



# HEIDENHAIN



## ACCOM 4.0

User's Manual

Software for Machine Calibration  
with an RVM 4000  
Version 1.2.x

English (en)  
06/2024

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# 1

## Fundamentals

## 1.1 Overview

This chapter contains information about the product and this manual.

## 1.2 Information about the software

ACCOM 4.0 is a software for machine calibration. In combination with the RVM 4000 comparative encoder for rotary axes, you can record positioning processes of rotary axes and evaluate them in compliance with the applicable standards.

The measurement results can be used for the following applications:

- Quality check of the production results with rotary tables or tilting axes
- Internal quality check
- Creation of acceptance protocols
- Creation of compensation tables for machine tools with four or five axes
- Analysis of the dynamic behavior of rotational axes

## 1.3 Documentation on the product

### 1.3.1 Validity of the documentation

This User's Manual is valid for version 1.2.x of the ACCOM 4.0 software in combination with the RVM 4000 comparative encoder for rotary axes.

- ▶ Before using the documentation, make sure that the documentation and software version match.



If the version numbers do not match so that the documentation is not valid, you will find the current documentation at [www.heidenhain.com](http://www.heidenhain.com).

### 1.3.2 Notes on reading the documentation

<b>⚠ WARNING</b>	
<b>Fatal accidents, personal injury or property damage caused by non-compliance with the documentation!</b>	
Failure to comply with the documentation may result in fatal accidents, personal injury or property damage.	
<ul style="list-style-type: none"> <li>▶ Read the documentation carefully from beginning to end</li> <li>▶ Keep the documentation for future reference</li> </ul>	

The following table lists the various parts of the documentation in their order of reading priority.

Document type	Description
Addendum	An Addendum supplements or supersedes the corresponding contents of the Operating Instructions and the User's Manual. If an Addendum is included in the shipment, it has the highest reading priority. All other documentation content retains its validity.
Operating Instructions	The Operating Instructions contain all the information and safety precautions needed for the proper mounting and installation of the product. The Operating Instructions are included in delivery. The Operating Instructions have the second highest priority for reading.
User's Manual	The User's Manual contains all the information and safety precautions needed for the proper operation of the product according to its intended use. The User's Manual can be downloaded from the download area at <b>www.heidenhain.com</b> . The User's Manual has the third highest reading priority.

#### **Have you found any errors or would you like to suggest changes?**

We are continuously striving to improve our documentation for you. Please help us by sending your suggestions to the following e-mail address:

**userdoc@heidenhain.de**

### 1.3.3 Storage and distribution of the documentation

The User's Manual must be kept in the immediate vicinity of the workplace and must be available to all personnel at all times. The operating company must inform the personnel where the User's Manual is kept. If the User's Manual has become illegible, the operating company must obtain a new copy from the manufacturer.

If the software is passed on to any other party, the User's Manual must also be passed on to the new owner.

## 1.4 Target groups for the instructions

These instructions must be read and observed by every person who performs any of the following tasks:

- Software configuration
- Operation
- Service and maintenance

## 1.5 Notes in this documentation

### Safety precautions

Precautionary statements warn of hazards in handling the device and provide information on their prevention. Precautionary statements are classified by hazard severity and divided into the following groups:

#### DANGER

**Danger** indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **will result in death or severe injury**.

#### WARNING

**Warning** indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **could result in death or serious injury**.

#### CAUTION

**Caution** indicates hazards for persons. If you do not follow the avoidance instructions, the hazard **could result in minor or moderate injury**.

#### NOTICE

**Notice** indicates danger to material or data. If you do not follow the avoidance instructions, the hazard **could result in property damage**.



### Informational notes

Informational notes ensure reliable and efficient operation of the device. Informational notes are divided into the following groups:



The information symbol indicates a **tip**.  
A tip provides important additional or supplementary information.



The gear symbol indicates a function that **depends on the machine**.  
The function described depends on the machine if, for example:

- Your machine features a certain software or hardware option
- The behavior of the functions depends on the configurable machine settings



The book symbol indicates a **cross reference**.  
A cross reference leads to external documentation, for example the documentation of your machine manufacturer or other supplier.

## 1.6 Symbols and fonts used for marking text

In these instructions the following symbols and fonts are used for marking text:

Format	Meaning
▶ ... > ...	Identifies an action and the result of this action Example: ▶ Tap <b>OK</b> > The message is closed
■ ... ■ ...	Identifies an item of a list Example: ■ TTL interface ■ EnDat interface ■ ...
<b>Bold</b>	Identifies menus, displays and buttons Example: ▶ Tap <b>Shut down</b> > The operating system shuts down. ▶ Turn the power switch off

## 1.7 Further information

For detailed information on hardware and connection technology, refer to the following documentation:

- "RVM 4000 Operating Instructions"
- "EIB 74x Operating Instructions"
- "Cables and Connection Technology User's Manual"

# 2

**Safety**

## 2.1 Overview

This chapter contains important safety information needed for setting up and using the software.

## 2.2 General safety precautions

Generally accepted safety precautions, in particular the applicable precautions relating to the handling of live electrical equipment, must be followed when operating the system. Failure to observe these safety precautions may result in personal injury or damage to the device.

It is understood that safety rules within individual companies vary. If a conflict exists between the material contained in these instructions and the rules of a company using this system, the more stringent rules take precedence.

## 2.3 Intended use

The ACCOM 4.0 software is intended solely for the following use:

- Axis measurement of machine tools, rotary tables and tilting axes
- Evaluation of measured data

## 2.4 Improper use

Any use not specified in 'Intended use' is considered improper use. The company operating the device is solely liable for any damage resulting from improper use. Especially its use as part of a safety function is not permitted.

## 2.5 Personnel qualification

The personnel required for the individual activities to be performed on the product are indicated in the respective sections of these instructions.

The personnel groups are specified in detail as follows with regard to their qualifications and tasks.

### Qualified personnel

The qualified personnel are trained by the operating company to perform advanced operation and parameterization. The qualified personnel have the required technical training, knowledge and experience and know the applicable regulations, and are thus capable of performing the assigned work regarding the application concerned and of proactively identifying and avoiding potential risks.

### Electrical specialist

The electrical specialist has the required technical training, knowledge and experience and knows the applicable standards and regulations, and is thus capable of performing work on electrical systems and of proactively identifying and avoiding potential risks. Electrical specialists have been specially trained for the environment they work in.

Electrical specialists must comply with the provisions of the applicable legal regulations on accident prevention.


## 2.6 Obligations of the operating company

The operating company owns or leases the device and the peripherals. At all times, the operating company is responsible for ensuring that the intended use is complied with.

The operating company must:

- Assign the different tasks to be performed on the device to suitable, qualified and authorized personnel
- Verifiably train the personnel in the authorizations and tasks
- Provide all materials and means necessary in order for the personnel to complete the assigned tasks
- Ensure that the device is operated only when in perfect technical condition
- Ensure that the device is protected from unauthorized use

## 2.7 General safety precautions

 The safety of any system incorporating the use of this product is the responsibility of the assembler or installer of the system.

The specific safety precautions required for the individual activities to be performed are indicated in the respective sections of this manual.



# 3

**Software  
Installation**

## 3.1 Overview

This chapter provides all of the information needed for downloading and properly installing the software on a computer.

## 3.2 System requirements

If you want to install ACCOM 4.0 on a computer, the computer system must meet the following requirements:

- Microsoft Windows 11, Microsoft Windows 10 version 1803 or higher.
- At least 200 MB of free hard disk space
- Screen resolution of at least 1280 × 800 recommended

For communication with the EIB 74x, the corresponding TCP port on the PC must be enabled.

The EIB 74x requires firmware version 16 or higher.



- Have an IT specialist configure the firewall to enable the required TCP ports.
- Make sure that the Microsoft Windows energy efficiency settings enable reliable data transfer. This applies to connecting the EIB 74x to the computer via USB or LAN.

## 3.3 Installation

### Downloading the installer

To install ACCOM 4.0, you need to download the installer from the HEIDENHAIN website ([www.heidenhain.com](http://www.heidenhain.com)).

- ▶ Download the current version from [www.heidenhain.com/service/downloads/software/](http://www.heidenhain.com/service/downloads/software/)
- ▶ Navigate to the Download folder of your web browser
- ▶ Unpack the downloaded file (with the extension \*.zip) into a temporary storage folder
- > The **ACCOM\_1.2.0\_Win10\_1337715.exe** installer is unpacked and available in the temporary folder.

### Installing ACCOM 4.0 under Microsoft Windows



In order to perform the installation, you need to log in to Microsoft Windows as an administrator.

- ▶ Double-click the installer file
- > The Setup Wizard opens.
- ▶ Select the setup language
- ▶ Follow the setup wizard instructions
- ▶ Accept the license conditions
- ▶ Click the **Finish** button to complete the installation process.
- > ACCOM 4.0 has been installed successfully.



### Updating ACCOM 4.0



- In order to perform the update, you need to log in to Microsoft Windows as an administrator.
- Already activated license keys will be taken over during the update.

- ▶ Double-click the installer file
- > The Setup Wizard opens.
- ▶ Select the setup language
- ▶ Follow the setup wizard instructions
- ▶ Accept the license conditions
- ▶ Click the **Finish** button to complete the installation process
- > ACCOM 4.0 has been updated successfully.

## 3.4 Licensing

Before starting ACCOM 4.0, you need to request a license key and enable the Basic option of ACCOM 4.0 at first.

The advanced functionality of ACCOM 4.0 provided via the optional Plus modules is also controlled via license keys.

All licenses can be obtained via the HEIDENHAIN Sales department. You will receive a license key that activates the respective software option.

- i ■ The term of the license starts upon activation of the license key.
- All recorded data will also be retained after expiration of the license.

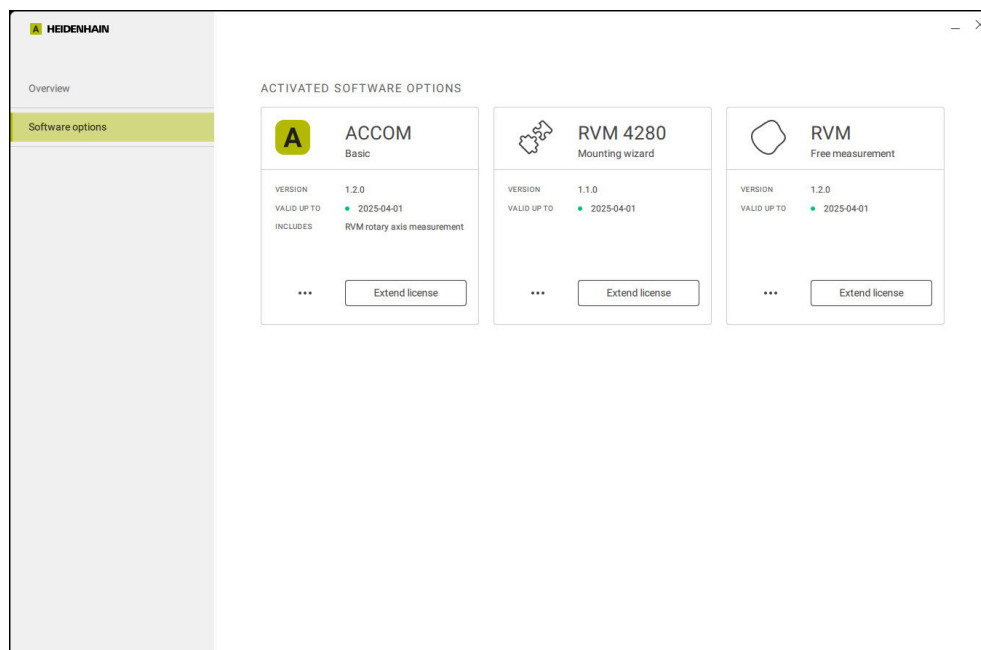


Figure 1: **UNLOCK SOFTWARE OPTIONS**

The following software options are available:

Option	Extended functionality	ID
1	<b>ACCOM Basic</b> <b>RVM Rotary axis measurement</b>	1376737-01
2	<b>ACCOM Plus</b> <b>RVM 4280 Mounting wizard</b>	1376738-01
3	<b>ACCOM Plus</b> <b>RVM Free measurement</b>	1421212-01

### Requesting the license key



The license key must be requested on the PC on which ACCOM 4.0 will be used later because the license key is connected to the PC.

- ▶ Start ACCOM 4.0
- > The opening screen with the **Overview** tab is displayed
- ▶ Click the **Software options** tab
- > The available software options are displayed
- > Under **UNLOCK SOFTWARE OPTIONS**, click **Unlock the option** for the desired software option
- > The **Unlock the option** dialog box appears
- ▶ Click **Request license key**
- ▶ In the dialog box, select the storage location in which you want to save the license key request
- ▶ Enter a suitable file name and click **Save**
- > The license request (XML file) is created and saved in the selected folder.
- ▶ Contact a HEIDENHAIN service agency and submit the file you created in order to request a license key
- > The license key is generated and submitted as an XML file by e-mail.

### Uploading the license key from the license file

- ▶ Click **Activate license key**
- > The **Unlock the option** dialog box appears
- ▶ Click **Open the license file**
- ▶ Select the XML file with the license key in the file system
- ▶ Click **Open**
- > The license key is activated
- > The activated software option is displayed under **ACTIVATED SOFTWARE OPTIONS**

### Renewing the license key



30 days before the license expires, a prompt will be displayed every time you start the software reminding you to request a new license.

- ▶ Start ACCOM 4.0
- > The opening screen with the **Overview** tab is displayed
- ▶ Click the **Software options** tab
- > The available software options are displayed
- > Under **ACTIVATED SOFTWARE OPTIONS**, click **Extend license** for the desired software option
- > The **Unlock the option** dialog box appears
- ▶ Click **Request license key**
- ▶ In the dialog box, select the storage location in which you want to save the license key request
- ▶ Enter a suitable file name and click **Save**
- > The license request (XML file) is created and saved in the selected folder.
- ▶ Contact a HEIDENHAIN service agency and submit the file you created in order to request a license key
- > The license key is generated and submitted as an XML file by e-mail.
- > Activate the license key as described under "Uploading the license key from the license file"

# 4

## Basic Operation

## 4.1 Overview

This chapter describes the user interface, operating elements and basic functions of the software.


## 4.2 Starting the software

To start the software:

- A**
  - ▶ Double-click the ACCOM 4.0 shortcut on the Microsoft Windows desktop
  - or
  - ▶ Open it in Microsoft Windows with the following sequence  
**Start > HEIDENHAIN > ACCOM 4.0**
  - > The software is started

## 4.3 Exiting the software

To exit the software:

- 
  - ▶ Click **Main menu** in the menu bar
  - ▶ Click **Exit**
  - > The **Exit** dialog box appears.
  - ▶ Click **Yes**
  - > If the software is connected to the EIB 74x, the connection is disconnected.
  - > The software is terminated.

## 4.4 Module selection

The module selection screen appears after starting up the software. You can select the desired measurement method and the encoder used.

The following modules are available in software version 1.2.x:

- **RVM Rotary axis measurement**
- **RVM 4280 Mounting wizard**
- **RVM Free measurement**

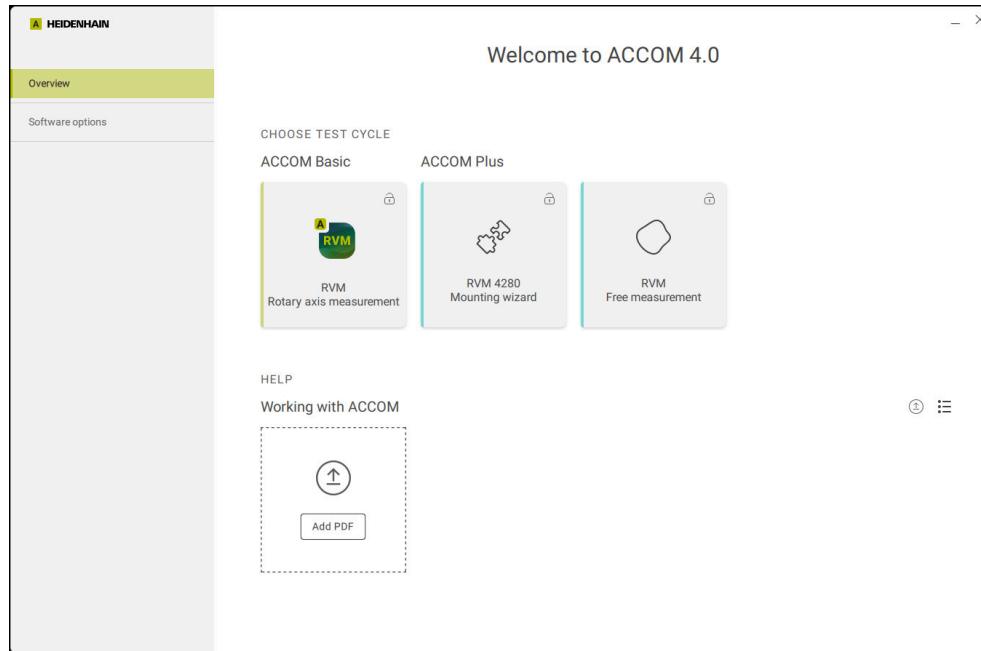



Figure 2: Module selection, **Overview** tab

The activated software options are shown on the **Software options** tab.

The following information is available:

- **Version**
- **Valid up to**

 Here you can extend the license (**Extend license**)

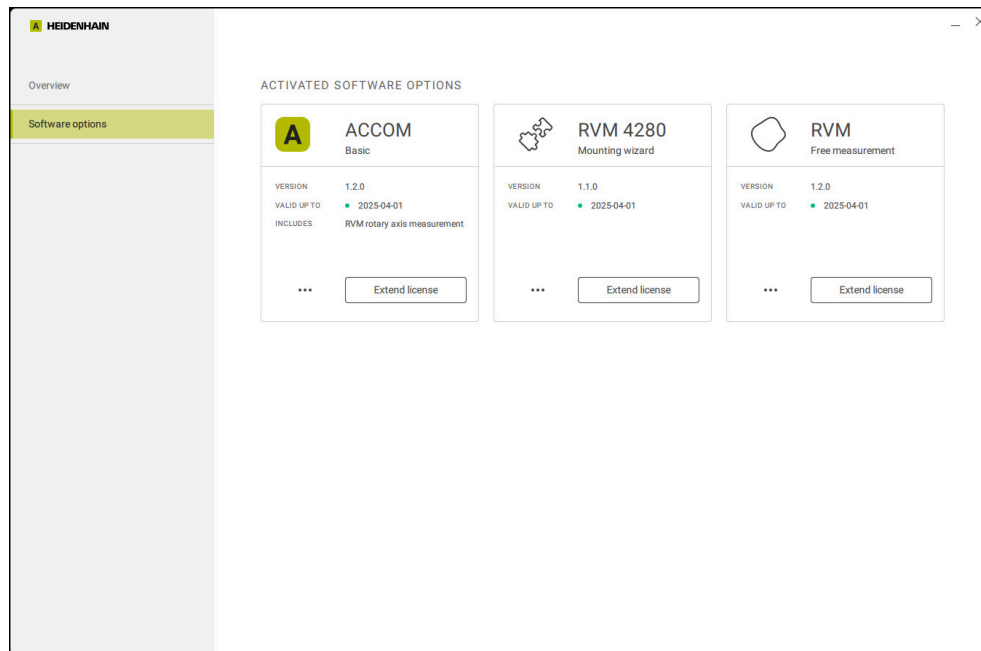


Figure 3: Module selection, **Software options** tab



## 4.5 Opening screen

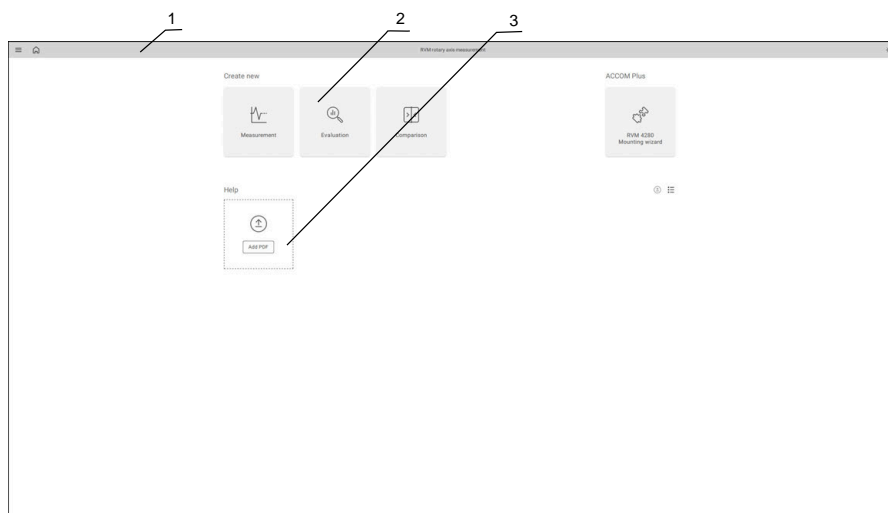










Figure 4: Opening screen





- 1 Menu bar
- 2 Selection of function: Measurement function, Evaluation function and Comparison function
- 3 Help area

The opening screen and the functions show different operating elements that you can call via the menu bar.

### Operating elements of the menu bar

Operating element	Function
	<p><b>Main menu</b> Opening the main menu with various available functions</p>
	<p><b>Home</b> Switch to the opening screen</p>
	<p><b>Open setup</b> Opening saved setup files for measurements This operating element is displayed in the <b>Measurement</b> function in the <b>Preparation</b> submenu.</p>
	<p><b>Save setup as</b> Saving of setup files for measurements This operating element is displayed in the <b>Measurement</b> function in the <b>Preparation</b> submenu.</p>
	<p><b>Export characteristic data</b> Exporting characteristic data as TXT file This operating element is displayed in the <b>Evaluation</b> function.</p>
	<p><b>Print the report</b> Printing a report of the evaluation data via the connected printer. This operating element is displayed in the <b>Evaluation</b> function.</p>
	<p><b>Open comparison file</b> Opening saved files for comparison This operating element is displayed in the <b>Comparison</b> function.</p>
	<p><b>Light mode / Dark mode</b> Changing the software representation</p>

### Operating elements of the file management

Operating element	Function
	<p><b>Tile view</b> Display of the files in tile view next to and below one another</p>
	<p><b>List view</b> Display of the files in a vertical consecutive list view</p>
	<p><b>Add PDF</b> Selecting a PDF file for the help area</p>
	<p><b>Delete</b> Deleting a selected PDF file from the help area</p>

## 4.6 Main menu

### Call up

- ▶ Click **Main menu** in the menu bar
- > The main menu is opened.

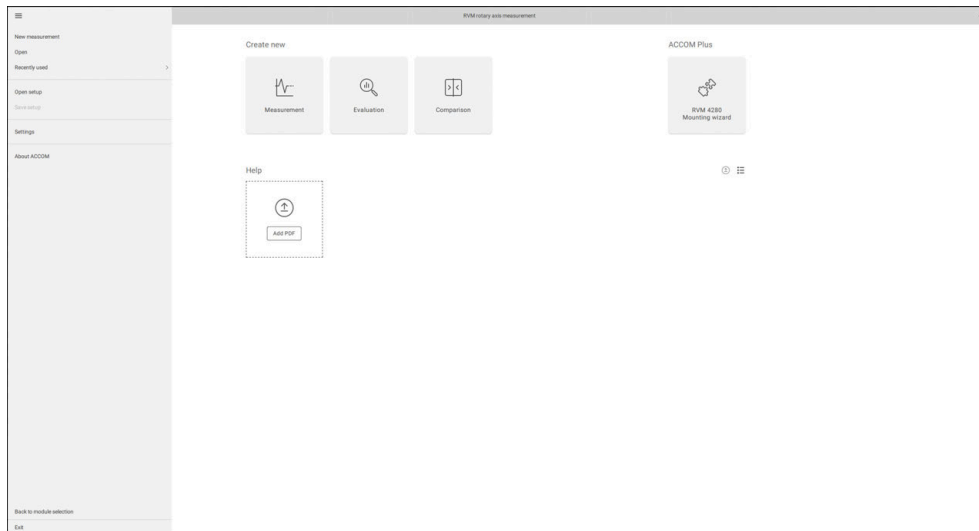


Figure 5: Main menu



The menu items available vary depending on the module from which the main menu is opened. Menu items that are not available appear dimmed.

Menu item	Function
<b>New measurement</b>	Calling the <b>Measurement</b> function <b>Further information:</b> "Module RVM Rotary axis measurement", Page 29
<b>Open</b>	Opening an XRVM file for evaluation <b>Further information:</b> "Evaluation", Page 43
<b>Recently used</b>	Displaying the most recently used files for setup and evaluation
<b>Open setup</b>	Opening an XRVM file with prepared measurement parameters <b>Further information:</b> "Working with setup files", Page 41
<b>Save setup as</b>	Saving set measurement parameters as an XRVM file <b>Further information:</b> "Working with setup files", Page 41
<b>Settings</b>	Software settings, such as managing user accounts, language settings or resetting to the factory default settings <b>Further information:</b> "Settings", Page 87
<b>About ACCOM</b>	Displaying the software version and the licenses of the software used
<b>Back to module selection</b>	Going back to <b>module selection</b>



# 5

**Module**  
**RVM Rotary axis**  
**measurement**

## 5.1 Overview

This chapter describes the **RVM Rotary axis measurement** module that allows you to prepare and perform a rotary axis measurement in conformity with standards.

### Call

- ▶ Click **RVM Rotary axis measurement** in the module selection shown on the screen after startup
- > The **RVM Rotary axis measurement** module is opened.

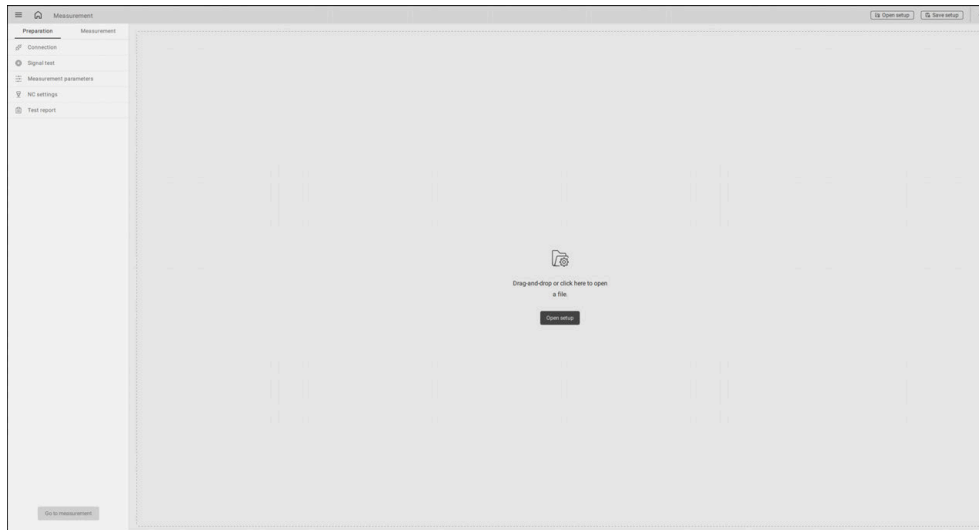


Figure 6: **RVM Rotary axis measurement** module

The **RVM Rotary axis measurement** module provides the **Measurement**, **Evaluation**, and **Comparison** functions.

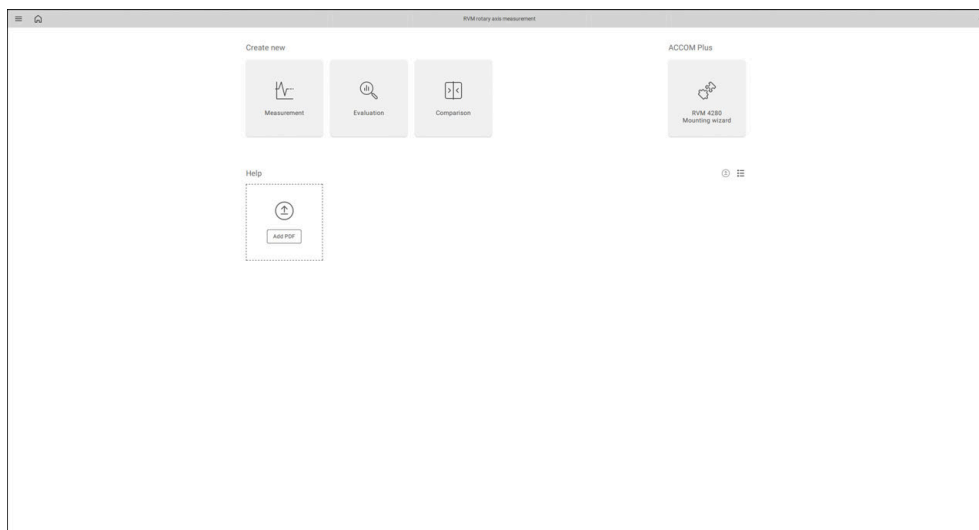


Figure 7: **RVM Rotary axis measurement** functions

## 5.2 Measurement

This chapter describes the **Measurement** function.

The **Measurement** function provides the **Preparation** submenu and the **Measurement** submenu.

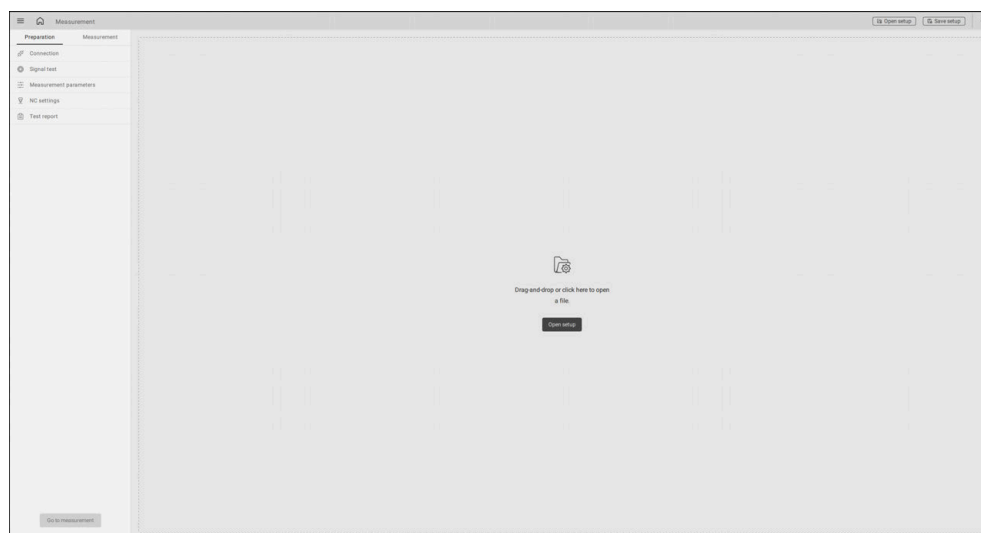


Figure 8: **Measurement** function

### 5.2.1 Preparing a measurement

Prerequisite: Before starting the measuring setup, thoroughly clean the area in which the measurement is to be conducted.

To prepare a **Measurement**:

- ▶ Click the **Measurement** function on the opening screen
- > The **Measurement** menu is opened.
- ▶ To set the parameters for the encoder and the measurement, click the individual menu items in the **Preparation** submenu

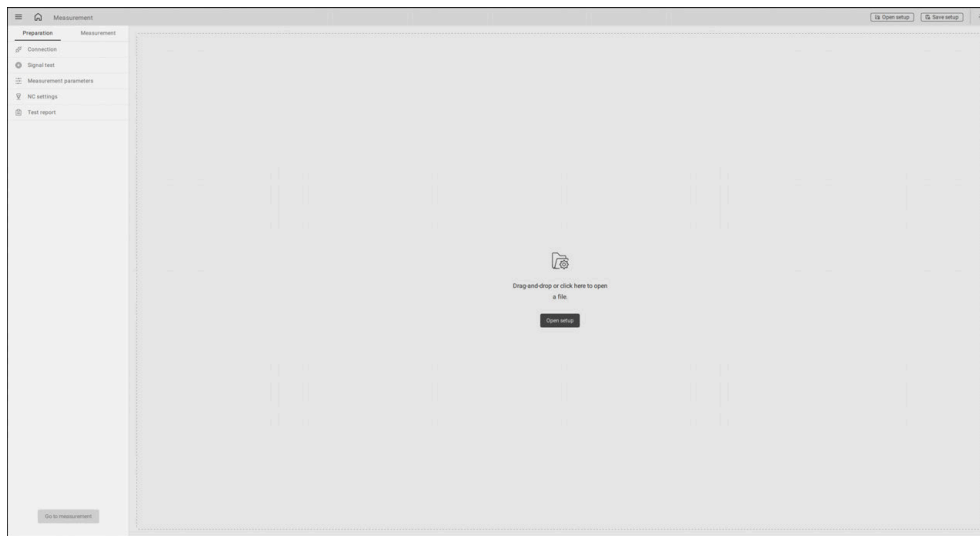


Figure 9: **Preparation** submenu

**i** To prepare the measurement, edit the menu items of the **Preparation** submenu from top to bottom.

The menu structure of the **Preparation** submenu contains the following categories:

- **Connection**
- **Signal test**
- **Measurement parameters**
- **NC settings**
- **Test report**

When the measurement has been prepared, you can switch to the **RVM Rotary axis measurement** submenu.

#### Connection

To connect the software to the EIB 74x:

- ▶ Enter the IP address of the EIB 74x
- ▶ To activate an automatic connection, drag the slide switch to the right
- ▶ Click **Connect**
- > The result of the connection setup is displayed.




### Signal test

The signal test allows you to check the mounting quality of the comparative encoder. For this purpose, the electrical connections and the mechanical mounting are evaluated.


Proceed as follows:



- ▶ Click **Start signal test**
- ▶ Using the machine control, move the axis under test smoothly and without reversing direction over the possible measuring range
- ▶ Click **Stop signal test**
- > The result is displayed.
- > With an RVM 4180 or RVM 4280:  
The encoder connected to the EIB 74x is detected and displayed.



 If the signal test fails, the signal test may have to be repeated.



### Measurement parameters

You can specify the measurement procedure by defining the measurement parameters.

 In order to avoid having to reenter the measurement parameters for the encoder and the measurement every single time a measurement is conducted, you can save the measurement parameters in setup files and reuse them.  
**Further information:** "Working with setup files", Page 41

 The  icon allows you to call help texts with additional explanations for some measurement parameters.

Measurement parameter	Explanation
<b>Evaluation guideline</b>	Selecting the evaluation guideline: <ul style="list-style-type: none"> <li>■ <b>ISO 230-2:2014</b> (set as default)</li> <li>■ <b>VDI/DGQ 3441:1977</b></li> <li>■ <b>ISO 230-3:2007</b></li> <li>■ <b>ISO 230-2:1988</b></li> <li>■ <b>JIS B 6190-2:2016</b></li> </ul>
<b>Test cycle</b> 	Selecting the measuring method: <ul style="list-style-type: none"> <li>■ <b>Standard cycle</b></li> <li>■ <b>Step cycle</b></li> </ul>
<b>Direction of measurement</b> 	Selecting the direction of measurement: <ul style="list-style-type: none"> <li>■ <b>Positive</b></li> <li>■ <b>Negative</b></li> </ul>

Measurement parameter	Explanation
<b>Axis under test</b>	<p>Selecting the axis on which the measurement is conducted. A table axis is a <b>C</b> axis by default. The <b>A</b> axis or the <b>B</b> axis are tilting axes.</p> <ul style="list-style-type: none"> <li>■ <b>A</b></li> <li>■ <b>B</b></li> <li>■ <b>C</b></li> </ul>
<b>Measurement procedure</b>	<p>A default parameter set is preset for the measurement procedure.</p> <ul style="list-style-type: none"> <li>■ <b>Number of cycles:</b> 5</li> <li>■ <b>Current position of RVM:</b> 0° (to be read from the control)</li> <li>■ <b>Reversing angle:</b> 0.5°</li> <li>■ <b>Dwell time:</b> 2 s</li> <li>■ <b>Feed rate:</b> 1000 °/min</li> </ul>
<b>Target positions</b>	<p>Specifying the target positions at which measurements will be conducted</p> <p><b>1st point/step width</b></p> <ul style="list-style-type: none"> <li>■ <b>Step width:</b> Measurement distances in degrees; default setting: 30°</li> <li>■ <b>Travel:</b> The minimum value must be less than the maximum value; default setting: 0° minimum; 360° maximum</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> Click <b>Show target positions</b> to display the defined measuring positions</p> </div> <p><b>User defined</b></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> Click <b>Insert target positions</b> to enter the user-defined measuring positions.</p> </div>

### Entering user-defined target positions

In the **Target positions** window, you can enter user-defined target positions. Proceed as follows:

- ▶ In the **Target positions** measurement parameter, click **User defined**
- ▶ Click **Insert target positions**
- > The **Target positions** dialog box appears.

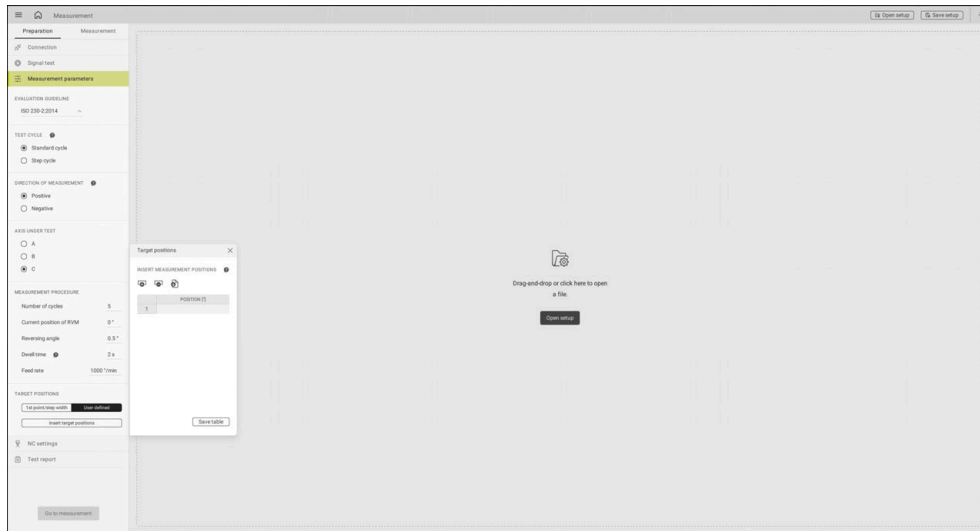


Figure 10: User-defined **Target positions**



- ▶ Click the 'Add row' icon to add a row



- ▶ Click the 'Delete row' icon to delete a row
- ▶ Click the Position column
- ▶ Enter the desired values via the keyboard
- ▶ Click **Save table**
- > The table is saved.



- ▶ To use a position list from an existing compensation table, click **Open COM file**
- ▶ Select the desired file
- > The position list is filled from the COM file.

## NC settings

Parameters of the NC interface	Explanation
<b>Mode</b>	Setting of the format in which the NC program will be generated <ul style="list-style-type: none"> <li>■ <b>HEIDENHAIN Klartext</b></li> <li>■ <b>DIN/ISO</b></li> </ul>
<b>M functions</b>	Input of the M functions as M1 to Mxx. The M functions are partly control-specific. Known M functions are, e.g., M30 for 'Jump back to first block' and M9 for 'Coolant off' (relevant for <b>DIN/ISO</b> format) <ul style="list-style-type: none"> <li>■ <b>In each block</b></li> <li>■ <b>Program start</b></li> <li>■ <b>Program end</b></li> </ul>
<b>Export NC program</b>	Saving the NC program for transfer to a machine tool

### Exporting an NC program

With the **Export NC program** function, you can generate an NC program for transfer to the machine tool. You can then transfer the program via TNCremo or a USB mass storage device.

- ▶ Click **Export NC program**
- ▶ Select the desired storage location in the dialog
- ▶ Enter the name of the NC Program
- ▶ Select the desired file format
- ▶ Click **Save as**
- > The NC program is exported and saved in the storage location.



Check the NC program for correctness before starting it on the machine and with the mounted encoder.

## Test report

In the test report, you can enter various information about the customer, the machine type, the reference encoder and the measurement. After the measurement, the measured values are added to the test report.

- ▶ To open the test report, click **Test report**
- > The test report is displayed.

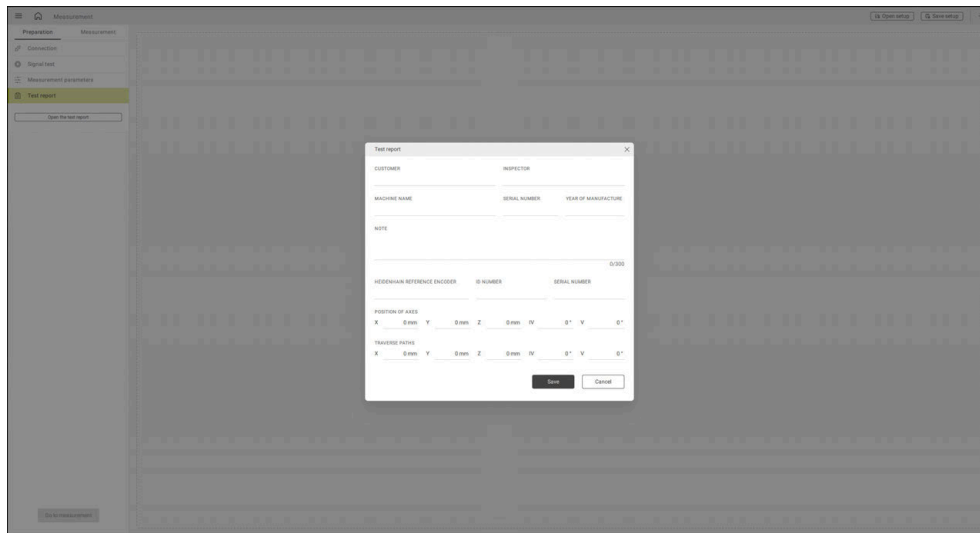


Figure 11: **Test report**

You can enter the following information in the test report:

Area	Explanation
<b>Miscellaneous</b>	Information on <b>Customer</b> and <b>Inspector</b>
<b>Machine name</b>	Information on the machine on which the measurement is conducted, such as the <b>Serial number</b> and <b>Year of manufacture</b>
<b>Note</b>	Individual information on the measurement
<b>HEIDENHAIN reference encoder</b>	Information on the reference encoder used, such as the <b>Serial number</b> and <b>ID number</b>
<b>Position of axes</b>	Current position of the linear axes <b>X</b> , <b>Y</b> and <b>Z</b> Current position of the rotary axes <b>IV</b> and <b>V</b>
<b>Traverse paths</b>	Traverse paths of the linear axes <b>X</b> , <b>Y</b> and <b>Z</b> Traverse paths of the rotary axes <b>IV</b> and <b>V</b>



You can enter the information in the test report in advance and reuse it as a setup file.

**Further information:** "Working with setup files", Page 80

## 5.2.2 Conducting a measurement

### **⚠ WARNING**

#### **Parts of the device may come off during measuring operation**

Crushing and impact hazards due to moving parts

- ▶ Close any doors or covers



Before the measurement, ensure that you have not activated any compensations—which affect the measurement—for controlling the rotational axis.  
Any active compensation tables must be taken into account in the evaluation.

You can conduct a measurement in the **Measurement** submenu.

Prerequisite: Active connection to the EIB 74x.

To open the **Measurement** submenu:

- ▶ Click the **Measurement** submenu in the **Measurement** function
- or
- ▶ Click **Go to measurement** in the **Preparation** submenu
- > The **Measurement** submenu is opened.

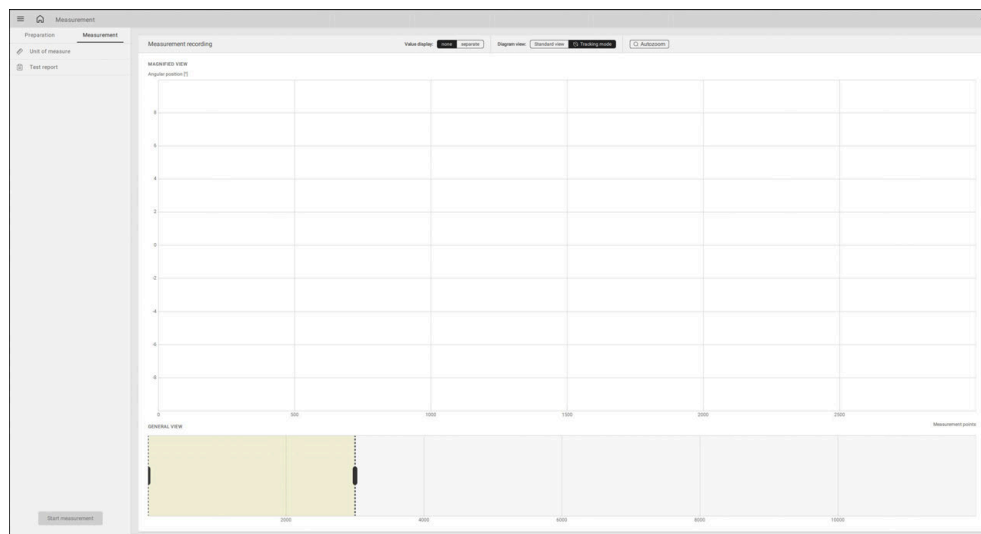


Figure 12: **Measurement** submenu

In the **Measurement** submenu, you can make the following settings:

- **Unit of measure**
- **Test report**

## Start measurement

You can start the measurement in the **Measurement** submenu.

Proceed as follows:

- ▶ Click **Begin Measure**
- ▶ Click **OK** in the dialog box
- ▶ Measuring points and angle positions are recorded in the measurement recording.

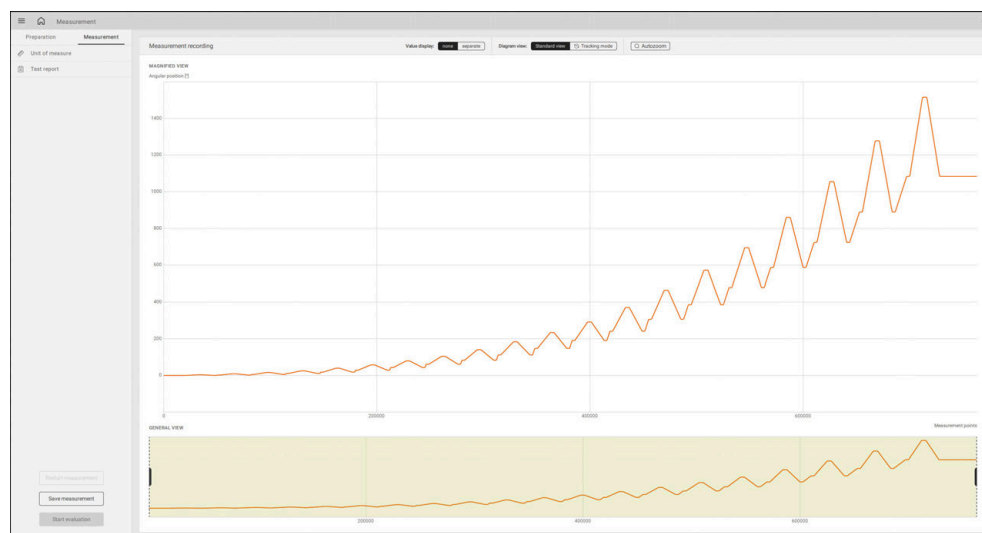


Figure 13: **Begin Measure**

During recording, you can stop or restart the measurement. After you have stopped the measurement, you can save the measured data.

## Test report

In the test report, you can enter various information about the customer, the machine type, the reference encoder and the measurement. After the measurement, the measured values are added to the test report.

- ▶ To open the test report, click **Test report**
- > The test report is displayed.

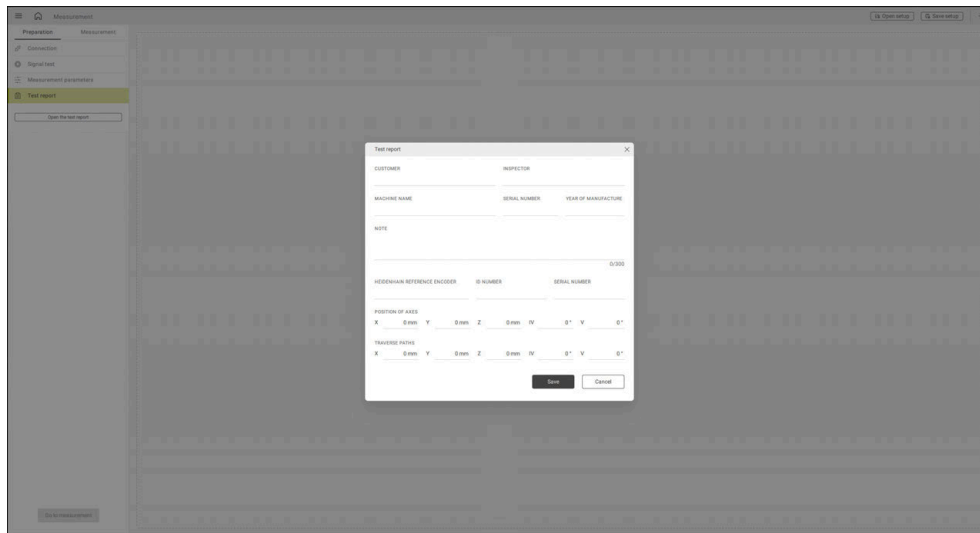


Figure 14: **Test report**

You can enter the following information in the test report:

Area	Explanation
<b>Miscellaneous</b>	Information on <b>Customer</b> and <b>Inspector</b>
<b>Machine name</b>	Information on the machine on which the measurement is conducted, such as the <b>Serial number</b> and <b>Year of manufacture</b>
<b>Note</b>	Individual information on the measurement
<b>HEIDENHAIN reference encoder</b>	Information on the reference encoder used, such as the <b>Serial number</b> and <b>ID number</b>
<b>Position of axes</b>	Current position of the linear axes <b>X, Y</b> and <b>Z</b> Current position of the rotary axes <b>IV</b> and <b>V</b>
<b>Traverse paths</b>	Traverse paths of the linear axes <b>X, Y</b> and <b>Z</b> Traverse paths of the rotary axes <b>IV</b> and <b>V</b>



You can enter the information in the test report in advance and reuse it as a setup file.

**Further information:** "Working with setup files", Page 80



## Saving a measurement

After completion of the measurement, you can save the measurement result.

Proceed as follows:

- ▶ Click **Finish Measurement**
- ▶ Click **Save measurement**
- > The **Save as** dialog box appears.
- ▶ Navigate to the desired storage location
- ▶ Enter the file name
- ▶ Click **Save**
- > The XRVM file is saved.

After saving, you can directly open the evaluation by clicking the displayed **Start evaluation** button.

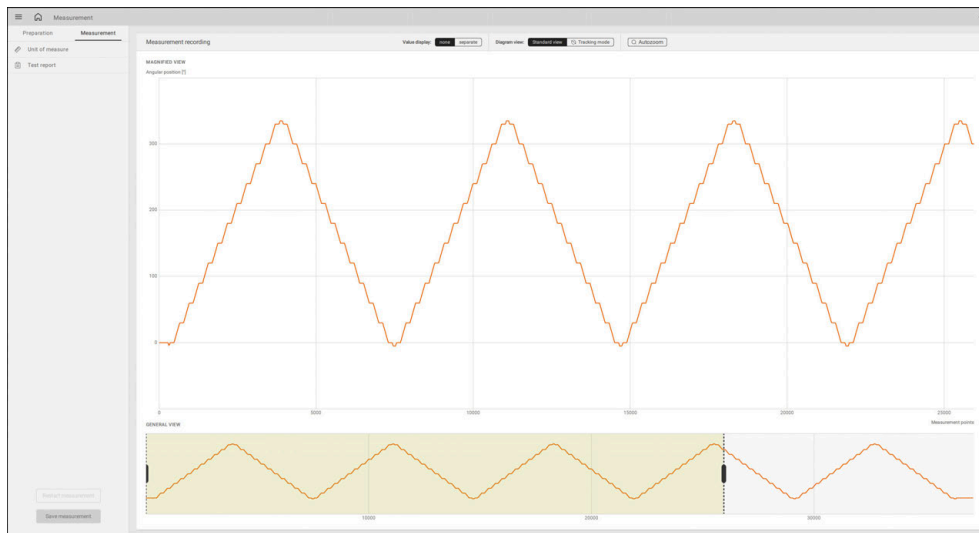


Figure 15: **Start evaluation** after saving

### 5.2.3 Working with setup files

Using setup files in XRVM format, you can prepare measurement parameters and test reports and reuse them as a template for further measurements.

## Opening a setup file

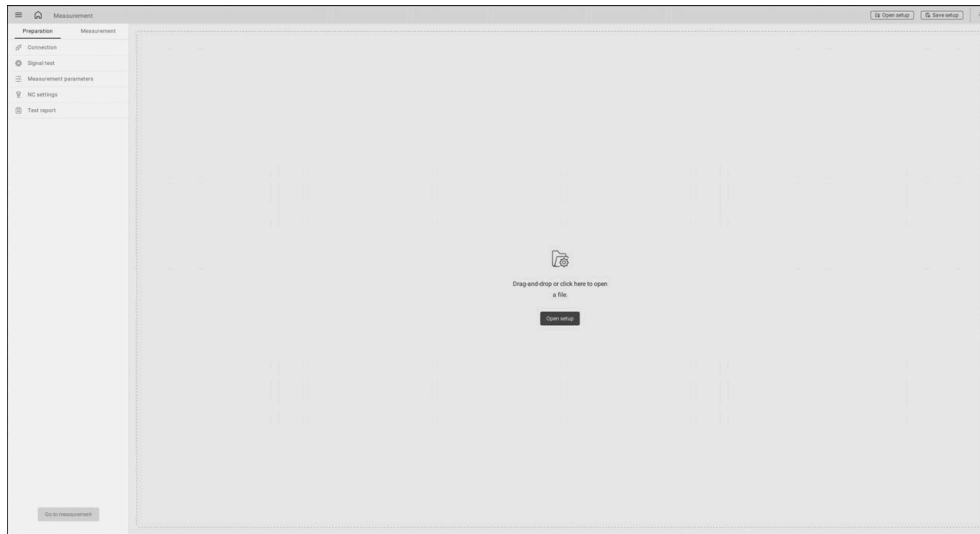


Figure 16: **Measurement** function

To open a prepared setup file:



- ▶ Click **Main menu**
- ▶ Click **Open setup**

or



- ▶ Click **Open setup** in the menu bar of the **Preparation** submenu
- > The **Open** dialog box appears.
- ▶ Navigate to the corresponding storage location of the desired XRVM file
- ▶ Select the desired XRVM file
- ▶ Click **Open**
- > The setup file is opened.



You can also open setup files by drag and drop in the **Measurement** function.

## Saving a setup file

If you have entered measurement parameters or filled out a test report in the **Measurement** function, you can save these contents as a setup file.

To save a setup file:



- ▶ Click **Main menu** in the **Preparation** submenu
- ▶ Click **Save setup as**

or



- ▶ Click **Save setup as** in the menu bar of the **Preparation** submenu
- > The **Save as** dialog box appears.
- ▶ Navigate to the desired storage location of the XRVM file
- ▶ Enter the file name
- ▶ Click **Save**
- > The setup file is saved.

## 5.3 Evaluation

This chapter describes the **Evaluation** function. The evaluation takes place after a measurement.

**i** You can also perform a comparison directly after the evaluation.  
**Further information:** "Comparison", Page 55

### 5.3.1 Opening a measurement for evaluation

You can open the **Evaluation** function in the opening screen. Select the previously saved file for the measurement you want to evaluate.

To evaluate a measurement file:

- ▶ Click **Evaluation** in the opening screen
- The **Open** dialog box appears.
- ▶ Navigate to the storage location of the measurement file
- ▶ Click desired measurement file
- ▶ Click **Open**
- The measurement file is opened in the **Evaluation** function.

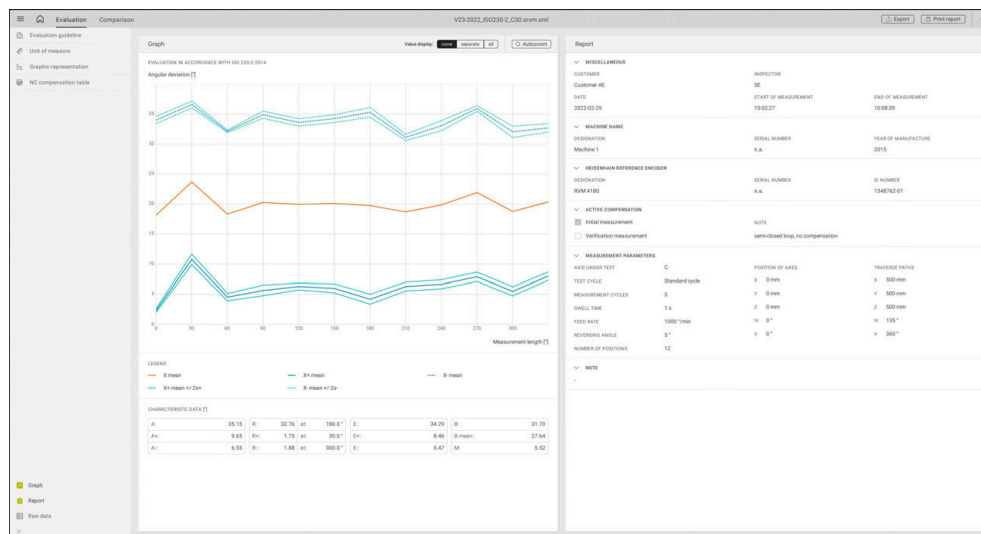








Figure 17: **Evaluation** function

You can also open the **Evaluation** function by proceeding with this directly after saving the measurement.

**Further information:** "Saving a measurement", Page 41

### 5.3.2 Showing an evaluation

The **Evaluation** function allows you to show or hide various displays.  
The following displays are available:

Display	Explanation
 	<b>Graph</b> Click to show or hide the graph
 	<b>Report</b> Click to show or hide the report
 	<b>Raw data</b> Click to show or hide the raw data



To display a combination of several views, you can show two or three displays at the same time.

## Graph

The following elements are shown in the **Graph** display:

Element	Explanation
<b>Evaluation in accordance with...</b>	Display of the measurement results as a graph according to the method selected under <b>Evaluation guideline</b> and the parameters selected under <b>Graphic representation</b>
<b>Legend</b>	Explanation of line types used in the measurement chart
<b>CHARACTERISTIC DATA</b>	Display of the characteristic data in the unit selected under <b>Unit of measure</b>

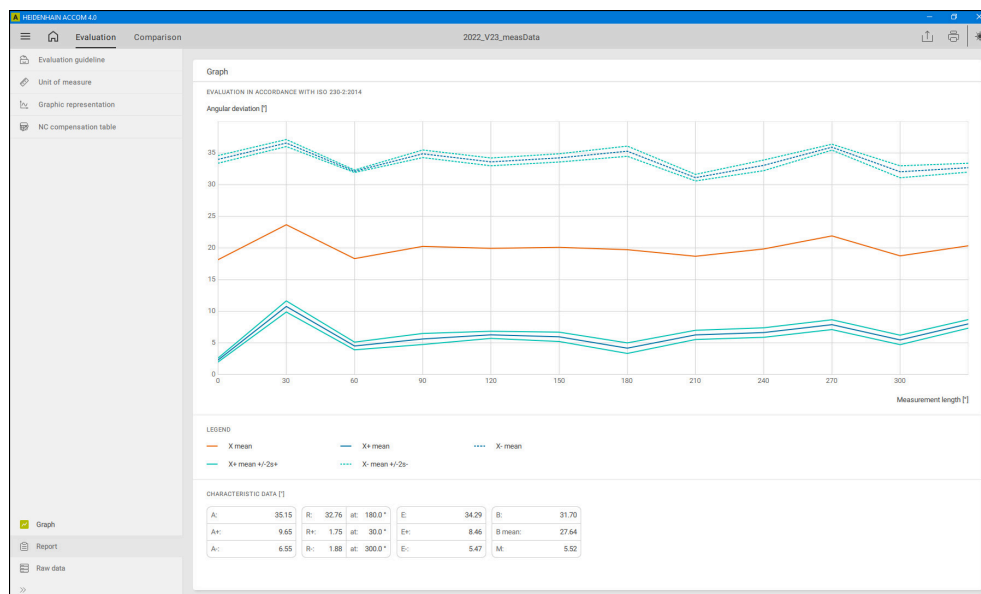


Figure 18: **Graph** display in the **Evaluation** function



You can adapt the curves shown in the **Graph** display under **Graphic representation**.

**Further information:** "Configuring the evaluation ", Page 49

**Legend in accordance with ISO 230-2:2014, ISO 230-2:1988, and JIS B 6190-2:2016.**

The following values are displayed under **Legend** in accordance with the requirements of these standards:

**Representation according to characteristic data**

<b>X mean</b>	Mean value of <b>X+ mean</b> and <b>X- mean</b>
<b>X+ mean</b>	Mean value of the deviation in positive direction of rotation
<b>X- mean</b>	Mean value of the deviation in negative direction of rotation
<b>X+ mean +/-2s+</b>	Statistical deviation of <b>X+ mean</b> . The standard deviation in the positive direction is taken into account in the curves.
<b>X+ mean +/-2s-</b>	Statistical deviation of <b>X- mean</b> . The standard deviation in the negative direction is taken into account in the curves.

**Representation according to single cycles**

<b>X+</b>	Deviation of the individual measuring cycles in positive direction of rotation
<b>X-</b>	Deviation of the individual measuring cycles in negative direction of rotation

**Legend in accordance with VDI/DGQ 3441:1977**

For the **VDI/DGQ 3441:1977** standard, the following values are displayed under **Legend**:

<b>Sys. deviation</b>	Mean value of the deviation in positive and negative direction of rotation
<b>U</b>	Hysteresis
<b>Ps</b>	Position variation range

**Legend in accordance with ISO 230-3:2007**

For the **ISO 230-3:2007** standard, the following values are displayed under **Legend**:

<b>e1(c,+)</b>	Deviation of the first target position relative to start in positive direction of rotation
<b>e1(c,-)</b>	Deviation of the first target position relative to start in negative direction of rotation
<b>e2(c,+)</b>	Deviation of the second target position relative to start in positive direction of rotation
<b>e2(c,-)</b>	Deviation of the second target position relative to start in negative direction of rotation

## Report

The **Report** display shows the data of the measurement report. The measurement report contains the following information:

Area	Explanation
<b>Miscellaneous</b>	Information on <b>Customer, Inspector</b> , date and time of measurement
<b>Machine name</b>	Information on the machine on which the measurement was conducted, such as <b>Designation, Serial number</b> and <b>Year of manufacture</b>
<b>HEIDENHAIN reference encoder</b>	Information on the reference encoder used, such as <b>Designation, Serial number</b> and <b>ID number</b>
<b>Active compensation</b>	Information on the measurement performance, such as <b>Initial measurement</b> or <b>Verification measurement</b> . Describes whether a compensation table for the axis under test was active. There is no active compensation for an <b>Initial measurement</b> . For a <b>Verification measurement</b> , a previously generated compensation is validated. <b>Further information:</b> "Creating an NC compensation table for non-HEIDENHAIN controls ", Page 54
<b>Measurement parameters</b>	Information on the measurement parameters set before <b>Further information:</b> "Measurement parameters", Page 33
<b>Note</b>	Individual information on the measurement

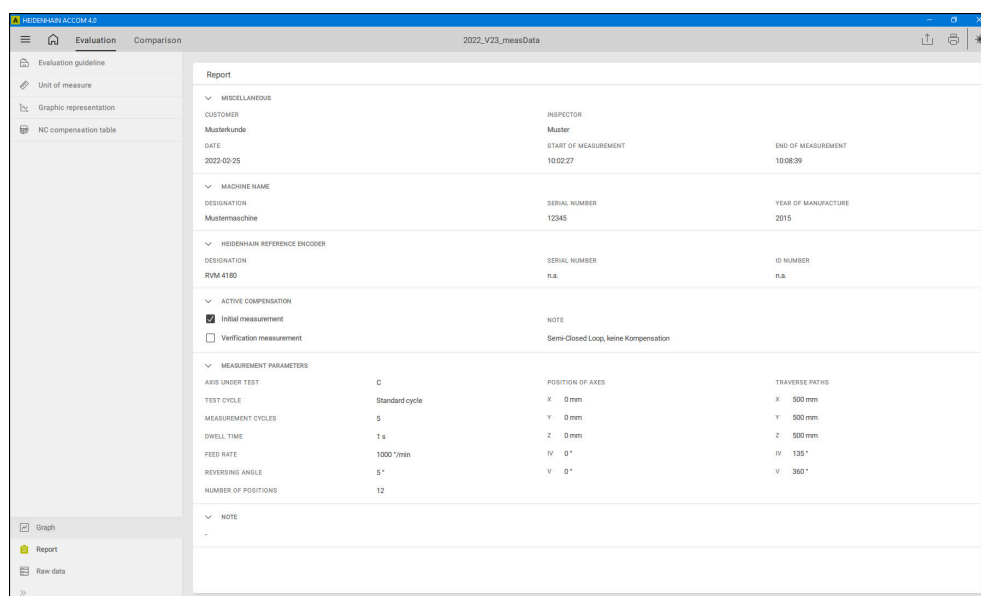
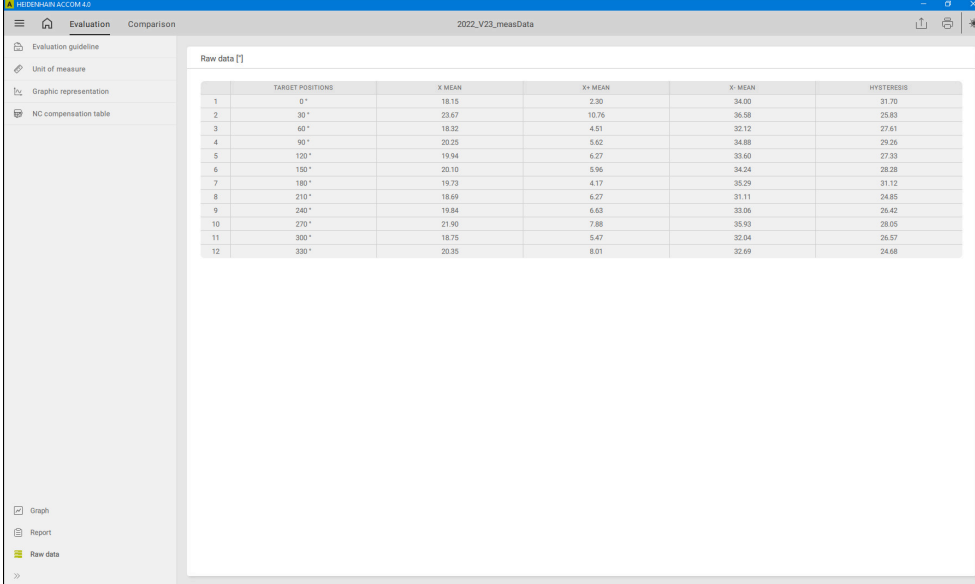


Figure 19: **Report** display in the **Evaluation** function

## Raw data

The **Raw data** display shows a table with the target positions and measured values. The raw data provide the numerical values for the **Graph** display.



	TARGET POSITIONS	X-MEAN	X+MEAN	X-MEAN	HYSTERESIS
1	0°	18.15	2.30	34.00	31.70
2	30°	23.67	10.76	36.58	25.83
3	60°	18.32	4.51	32.12	27.61
4	90°	20.25	5.62	34.88	29.26
5	120°	19.94	6.27	33.60	27.33
6	150°	20.10	5.96	34.24	28.28
7	180°	19.73	4.17	35.29	31.12
8	210°	18.69	6.27	31.11	24.85
9	240°	19.84	6.65	31.56	26.42
10	270°	21.90	7.88	35.90	28.05
11	300°	18.75	5.47	32.04	26.57
12	330°	20.35	8.01	32.69	24.68

Figure 20: **Raw data** display in the **Evaluation** function



### 5.3.3 Configuring the evaluation

The **Evaluation** function allows you to configure the display parameters for the measurement evaluation.

The following representation parameters are available:

Representation parameter	Explanation
<b>Evaluation guideline</b>	<p>Selecting the standard for the representation of the evaluation</p> <ul style="list-style-type: none"> <li>■ <b>ISO 230-2:2014</b></li> <li>■ <b>VDI/DGQ 3441:1977</b></li> <li>■ <b>ISO 230-3:2007</b></li> <li>■ <b>ISO 230-2:1988</b></li> <li>■ <b>JIS B 6190-2:2016</b></li> </ul>
<b>Unit of measure</b>	<p>Selecting the unit of measure for the representation of the evaluation</p> <ul style="list-style-type: none"> <li>■ <b>Arc second</b></li> <li>■ <b>Degree</b></li> <li>■ <b>mdeg</b></li> <li>■ <b>mrاد</b></li> <li>■ <b>μrad</b></li> </ul>
<b>Graphic representation</b>	<p>Mode of representation of the axes in the evaluation</p> <p><b>Y axis</b></p> <ul style="list-style-type: none"> <li>■ <b>Scaling of Y axis</b>  <b>Auto:</b> The Y axis is automatically scaled. All curves are displayed  <b>From... to...:</b> The display range can be delimited by entering values</li> </ul> <p><b>X axis</b></p> <ul style="list-style-type: none"> <li>■ <b>Display</b> in accordance with <b>ISO 230-2:2014</b> , <b>VDI/DGQ 3441:1977</b>, <b>ISO 230-2:1988</b>, <b>JIS B 6190-2:2016</b>  <b>Characteristic data:</b> Representation based on the selected standard. Various curves are displayed  <b>Single cycles:</b> Representation of each individual measurement in the positive and negative directions</li> <li>■ <b>Display for ISO 230-3:2007</b>  <b>Position drift over cycles:</b> Representation of the position error of the target positions in the positive and negative approach directions over the entire measuring period. Display of measuring period in number of measuring cycles on the abscissa  <b>Position drift over time:</b> Representation of the position error of the target positions in the positive and negative approach directions over the entire measuring period. Display of measuring period in time</li> <li>■ <b>Scaling of X axis</b>  <b>Auto:</b> The X axis is automatically scaled. The entire measuring range is displayed  <b>From... to...:</b> The displayed measuring range can be enlarged or reduced by entering values</li> </ul>

### 5.3.4 Export characteristic data

The **Export** function allows you to export the characteristic data as a text file.

The characteristic data contain information on the positioning accuracy according to the selected evaluation guideline. This allows you to check whether your requirements for the encoder and machine are met. You can also use the characteristic data to monitor the accuracy of the axis over extended time periods.

To export the characteristic data:



- ▶ Click **Export** in the menu bar
- ▶ Select the storage location in the **Save as** dialog box
- ▶ Enter a name for the characteristic data
- ▶ Click **Save**
- The characteristic data are exported and saved in the storage location.

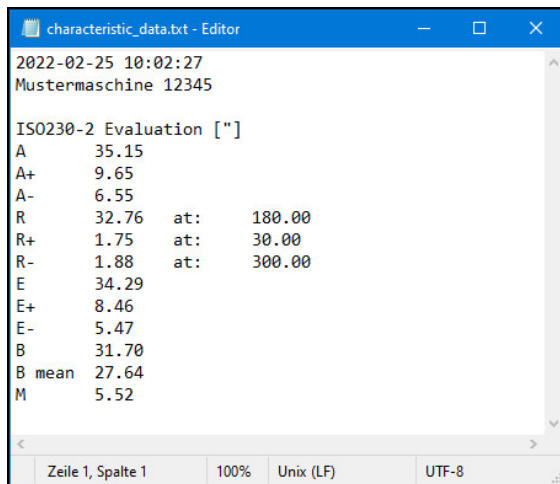


Figure 21: Example of characteristic data

### 5.3.5 Printing the report

You can print the measurement report on the installed printer.

Proceed as follows:



- ▶ Click **Print the report** in the menu bar
- ▶ In the **Print the report** dialog box, select the data that you want to add to the measurement report:
  - **Chart with characteristic data**
  - **Raw data**
- ▶ Click **Continue**
- The **Print** dialog box appears.
- ▶ Select the desired printer
- The test report and the additional data are output to the selected printer.

### 5.3.6 NC compensation table

**i** The **NC compensation table** is available only for measurements and evaluations performed in accordance with the requirements of the following standards:

- **ISO 230-2:2014**
- **VDI/DGQ 3441:1977**
- **ISO 230-2:1988**
- **JIS B 6190-2:2016**

The **NC compensation table** function allows you to generate a compensation table from the measured values with the help of a wizard. This compensation table can be used by the machine control to improve the long-range accuracy of an axis.

- If you have a HEIDENHAIN control (TNC 640 or higher), you can download a COM file from the HEIDENHAIN control and select which parameters you want to change.
- If you do not have a HEIDENHAIN control, you can also generate a compensation table without a COM file. In this case you will create a TXT file with the compensation values that you can then transfer manually to your machine control.

#### Creating an NC compensation table for HEIDENHAIN controls

To create an NC compensation table for HEIDENHAIN controls:

- ▶ Click **Create NC compensation table**
- ▶ The **NC compensation table** dialog box with the wizard appears.

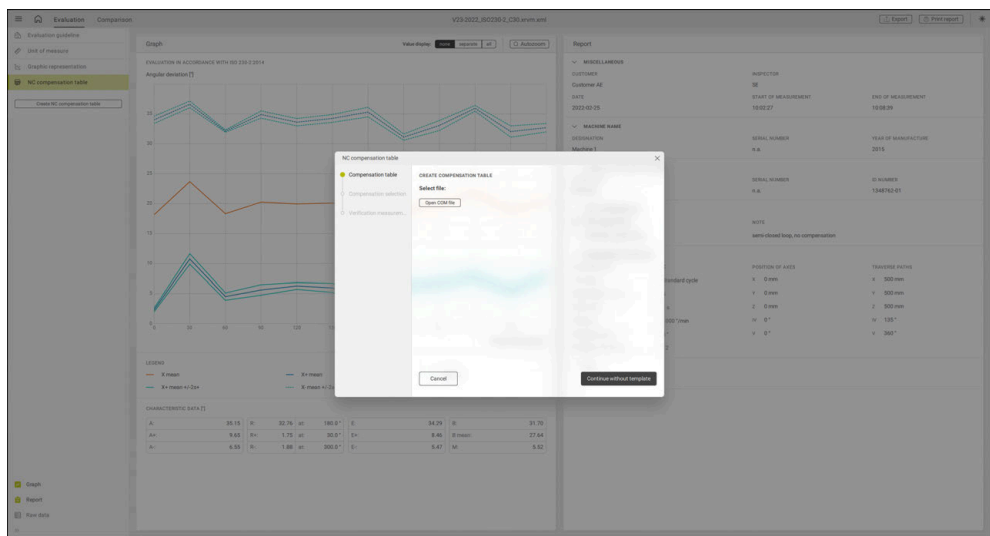


Figure 22: **NC compensation table** dialog box

**Step: Create compensation table**

- ▶ Click **Open COM file**
- > The **Open** dialog box appears.
- ▶ Navigate to the corresponding storage location of the desired COM file
- ▶ Select the desired COM file
- ▶ Click **Open**
- > The COM file is opened.
- ▶ Select the corresponding axis under **The following parameters were detected:**
- ▶ Click **Continue**
- > The wizard jumps to the **Compensation selection** step.

**Step: Compensation selection**

- ▶ Define the parameters:

Parameter	Explanation
<b>Compensation values</b>	<p>The compensation value is calculated from the measured values. By default, the compensation value is calculated by averaging. If there is a preferred axis direction, you can select a different method (depending on the machine).</p> <p>Selection:</p> <ul style="list-style-type: none"> <li>■ <b>Averaged value from forward and reverse cycles</b></li> <li>■ <b>Only forward cycles</b></li> <li>■ <b>Only reverse cycles</b></li> </ul>
<b>Compensation method</b>	<p>If the COM file contains an arbitrary compensation table, you can overwrite the values. In this case the compensation table just serves as a template.</p> <p>If the measurement was already performed with an active compensation table for the axis under test, you have to add up the compensation values and the existing values.</p> <p>Selection:</p> <ul style="list-style-type: none"> <li>■ <b>Absolute (overwrite)</b></li> <li>■ <b>Incremental (add)</b></li> </ul>
<b>Decimal separator</b>	<p>Selecting the decimal separator being used</p> <p>Selection:</p> <ul style="list-style-type: none"> <li>■ <b>Point</b></li> <li>■ <b>Comma</b></li> </ul>
<b>Additional compensation</b>	<p>Select the <b>Backlash compensation</b> option if you want the hysteresis (backlash) of the measured axis to be corrected directly via the compensation table.</p> <p>The BACKLASH column will then be filled correspondingly.</p> <p>Select the <b>Offset correction</b> option if you do not want the reference position at 0 degrees to be changed by the compensation. The compensation value at 0 degrees will thus be set to zero, and the other values will be corrected by the value of the offset.</p>

- ▶ Click **Save and continue**
- > The **Save as** dialog box appears.
- ▶ Navigate to the desired storage location
- ▶ Enter the file name
- ▶ Click **Save**
- > The compensation table is saved as a COM file.
- > The wizard jumps to the **Verification measurement** step.

**Step: Verification measurement**

After you have transferred the compensation table to the machine control, a verification measurement is recommended.

- ▶ To start the verification measurement, click **Start verification measurement**
- > The wizard jumps to the **Measurement** submenu of the **Measurement** function.

**Further information:** "Start measurement", Page 39

**Creating an NC compensation table for non-HEIDENHAIN controls**

To generate an NC compensation table for non-HEIDENHAIN controls:

- ▶ Click **Create NC compensation table**
- > The **NC compensation table** dialog box with the wizard appears.

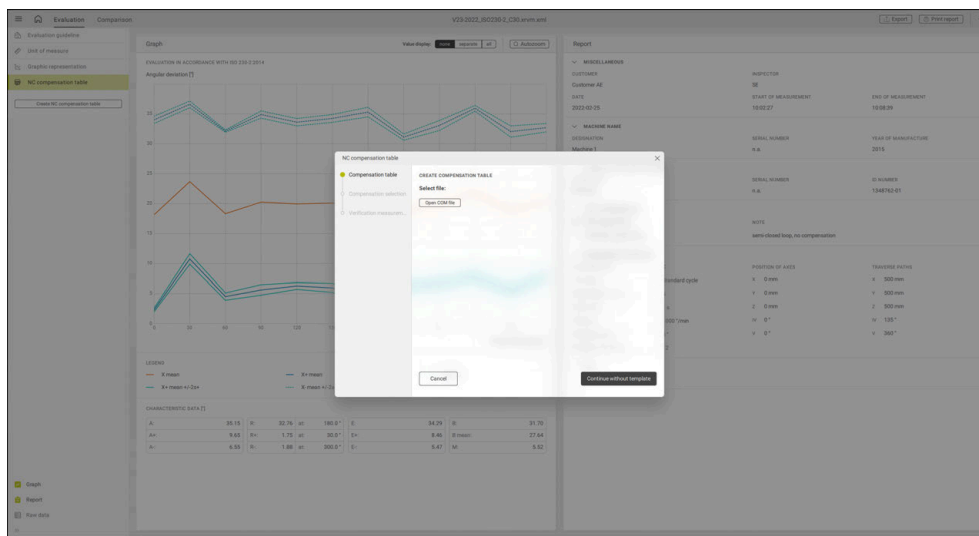


Figure 23: **NC compensation table** dialog box

**Step: Create compensation table**

- ▶ To start without a COM file, click **Continue without template**
- > The wizard jumps to the **Compensation selection** step.

**Step: Compensation selection**

- ▶ Enter the following parameters:

Parameter	Explanation
<b>Compensation values</b>	<p>The compensation value is calculated from the measured values. By default, the compensation value is calculated by averaging. If there is a preferred axis direction, you can select a different method (depending on the machine).</p> <p>Selection:</p> <ul style="list-style-type: none"> <li>■ <b>Averaged value from forward and reverse cycles</b></li> <li>■ <b>Only forward cycles</b></li> <li>■ <b>Only reverse cycles</b></li> </ul>
<b>Compensation method</b>	<p>For a non-HEIDENHAIN-control, select <b>Absolute (overwrite)</b>.</p> <p>Selection:</p> <ul style="list-style-type: none"> <li>■ <b>Absolute (overwrite)</b></li> <li>■ <b>Incremental (add)</b></li> </ul>
<b>Decimal separator</b>	<p>Selecting the decimal separator being used</p> <p>Selection:</p> <ul style="list-style-type: none"> <li>■ <b>Point</b></li> <li>■ <b>Comma</b></li> </ul>

- ▶ Click **Save and continue**
- > The **Save as** dialog box appears.
- ▶ Navigate to the desired storage location
- ▶ Enter the file name
- ▶ Click **Save**
- > The compensation table is saved as a TXT file.
- > The wizard jumps to the **Verification measurement** step.

**Step: Verification measurement**

After you have transferred the compensation table to the machine control, a verification measurement is recommended.

- ▶ To start the verification measurement, click **Start verification measurement**
- > The wizard jumps to the **Measurement** submenu of the **Measurement** function.

**Further information:** "Start measurement", Page 39

## 5.4 Comparison

This chapter describes the **Comparison** function. The **Comparison** function compares the evaluation results of two measurements. Through a time response, the comparison can serve as an indication of wear or measurement errors, or compare the parameters before and after compensation.

The **Comparison** function compares the evaluation results of two measurements.

 You can also open the **Comparison** function by proceeding with the measurement directly after the evaluation.

### 5.4.1 Opening measurements for comparison

You can open the **Comparison** function in the opening screen. Select two previously saved files that you want to compare.

If you perform a comparison directly after an evaluation, the evaluated file will be used as the first comparison file.

To compare measurement files:

- ▶ Click **Comparison** in the opening screen
- ▶ The selection fields for the first and the second comparison file are displayed
- ▶ Click **Open File**
- ▶ The **Open** dialog box appears.
- ▶ Navigate to the storage location of the measurement file
- ▶ Click desired measurement file
- ▶ Click **Open**
- or
- ▶ Drag the desired measurement file from the explorer to the selection field
- ▶ The measurement file is opened in the **Comparison** function.
- ▶ To open the second measurement file, if applicable, repeat these steps

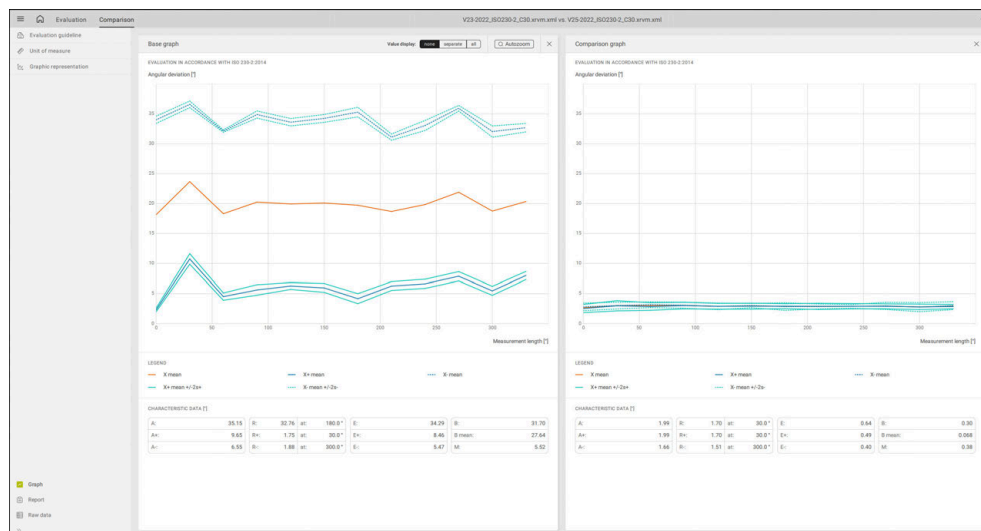





Figure 24: **Comparison** function

### 5.4.2 Displaying a comparison

The **Comparison** function allows you to individually show or hide various displays. The following displays are available:

Display	Explanation
	<b>Graph</b> Click to show or hide the graph
	<b>Report</b> Click to show or hide the report
	<b>Raw data</b> Click to show or hide the raw data



## Graph

The following elements are shown in the **Graph** display:

Element	Explanation
<b>Evaluation in accordance with...</b>	Display of the measurement results as a graph according to the method selected under <b>Evaluation guideline</b> and the parameters selected under <b>Graphic representation</b>
<b>Legend</b>	Explanation of line types used in the measurement chart
<b>CHARACTERISTIC DATA</b>	Display of the characteristic data in the unit selected under <b>Unit of measure</b>

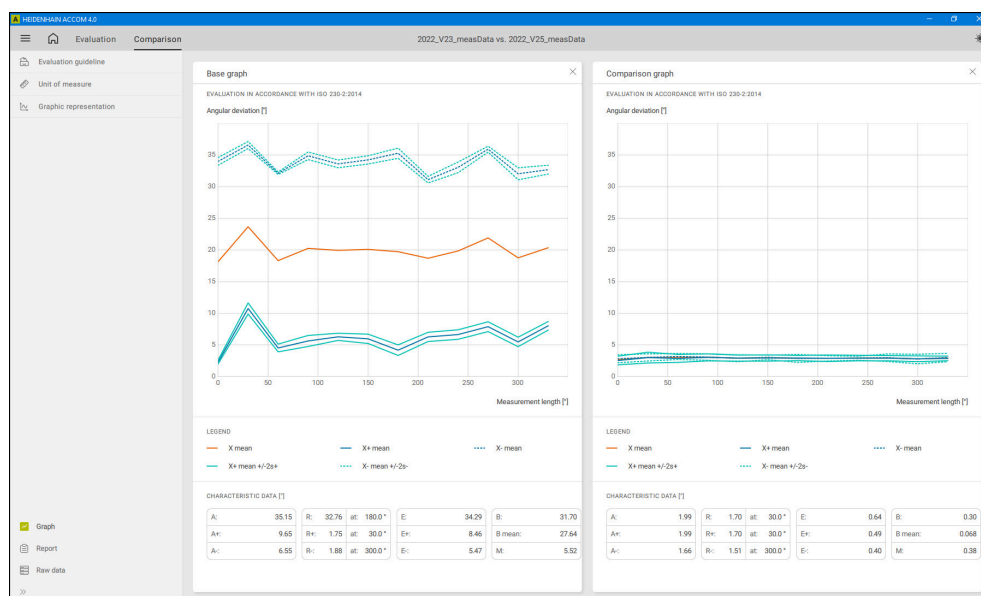


Figure 25: **Graph** display in the **Comparison** function



You can adapt the curves shown in the **Graph** display under **Graphic representation**.

**Further information:** "Configuring the evaluation ", Page 49

**Legend in accordance with ISO 230-2:2014, ISO 230-2:1988, and JIS B 6190-2:2016.**

The following values are displayed under **Legend** in accordance with the requirements of these standards:

**Representation according to characteristic data**

<b>X mean</b>	Mean value of <b>X+ mean</b> and <b>X- mean</b>
<b>X+ mean</b>	Mean value of the deviation in positive direction of rotation
<b>X- mean</b>	Mean value of the deviation in negative direction of rotation
<b>X+ mean +/-2s+</b>	Statistical deviation of <b>X+ mean</b> . The standard deviation in the positive direction is taken into account in the curves.
<b>X+ mean +/-2s-</b>	Statistical deviation of <b>X- mean</b> . The standard deviation in the negative direction is taken into account in the curves.

**Representation according to single cycles**

<b>X+</b>	Deviation of the individual measuring cycles in positive direction of rotation
<b>X-</b>	Deviation of the individual measuring cycles in negative direction of rotation

**Legend in accordance with VDI/DGQ 3441:1977**

For the **VDI/DGQ 3441:1977** standard, the following values are displayed under **Legend**:

<b>Sys. deviation</b>	Mean value of the deviation in positive and negative direction of rotation
<b>U</b>	Hysteresis
<b>Ps</b>	Position variation range

**Legend in accordance with ISO 230-3:2007**

For the **ISO 230-3:2007** standard, the following values are displayed under **Legend**:

<b>e1(c,+)</b>	Deviation of the first target position relative to start in positive direction of rotation
<b>e1(c,-)</b>	Deviation of the first target position relative to start in negative direction of rotation
<b>e2(c,+)</b>	Deviation of the second target position relative to start in positive direction of rotation
<b>e2(c,-)</b>	Deviation of the second target position relative to start in negative direction of rotation

## Report

The **Report** display shows the data of the measurement report. The measurement report contains the following information:

Area	Explanation
Miscellaneous	Information on <b>Customer</b> , <b>Inspector</b> , date and time of measurement
Machine name	Information on the machine on which the measurement was conducted, such as <b>Designation</b> , <b>Serial number</b> and <b>Year of manufacture</b>
HEIDENHAIN reference encoder	Information on the reference encoder used, such as <b>Designation</b> , <b>Serial number</b> and <b>ID number</b>
Active compensation	Information on the measurement performance, such as <b>Initial measurement</b> or <b>Verification measurement</b> . Describes whether a compensation table for the axis under test was active. There is no active compensation for an <b>Initial measurement</b> . For a <b>Verification measurement</b> , a previously generated compensation is validated. <b>Further information:</b> "Creating an NC compensation table for non-HEIDENHAIN controls ", Page 54
Measurement parameters	Information on the measurement parameters set before <b>Further information:</b> "Measurement parameters", Page 33
Note	Individual information on the measurement

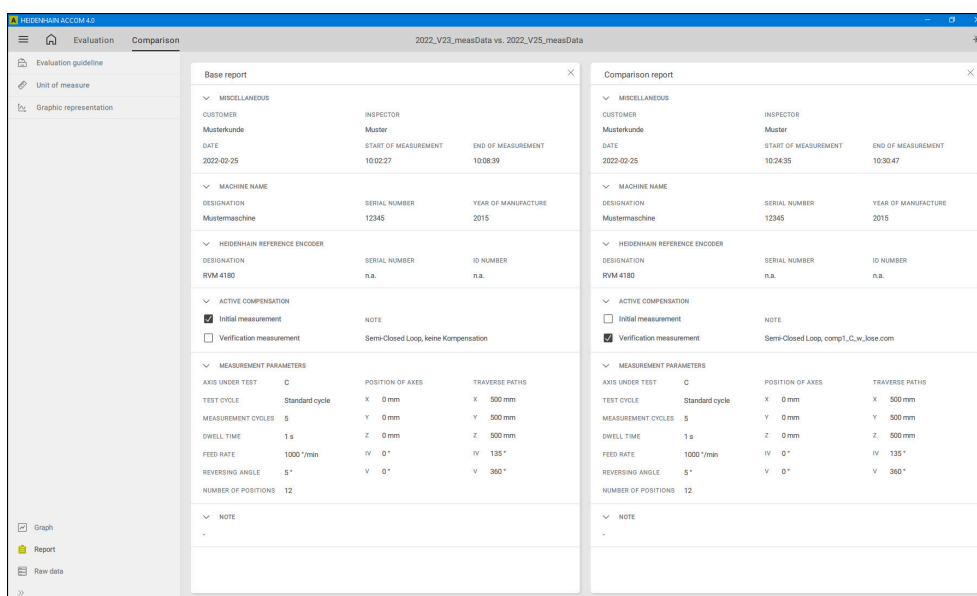


Figure 26: **Report** display in the **Comparison** function

## Raw data

The **Raw data** display shows a table with the target positions and measured values. The raw data provide the numerical values for the **Graph** display.

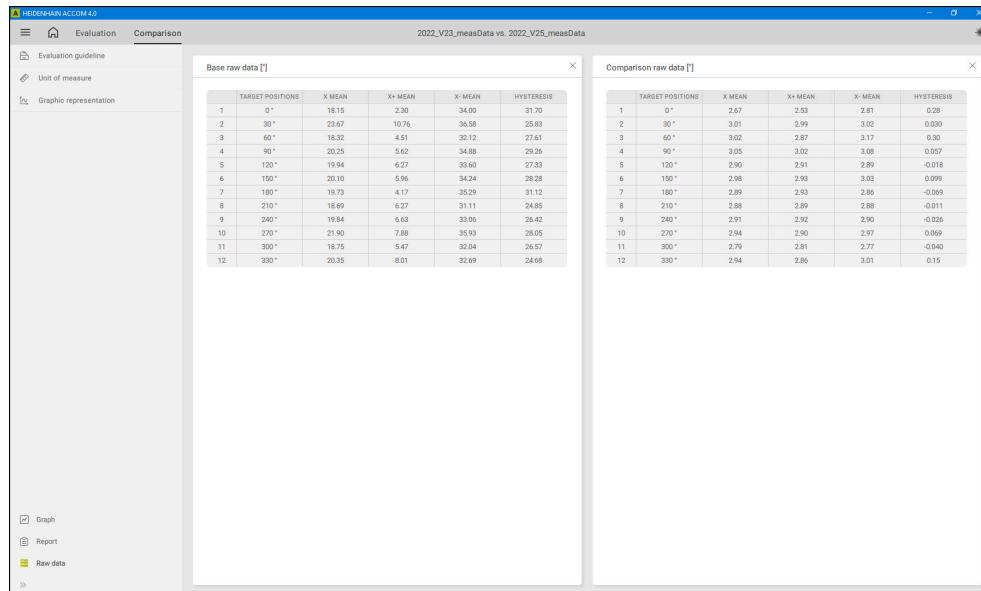


Figure 27: **Raw data** display in the **Comparison** function

### 5.4.3 Configuring the comparison

The **Comparison** function allows you to configure the display parameters for the comparison view.



Under **Graphic representation**, the scaling is adjusted automatically so that the two graphs are displayed completely. You can later change these values manually.

The following representation parameters are available:

Representation parameter	Explanation
<b>Evaluation guideline</b>	Selecting the standard for the representation of the evaluation <ul style="list-style-type: none"> <li>■ ISO 230-2:2014</li> <li>■ VDI/DGQ 3441:1977</li> <li>■ ISO 230-3:2007</li> <li>■ ISO 230-2:1988</li> <li>■ JIS B 6190-2:2016</li> </ul>
<b>Unit of measure</b>	Selecting the unit of measure for the representation of the evaluation <ul style="list-style-type: none"> <li>■ Arc second</li> <li>■ Degree</li> <li>■ mdeg</li> <li>■ mrad</li> <li>■ µrad</li> </ul>

Representation parameter	Explanation
Graphic representation	<p>Mode of representation of the axes in the evaluation</p> <p><b>Y axis</b></p> <ul style="list-style-type: none"> <li> <b>Scaling of Y axis</b>  <b>Auto:</b> The Y axis is automatically scaled. All curves are displayed  <b>From... to...:</b> The display range can be delimited by entering values </li> </ul> <p><b>X axis</b></p> <ul style="list-style-type: none"> <li> <b>Display</b> in accordance with <b>ISO 230-2:2014</b> , <b>VDI/DGQ 3441:1977</b>, <b>ISO 230-2:1988</b>, <b>JIS B 6190-2:2016</b>  <b>Characteristic data:</b> Representation based on the selected standard. Various curves are displayed  <b>Single cycles:</b> Representation of each individual measurement in the positive and negative directions </li> <li> <b>Display</b> for <b>ISO 230-3:2007</b>  <b>Position drift over cycles:</b> Representation of the position error of the target positions in the positive and negative approach directions over the entire measuring period. Display of measuring period in number of measuring cycles on the abscissa  <b>Position drift over time:</b> Representation of the position error of the target positions in the positive and negative approach directions over the entire measuring period. Display of measuring period in time </li> <li> <b>Scaling of X axis</b>  <b>Auto:</b> The X axis is automatically scaled. The entire measuring range is displayed  <b>From... to...:</b> The displayed measuring range can be enlarged or reduced by entering values </li> </ul>



# 6

**RVM 4280 Mounting  
wizard module**

## 6.1 Overview

This chapter describes the optional **RVM 4280 Mounting wizard** module. This module supports you in accurately mounting the RVM 4280 encoder to a rotary table before performing the actual measurement. This procedure prevents possible measuring errors.



The **RVM 4280 Mounting wizard** module is an auxiliary function that is not included in the software's standard range of functions.

**Further information:** "Licensing", Page 18

### Call

- ▶ Click **RVM 4280 Mounting wizard** under **ACCOM Plus** in the module selection shown on the screen after startup
- > The mounting wizard is opened.

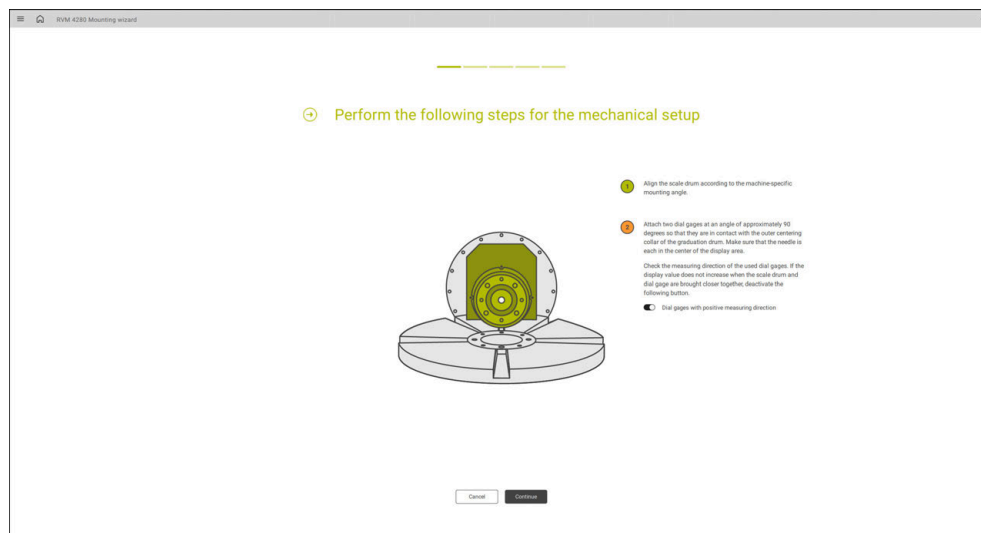


Figure 28: **RVM 4280 Mounting wizard** module



## 6.2 Executing the mounting wizard

### Preparing installation

Before you start the mounting wizard, you have to mount the scale drum of the RVM 4280 encoder and the dial gages.

- ▶ Mount the RVM 4280 encoder with the pertaining mounting bracket to the rotary table of the machine as described in the RVM 4000 Operating Instructions.
- ▶ Attach two dial gages to the machine frame such that they touch the encoder's centering collar at an angle of approx. 90° relative to each other so that the gage scales are easily readable.
- ▶ Check whether the needles of the dial gages each are in the center of the display area after mounting

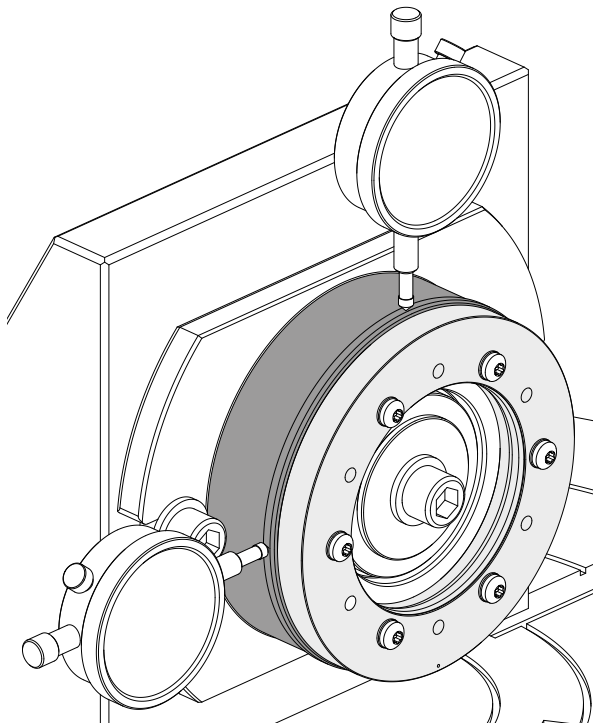


Figure 29: Mounting the Scale Drum

### Starting the mounting wizard

- ▶ Click **RVM 4280 Mounting wizard** under **ACCOM Plus** in the module selection shown on the screen after startup
- > The mounting wizard is opened.
- ▶ Check whether the mechanical mounting is complete
- ▶ Check whether the dial gages being used work with the positive (default) or negative measuring direction, and select the **Dial gages with positive measuring direction** option as needed
- ▶ Click **Continue**

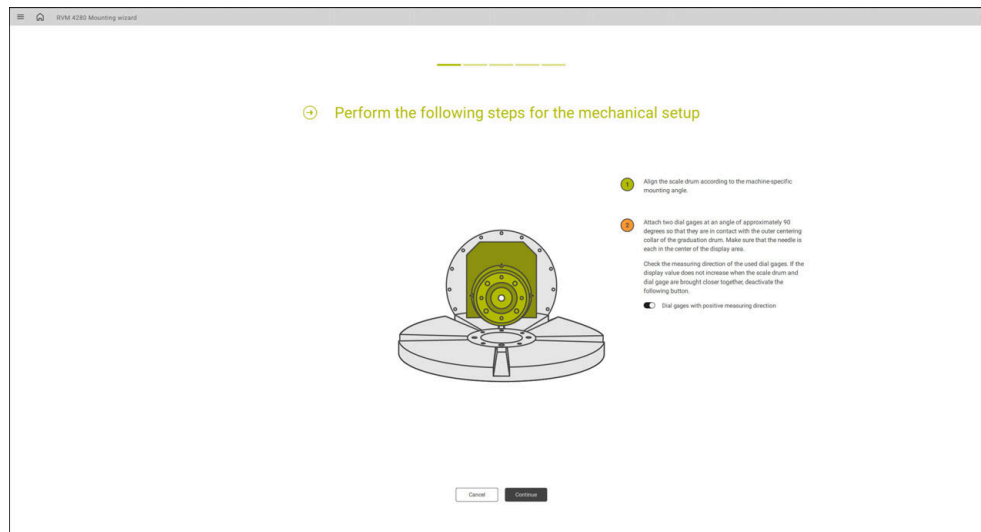


Figure 30: RVM 4280 Mounting wizard

### Conducting measurements

- ▶ Read the axis angle of the tilting axis from the machine control and enter the value in the **Angle value** field
- ▶ Enter the values of the dial gages in the respective **Dial gage** fields. Press Return to conclude your entry
- ▶ Move the tilting axis by at least 60° with the machine control.

**i** If tilting by 60° is not possible, select the limits of the measuring range and a center position as reading positions in each case.

- ▶ Click **Continue**
- ▶ Repeat the measurements with a second and a third tilting axis position. When doing so, always move the tilting axis by at least 60°.
- ▶ After the third measurement, click **Analysis**

### Evaluating an analysis

During the analysis, the position of the center of rotation of the scale drum relative to the rotary axis of the tilting axis is determined and evaluated as follows:

- **Mounting is ideal**  
Measurement can start, the **Go to measurement** button is displayed
- **Mounting should be corrected**  
The position is still within the specified runout tolerance. Nevertheless mounting should be corrected to avoid negative effects on the measurement accuracy
- **Mounting must be corrected**  
The position is outside the specified runout tolerance; therefore, mounting must be corrected



After mounting has been corrected, you always have to restart the mounting wizard.

## Performing mounting correction

If mounting must be corrected, you can use the following values:

- **Analysis**
  - **Eccentricity**  
Displayed for information; shows the deviation of the rotational axes from the tilting table and the scale drum of the encoder
  - **Target value Dial gage 1/2**  
The position of the scale drum must be adjusted until these values are shown on the dial gages
- Chart and **Angle position selection**  
Shows the direction of rotation for the change in position; the arrows displayed depend on the respective measuring position  
The measuring position can be selected based on the accessibility of the scale drum (e. g., due to machine parts)
- **Center of rotation of the scale drum**  
Display of the positions
  - **Actual position**
  - **Target position**

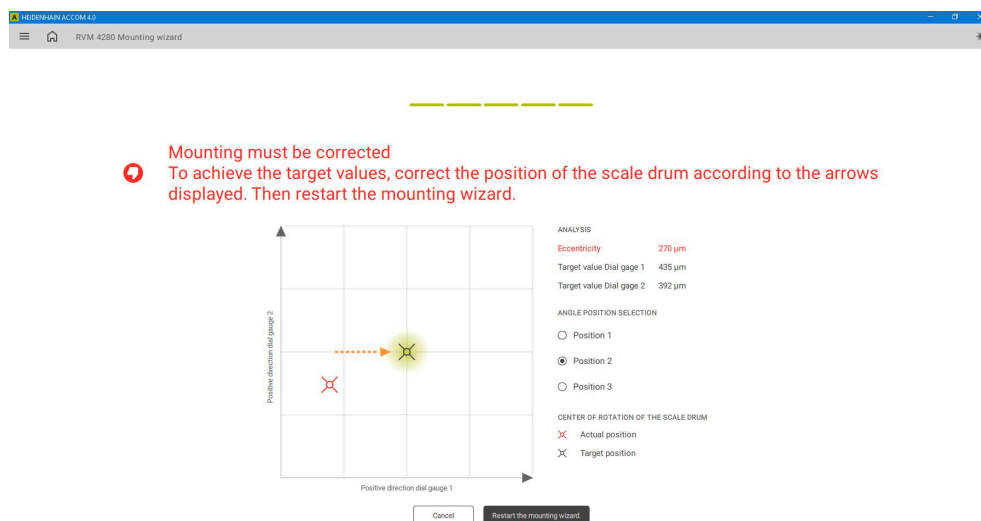


Figure 31: Example of compensation values

- ▶ Correct the position of the scale drum according to the arrows by slightly tapping with a rubber hammer until the specified target values on the dial gages have been reached
- ▶ Click **Restart the mounting wizard**.
- ▶ Execute the mounting wizard again



- You can execute the mounting wizard until ideal mounting is indicated
- Once the mounting wizard has been completed again, you can see the position corrections that have been made in the representation under **Center of rotation of the scale drum**

7

**RVM Free  
measurement  
module**

## 7.1 Overview

This chapter describes the **RVM Free measurement** module that allows you to prepare and perform a free measurement.

**i** The **RVM Free measurement** module is an auxiliary function that is not included in the software's standard range of functions.  
**Further information:** "Licensing", Page 18

### Call

- ▶ Click **RVM Free measurement** under **ACCOM Plus** in the module selection shown on the screen after startup
- > The **RVM Free measurement** module is opened.

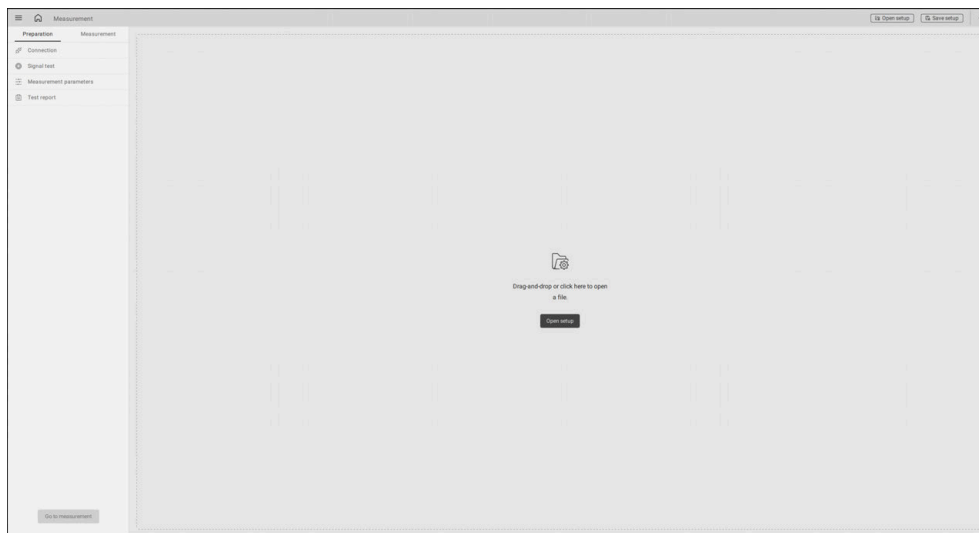


Figure 32: **RVM Free measurement** module

The **RVM Free measurement** module provides the **Measurement** and **Evaluation** functions.

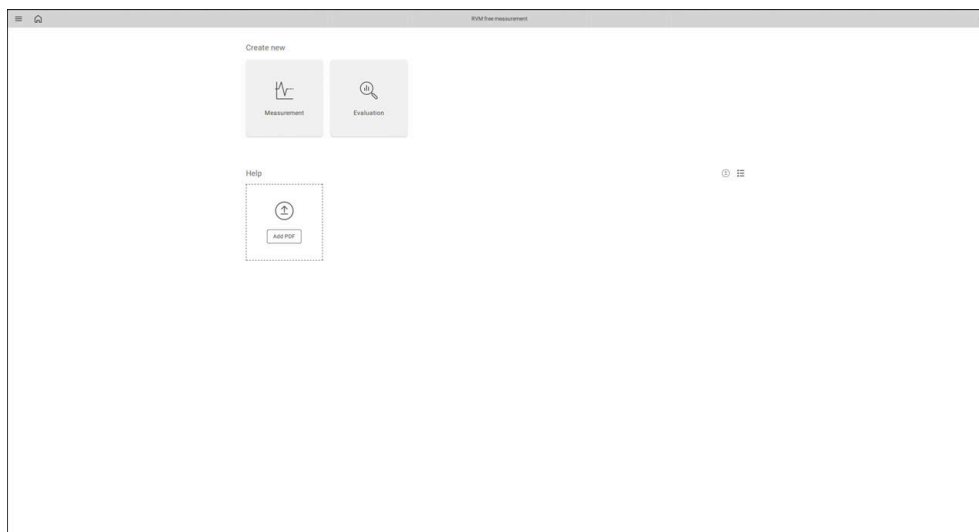


Figure 33: **RVM Free measurement** functions

## 7.2 Measurement

This chapter describes the **Measurement** function.

The **Measurement** function provides the **Preparation** submenu and the **Measurement** submenu.

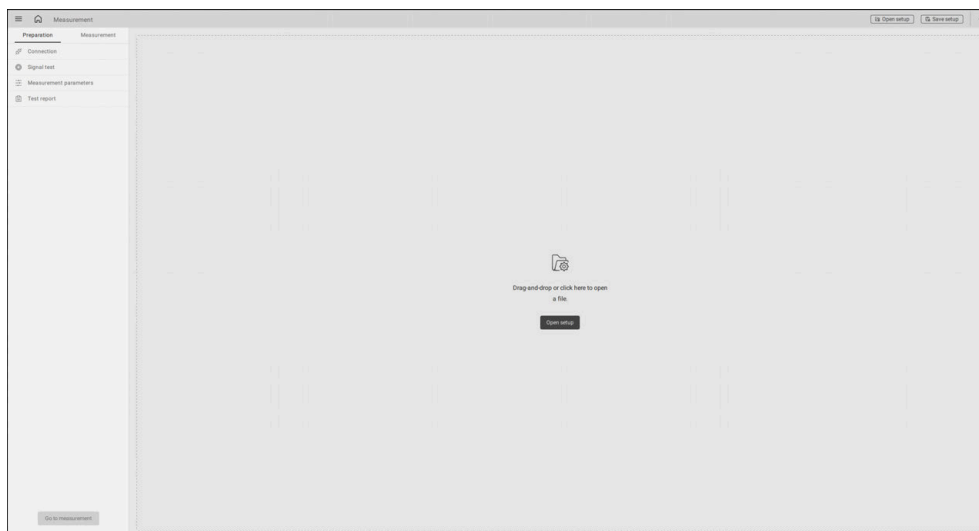


Figure 34: **Measurement** function

## 7.2.1 Preparing a Measurement

Requirement: Before starting with the measuring setup, thoroughly clean the area in which the measurement will be performed.

To prepare an **RVM Free measurement**:

- ▶ Click **Measurement** on the opening screen
- > The **Measurement** menu is opened.
- ▶ To set the parameters for the encoder and the measurement, click the individual menu items in the **Preparation** submenu

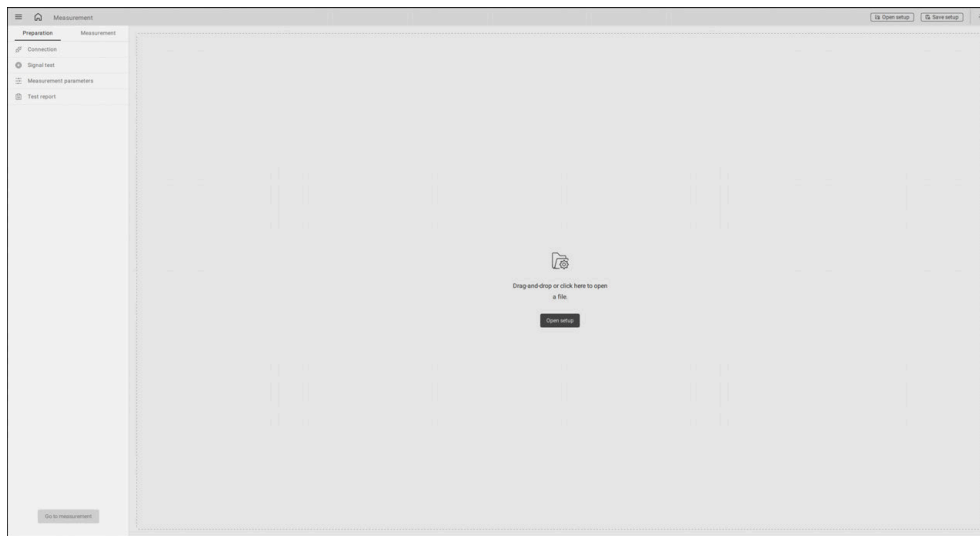


Figure 35: **Preparation** submenu



To prepare the measurement, edit the menu items of the **Preparation** submenu from top to bottom.

The menu structure of the **Preparation** submenu contains the following categories:

- **Connection**
- **Signal test**
- **Measurement parameters**
- **Test report**

When the measurement has been prepared, you can switch to the **Measurement** submenu.

### Connection

To connect the software to the EIB 74x:

- ▶ Enter the IP address of the EIB 74x
- ▶ To activate an automatic connection, drag the slide switch to the right
- ▶ Click **Connect**
- > The result of the connection setup is displayed.




### Signal test

The signal test allows you to check the mounting quality of the comparative encoder. For this purpose, the electrical connections and the mechanical mounting are evaluated.


Proceed as follows:



- ▶ Click **Start signal test**
- ▶ Using the machine control, move the axis under test smoothly and without reversing direction over the possible measuring range
- ▶ Click **Stop signal test**
- > The result is displayed.
- > With an RVM 4180 or RVM 4280:  
The encoder connected to the EIB 74x is detected and displayed.


 If the signal test fails, the signal test may have to be repeated.


### Measurement parameters

You can specify the measurement procedure by defining the measurement parameters.

 You can save the measurement parameters for the encoder in setup files and reuse them so that you won't have to reenter them every time a measurement is conducted.  
**Further information:** "Working with setup files", Page 80

 The  icon allows you to call help texts with additional explanations for some measurement parameters.

Measurement parameter	Explanation
<b>Direction of measurement</b>  	Selecting the direction of measurement: <ul style="list-style-type: none"> <li>■ <b>Positive</b></li> <li>■ <b>Negative</b></li> </ul>
<b>Axis under test</b>	Selecting the axis on which the measurement is conducted. A table axis is a <b>C</b> axis by default. The <b>A</b> axis or the <b>B</b> axis are tilting axes. <ul style="list-style-type: none"> <li>■ <b>A</b></li> <li>■ <b>B</b></li> <li>■ <b>C</b></li> </ul>

Measurement parameter	Explanation
Measurement procedure	<p>A default parameter set is preset for the measurement procedure.</p> <ul style="list-style-type: none"><li>■ <b>Current position of RVM:</b> 0° (to be read from the control)</li><li>■ <b>Sampling rate:</b> 5000 Hz</li><li>■ <b>Maximum measurement time:</b> 120 s</li></ul> <div style="border: 1px solid black; padding: 5px;"><p> The maximum sampling rate is 40 000 Hz. The maximum measurement time may be revised downward depending on the selected sampling rate, and vice versa.</p></div>

### Test report

In the test report, you can enter various information about the customer, the machine type, the reference encoder and the measurement. After the measurement, the measured values are added to the test report.

- ▶ To open the test report, click **Test report**
- > The test report is displayed.

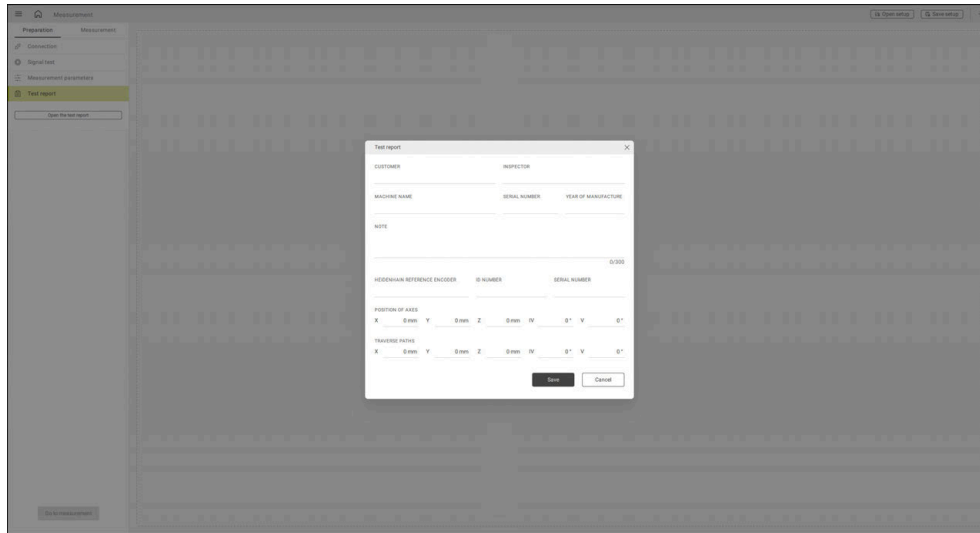


Figure 36: **Test report**

You can enter the following information in the test report:

Area	Explanation
<b>Miscellaneous</b>	Information on <b>Customer</b> and <b>Inspector</b>
<b>Machine name</b>	Information on the machine on which the measurement is conducted, such as the <b>Serial number</b> and <b>Year of manufacture</b>
<b>Note</b>	Individual information on the measurement
<b>HEIDENHAIN reference encoder</b>	Information on the reference encoder used, such as the <b>Serial number</b> and <b>ID number</b>
<b>Position of axes</b>	Current position of the linear axes <b>X, Y</b> and <b>Z</b> Current position of the rotary axes <b>IV</b> and <b>V</b>
<b>Traverse paths</b>	Traverse paths of the linear axes <b>X, Y</b> and <b>Z</b> Traverse paths of the rotary axes <b>IV</b> and <b>V</b>

**i** You can enter the information in the test report in advance and reuse it as a setup file.  
**Further information:** "Working with setup files", Page 80

## 7.2.2 Conducting a measurement

### **⚠ WARNING**

#### **Parts of the device may come off during measuring operation**

Crushing and impact hazards due to moving parts

- ▶ Close any doors or covers



Before the measurement, ensure that you have not activated any compensations—which affect the measurement—for controlling the rotational axis. Any active compensation tables must be taken into account in the evaluation.

You can conduct a measurement in the **Measurement** submenu.

Prerequisite: Active connection to the EIB 74x.

To open the **Measurement** submenu:

- ▶ Click the **Measurement** submenu in the **Measurement** function
- or
- ▶ Click **Go to measurement** in the **Preparation** submenu
- ▶ The **Measurement** submenu is opened.

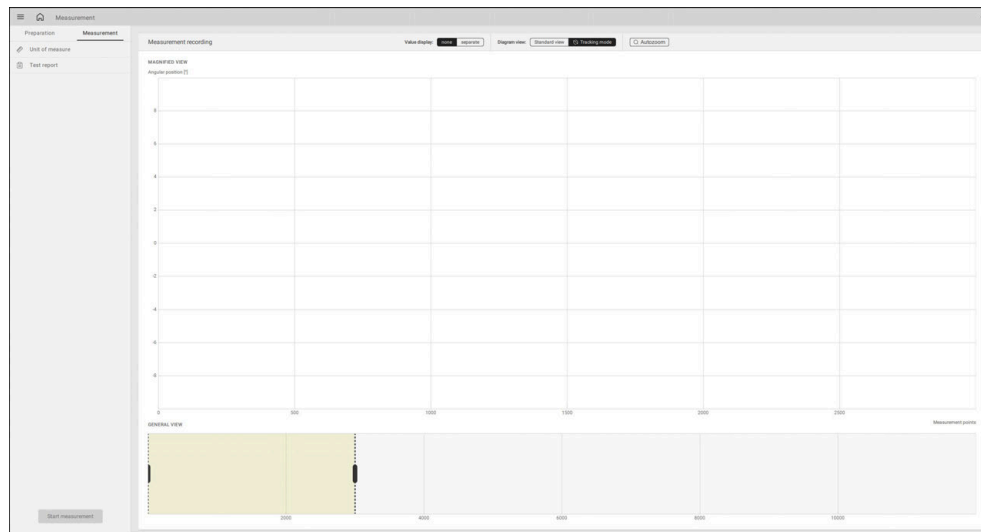


Figure 37: **Measurement** submenu

In the **Measurement** submenu, you can make the following settings:

- **Unit of measure**
- **Test report**

## Start measurement

You can start the measurement in the **Measurement** submenu.

Proceed as follows:

- ▶ Click **Begin Measure**
- ▶ Click **OK** in the dialog box
- ▶ Measuring points and angle positions are recorded in the measurement recording.

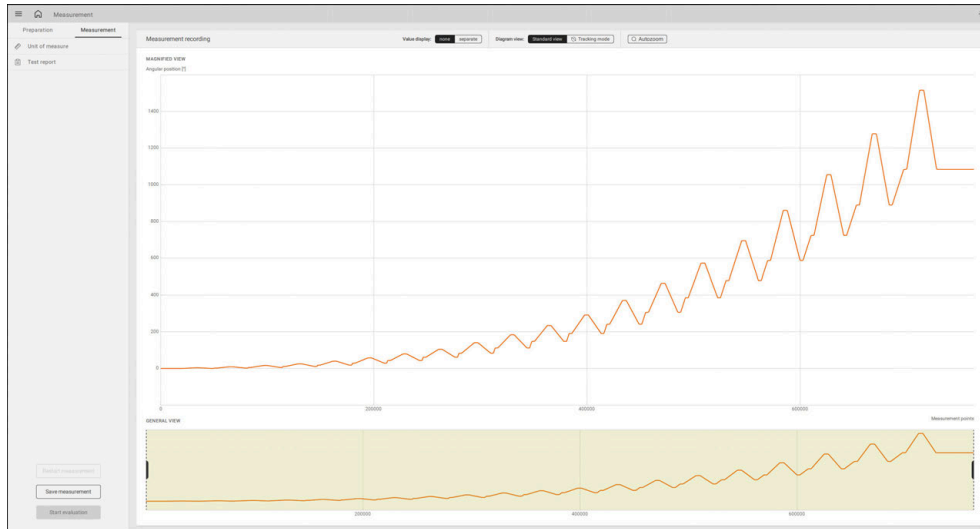


Figure 38: **Begin Measure**

During recording, you can stop or restart the measurement. After you have stopped the measurement, you can save the measured data.

## Test report

In the test report, you can enter various information about the customer, the machine type, the reference encoder, and the measurement. After the measurement, the measured values are added to the test report.

- ▶ To open the test report, click **Test report**
- > The test report is displayed.

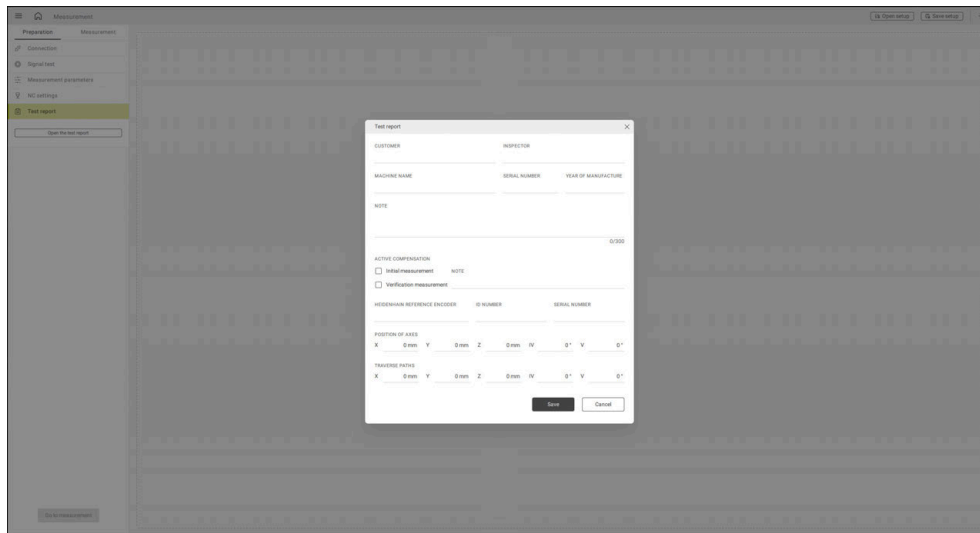


Figure 39: **Test report**

You can enter the following information in the test report:

Area	Explanation
<b>Miscellaneous</b>	Information on <b>Customer</b> and <b>Inspector</b>
<b>Machine name</b>	Information on the machine on which the measurement is conducted, such as the <b>Serial number</b> and <b>Year of manufacture</b>
<b>Note</b>	Specific information on the measurement
<b>HEIDENHAIN reference encoder</b>	Information on the reference encoder used, such as the <b>Serial number</b> and <b>ID number</b>
<b>Position of axes</b>	Current position of the linear axes <b>X</b> , <b>Y</b> , and <b>Z</b> Current position of the rotary axes <b>IV</b> and <b>V</b>
<b>Traverse paths</b>	Traverse paths of the linear axes <b>X</b> , <b>Y</b> , and <b>Z</b> Traverse paths of the rotary axes <b>IV</b> and <b>V</b>



You can enter the data in the test report in advance and reuse it as a setup file.

**Further information:** "Working with setup files", Page 41

## Saving a measurement

After completion of the measurement, you can save the measurement result.

Proceed as follows:

- ▶ Click **Finish Measurement**
- ▶ Click **Save measurement**
- > The **Save as** dialog box appears.
- ▶ Navigate to the desired storage location
- ▶ Enter the file name
- ▶ Click **Save**
- > The XRVF file is saved.

After saving, you can directly open the evaluation by clicking the displayed **Start evaluation** button.

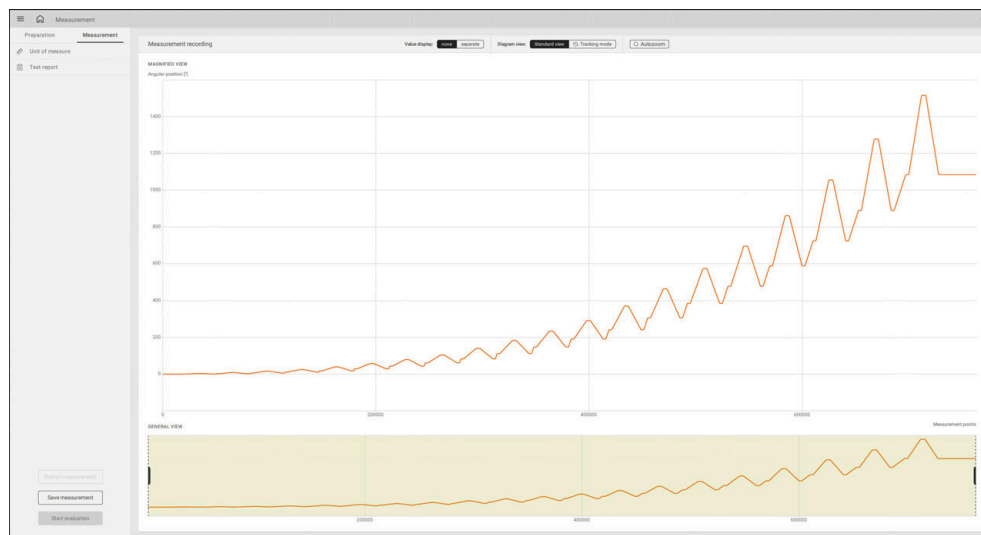


Figure 40: **Start evaluation** after saving

### 7.2.3 Working with setup files

Using setup files in XRVF format, you can prepare measurement parameters and test reports and reuse them as a template for further measurements.

#### Opening a setup file

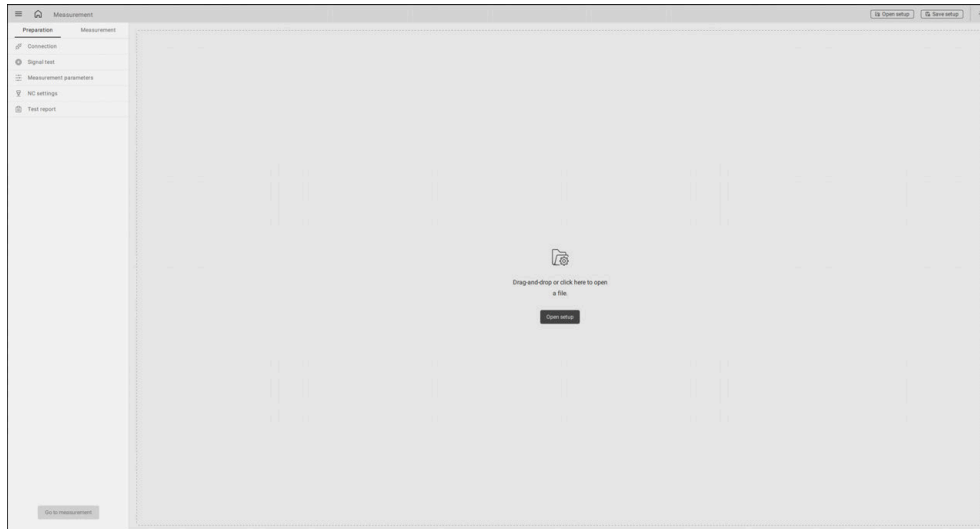


Figure 41: **Measurement** function

To open a prepared setup file:



- ▶ Click Main menu
  - ▶ Click **Open setup**
- or



- ▶ Click **Open setup** in the menu bar of the **Preparation** submenu
- > The **Open** dialog box appears.
- ▶ Navigate to the corresponding storage location of the desired XRVF file
- ▶ Select the desired XRVF file
- ▶ Click **Open**
- > The setup file is opened.



You can also open setup files by drag and drop in the **Measurement** function.



### Saving a setup file

After you have entered measurement parameters or filled out a test report in the **Measurement** function, you can save these contents as a setup file.

To save a setup file:



- ▶ Click **Main menu** in the **Preparation** submenu
  - ▶ Click **Save setup as**
- or



- ▶ Click **Save setup as** in the menu bar of the **Preparation** submenu
- > The **Save as** dialog box appears.
- ▶ Navigate to the desired storage location of the XRVF file
- ▶ Enter the file name
- ▶ Click **Save**
- > The setup file is saved.

## 7.3 Evaluation

This chapter describes the **Evaluation** function. The evaluation takes place after a measurement.

### 7.3.1 Opening a measurement for evaluation

You can open the **Evaluation** function on the opening screen. Select the previously saved file of the measurement you want to evaluate.

To evaluate a measurement file:

- ▶ Click **Evaluation** on the opening screen
- ▶ The **Open** dialog box appears.
- ▶ Navigate to the storage location of the measurement file
- ▶ Click the desired measurement file
- ▶ Click **Open**
- ▶ The measurement file is opened in the **Evaluation** function.

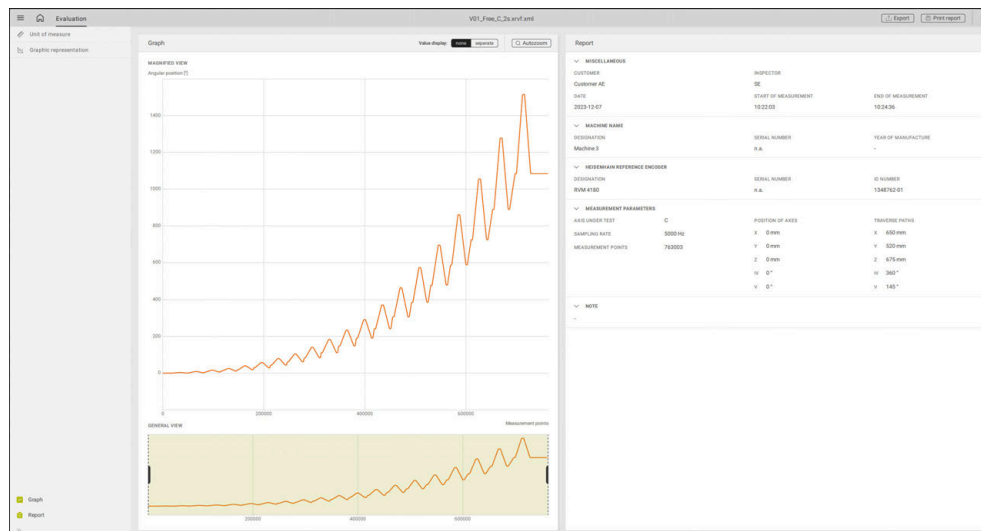


Figure 42: **Evaluation** function

You can also open the **Evaluation** function directly by pressing the corresponding button that will be displayed after saving the measurement.

**Further information:** "Saving a measurement", Page 41

### 7.3.2 Displaying an evaluation

The **Evaluation** function allows you to individually show or hide various displays. The following displays are available:

Display	Explanation
	<b>Graph</b> Click to show or hide the graph
	<b>Report</b> Click to show or hide the report



For a combination of multiple displays, you can simultaneously show two or three displays.

## Graph

**i** You can adapt the curves shown in the **Graph** display under **Graphic representation**.  
**Further information:** "Configuring the evaluation", Page 85

You can choose between various views in the **Graph** display:

View	Explanation
<b>General view</b>	Display of all recorded data
<b>Magnified view</b>	Display of selected detail

**i** The selection can be made:

- Using the slider in the General view
- Under **Graphic representation**

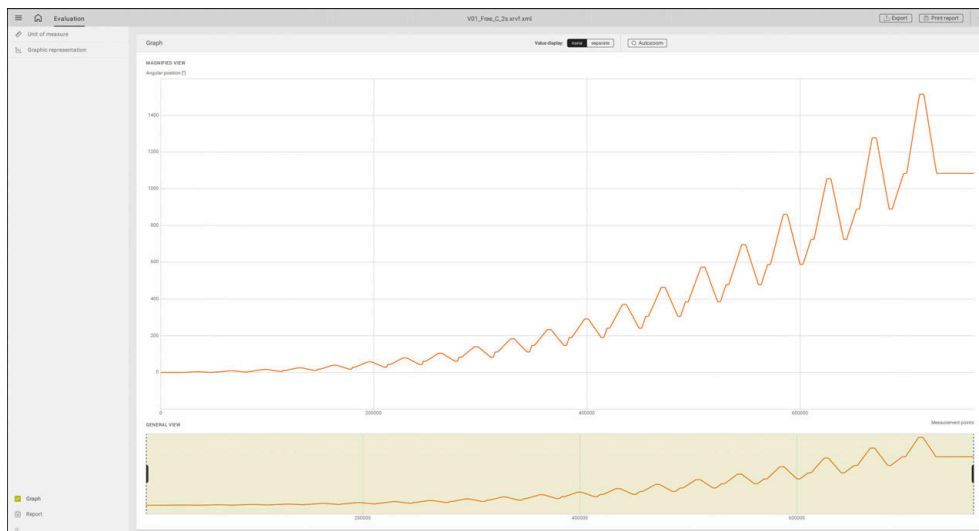


Figure 43: **Graph** display in the **Evaluation** function



### 7.3.3 Configuring the evaluation

The **Evaluation** function allows you to configure the display parameters for the measurement evaluation.

The following display parameters are available:

Display parameter	Explanation
<b>Unit of measure</b>	Selecting the unit of measure for the representation of the evaluation <b>Angular position</b> <ul style="list-style-type: none"> <li>■ Degrees</li> <li>■ rad</li> </ul> <b>Linear deviation</b> <ul style="list-style-type: none"> <li>■ <math>\mu\text{m}</math></li> <li>■ <math>\mu\text{in}</math></li> </ul>
<b>Graphic representation</b>	Mode of representation of the axes in the evaluation <b>Y axis</b> <ul style="list-style-type: none"> <li>■ <b>Display</b> <ul style="list-style-type: none"> <li>■ <b>Position</b></li> <li>■ <b>Linear deviation</b></li> </ul> </li> <li>■ <b>Scaling of Y axis</b> <p><b>Auto:</b> The Y axis is automatically scaled. All curves are displayed</p> <p><b>From... to...:</b> The display range can be delimited by entering values</p> </li> </ul> <b>X axis</b> <ul style="list-style-type: none"> <li>■ <b>Display</b> <ul style="list-style-type: none"> <li>■ <b>Measurement points</b></li> <li>■ <b>Measurement time</b></li> <li>■ <b>Measurement plane</b></li> </ul> </li> <li>■ <b>Scaling of X axis</b> <p><b>Auto:</b> The X axis is automatically scaled. The entire measuring range is displayed</p> <p><b>From... to...:</b> The displayed measuring range can be increased or reduced by entering values</p> </li> </ul>

### 7.3.4 Exporting measured data

The **Export** function allows you to export the measured data as a CSV file. This enables evaluation in other software programs.

To export the measured data:



- ▶ Click **Export** in the menu bar
- ▶ Select the storage location in the **Save as** dialog box
- ▶ Enter a file name
- ▶ Click **Save**
- > The measured data are exported and saved in the storage location.

### 7.3.5 Printing the report

You can print the test report on the installed printer.

Proceed as follows:



- ▶ Click **Print the report** in the menu bar
- ▶ In the **Print the report** dialog box, select the data that you want to add to the test report:
  - **Current view**
  - General view: **Position, X axis: Measurement points**, or **Measurement time**
  - General view: **Linear deviation, X axis: Measurement points**, or **Measurement time**
  - **Linear deviation (measuring plane)**
- ▶ Click **Continue**
- > The **Print** dialog box appears.
- ▶ Select the desired printer
- > The test report and the additional data are output to the selected printer.

# 8

**Settings**

## 8.1 Overview


This chapter describes settings for configuring the operation and representation mode.

## 8.2 Settings

You can open the settings in the **Main menu**. The following settings are available:

Parameter	Explanation
<b>User</b>	Selecting the user account. The following user accounts are available: <ul style="list-style-type: none"> <li>■ <b>Operator</b></li> <li>■ <b>Service</b> (for HEIDENHAIN Service only)</li> <li>■ <b>Developer</b> (for manufacturer only)</li> </ul>
<b>Language</b>	Selecting the language of the user interface. In addition to German and English, other languages are available.
<b>Reset</b>	Resetting to the factory default settings. The following data are reset: <ul style="list-style-type: none"> <li>■ Language</li> <li>■ Brightness mode</li> <li>■ Settings under measurement/preparation</li> <li>■ Saved setup files</li> </ul>

You can define the user interface display mode in the menu bar.

Operating element	Function
	<b>Light mode / Dark mode</b> Switching the display mode of the user interface

### 8.2.1 Setting the language

In the factory default setting, the user interface language corresponds to the language used by Microsoft Windows. You can change to another language, if desired.

To set the language:



- ▶ Click **Main menu** in the menu bar
- ▶ Click **Settings**
- ▶ Click **Language**
- ▶ Select the desired language in the **Select language** drop-down list
- ▶ Click **Save**
- > The user interface is shown in the selected language.



### 8.2.2 Resetting the settings

To reset the software to the factory default settings:

- ▶ Click **Reset** under **Settings**
- ▶ Click **Reset**
- ▶ Click **Reset** in the dialog box
- > All settings are reset.
- > The software restarts automatically.

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