BECKHOFF New Automation Technology

Quick commissioning guide | EN

TE5950

TC3 Drive Manager 2

5/20/2021 | Version 1.2

Table of contents

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- EP1789857
- EP1456722
- EP2137893
- DE102015105702

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Version numbers

Provision of revision levels
On request we can send you a list of revision levels for changes to the documentation.

- Send your request to: info@beckhoff.de

Origin of the document
This documentation was originally written in German. All other languages are derived from the German original.

Product features
The valid product features are always those specified in the current documentation. Further information given on the product pages of the Beckhoff homepage, in emails or in other publications is not authoritative.

Staff qualification

This documentation is aimed at trained specialists working in control technology and automation who have knowledge of the applicable and required standards and directives.

Specialists must have knowledge of drive technology and electrical equipment as well as knowledge of safe working on electrical systems and machines. This includes knowledge of proper setup and preparation of the workplace as well as securing the working environment for other persons.

The documentation published at the time must be used for each installation and commissioning. The products must be used in compliance with all safety requirements, including all applicable laws, regulations, provisions and standards.

Instructed person
Instructed persons have a clearly defined task area and have been informed about the work to be carried out. Instructed persons are familiar with:

- The necessary protective measures and protective devices
- The intended use and risks that can arise from use other than for the intended purpose

Trained person
Trained persons meet the requirements for instructed persons. Trained persons have additionally received training from the machine manufacturer or vendor:

- Machine-specific or
- Plant-specific

Trained specialists
Trained specialists have received specific technical training and have specific technical knowledge and experience. Trained specialists can:

- Apply relevant standards and directives
- Assess tasks that they have been assigned
- Recognize possible hazards
- Prepare and set up workplaces

Qualified electricians

Qualified electricians have comprehensive technical knowledge gained from a course of study, an apprenticeship or technical training. They have an understanding of control technology and automation. They are familiar with relevant standards and directives. Qualified electricians can:

- Independently recognize, avoid and eliminate sources of danger
- Implement specifications from the accident prevention regulations
- Assess the work environment
- Independently optimize and carry out their work

Safety and instruction

Read the contents that refer to the activities you have to perform with the product. Always read the chapter For your safety in the documentation. Observe the warning notes in the chapters so that you can handle and work properly and safely with the product.

Explanation of symbols

Various symbols are used for a clear arrangement:

- ► The triangle indicates instructions that you should execute
- • The bullet point indicates an enumeration
- […] The square parentheses indicate cross-references to other text passages in the document
- [+] The plus sign in square brackets indicates ordering options and accessories

Pictograms

Pictograms and signal words are used in warning notices to make it easier for you to find text passages:

⚠ DANGER

Failure to observe will result in serious or fatal injuries.

⚠ WARNING

Failure to observe may result in serious or fatal injuries.

⚠ CAUTION

Failure to observe may result in minor or moderate injuries.

Notes
Notes are used for important information on the product.
The possible consequences of failure to observe these include:

- Malfunctions of the product
- Damage to the product
- Damage to the environment

Informations
This sign indicates information, tips and notes for dealing with the product or the software.

Examples
This symbol shows examples of how to use the product or software.

QR codes
This symbol shows a QR code, via which you can watch videos or animations. Internet access is required in order to use it.

You can read the QR code, for example, with the camera of your Smartphone or Tablet PC. If your camera doesn't support this function you can download a free QR code reader app for your Smartphone. Use the Appstore for Apple operating systems or the Google Play Store for Android operating systems.

If you cannot read the QR code on paper, make sure that the lighting is adequate and reduce the distance between the reading device and the paper. In the case of documentation on a monitor screen, use the zoom function to enlarge the QR code and reduce the distance.

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The Beckhoff Support offers technical advice on the use of individual Beckhoff products and system planning. Staff provide assistance for programming and commissioning complex automation systems and offer a comprehensive training program.

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E-mail:	service@beckhoff.com
Web:	www.beckhoff.de/service

Download area

In the download area you will find product information, software updates, the TwinCAT automation suite, documentation and much more.

Web:	www.beckhoff.de/download

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The addresses of the international Beckhoff branch offices can be found on the Beckhoff website: http://www.beckhoff.de

System

Before installing the Beckhoff TC3 Drive Manager 2, make sure that your computer meets the minimum system requirements.

Component	System requirement
Processor	1 GHz or faster
Main memory	1 GB RAM 1.5 GB in the case of execution on a virtual machine
Hard disk	4 GB free memory
Screen	No special requirements
Graphics card	DirectX9 compatible Resolution: 1024 pixels x 768 pixels
Operating system	Microsoft Windows 7 or higher
Microsoft Visual Studio version	**Full installation:** Microsoft Visual Studio Shell 2010 **Update version:** Microsoft Visual Studio Shell 2012 and 2013

Software

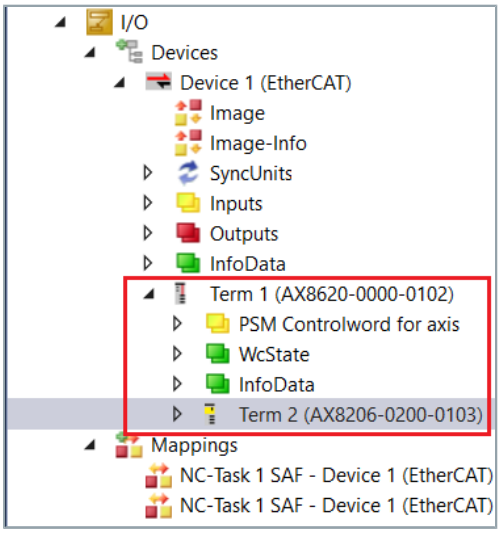
Use the latest software version
The full functionality of the TC3 Drive Manager 2 is only available with the latest version.
Download the latest version before installation:
TE5950 | TC3 Drive Manager 2

TC3 Drive Manager 2 is a commissioning software for Beckhoff drive solutions. It is integrated as an independent project in a Visual Studio environment.

The following products are supported:

- Power supply modules of the AX86x0 series
- Axis modules of the AX8xxx series
- Capacitor modules of the AX8810 series
- Servo terminals of the EL72xx, EP72xx and EJ72xx series
- Integrated AMI81xx servo drive
- AMP8000 distributed Servo Drive system
- Servo drives from the AX5000 series

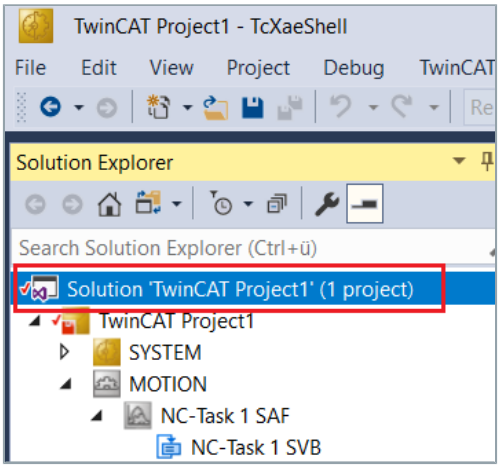
Requirement



To use the TC3 Drive Manager 2, create your axes in the Solution Explorer.

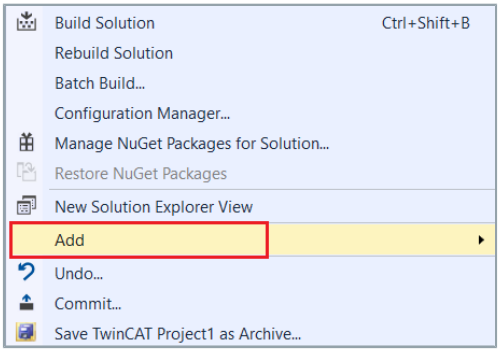
Read the TC3 User Interface manual
For safe control of the basic functions and to make adjustments to your project environment in TwinCAT 3, please read the following documentation:
TC3 | User Interface

Inserting a project



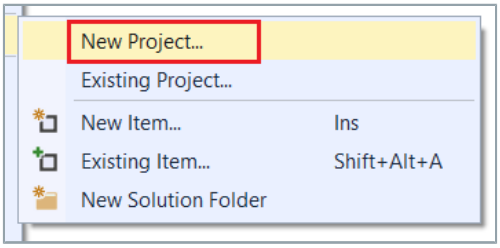
► Right-click: “Solution TwinCAT Project 1”

A new selection area opens.



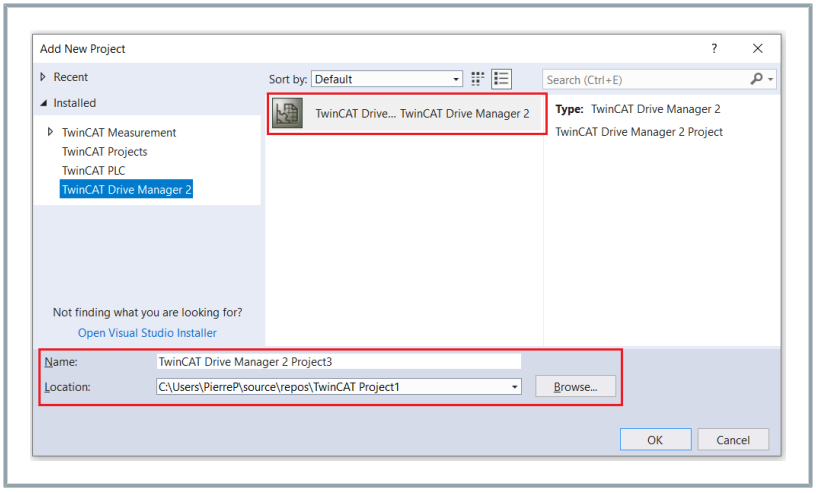
► Select Add

A new selection area opens.



► Left-click: "New Project"

A new "Add new Project" dialog box opens.



TwinCAT Drive Manager 2 is preselected.

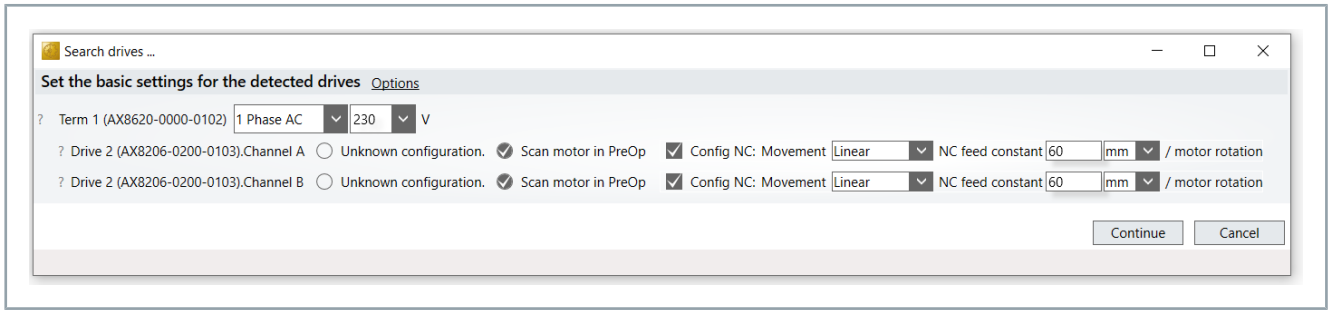
► Left-click: “TwinCAT Drive... TwinCAT Drive Manager 2”

► Assign project name and storage location

► Confirm with OK

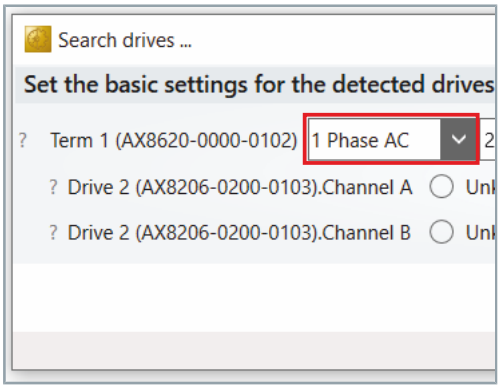
Basic settings

In the "Search drives..." dialog box you can configure the connected components of the AX8000 multi-axis servo system and make basic settings.



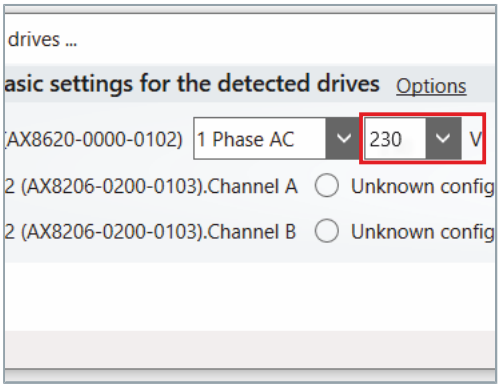
Power supply

Select the power supply for your power supply module. If there is no supply voltage, the default settings are used.



Select supply network:

- 3 Phase AC
- 1 Phase AC
- DC

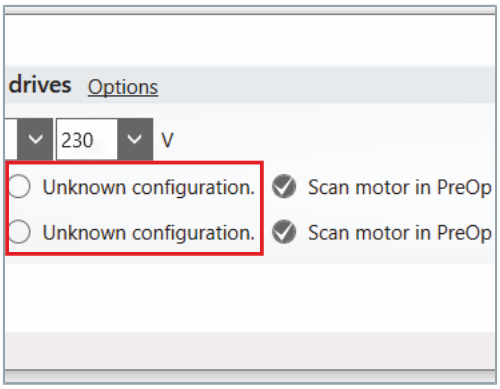


Select voltage:

3 phase and 1 phase networks [V_{AC}]	DC [V_{DC}]
100	24
200	48
230	---
400	---
480	---

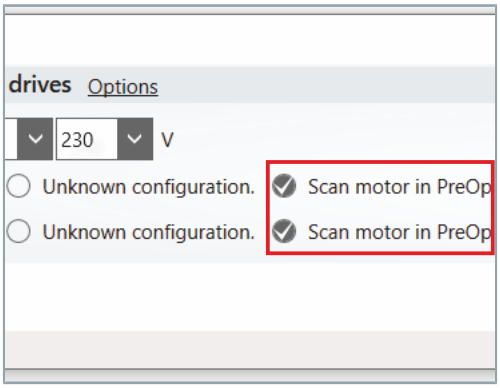
Extended selection options for DC supply
If you select DC supply, you can choose between 24 V_{DC} and 48 V_{DC} in the voltage selection.

Unknown configuration



If you select this option, your axis module is transferred into the configuration with its default values. You can change the basic settings later in the project.

Scan motor in PreOp

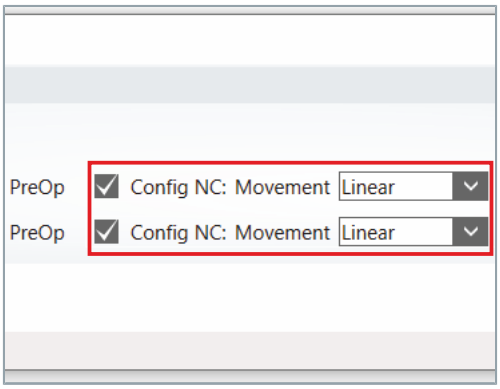


Motors of the AM8000 and AM8500 series with electronic type plate are automatically scanned and transferred to the configuration.

Establish “PreOp” operating state and connect motor
The “Scan motor in PreOp” function is only available if a motor is connected and the axis module is in the “PreOp” operating state.
You can also establish the “PreOp” operating state when no motor is connected. In this case, no motor data are displayed and no default settings are loaded.

Config NC: Movement

This function allows you to make basic scaling settings on the NC axis.

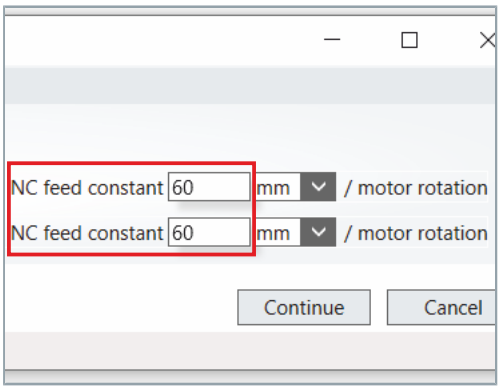


Selection options:

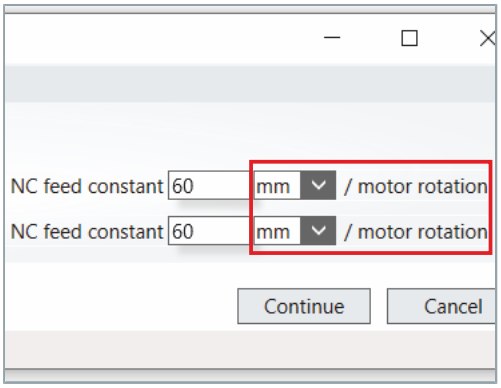
Selection	Configuration
Linear	The NC axis is configured as a linear axis
Rotary	The NC axis is configured as a rotary axis

Linking the NC axis to the axis module
The function "Config NC: Movement" requires an active connection between the NC axis and the axis module. Make sure the NC axis is linked to the axis module.

NC feed constant



This function defines the distance travelled per motor revolution. Adjust the mechanics via the "Scaling" menu.



Selection options:

Linear NC axis	Rotary NC axis
mm	°
m	degrees
---	s

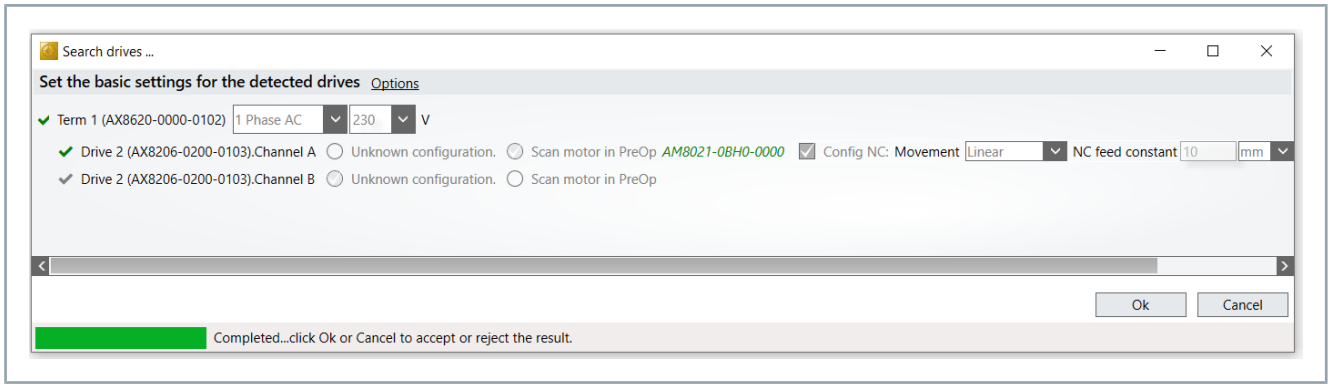
Read Excursus: "Scaling"
For further information on determining the "NC Feed constant", please refer to the "Excursus: Scaling", [Page 26].

Scanning motors

► Confirm settings with OK

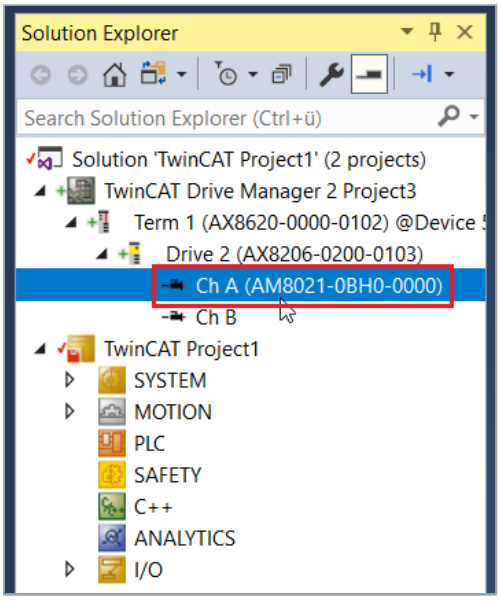
The motors are now scanned and transferred to your configuration.

The scanned motors are displayed in green:



► Finish configuration with OK

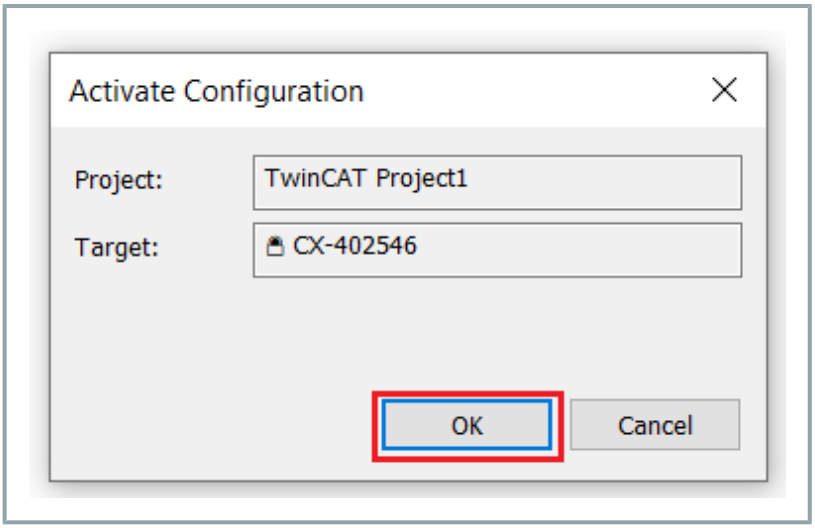
Activate configuration



► Select drive [Ch A (AM8021-0BH0-0000)]

► Left-click: "Activate Configuration" in the Visual Studio ribbon

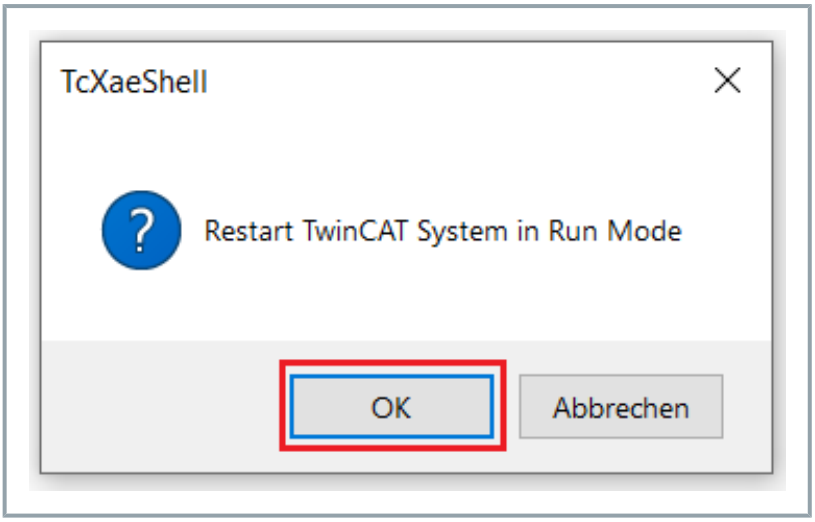
A new "Activate Configuration" dialog box opens.



► Confirm with OK

Your configuration is now activated.

A new dialog box "TcXaeShell" opens.



► Confirm with OK

TwinCAT is now in "Run mode".

Run Motor

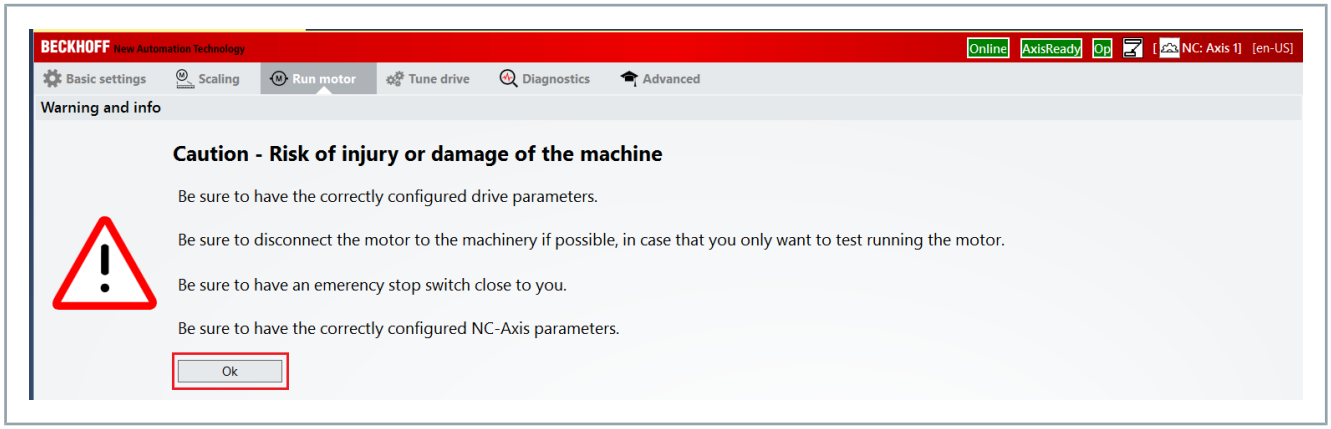
⚠ WARNING

Check the security parameters and security settings
Before you put your test setup or motor into operation, make sure that:

- The drive parameters are configured correctly
- The motor is separated from the machine or system in manual mode
- Emergency stop switches are within easy reach
- The NC axis parameters are configured correctly

Non-observance can lead to serious or even fatal injuries during operation.

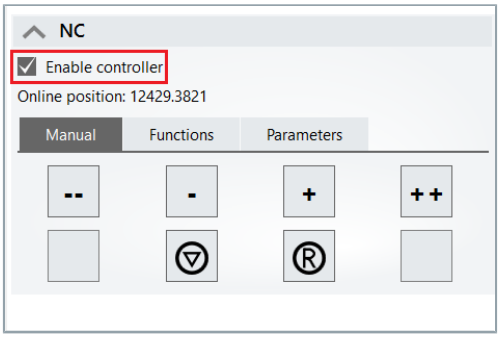
This function allows you to move the motor in manual mode.



► Activate function with OK

A new "NC" dialog box opens.

Manual operation



► Activate "Enable controller"

You can now move the motor in manual mode.

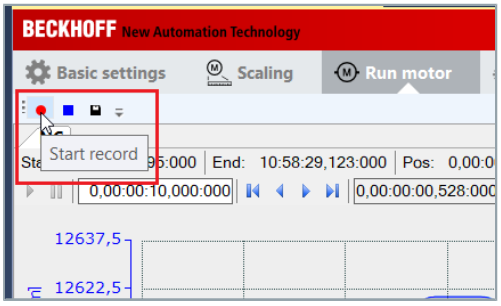
The following functions are provided:

Coding	Explanation
-	Move the motor in negative direction
--	Rapidly move the motor in negative direction
+	Move the motor in positive direction
++	Rapidly move the motor in positive direction
▽	Stop the NC axis
R	Reset an error from the Motion NC

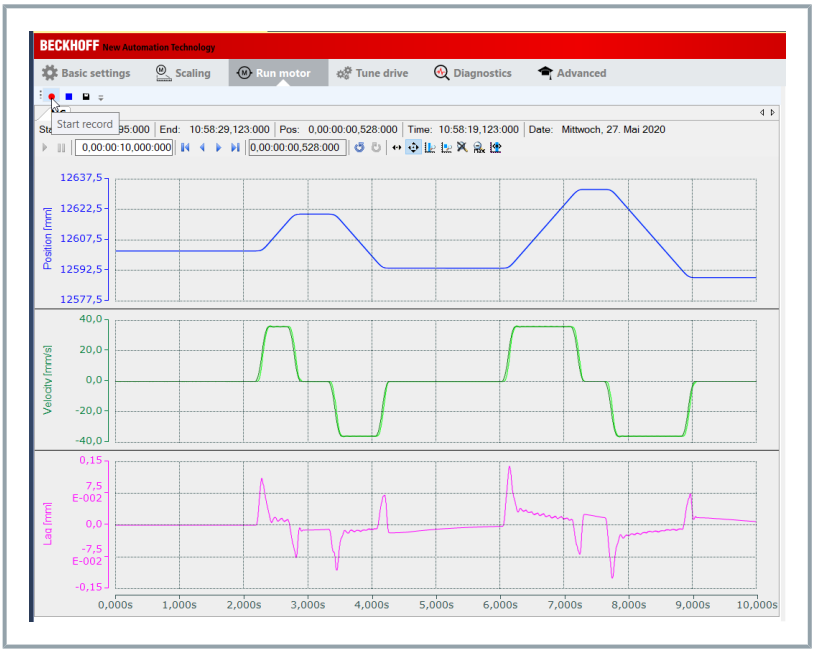
Manual Scope View

In manual mode you have the option of starting a manual Scope View recording.

This allows you to record the velocity, position and following error. Scope View is an integrated feature of TC3 Drive Manager 2.



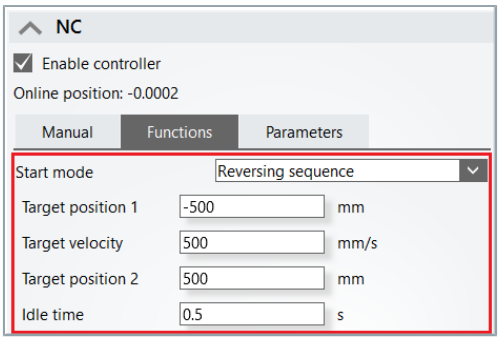
► Left-click: "Start record"



You have successfully enabled your Scope View.

Reversing mode

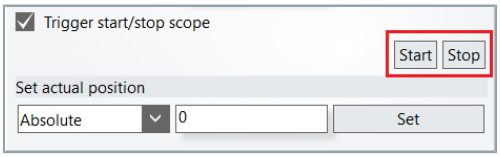
With the “Reversing sequence” function, you can move your axes between a defined start position and the end position.



- ► Activate “Enable controller”
- ► Enter start position “Target position 1” and target position “Target position 2”
- ► Enter the “Target velocity” and the “Idle time”

Automatic Scope View

You can start reversing mode with an automatic Scope View recording at the same time.



- ► Activate “Trigger start/stop scope”
- ► Activate/deactivate reversing mode with Start/Stop

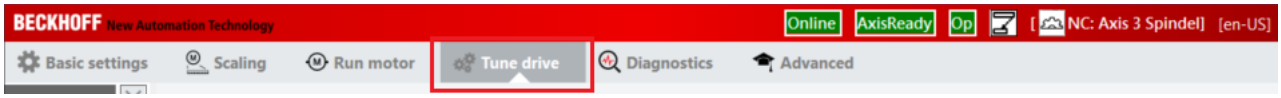
The following setting options are available:

Term	Explanation
Target position 1	Start position of the axis to be moved
Target position 2	Target position of the axis to be moved
Target velocity	Velocity at which your axis moves between the start position and the target position in reversing mode
Idle time	Waiting time between movements
Trigger start/stop scope	Start/stop automatic Scope View recording

Tune drive

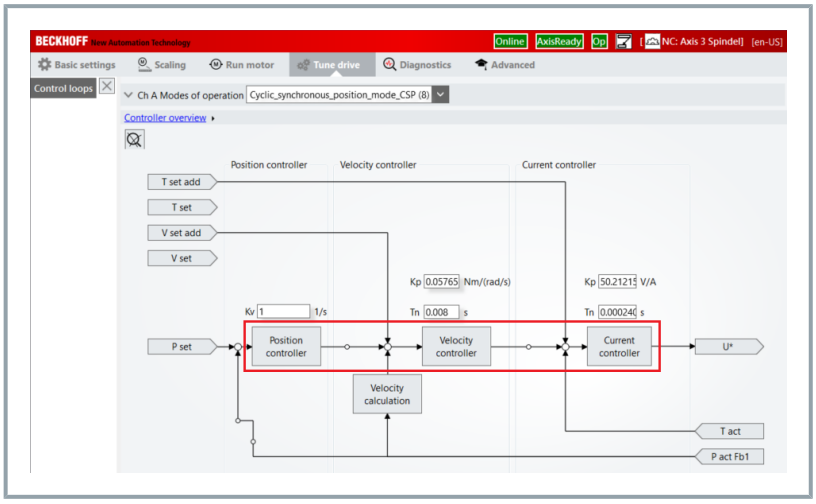
This function allows you to make settings on the position controller, velocity controller and current controller. It provides access to the control parameters that can be set with the TC3 Drive Manager 2.

Select the "Tune Drive" menu in the selection area of the TC3 Drive Manager 2.



A new selection area opens.

Further selection areas are available by left-clicking on the different controllers. In the following table the setting options are assigned to the controllers.



The following setting options are available:

Controller structure	Explanation
Position controller "Position controller"	K_v = gain factor = P-part
Velocity controller "Velocity controller"	K_p = gain factor = P-part T_n = time constant; integral action time = I-part
Current controller "Current controller"	K_p = gain factor = P-part T_n = time constant; integral action time = I-part

Diagnostics

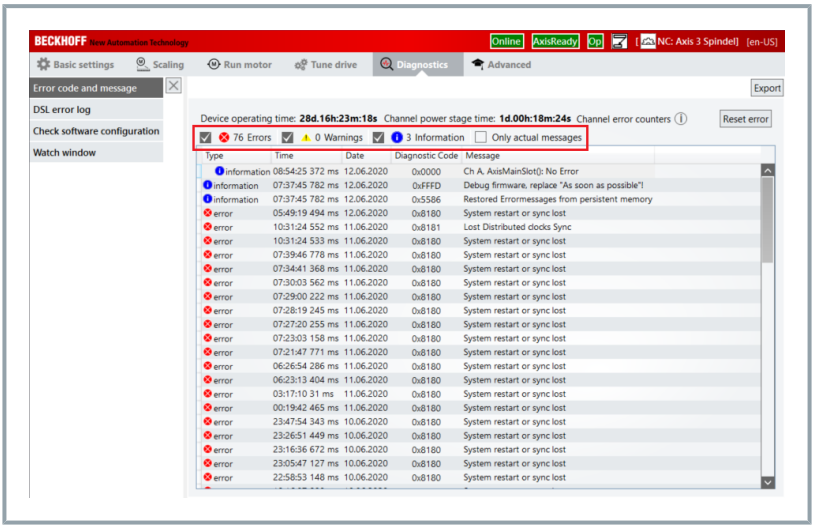
This function can be used to read out error codes and error messages to verify whether the drive is operating without errors or whether errors and warnings are present.

Different selection options
Note that different choices appear in the “Diagnostics” menu, depending on the component that is connected and configured.
Below you will find information on the selection options for power supply modules of the AX86xx series and axis modules of the AX8xxx series.

Select the “Diagnostics” menu in the selection area of the TC3 Drive Manager 2.

A new selection area opens.

Various error and information types are available for interpretation and analysis. This allows conclusions to be drawn about possible faults in the drivetrain or in your components.

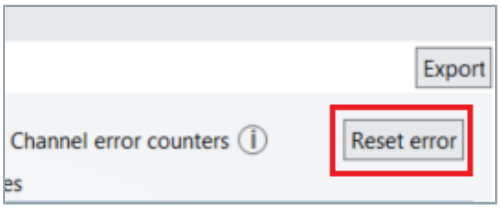


The following information is available:

Description	Explanation
Error	Critical error that can lead to the device being switched off. May occur when a configured limit value is exceeded, for example.
Warning	Precursor of a device shutdown. Indicates that limit values may be exceeded.
Information	General information that has no effect on the components or the configuration of the drivetrain
Only actual messages	This button limits the display to current messages

Deleting messages

You can acknowledge errors in the servo drive once the error has been resolved. Corresponding information and messages are then deleted from the error list.

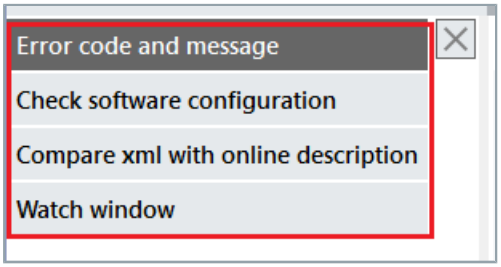


► Click the "Reset error" button

You have successfully reset the errors in the servo drive.

Selection options for AX86xx

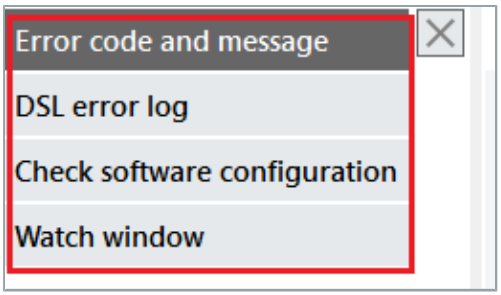
Different display options are available under "Diagnostics".



Information type	Explanation
Error code and message	Error codes and messages with corresponding plain text error message
Check software configuration	Comparison between valid startup list and current configuration
Compare xml with online description	Verification of the XML file
Watch window	Current values of the selected parameters

Selection options for AX8xxx

Different display options are available under "Diagnostics".

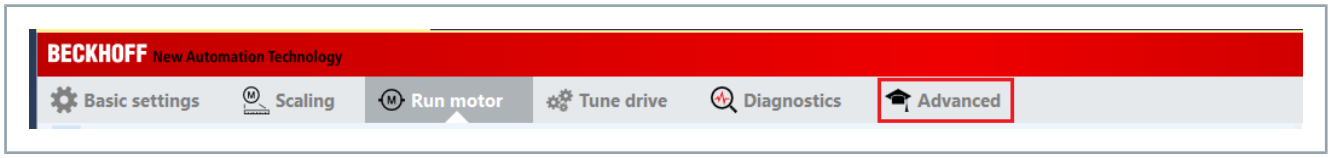


Information type	Explanation
Error code and message	Error codes and messages with corresponding plain text error message
DSL error log	Current error history of the encoder
Check software configuration	Comparison between valid startup list and current configuration
Watch window	Current values of the selected parameters

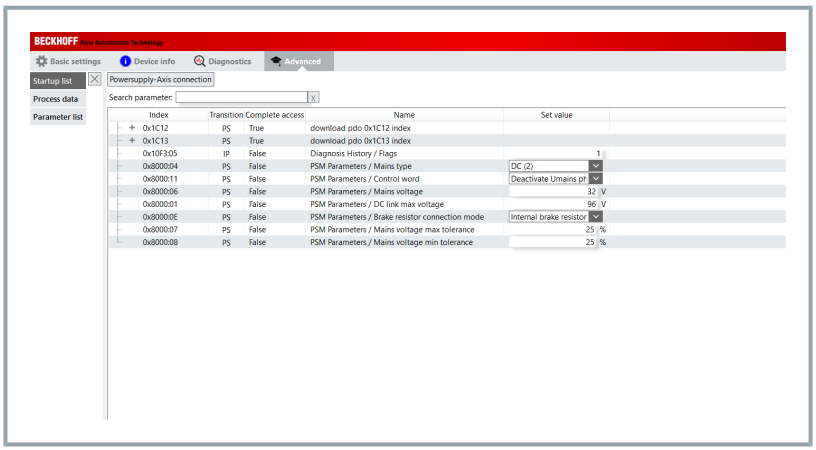
Advanced

This function provides further settings for your configuration.

Select the "Advanced" menu in the selection area of the TC3 Drive Manager 2.

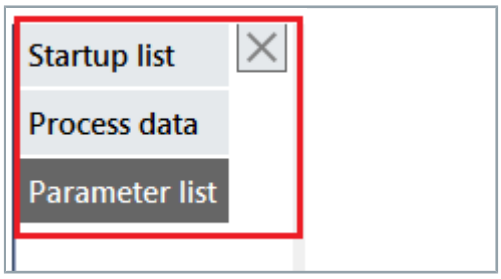


A new selection area opens.



Selection options

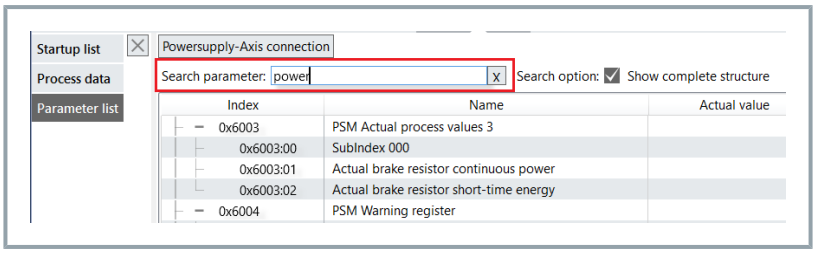
Different list display options are available under "Advanced".



Start search function:

► Left-click: "Startup list", "Process data" or "Parameter list"

A new selection area opens.



► Enter a search term under "Search parameter"

Note the available options:

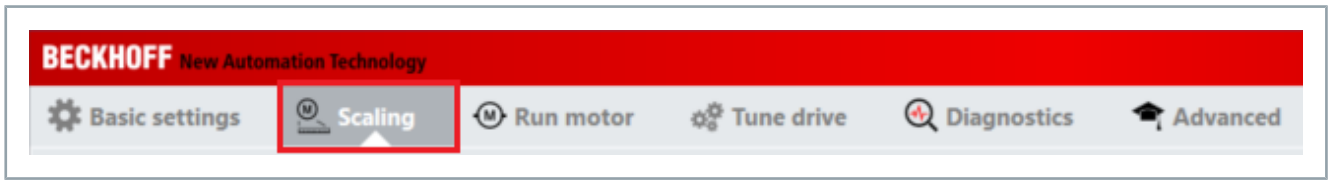
Option	Explanation
Show complete structure	Shows all parameters found in the corresponding parameter group

You have successfully performed the search function.

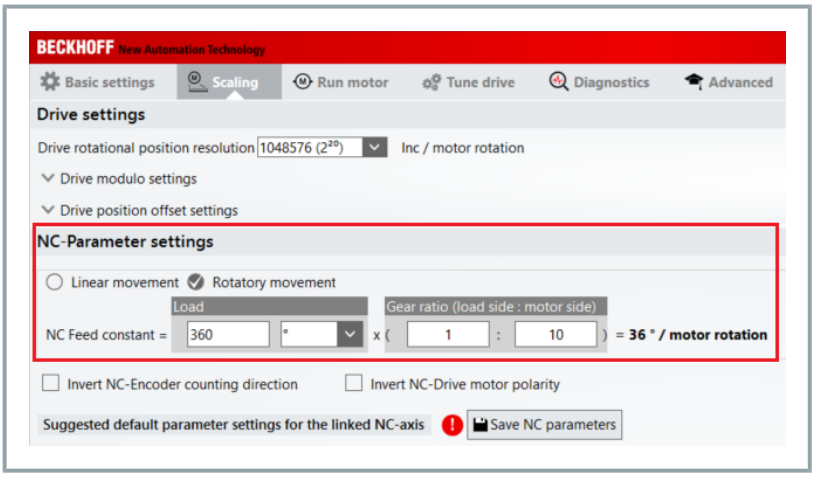
The following settings are provided as examples. They can vary depending on the application, machine or system.

Settings for a rotary NC axis as an example
Requirement:
A rotary table with 360°
A gear unit with a transmission ratio of i = 10
Result:
NC feed constant = 36° per motor revolution

In the menu “NC feed constant”, you have the option to enter the data of your mechanism. To do this, select the “Scaling” menu in the selection area of the TC3 Drive Manager 2.

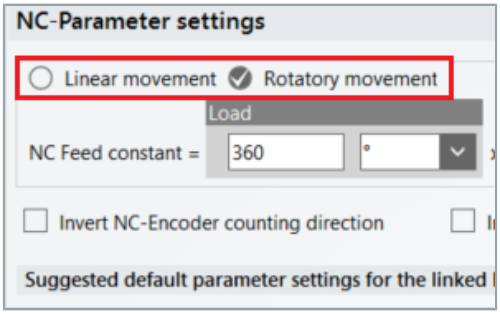


A new selection area opens.

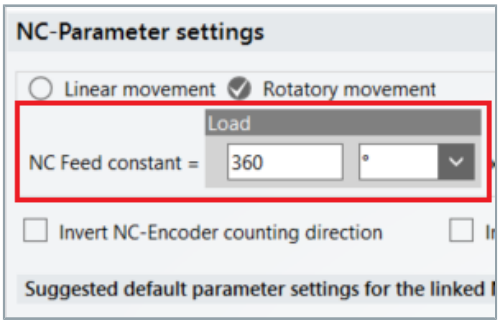


Settings

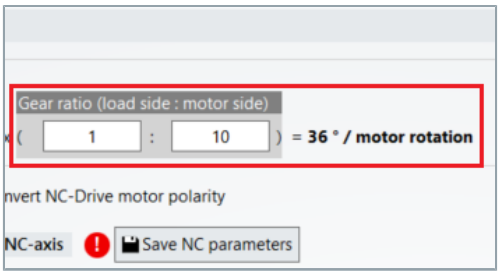
In the selection area for "NC parameter settings" you can size your mechanical system and thus determine the "NC Feed constant".



► Select Rotatory movement



► Enter rotary table from example with 360°



► Set gear ratio 1:10

► Confirm settings with "Save NC parameters"

You have successfully sized your mechanical system. Your "NC Feed constant" is 36° per motor revolution.

More Information:
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