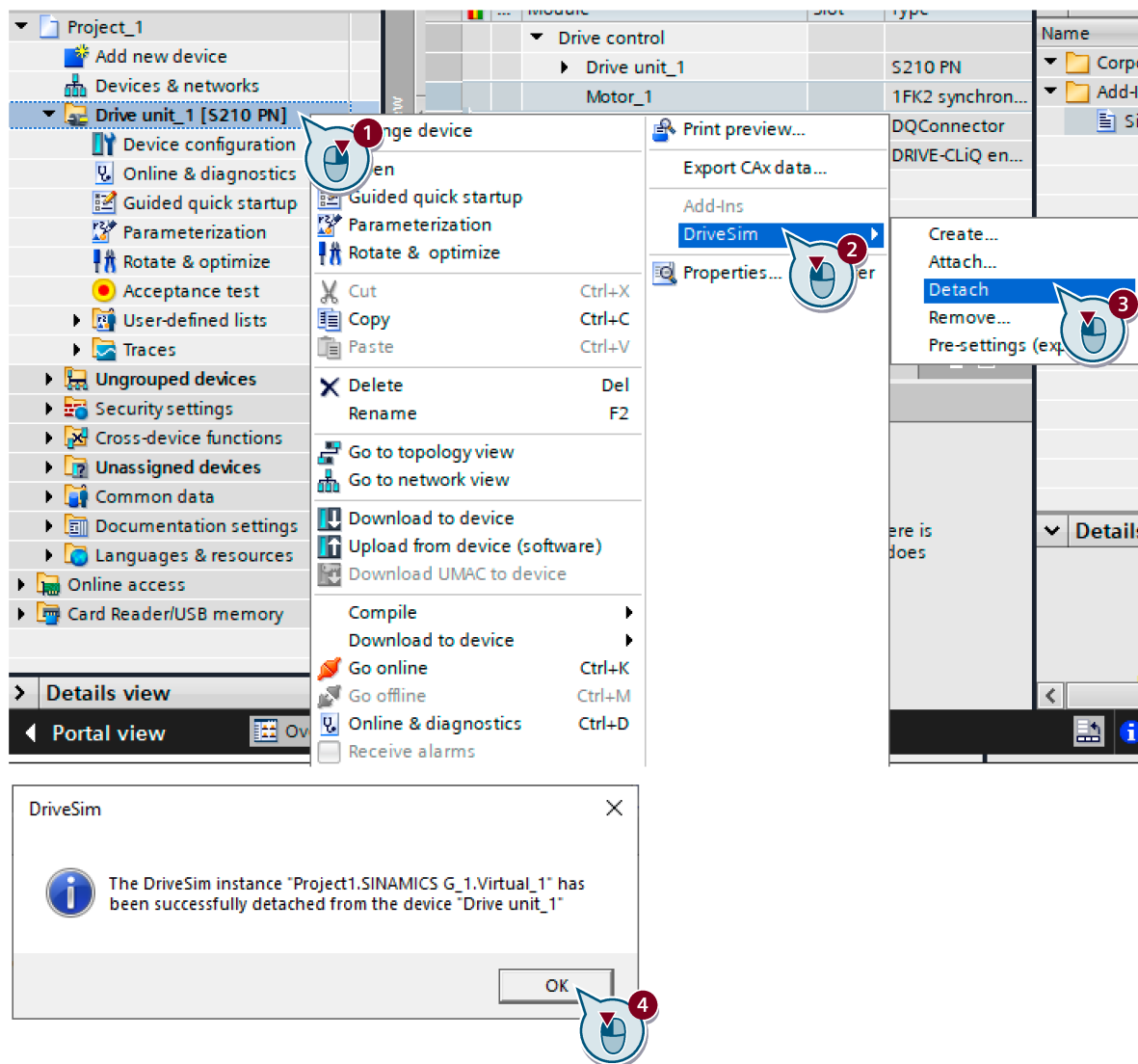
4.  Configure the connection settings of the real device in Startdrive and click ⬛ to download the settings from the Startdrive project. The process may take a few minutes.
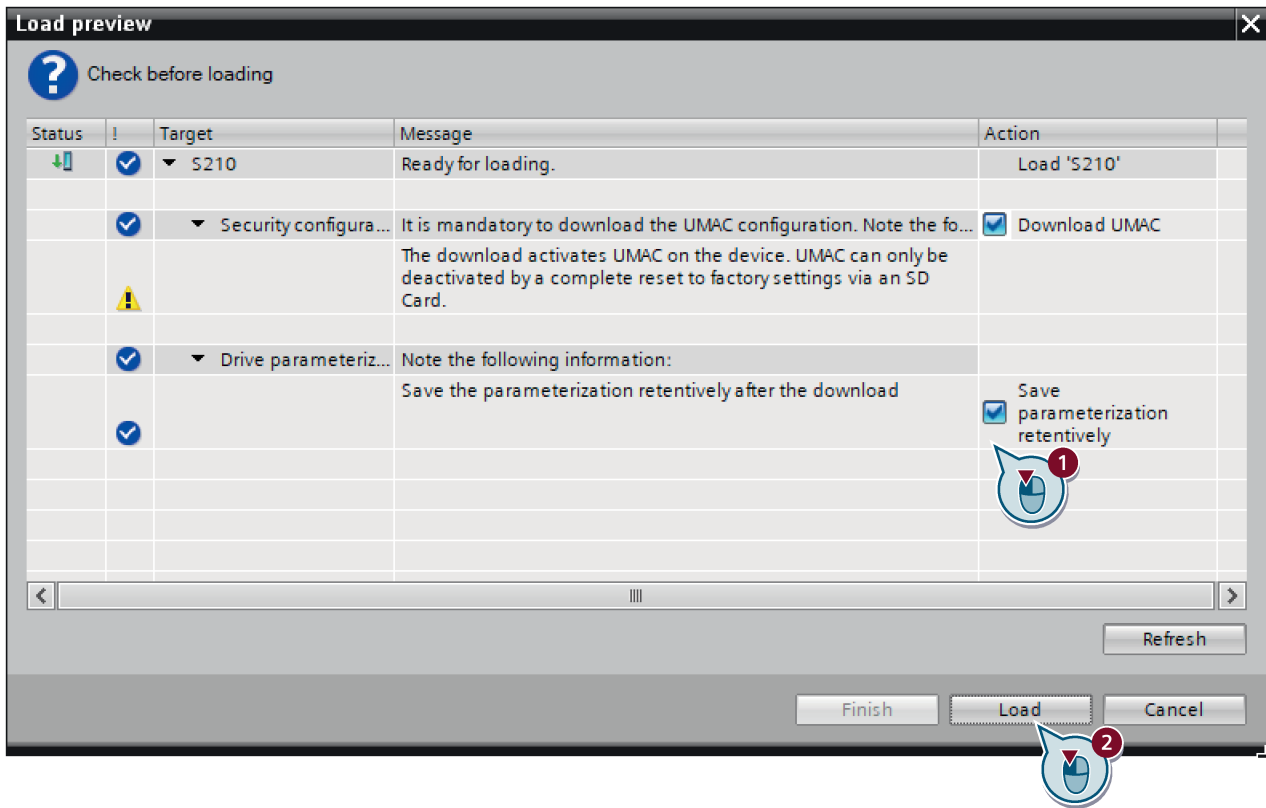


**Result**

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

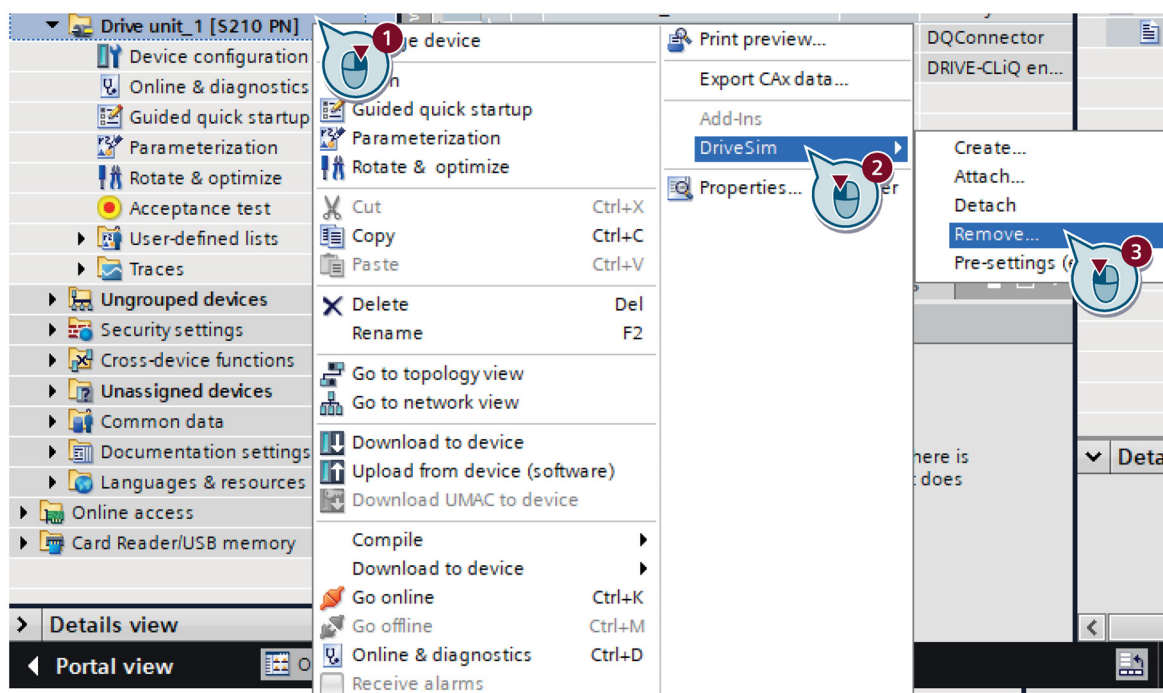# 7.11 Deleting a simulated drive

## Requirement
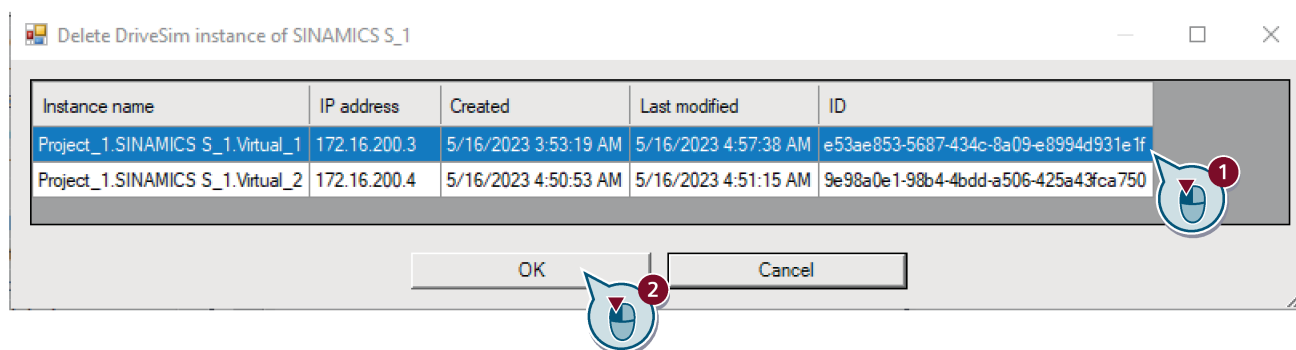
The simulation instance has been created.

## Procedure

### Deleting a simulation instance in Startdrive

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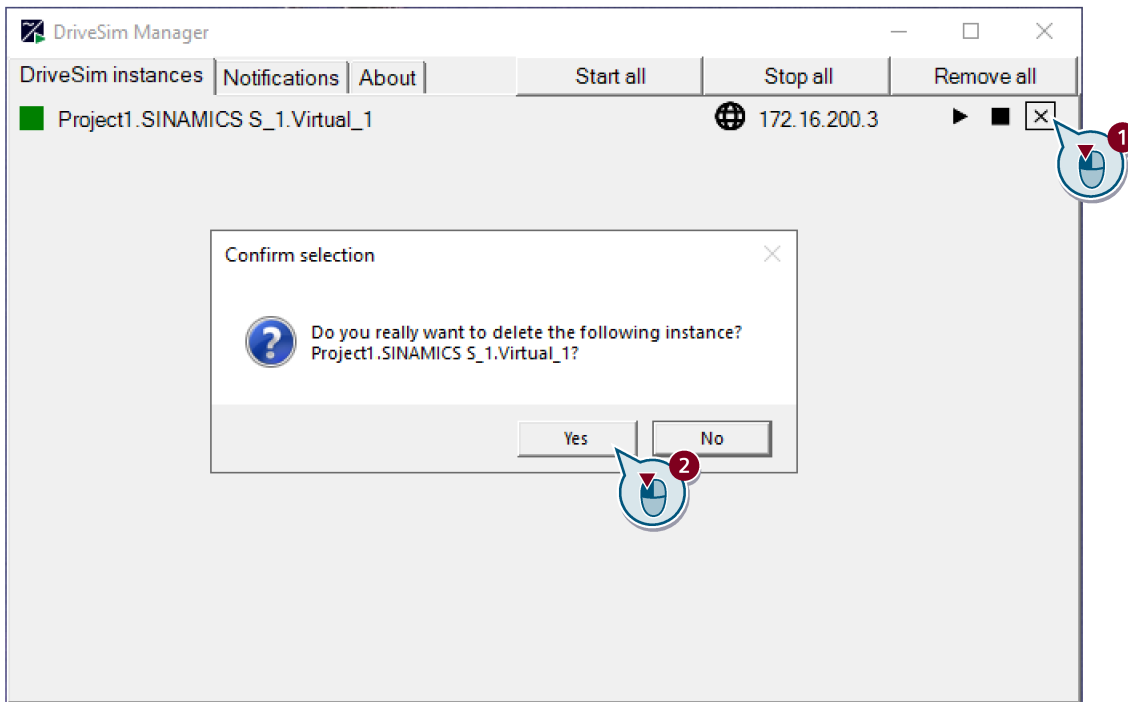


2. Select the instance you want to delete.

**Deleting a simulation instance in DriveSim Manager**

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



## Result

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

# Additional information

# 8

## 8.1    Repairing DriveSim Engineer

**Overview**

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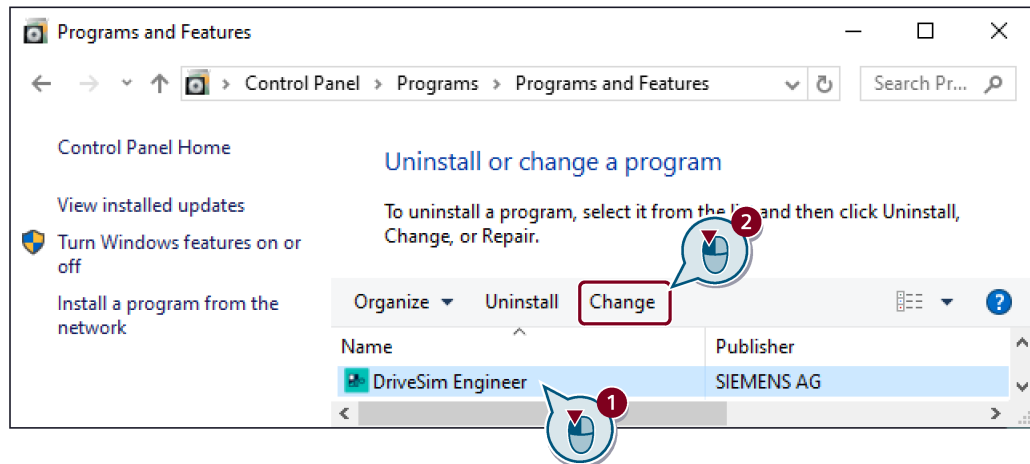
**Requirement**

- 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.
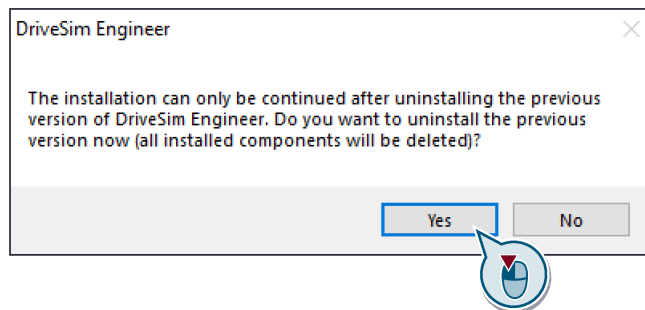


3. Wait a few minutes until the DriveSim Engineer setup wizard automatically opens.

4. Follow the installation procedure described in Chapter "Installing the setup package for DriveSim Engineer (Page 29)" 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 Add-in) to upgrade the software.
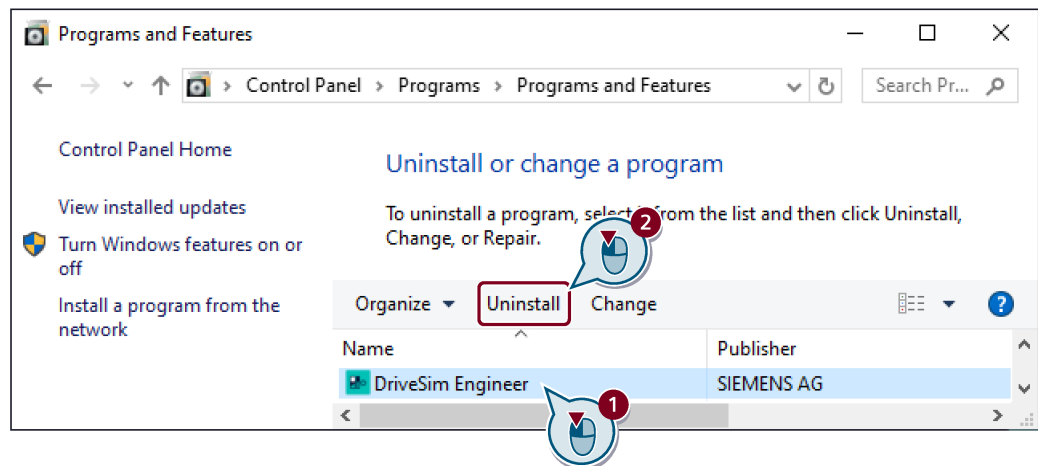
**Requirement**

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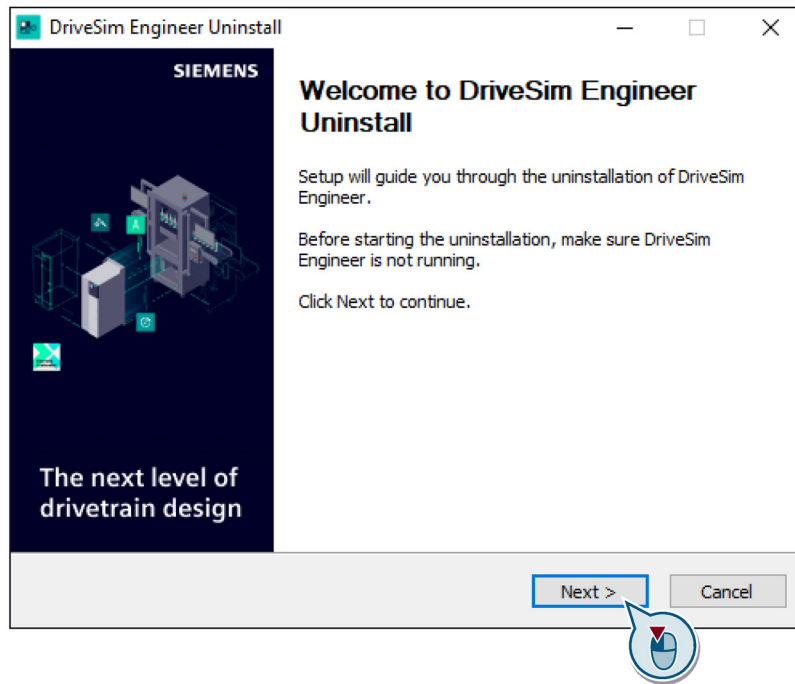- You have stopped DriveSim Manager.

**Procedure**

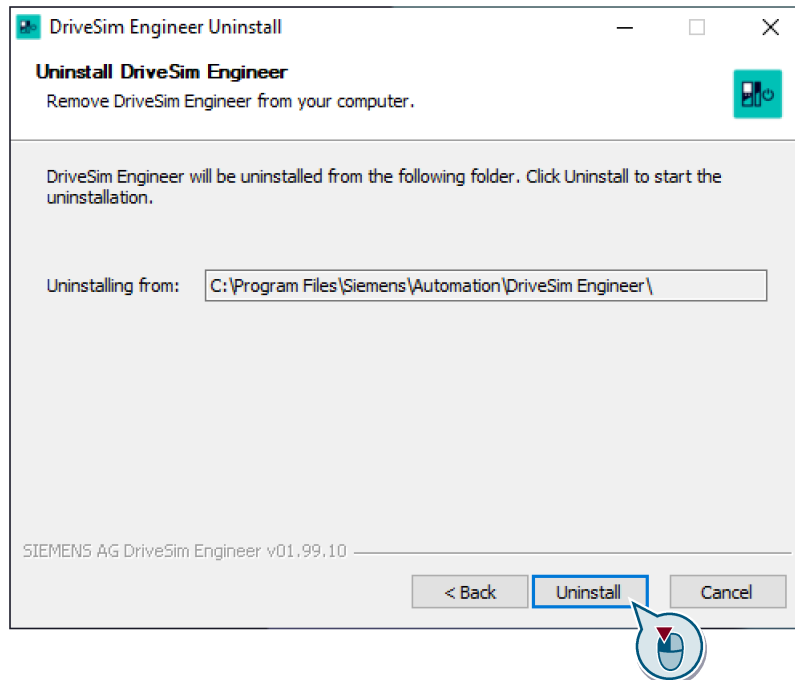Proceed as follows to upgrade DriveSim Engineer:

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. When the uninstallation is complete, the uninstall wizard closes automatically.

---

**Note**

**Delete log files manually**

If the log files are not deleted automatically after the uninstallation, you can find these files in the following address and delete them manually:

%ProgramData%\Siemens\Automation\SinamicsWinHost\Logs

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

---

6. Download the latest version of the installation package at the following link (https://support.industry.siemens.com/cs/document/109821163).

7. Follow the installation procedure described in Chapter "Installing the setup package for DriveSim Engineer (Page 29)" to finish the installation of the latest software version on your computer.

**Result**

You have finished the software upgrade on your computer.

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Function Manual, 12/2024, A5E52754110B AD

## Get more information

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

Industry Mall:
**www.siemens.com/industrymall**

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