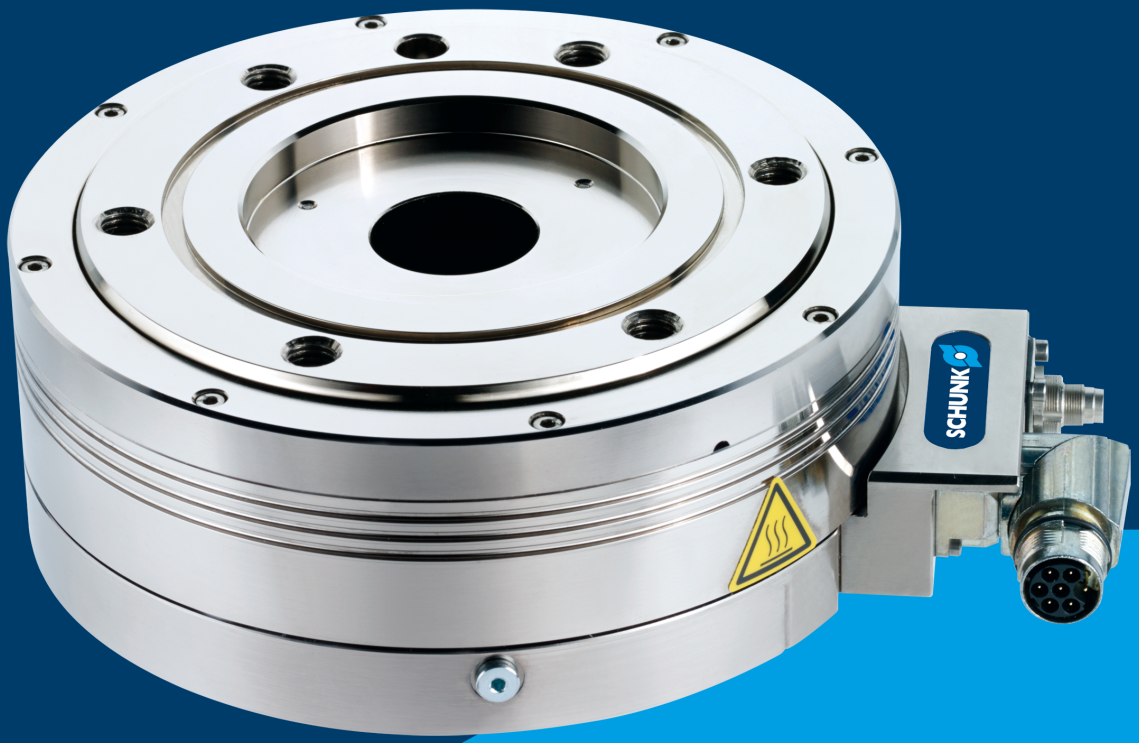


Commissioning manual ERS on IndraDrive CS

Electrical turning unit with torque motor

Translation of original commissioning instructions

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

Document number: 389767

Version: 05.00 | 14/05/2024 | en

Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management

Tel. +49-7133-103-2503
Fax +49-7133-103-2189

cmg@de.schunk.com

Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.2 [🗋 5] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ DANGER

Dangers for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business*
- Catalog data sheet of the purchased product*
- Assembly and Operating manuals of the accessories*
- Assembly and operating manual of the product *
- Documentation of the drive controller

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

1.1.3 Sizes

This operating manual applies to the following sizes:

- ERS on IndraDrive CS135, 560 V
- ERS on IndraDrive CS170, 560 V
- ERS on IndraDrive CS210, 560 V

1.1.4 Versions

This operating manual applies to the following variations:

- ERS on IndraDrive CS
- ERS on IndraDrive CS with pneumatic holding brake
- ERS on IndraDrive CS with rotary feed-through (DDF)
- ERS on IndraDrive CS with protection class IP54

1.2 Scope of delivery

The scope of delivery includes

- QR slip for downloading the commissioning software

2 Basic safety notes

2.1 Intended use

The product was designed to rotate loads, workpieces and objects.

The poduct may only be operated in combination with a controller.

- The product may only be used within the scope of its technical data.
- The product is intended for installation in a machine/ automated system. The applicable guidelines for the machine/ automated system must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

It is not intended use if the product is used, for example, as a pressing tool, stamping tool, lifting gear, guide for tools, cutting tool, clamping device or a drilling tool.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is only used within its defined application parameters.

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician

Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel

Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person

Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer

Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.10 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.10.1 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.10.2 Protection against electric shock

Work on electrical equipment

Touching live parts may result in death.

- Work on the electrical equipment may only be carried out by qualified electricians in accordance with the electrical engineering regulations.
- Lay electrical cables properly, e. g. in a cable duct or a cable bridge. Observe standards.
- Before connecting or disconnecting electrical cables, switch off the power supply and check that the cables are free of voltage. Secure the power supply against being switched on again.
- Before switching on the product, check that the protective earth conductor is correctly attached to all electrical components according to the wiring diagram.
- Check whether covers and protective devices are fitted to prevent contact with live components.
- Do not touch the product's terminals when the power supply is switched on.

Possible electrostatic energy

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.
- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.

2.11 Notes on particular risks

⚠ DANGER

Danger from electric voltage!

Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians may perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.

⚠ DANGER

Risk of injury due to magnetic fields

The integrated high performance permanent magnets can represent a risk to persons with an active or passive implant.

- Persons with heart pace-makers, active or passive implants are prohibited from entering the area of the magnetic field.

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

⚠ WARNING

Risk of injury from objects falling in the event of an energy supply failure

In case of an energy supply failure, the gripping force decreases and a secure hold on the gripped workpiece cannot be guaranteed.

- Take suitable protective measures to secure the danger zone.

3 Parameter settings for ERS

The provided parameter settings from SCHUNK are only valid for the following drive controllers and firmware versions:

Drive controller	Firmware Version
Bosch Rexroth Indradrive C	Firmware MP*x* 07 to MP*x* 08
Bosch Rexroth Indradrive CS	Firmware MP*x* 17 and MP*x* 18
Siemens Sinamics S120, Steuerteile CU 310 and CU 320	Firmware Version 4.6.*x* and 4.7.*x*

If you are using firmware versions which differ, SCHUNK cannot ensure a safe and proper function.

Please get in contact with the SCHUNK service team in these cases or for any further questions.

SCHUNK-Service:
Service-Hotline: +49-7133-103-2333
Fax: +49-7133-103-2604
E-Mail: service.automation@de.schunk.com

4 Commissioning

⚠ WARNING

Risk of injury due to unexpected movements!

Incorrect parameterization may lead to unexpected movements of the machine/system causing injuries or physical damage.

- Only allow parameterization work to be carried out by authorized specialist personnel.
- Observe the information in the drive controller's operating manual.

⚠ WARNING

Risk of injury due to unexpected movements.

During setup mode the machine/system may move unexpectedly and the motor can run away. As a consequence, there may be a collision within the motor's moving range causing serious injuries.

- Keep the motor's moving range (360°) free.

CAUTION

Malfunctions in the event of overload.

An overload may cause the product to malfunction.

- Avoid impact loads.
- Do not exceed the bearing load limits.

CAUTION

Malfunctions in the event of overheating.

Malfunctions may occur if the product overheats

- Observe the motor's technical data. See ERS assembly and operating manual.

4.1 Required equipment

In order to commission a ERS with drive controller, the following equipment is necessary/requirements must be met:

- Fully assembled and installed ERS (see assembly and operating manual).
- PC with Ethernet TCP/IP interface
- Operator software of the drive controller
- Commissioning DVD for SCHUNK motors

- Ethernet connection cable (patch cable) to connect PC and drive controller

4.2 Commissioning the Bosch Rexroth IndraDrive C/CS

NOTE

This chapter provides brief instructions for commissioning the ERS with Bosch Rexroth IndraDrive. The user manual of the controller takes precedence. Read through the manual before commissioning the drive controller.

Connecting the drive controller

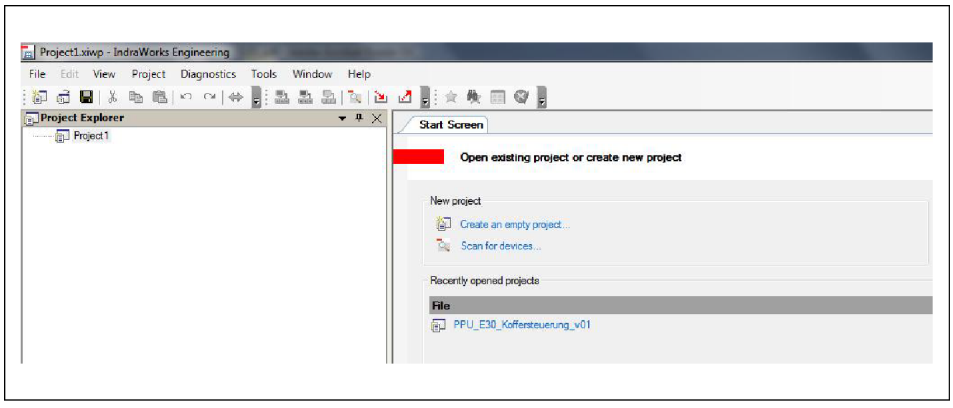
1. Connect the drive controller to the three-phase system.
2. Connect the 15-pin D-Sub plug of the sensor cable to the drive controller.
3. Connect the open ends of the power cable (U, V, W and Earth) to the drive controller.
4. Connect the power and encoder cable to the ERS.

Setting up the drive controller

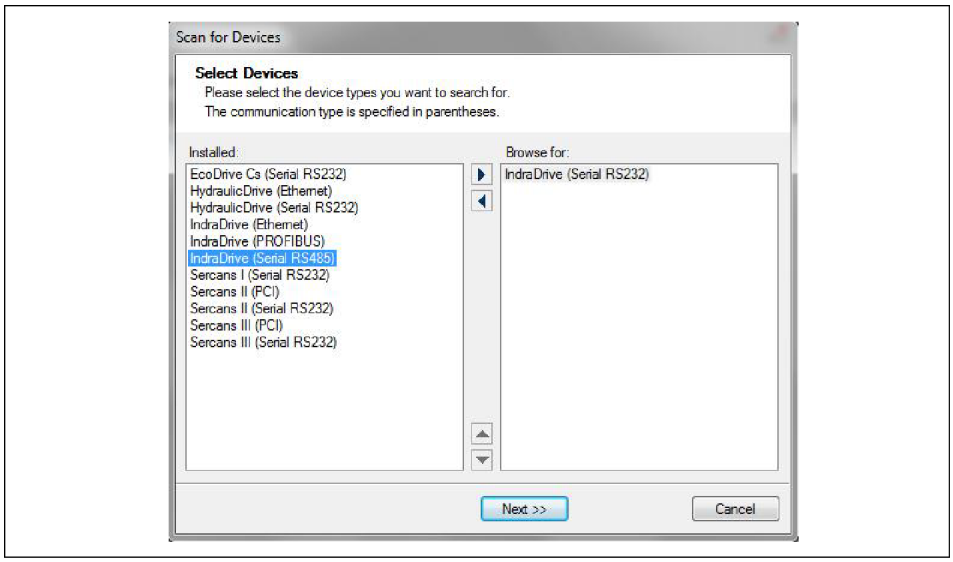
NOTE

Select the corresponding interface for commissioning via Ethernet. The procedure is the same.

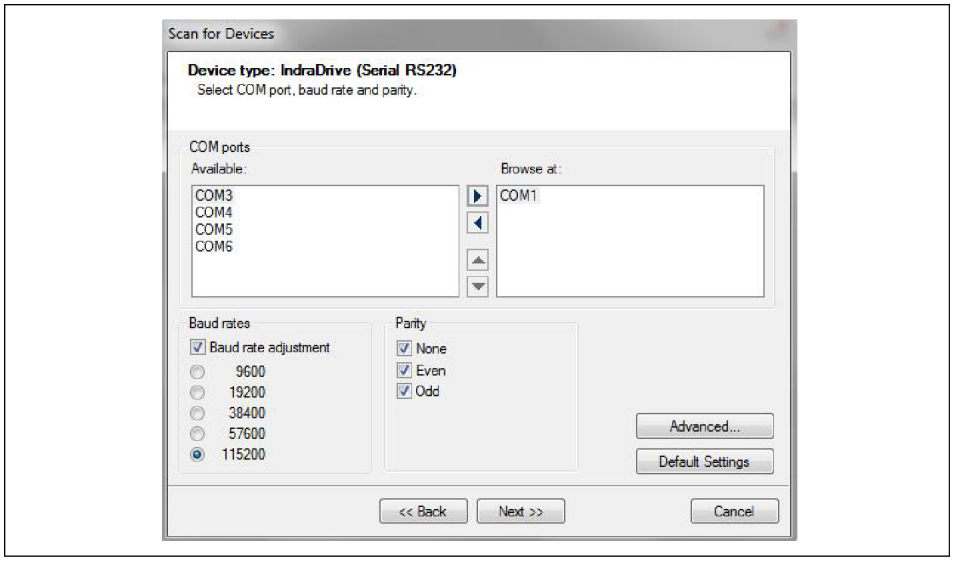
1. Connect the computer's RS232 interface to the serial interface of the drive controller.
2. Switch on the drive controller and power unit.
3. Start IndraWorks on the PC.



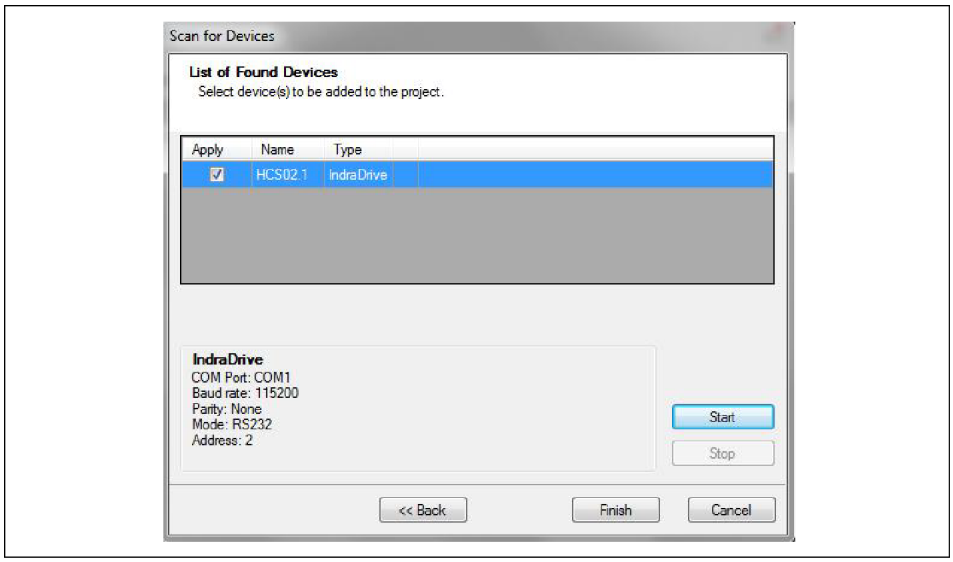
4. Select "Scan for Devices" under "New project".
   ⇨ The "Scan for Devices" window appears.



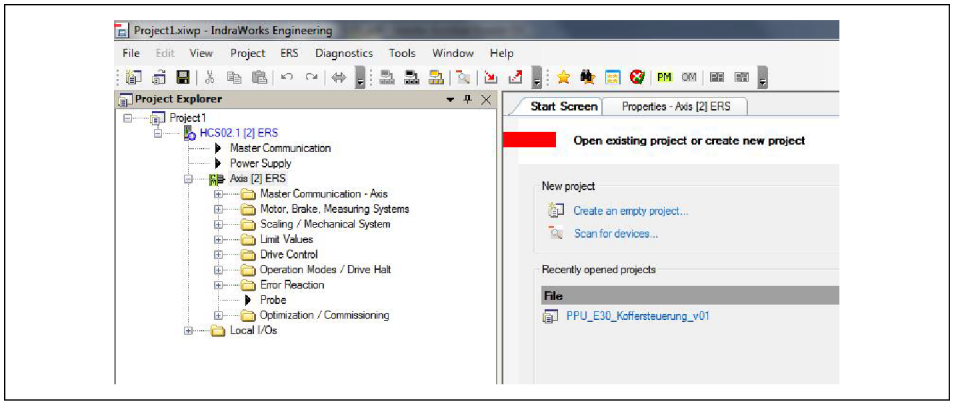
5. Select the interface of the drive controller in the "Scan for Devices" window and click the "Next »" button to continue.



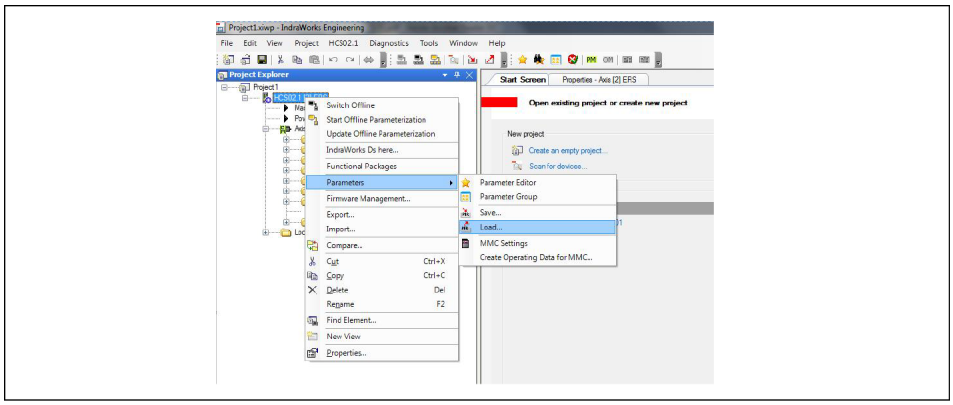
6. Select the computer's interface in the "Scan for Devices" window.
7. Move the interface via the "Move" button in the window "Browse at:" and click the "Next »" button to continue.
   ⇨ All devices found are displayed in the "List of Found Devices" in the "Scan for Devices" window.



8. Select your device from the list and click the "Finish" button.
   OR: If your device was not found, click the "Start" button to scan for devices manually.

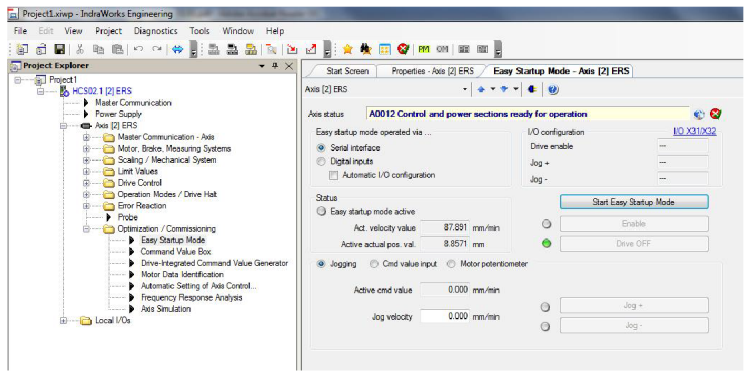


⇨ A new project has been created in the project explorer.



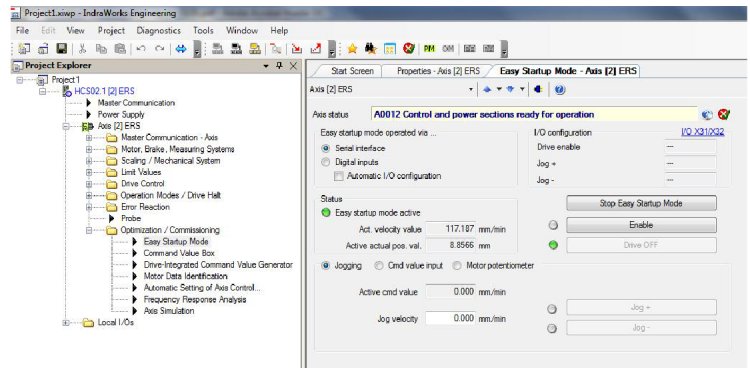
9. Right-click in the project explorer of the project folder to open the shortcut menu and select "Parameters" – "Load..." to import the provided parameter file.

   ⇨ The parameter file is imported.



10. Open the "Easy Startup Mode" under the "Optimization / Commissioning" folder in the Project explorer.

⇨ The "Easy Startup Mode" is displayed.



11. Click the "Stop Easy Startup Mode" button.

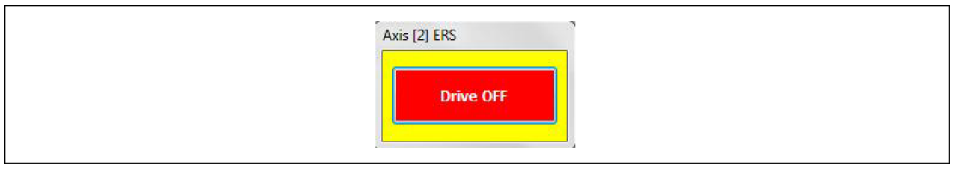
12. Click the "Enable" button to enable the drive (ERS).

⇨ The "Dangerous Movements" warning appears.

13. Confirm the warning by clicking "OK".

NOTE

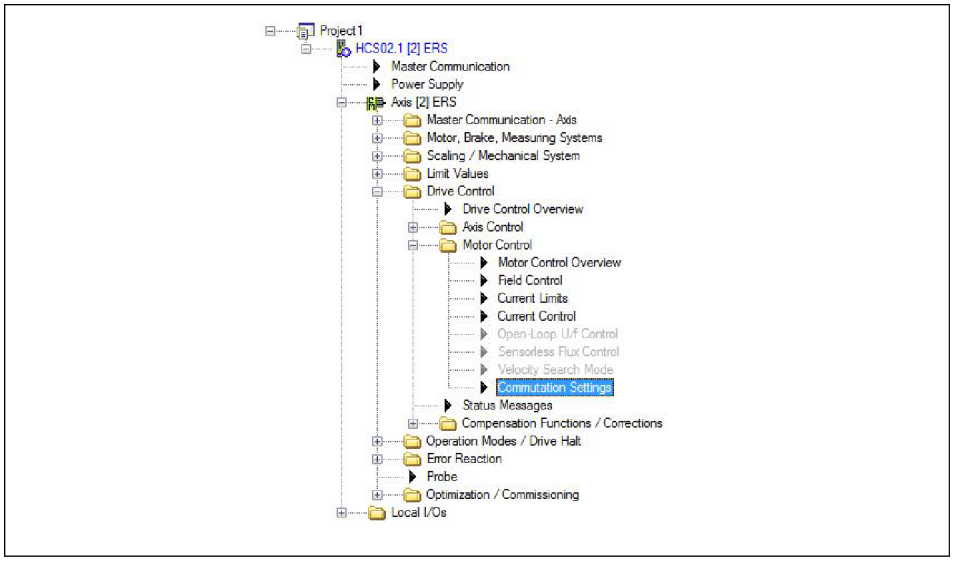
When the drive is enabled, a field appears in the foreground of the screen that can be used to switch off the drive (ERS) in an emergency.



NOTE

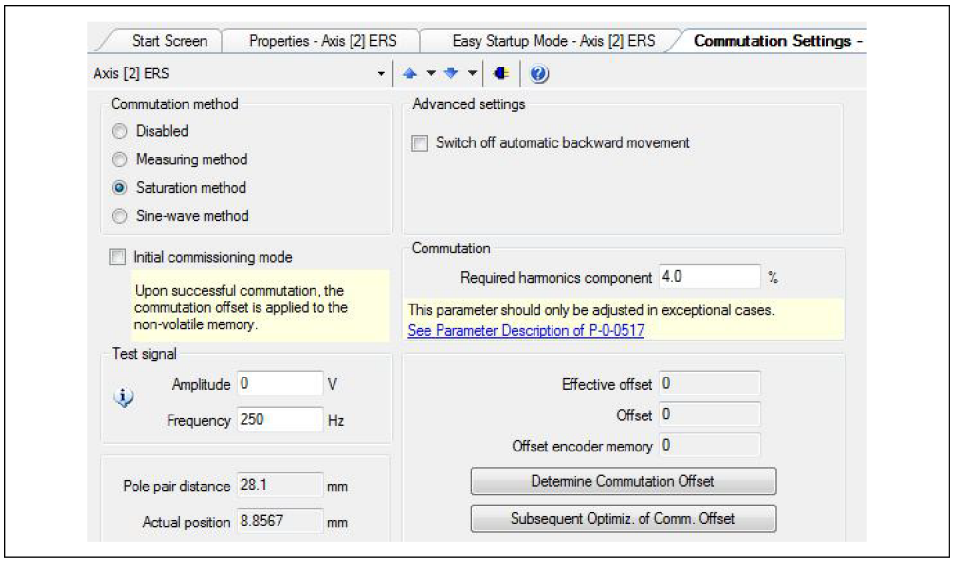
In case of the Bosch Rexroth IndraDrive C/CS the commutation current of the drive controller may be too low or too high after enabling the drive.

If one of these errors occurs, simply delete it.



14. Select "Commutation Settings" under the "Drive Control – Motor Control" folder in the project explorer.

⇨ The "Commutation Settings" tab appears.



15. Select "Saturation method" under the "Commutation Settings" tab.

16. Click the "Determine Commutation Offset" button.

⇨ The "Commutation Offset" is determined.

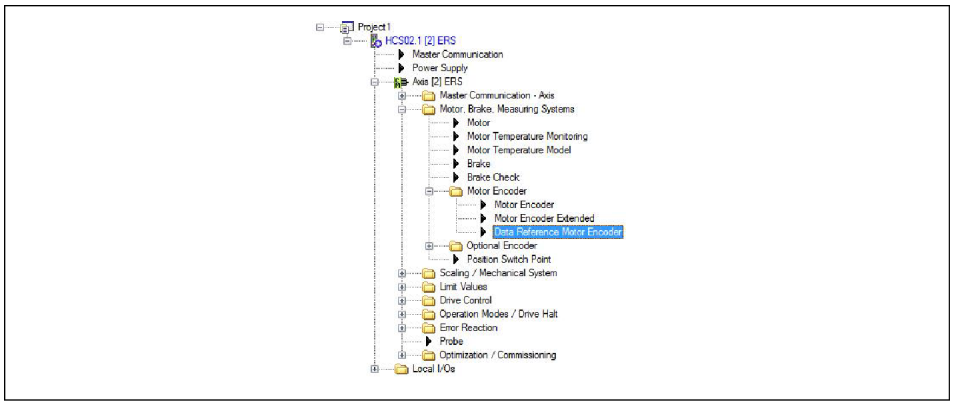
Select between the options "Referencing", "Velocity Run" or "Positioning Run" in the following steps.

Commissioning functions

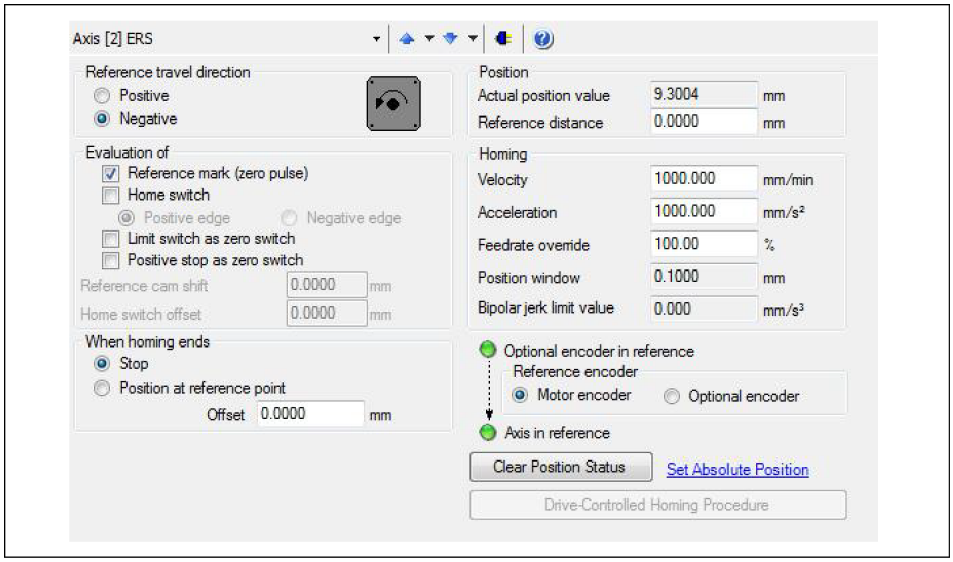
NOTE

For a variant with penumatic holding brake, the brake must be pressurized before the commissioning.

Referencing

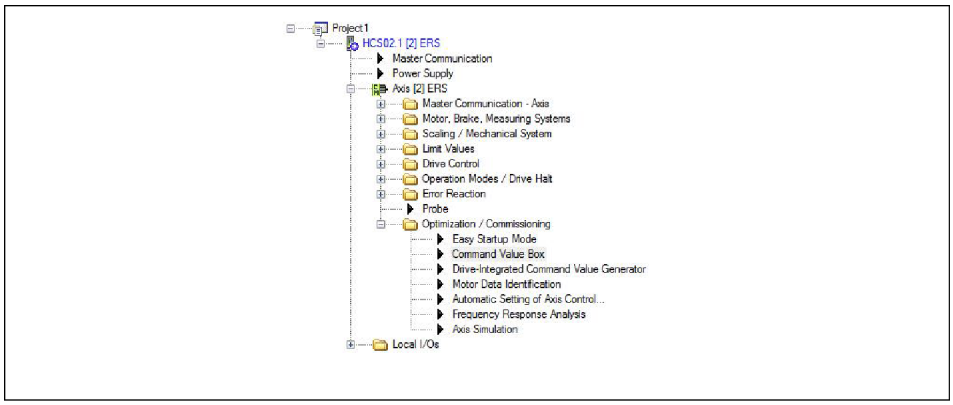


1. Select "Data Reference Motor Encoder" under the "Motor, Brake, Measuring Systems" – "Motor Encoder" folder in the project explorer.
   ⇨ The "Data Reference Motor Encoder" tab appears.



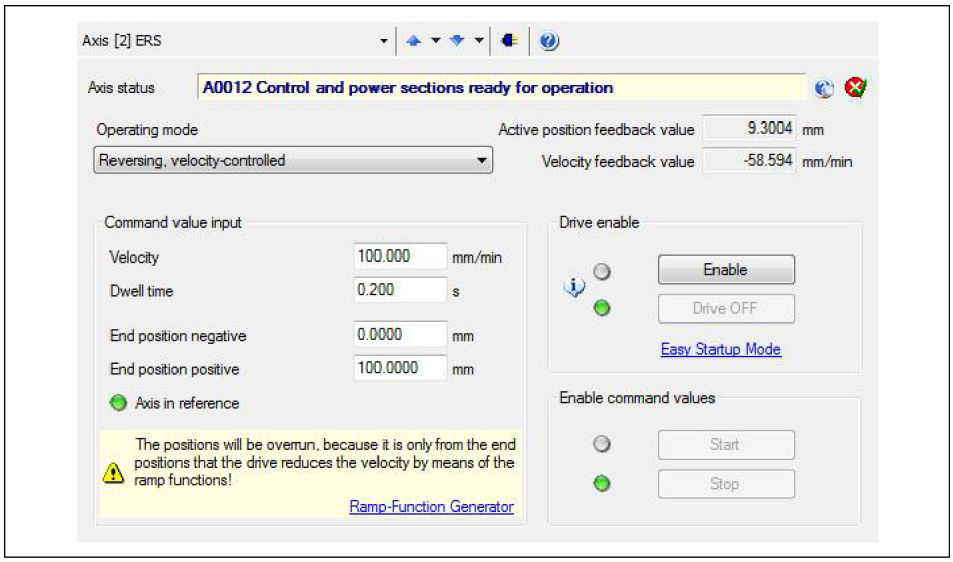
2. Make the reference settings and click on the "Drive-controlled Homing Procedure" button.
   ⇨ The homing procedure is started. After finishing the homing procedure, the referencing is completed.

Velocity run



1. Select the "Command Value Box" option under the "Optimization / Commissioning" folder in the project explorer.

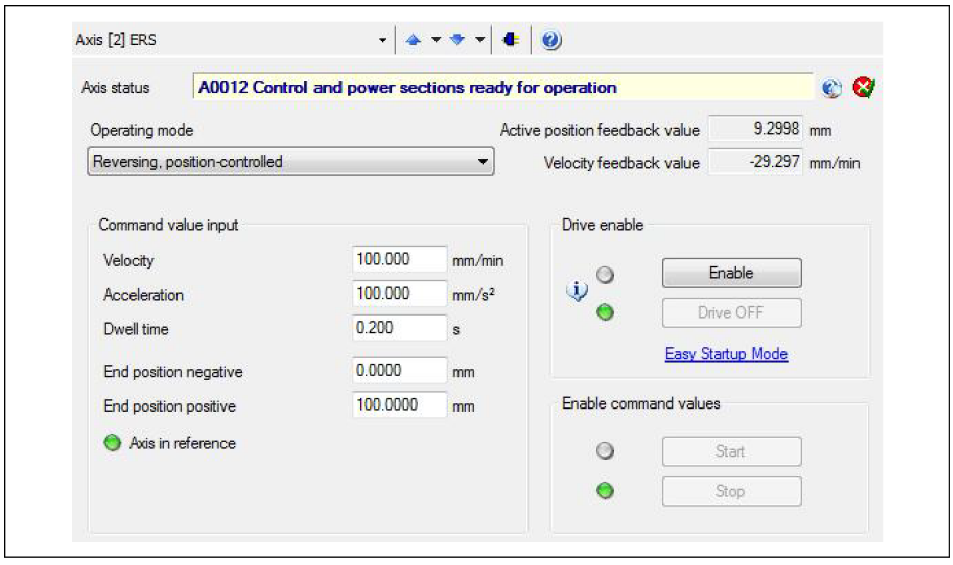
   ⇨ The "Command Value Box" tab appears.



2. Choose between "Reversing, velocity-controlled" or "Step operation, velocity-controlled" under "Operating mode" and click "Start".

   ⇨ The velocity run is started.

Positioning run



- Choose between "Reversing, position-controlled" or "Step operation, position-controlled" under "Operating mode" and click "Start".
  ⇨ The positioning run is started.

NOTE
For instructions on using other functions, see the Bosch Rexroth IndraDrive C user manual or contact Bosch Rexroth support.

4.3 Bosch Rexroth IndraDrive C/CS-Basic setting

Basic setting

1. Set position controller:
   Kp = 0.5
2. Set velocity controller:
   Kp = 1; Tn = 0
3. Set current controller:
   Kp = 30; Tn = 3
4. Set filter for speed control circuit:
   Speed controller smoothing time constant = 0

Setting the velocity controller

1. In velocity mode, run the motor at a constant velocity of 15 rpm.
2. Increase the Kp incrementally by 0.5 until the motor begins to vibrate.
3. Reduce the vibrations:
   by increasing the speed controller smoothing time constant.
   If this is not possible: Set the
   speed controller smoothing time constant to 0 and reduce the Kp until the vibrations cease.
4. Select the value that is half of the exact limit for Kp.
5. Select the high value for integral action time, Tn.
6. Reduce the Tn until the motor begins to vibrate.
7. Select the value that is double the exact limit for Tn.

Setting the position controller

1. Increase the Kp until the desired positioning time is achieved.

NOTE
Ensure that excessive vibrations do not occur.

2. Increase the Kp until the current curve is as smooth as desired. Make the current curve visible using the oscilloscope function.

NOTE
Be aware of noise emissions or vibrations.

5 Troubleshooting

5.1 The product is not turning

Possible cause	Corrective action
No motion release.	Check setting of the drive controller.
Drive controller is defective.	**DANGER Risk of fatal injury due to electric shock!** Check if there is voltage at the drive controller's output.
Communication betweeen higher-level controller and drive controller is interrupted.	Check communication.
The drive controller's settings are incorrect.	Check parameters and setting values, see operating manual of the drive controller.

5.2 Product is vibrating

Possible cause	Corrective action
Load inertia is too high.	Check settings of the drive controller.
Drive controller is not optimally adjusted.	Check settings of the drive controller.

5.3 Error message for winding temperature

Possible cause	Corrective action
Over- or undervoltage is present.	Check settings of the drive controller.
	Check output power supply.

5.4 Product is having control difficulties

Possible cause	Corrective action
Drive controller is not optimally adjusted.	Check settings of the drive controller (direction of motor rotation and encoder direction of counting).

SCHUNK SE & Co. KG
Spanntechnik | Greiftechnik | Automatisierungstechnik

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