



ERP 10xx

Mounting Instructions

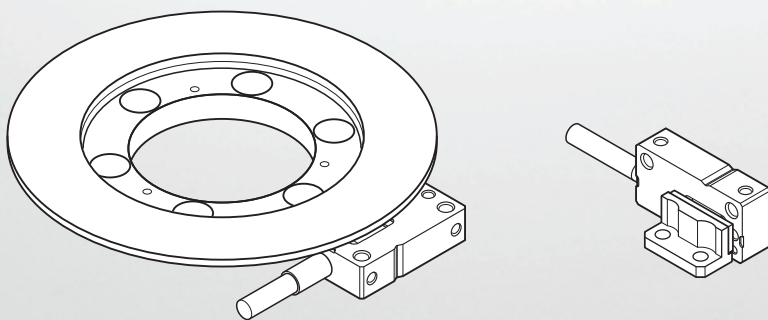


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1 Basic information

This chapter contains information about the product and the Mounting Instructions.

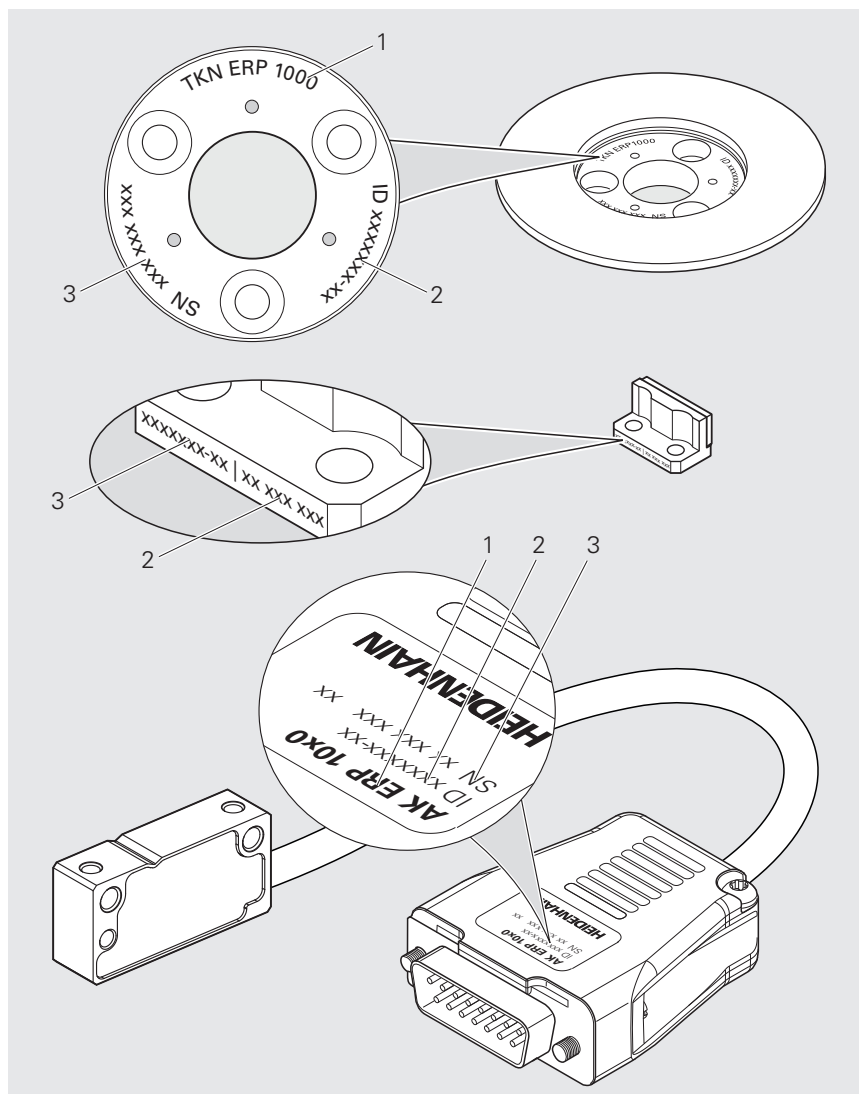
1.1 Applicability of the documentation

These Mounting Instructions are valid for the TKN ERP 1000, TKN ERP 1002, AK ERP 1010, AK ERP 1070, AK ERP 1080.

► Prior to using the documentation, check whether the documentation and product model match

The designation of the product is printed on the ID label.

ID label



ID label with legend

- 1 Product name
- 2 Product ID / Part number (ID)
- 3 Serial number (SN)

1.2 Target groups of the Mounting Instructions

The Mounting Instructions must be read and observed by every person who performs any of the following tasks:

- Design
- Mounting
- Removal

1.3 Notes on reading the documentation

WARNING

Fatal accidents, personal injury or property damage caused by non-compliance with the documentation!

Failure to comply with the documentation may result in fatal accidents, personal injury or property damage.

- ▶ Read the documentation carefully from beginning to end
- ▶ Keep the documentation for future reference

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, if applicable, of the Mounting Instructions. If an Addendum is included in the shipment, it has the highest priority for reading. All other documentation content retains its validity.
Operating Instructions	The Operating Instructions contain all of the information and safety instructions for the proper and intended operation of the device. The Operating Instructions (English language version) are included in delivery and can also be downloaded in other languages from www.heidenhain.com/documentation . The Operating Instructions must be read prior to initial operation of the product. The Operating Instructions have the second highest priority for reading.
Mounting Instructions	The Mounting Instructions contain all the information and safety precautions needed for the proper mounting and installation of a product. The Mounting Instructions are not included in delivery and must be downloaded from www.heidenhain.com/documentation . The Mounting Instructions have the third highest priority for reading.

Would you like any changes, or have you found any errors?

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

1.4 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: <ul style="list-style-type: none">▶ Tilt the shipping brace to remove it (c)> The shipping brace has been removed now
■ ...	Identifies an item of a list
■ ...	Example: <ul style="list-style-type: none">■ Solid contaminants: class 3■ Max. pressure dew point: class 4

1.5 Notes in this documentation

Safety precautions

Precautionary statements warn of hazards in handling the product 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 product. Informational notes are divided into the following groups:



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



The book symbol indicates a **cross reference**.
A cross reference leads to external documentation, for example: further documentation from HEIDENHAIN or another supplier.



The globe symbol represents a **cross reference** to a source on the Internet, e.g. www.heidenhain.com

1.6 Units and tolerances

Unless otherwise specified, the dimensions stated in these Mounting Instructions are given in millimeters.

Unless otherwise specified, the tolerances stated in these Mounting Instructions conform to ISO 8015 and ISO 2768 standards.

mm



Tolerancing ISO 8015
ISO 2768:1989-mH
≤ 6 mm: ±0.2 mm

2 Safety

This chapter provides important safety information needed for the proper mounting and installation of the product.

2.1 Personnel qualification

Mounting, initial configuration and removal must be conducted by a qualified specialist under compliance with local safety regulations.

2.2 General safety precautions

WARNING

Danger of electric shock due to connection to unsuitable downstream electronics!

If you connect unsuitable downstream electronics to the product, fatal accidents or severe personal injuries can occur.

- ▶ Connect the product only to downstream electronics whose supply voltage comes from PELV systems

WARNING

Live plug connections!

If you disengage plug connections while the equipment is under power, this may result in fatal accidents or severe personal injury.

- ▶ Do not engage or disengage any connecting elements while the product is under power

WARNING

Risk of injury from damaged or worn components!

Safety functions can fail if damaged or worn components are installed unintentionally. Failed safety functions can result in death or serious injury.

- ▶ Inspect the component for damage
- ▶ Do not use any damaged or worn components
- ▶ In case of replacement, repair the thread
- ▶ Use new screws, spring pins and nuts
- ▶ Secure screws and nuts with suitable material-bonding anti-rotation lock

NOTICE

Property damage due to mechanical stress!

- ▶ Do not drop the product or subject it to major vibration
- ▶ Do not expose the product to mechanical stress
- ▶ Do not change the physical structure of the product

NOTICE**Property damage due to electrical stress!**

- ▶ Do not engage or disengage any connecting elements while the product is under power
- ▶ Do not touch the contacts of the plug connections

NOTICE**Electrostatic discharge (ESD)!**

This product contains electrostatically sensitive components that can be destroyed by electrostatic discharge (ESD).


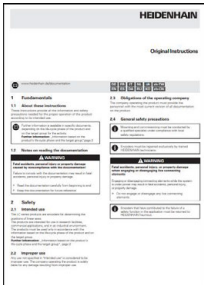

- ▶ It is essential to observe the safety precautions for handling ESD-sensitive components
- ▶ Never touch connector pins without ensuring proper grounding
- ▶ Wear a grounded ESD wristband when handling the connections of the product

3 Items supplied and accessories


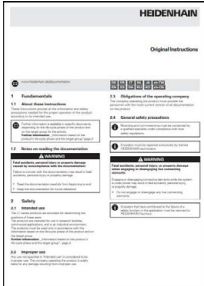

This chapter contains information on the items supplied and the available accessories of the product.

3.1 Items supplied

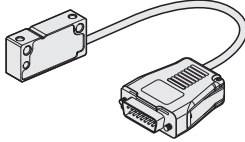
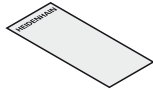
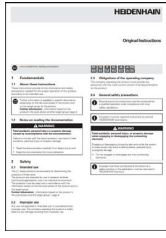

3.1.1 Items supplied: ERP 1000 circular scale

Component	Figure
Disk/hub assembly	
Operating Instructions	
Quality Inspection Document	

3.1.2 Items supplied: ERP 1002 circular scale

Component	Figure
Circular scale with hub segment	
Operating Instructions	
Quality Inspection Document	

3.1.3 Items supplied: Scanning head

Component	Figure
Scanning head	
Spacer shim	
Operating Instructions	
Manufacturer's Inspection Document	

3.2 Mounting accessories

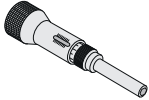
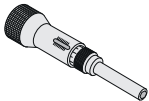
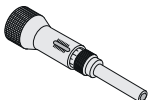


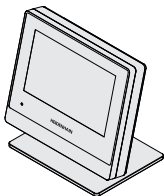
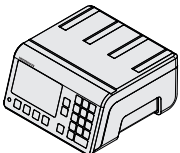
The following accessories can be ordered separately from HEIDENHAIN.



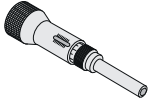

For more information on the listed products, please refer to the applicable Mounting Instructions and the **Modular Angle Encoders With Circular Scale** brochure.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1401414**

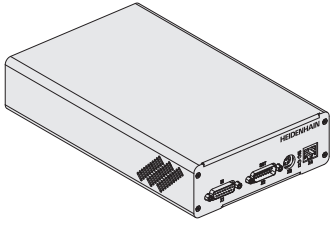
3.2.1 Accessories for mounting the ERP 1000 circular scale

Designation	ID	Figure
Torque screwdriver 0.2 Nm to 1.2 Nm	350379-04	
Torque screwdriver 1.0 Nm to 5.0 Nm	350379-04	
Torque screwdriver 0.02 Nm to 0.3 Nm	350379-10	
Screwdriver bit AF 2.5 mm	350378-05	
Screwdriver bit AF 3 mm	350378-10	
Optional: GAGE-CHEK 2000 or ND287 evaluation unit for centering with two scanning heads	1089181-xx	
	636287-01	

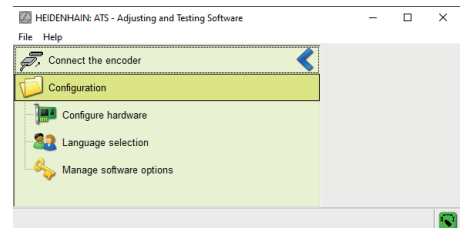
3.2.2 Accessories for mounting the ERP 1002 circular scale

Designation	ID	Figure
Torque screwdriver 0.2 Nm to 1.2 Nm	350379-04	
Screwdriver bit AF 1.5 mm	350378-01	

3.2.3 Accessories for mounting the scanning head

Designation	ID	Figure
PWM 21 inspection device	1200635-51	

Adjusting and Testing Software (ATS)



The ATS is available for download free of charge.

- ▶ www.heidenhain.com/service/downloads/software/
- ▶ Open the **Categories** selection menu
- ▶ Select the **Inspection and testing devices** category

4 Mounting

This chapter describes the mounting requirements, different mounting variants, and all other tasks necessary when mounting.

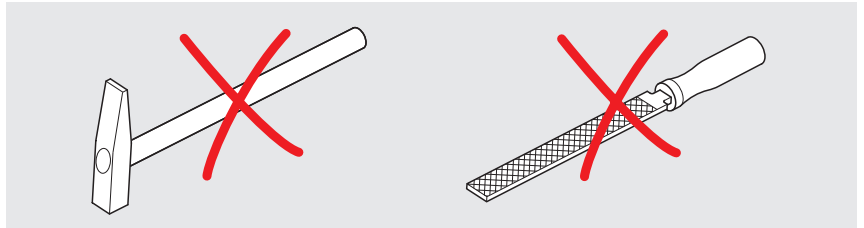
4.1 Requirements and notes

NOTICE

Property damage due to inappropriate tools!

Using inappropriate tools for mounting or removal of the encoder may cause damage to the encoder.

- ▶ Do not use hammers
- ▶ Do not use pointed or sharp-edged tools



i The mounting surfaces must be clean and free of burrs.

i The tightening torques of the mounting screws are only valid for mounting on steel.

In order to avoid signal interferences, observe the minimum clearance from sources of interference (e.g., power lines).

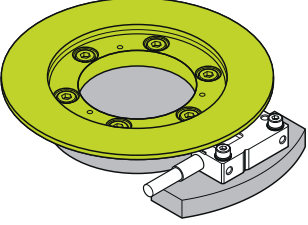
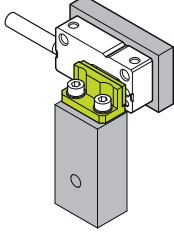
b For more information on sources of interference, refer to the **Interfaces of HEIDENHAIN Encoders** brochure.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1078628**

b For more information on mounting, refer to the **Mating Dimensions** document.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the product ID
- ▶ Open the product
- ▶ Open **Mating Dimensions**

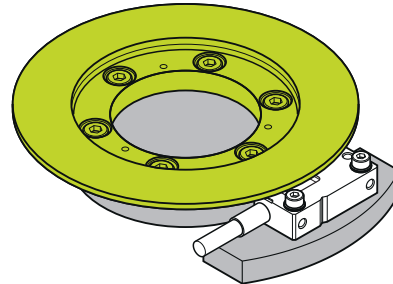
4.2 Selecting the product variant

Product variants	
ERP 1000: Disk/hub assembly	ERP 1002: Circular scale with hub segment
	
Page 17	Page 28

4.3 Mounting the ERP 1000

This chapter describes the mounting process for the ERP 1000 product variant.

For an overview of the product variants, refer to Page 16.

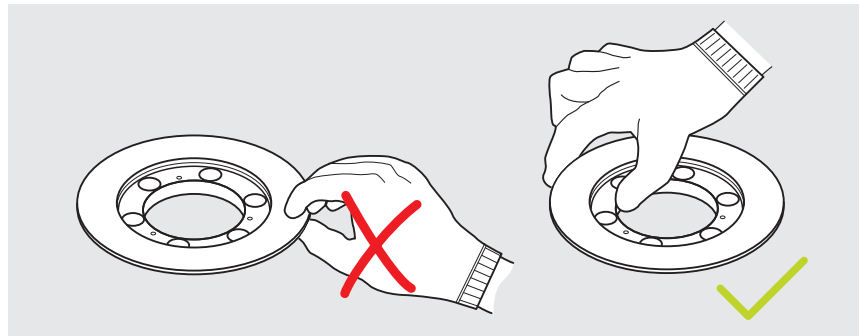


4.3.1 Mounting the circular scale

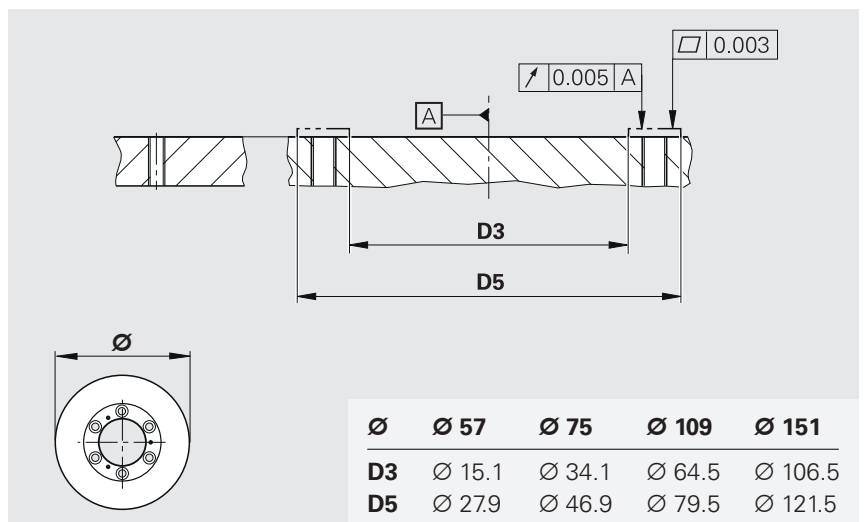
Mounting information

To avoid contamination, please note the following:

- Wear gloves when unpacking and mounting the circular scale
- Handle the graduation structure with care! Do not contaminate or scratch
- Only touch the sides of the circular scale



Pay attention to the mounting dimensions. Deviations from the mounting dimensions lead to imprecise measurement results during operation.



▣ = Bearing

Materials and tools

For this task, the following materials and tools are needed:

Included in delivery

To be provided separately

For the circular scale, \varnothing 57 mm:

- Three screws (ISO 4762 – M3 – 8.8)
- Torque screwdriver (hexagon socket, 2.5 mm)

For the circular scale, \varnothing 75 mm:

- Six screws (ISO 4762 – M3 – 8.8)
- Torque screwdriver (hexagon socket, 2.5 mm)

For the circular scale, \varnothing 109 mm or \varnothing 151 mm:

- Six screws (ISO 4762 – M4 – 8.8)
- Torque screwdriver (hexagon socket, 3 mm)

Mounting the circular scale

⚠ CAUTION

Irritation from isopropyl alcohol

Contact with isopropyl alcohol or inhaling isopropyl alcohol fumes can cause irritation affecting the skin, eyes, or respiratory system.

- ▶ Wear protective gloves and safety goggles
- ▶ Wear respiratory protection
- ▶ Keep the workplace well ventilated
- ▶ Comply with the manufacturer's safety data sheets

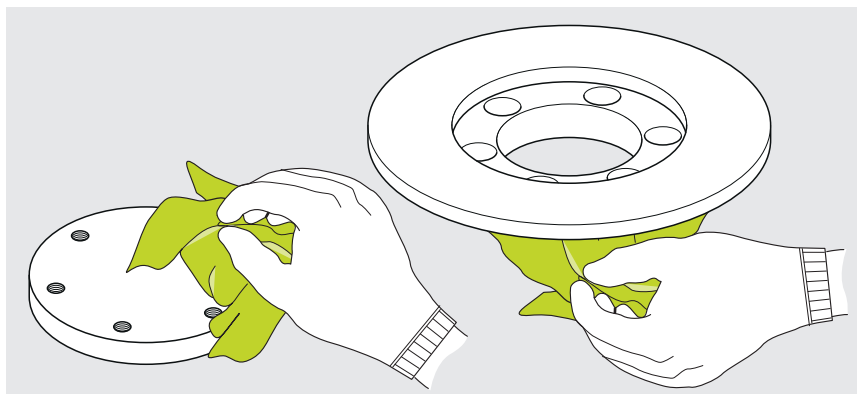
NOTICE

Property damage due to unsuitable cleaning agents!

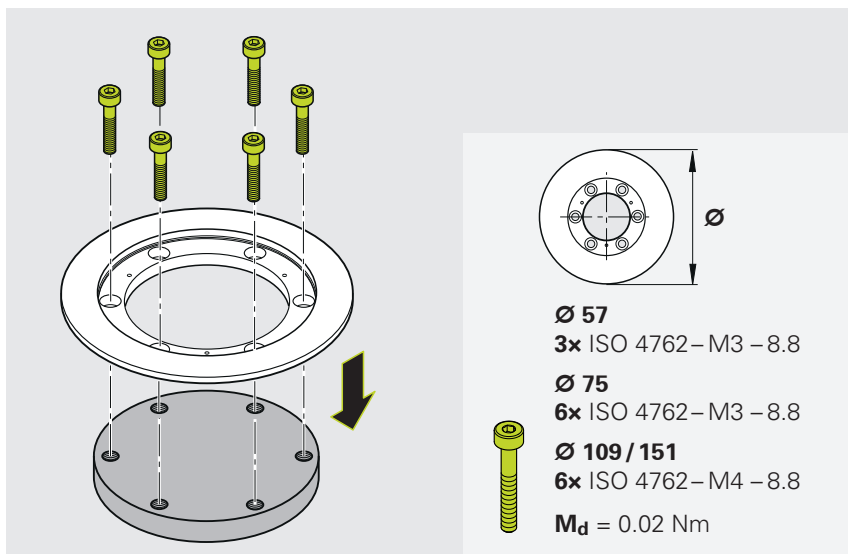
The use of inappropriate cleaning agents causes damage to the encoder.

- ▶ Use only isopropyl alcohol to clean the encoder
- ▶ Clean the encoder with a lint-free cloth

- ▶ If necessary, clean the graduation and the mounting surfaces with a lint-free cloth and isopropyl alcohol



- ▶ Slide the circular scale onto the mounting surface
- ▶ Insert the screws
- ▶ Tighten the screws with the specified torque



Centering the circular scale
Selecting the centering variant

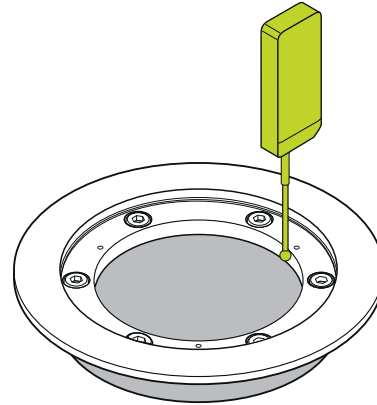
Centering variants

Centering with a length gauge	Centering with two scanning heads
Page 20	Page 23

Variant: Centering a with length gauge

This chapter describes the centering process using a length gauge.

For an overview of the centering variants, refer to Page 19.



Materials and tools

For this task, the following materials and tools are needed:

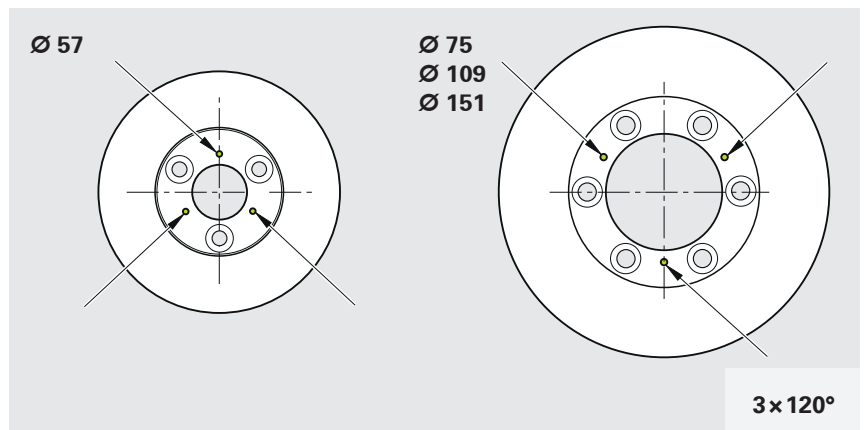
Included in delivery

To be provided separately

- Length gauge
 - For the circular scale, 57 mm or 75 mm:**
- Torque wrench (hexagon socket, 2.5 mm)
 - For the circular scale, \varnothing 109 mm or \varnothing 151 mm:**
- Torque wrench (hexagon socket, 3 mm)

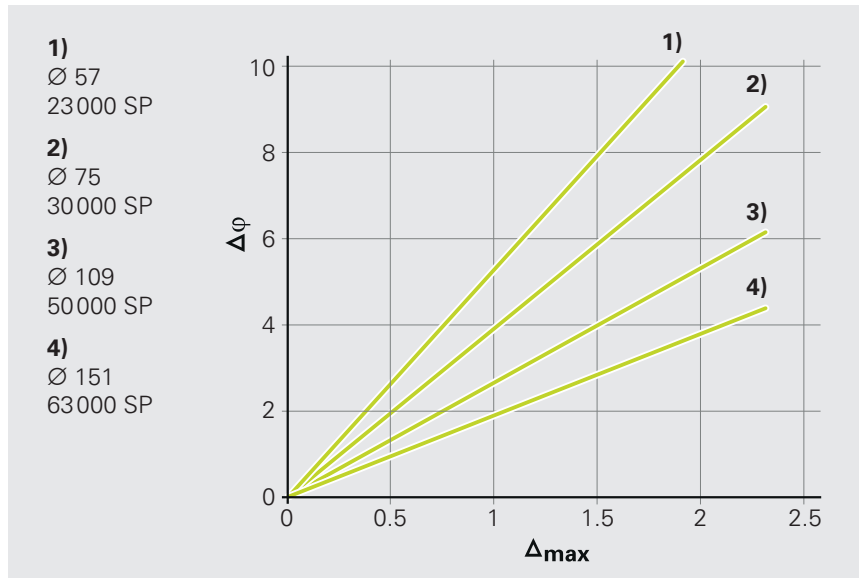
Centering with the length gauge

Centering is performed using the three marks.



Measurement error with three-point centering.

E	Resulting eccentricity of the disk/hub assembly in μm
$\Delta\varphi$	Measurement error in angular seconds due to eccentricity
Δ_{max}	Max. difference between the values measured at the three marks in μm
SP	Number of signal periods
R	Graduation diameter



$$E = 0.67 \cdot \Delta_{\text{max}}$$

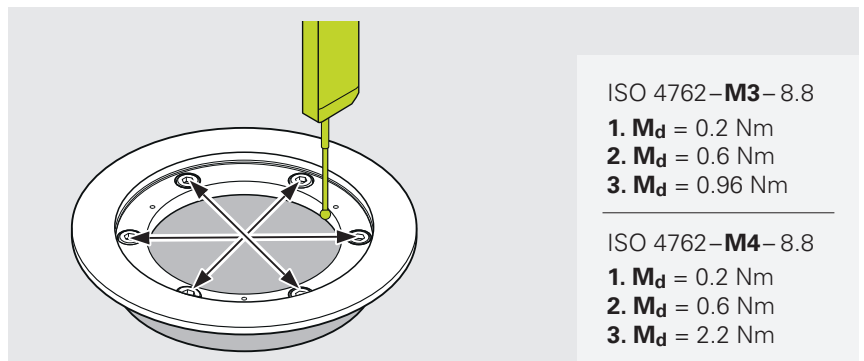
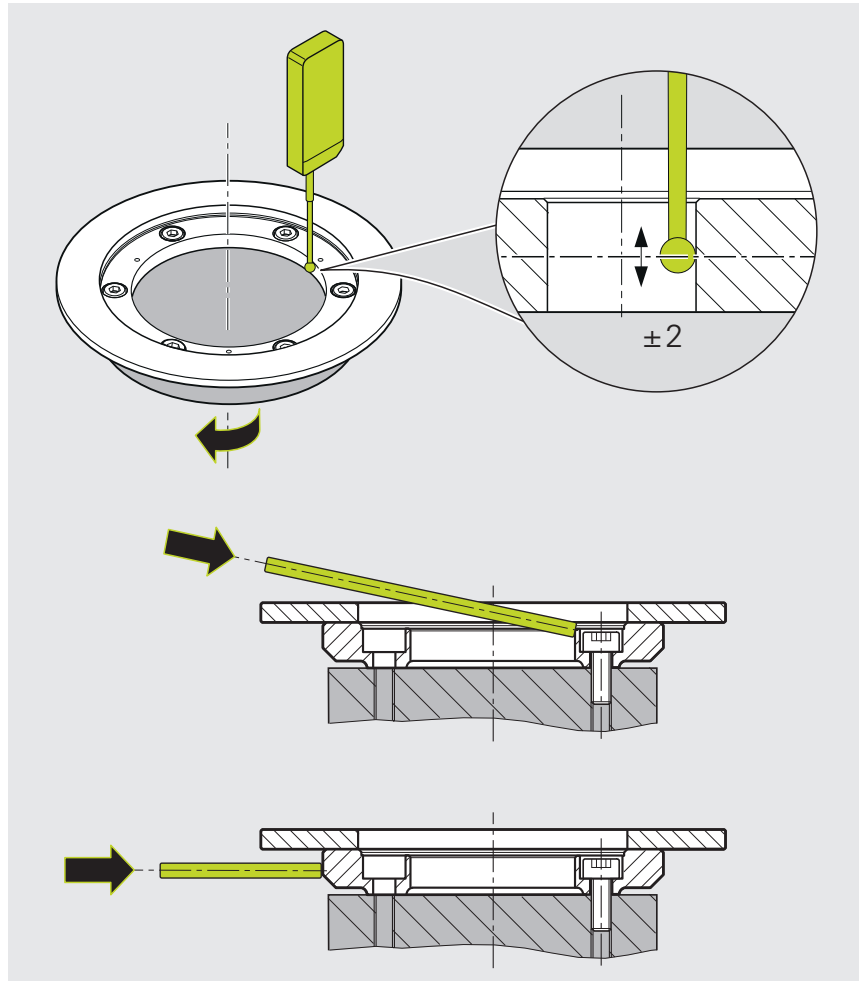
$$\Delta\varphi_1 = \pm \frac{412 \cdot E}{D}$$

Ø	Ø 57	Ø 75	Ø 109	Ø 151
SP / 360°	23000	30000	50000	63000
Ø D	Ø 52.5	Ø 71	Ø 104.5	Ø 146.5

NOTICE**Property damage due to mechanical stress!**

Using inappropriate tools or an inappropriate tapping position causes damage to the encoder.

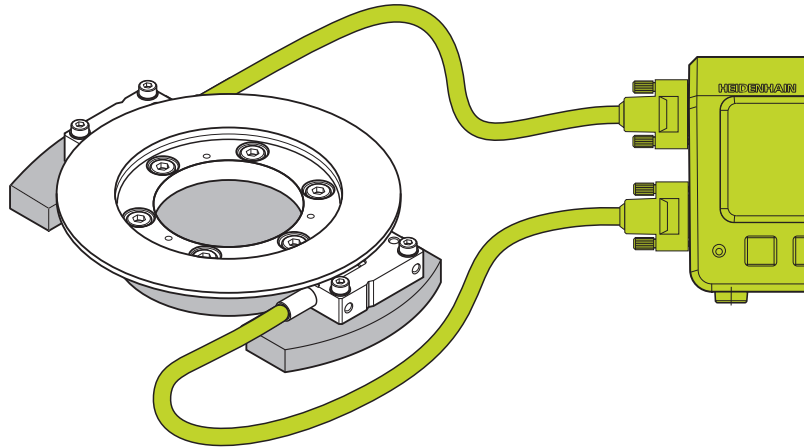
- Do not use metallic tools
 - Carefully tap only the inside or outside of the hub
 - Handle the graduation structure with care!
- ▶ Position the length gauge at the markings
 - ▶ Check the eccentricity
 - ▶ If necessary, lightly tap the inside or outside of the hub until the calculated eccentricity value is reached
- ▶ Tighten the screws crosswise in three steps with the specified torque
 - ▶ Check the eccentricity



Next step: "Mounting the scanning head", Page 24

Variant: Centering with two scanning heads

This chapter describes the centering process using two scanning heads. For an overview of the centering variants, refer to Page 19.



Materials and tools

For this task, the following materials and tools are needed:

Included in delivery

To be provided separately

- ND 287 or GAGE-CHEK 2000 evaluation unit
- Centering with Two Scanning Heads User's Manual, ID 1259987

Centering with two scanning heads

i Centering can only be performed after mounting a second scanning head. Mounting of the scanning heads is described on Page 24

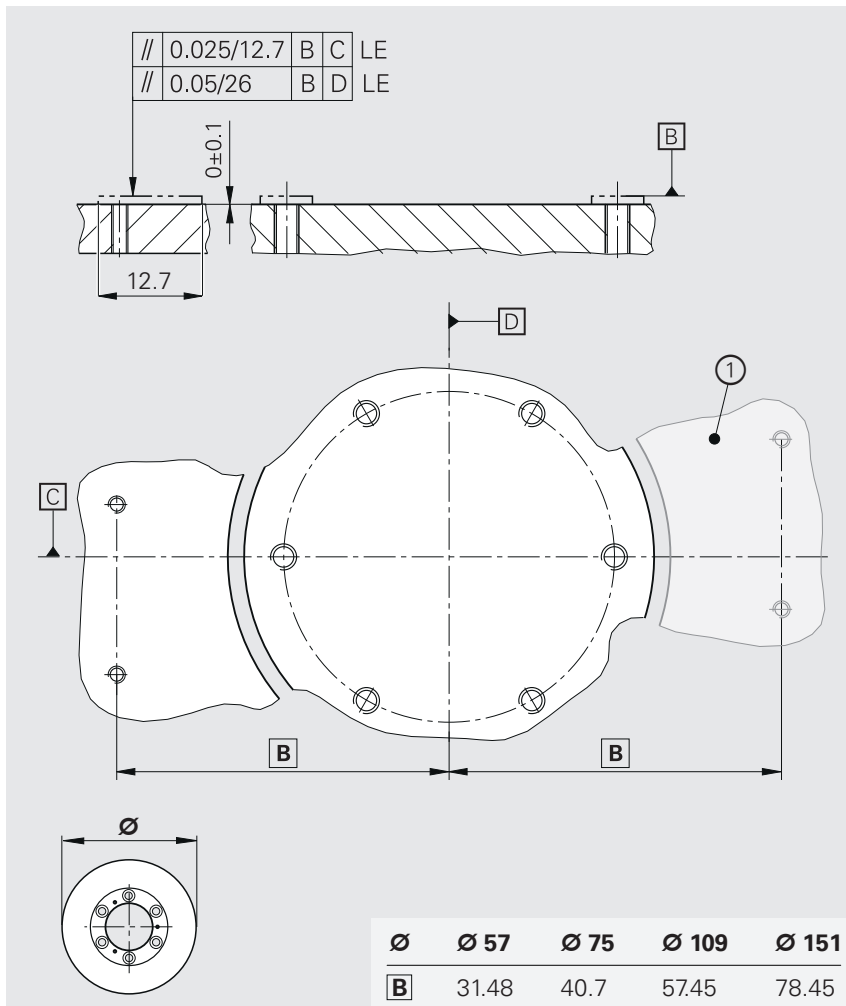
b Further information can be found in the **Centering with Two Scanning Heads** Mounting Instructions.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1259987**

4.3.2 Mounting the scanning head

Notes on mounting the scanning head

Pay attention to the mounting dimensions. Deviations from the mounting dimensions lead to imprecise measurement results during operation.



(1) Optional: when using the "Centering with two scanning heads" variant

Materials and tools

For this task, the following materials and tools are needed:

Included in delivery

To be provided separately

- Two screws (ISO 4762 – M2 – 8.8)
- Two washers (ISO 7092 – 2)
- Torque wrench (hexagon socket for 1.5 mm)
- PWM 21 inspection device

Mounting the scanning head

CAUTION

Irritation from isopropyl alcohol

Contact with isopropyl alcohol or inhaling isopropyl alcohol fumes can cause irritation affecting the skin, eyes, or respiratory system.

- ▶ Wear protective gloves and safety goggles
- ▶ Wear respiratory protection
- ▶ Keep the workplace well ventilated
- ▶ Comply with the manufacturer's safety data sheets

NOTICE

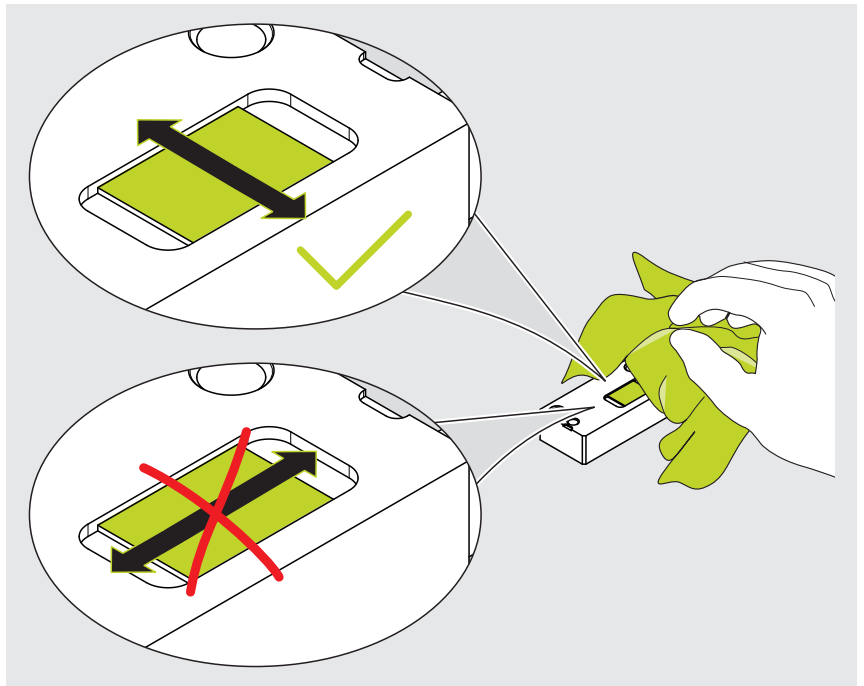
Property damage due to unsuitable cleaning agents!

The use of inappropriate cleaning agents causes damage to the encoder.

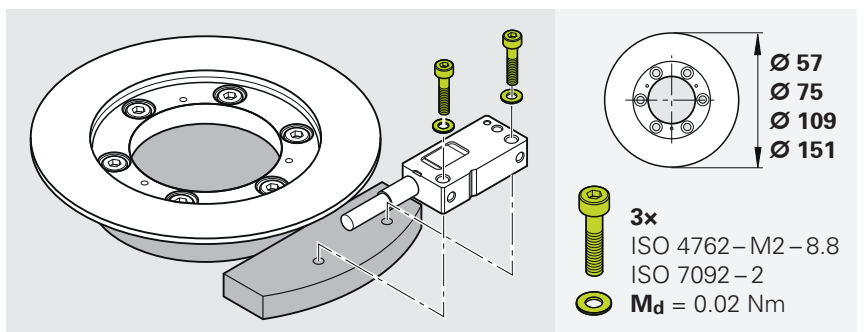
- ▶ Use only isopropyl alcohol to clean the encoder
- ▶ Clean the encoder with a lint-free cloth

When cleaning the product, take care to wipe the scanning window only in the specified direction.

- ▶ If necessary, clean the scanning window with a lint-free cloth and isopropyl alcohol
- ▶ If necessary, clean the graduation and the mounting surfaces with a lint-free cloth and isopropyl alcohol



- ▶ Carefully slide the scanning head into place on the mounting surface under the circular scale
- ▶ Insert the screws
- ▶ Tighten the screws with the specified torque



**For encoders with JST-SHR-12V-S connector:**

To be able to connect the mounting wizard, you have to mount the adapter connector.

Further information: "Mounting the adapter connector", Page 27

Next step: "Adjustment and diagnosis", Page 34

4.3.3 Mounting the adapter connector



For encoders with JST-SHR-12V-S connector:

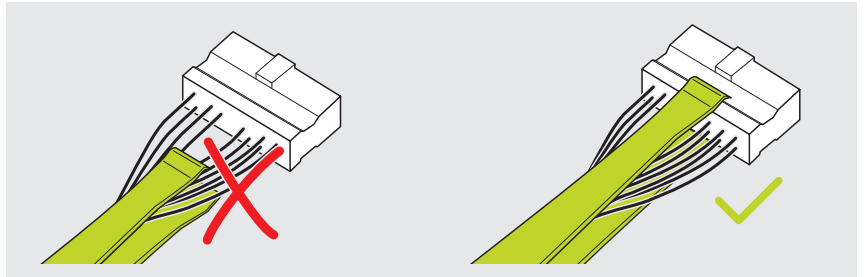
To be able to connect the mounting wizard, you have to mount the adapter connector.

NOTICE

Property damage due to improper mounting or removal of the cable assembly!

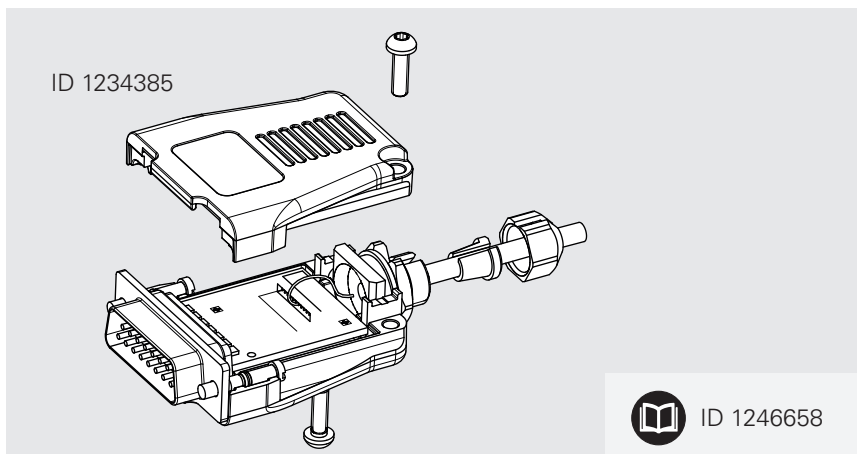
Tensile forces on the wires of the cable assembly can cause damage to the cable assembly.

- ▶ Use the mounting aid
 - ▶ Apply the mounting aid to the female header
-
- ▶ Mount the adapter connector (ID 1234385) according to the mounting instructions



Further information on mounting the adapter connector can be found in the **Adapter Connector** Mounting Instructions.

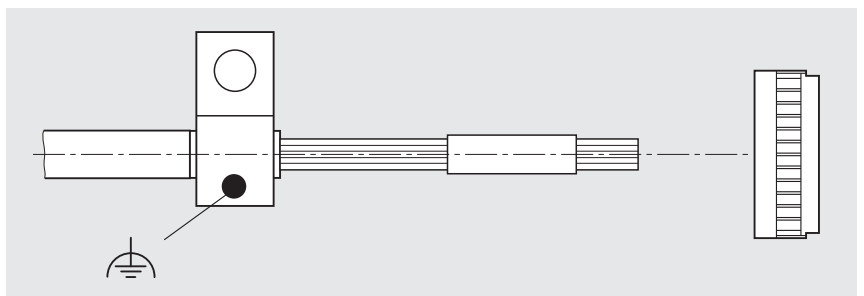
- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1246658**



- ▶ Use a cable clip and an M3x6 screw to attach the cable to the housing so that the connection is electrically conductive



After successful adjustment, you can remove the adapter connector again.



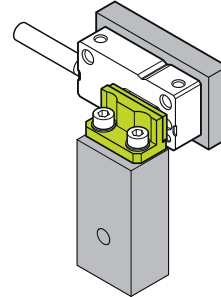
- ▶ Ensure electromagnetic compatibility of the complete system

Next step: "Adjustment and diagnosis", Page 34

4.4 Mounting the ERP 1002

This chapter describes the mounting process for the ERP 1002 product variant.

For an overview of the product variants, refer to Page 16.

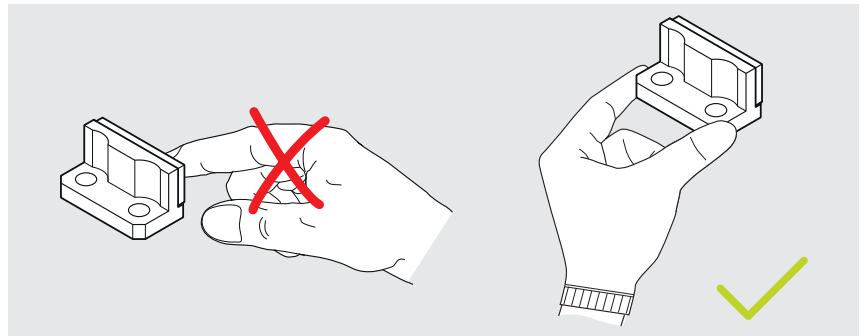


4.4.1 Mounting the circular scale

Mounting information

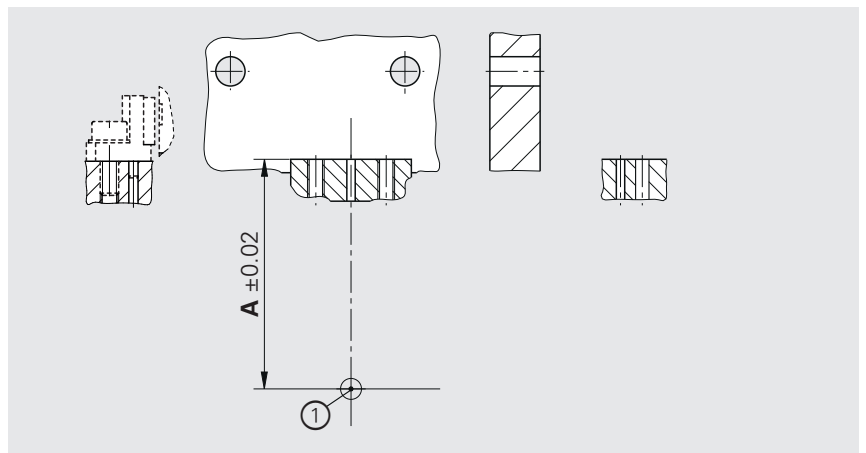
To avoid contamination, please note the following:

- Wear gloves when unpacking and mounting the circular scale
- Handle the graduation structure with care! Do not contaminate or scratch



Pay attention to the mounting dimensions. Deviations from the mounting dimensions lead to imprecise measurement results during operation.

(1)	Pivot
SP	Number of signal periods
MR	Measuring range
MR*	Required range to start up the system with the Adjusting and Testing Software



SP / 360°	23000	30000	50000	63000
MR	10° 23° 36°	8° 16° 31°	5° 11° 21°	4° 8° 15°
MR*	6.6°	5.2°	3.2°	2.4°
A	20.98	30.2	46.95	67.95

Materials and tools

For this task, the following materials and tools are needed:

Included in delivery

To be provided separately

- Two screws (ISO 4762 – M2 × 6 – 8.8)
- Torque wrench (hexagon socket, 1.5 mm)

Mounting the circular scale

⚠ CAUTION

Irritation from isopropyl alcohol

Contact with isopropyl alcohol or inhaling isopropyl alcohol fumes can cause irritation affecting the skin, eyes, or respiratory system.

- ▶ Wear protective gloves and safety goggles
- ▶ Wear respiratory protection
- ▶ Keep the workplace well ventilated
- ▶ Comply with the manufacturer's safety data sheets

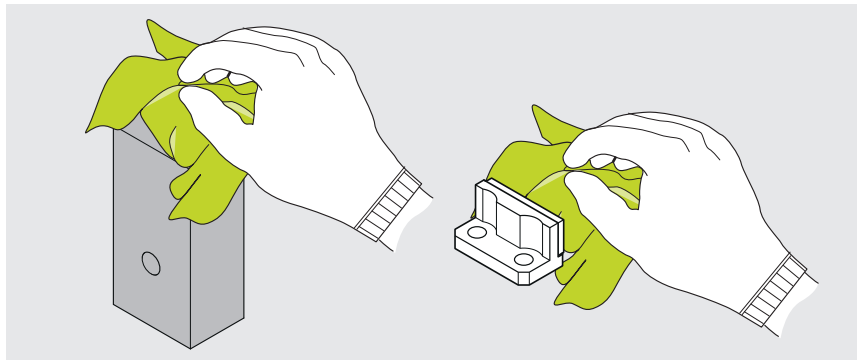
NOTICE

Property damage due to unsuitable cleaning agents!

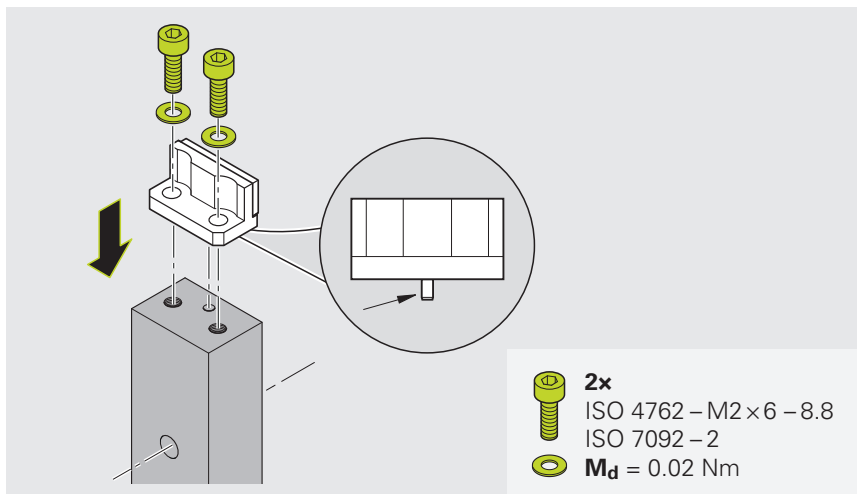
The use of inappropriate cleaning agents causes damage to the encoder.

- ▶ Use only isopropyl alcohol to clean the encoder
- ▶ Clean the encoder with a lint-free cloth

- ▶ If necessary, clean the graduation and the mounting surfaces with a lint-free cloth and isopropyl alcohol



- ▶ Slide the circular scale onto the mounting surface
- ▶ Insert the screws
- ▶ Tighten the screws with the specified torque

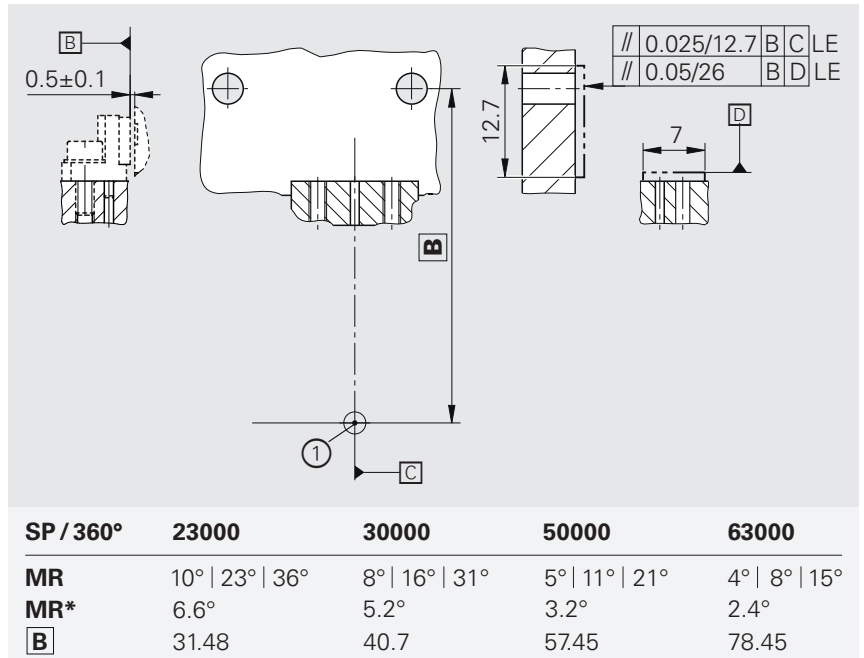


4.4.2 Mounting the scanning head

Mounting information

Pay attention to the mounting dimensions. Deviations from the mounting dimensions lead to imprecise measurement results during operation.

(1)	Pivot
SP	Number of signal periods
MR	Measuring range
MR*	Required range to start up the system with the Adjusting and Testing Software



Materials and tools

For this task, the following materials and tools are needed:

Included in delivery

To be provided separately

- Two screws (ISO 4762 – M3× (a+6) – 8.8)
- Torque wrench (hexagon socket for 2.5 mm)
- PWM 21 inspection device

Mounting the scanning head

⚠ CAUTION

Irritation from isopropyl alcohol

Contact with isopropyl alcohol or inhaling isopropyl alcohol fumes can cause irritation affecting the skin, eyes, or respiratory system.

- ▶ Wear protective gloves and safety goggles
- ▶ Wear respiratory protection
- ▶ Keep the workplace well ventilated
- ▶ Comply with the manufacturer's safety data sheets

NOTICE

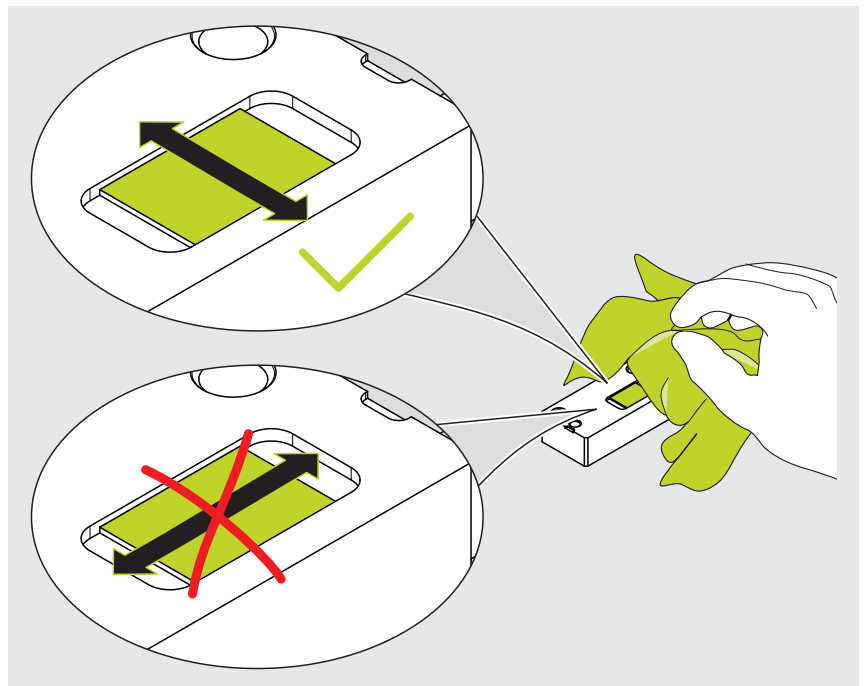
Property damage due to unsuitable cleaning agents!

The use of inappropriate cleaning agents causes damage to the encoder.

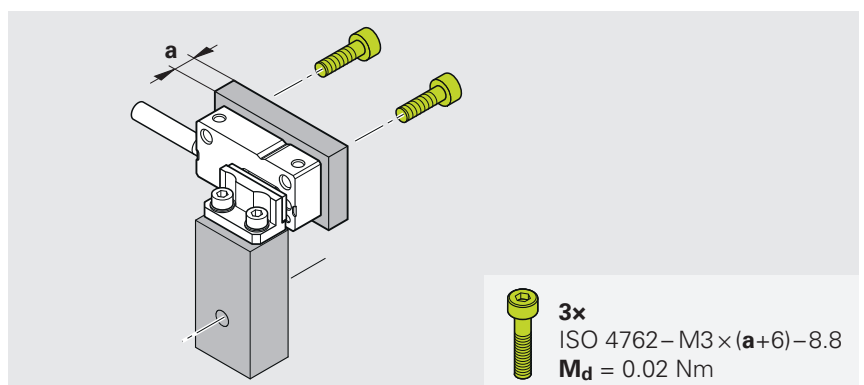
- ▶ Use only isopropyl alcohol to clean the encoder
- ▶ Clean the encoder with a lint-free cloth

When cleaning the product, take care to wipe the scanning window only in the specified direction.

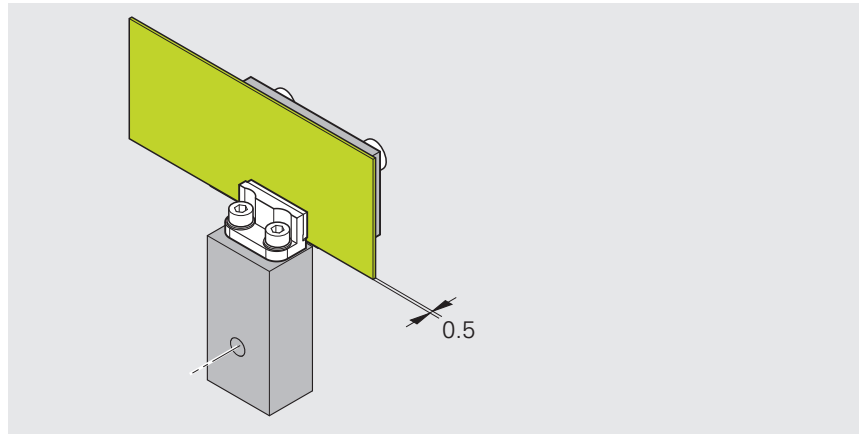
- ▶ If necessary, clean the scanning window with a lint-free cloth and isopropyl alcohol
- ▶ If necessary, clean the graduation and the mounting surfaces with a lint-free cloth and isopropyl alcohol



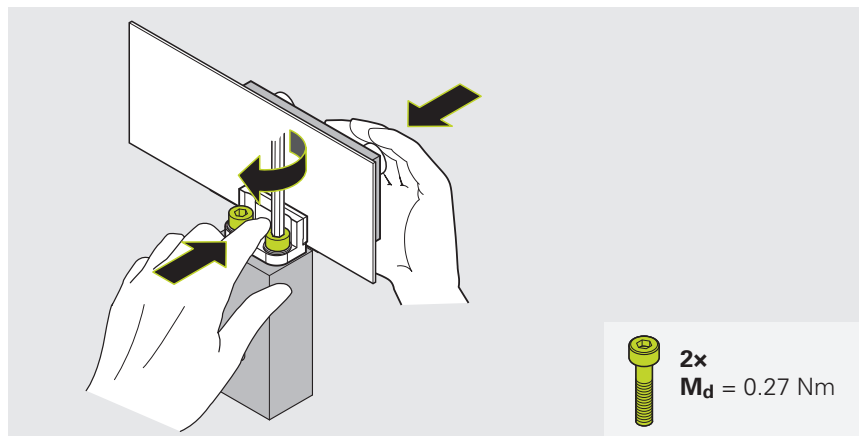
- ▶ Carefully slide the scanning head onto the mounting surface
- ▶ Insert the screws
- ▶ Tighten the screws with the specified torque



- ▶ Use the spacer shim to set the mounting clearance



- ▶ Align the circular scale to the scanning head by rotating it about the centering pin.
- ▶ Tighten the screws on the circular scale with the specified torque
- ▶ Remove the spacer shim



For encoders with JST-SHR-12V-S connector:

To be able to connect the mounting wizard, you have to mount the adapter connector.

Further information: "Mounting the adapter connector", Page 27

Next step: "Adjustment and diagnosis", Page 34

4.4.3 Mounting the adapter connector



For encoders with JST-SHR-12V-S connector:

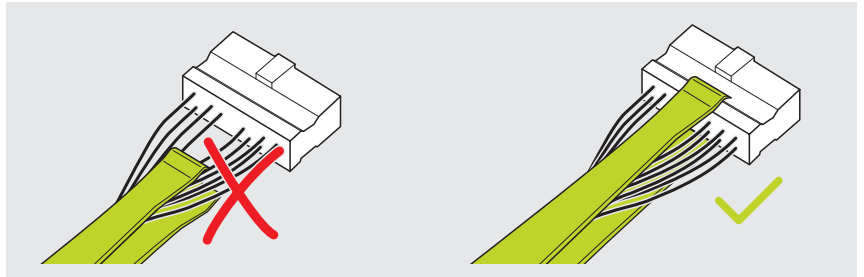
To be able to connect the mounting wizard, you have to mount the adapter connector.

NOTICE

Property damage due to improper mounting or removal of the cable assembly!

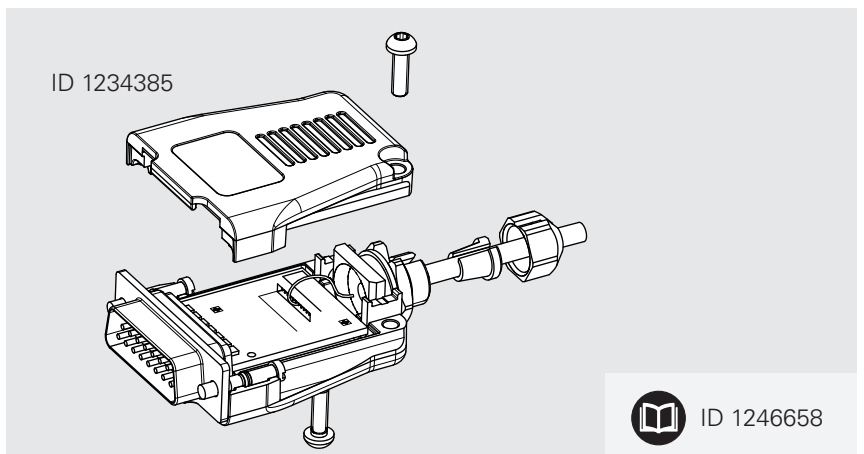
Tensile forces on the wires of the cable assembly can cause damage to the cable assembly.

- ▶ Use the mounting aid
 - ▶ Apply the mounting aid to the female header
-
- ▶ Mount the adapter connector (ID 1234385) according to the mounting instructions



Further information on mounting the adapter connector can be found in the **Adapter Connector** Mounting Instructions.

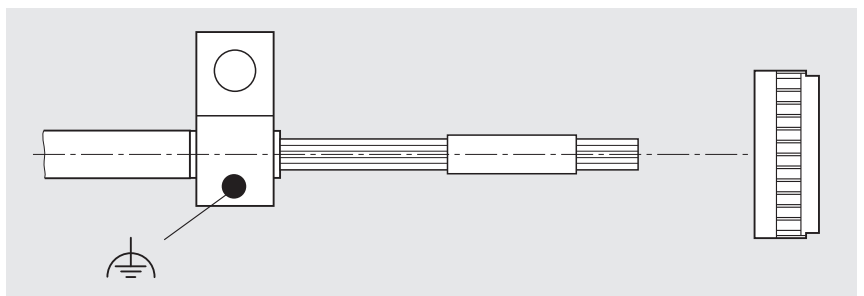
- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1246658**



- ▶ Use a cable clip and an M3x6 screw to attach the cable to the housing so that the connection is electrically conductive



After successful adjustment, you can remove the adapter connector again.



- ▶ Ensure electromagnetic compatibility of the complete system

Next step: "Adjustment and diagnosis", Page 34

5 Adjustment and diagnosis

This chapter describes the continuity test, as well as the adjustment and diagnosis with the PWM 21 and the Adjusting and Testing Software (ATS).

5.1 Requirements and notes

The following components are needed for the adjustment and diagnosis of HEIDENHAIN encoders:

- PWM 21
- ATS – if a special version (SVxx.x.x) for a specific device is available, use the special version. If no special version is available, use the latest version (Vx.x.xx).



The ATS is available for download free of charge.

- ▶ www.heidenhain.com/service/downloads/software/
- ▶ Open the **Categories** selection menu
- ▶ Select the **Inspection and testing devices** category



For more information, refer to the applicable **Adjusting and Testing Software** documentation.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **543734**



For more information, refer to the **Modular Angle Encoders With Circular Scale** brochure.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1401414**

5.2 Continuity check

5.2.1 Materials and tools

For this mounting step, the following materials and tools are needed:

Included in delivery

To be provided separately

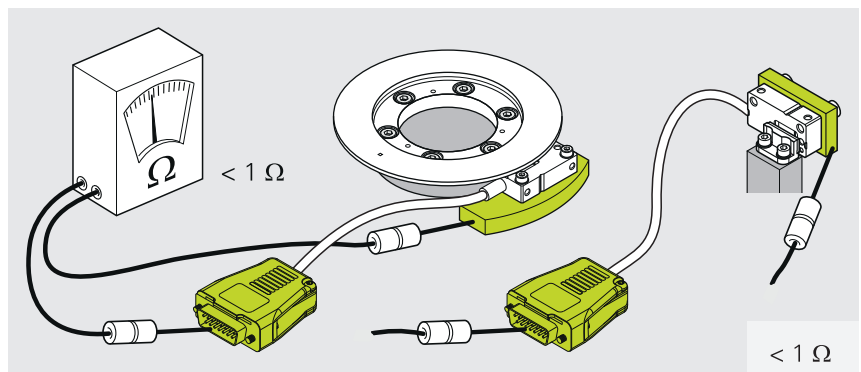
- Resistance measuring device

5.2.2 Measuring the electrical resistance

- ▶ Check the electrical resistance between the connector housing and the machine



The electrical resistance between the connector housing and the machine must be $< 1 \Omega$.



5.3 Selecting the scanning head

Scanning head variants	
ERP 1010	ERP 1070, ERP 1080
Scanning head with the EnDat 2.2 interface Page 36	Scanning head with a TTL or 1 V _{PP} interface Page 48

5.4 Adjustment and diagnosis of ERP 1010

5.4.1 Connecting the encoder to the ATS

Connecting the encoder

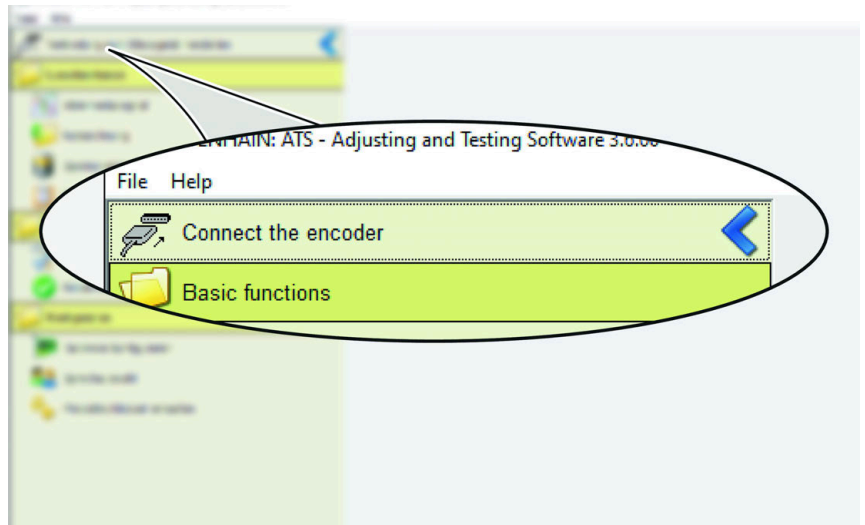
- ▶ Connect the encoder to the PWM 21
- ▶ Switch on the PWM 21

Selecting the connection

Connection options	
Connecting the encoder using its ID	Connecting the encoder manually
Recommended option with automatic determination of the measuring parameters.	Alternative option if the encoder cannot be connected using its ID.
Page 37	Page 38

Connecting the encoder using its ID

- ▶ Double-click **Connect the encoder** in the function menu
- > The **Encoder selection** dialog opens



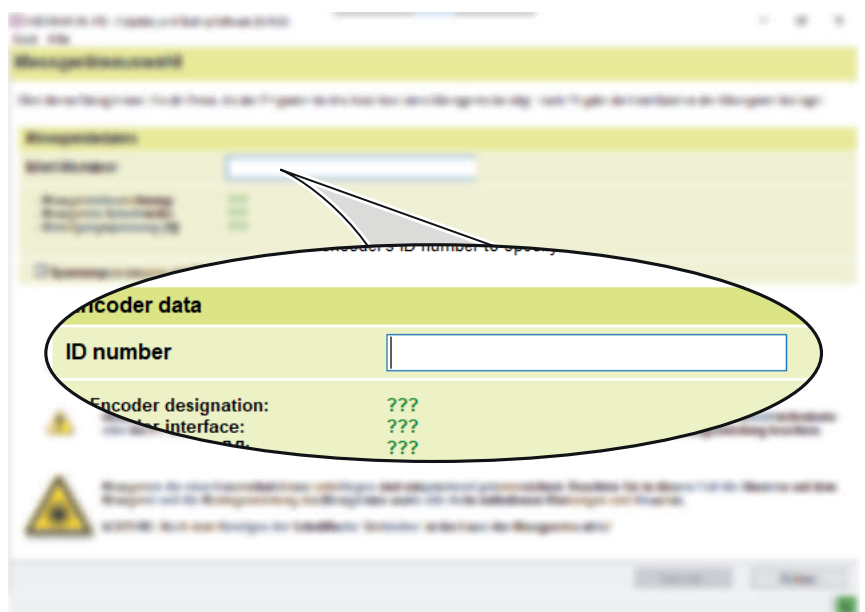
The **Function menu**

- ▶ Enter the product ID of the scanning head in the **ID number** field
- > The determined encoder parameters are shown in the **Encoder data** field.



If the ID number is not recognized, please enter the variant XXXXXXXX-00.

- ▶ Click **Connect**
- > The connection to the encoder is established.
- > The **Function menu** is displayed.



The **Encoder selection dialog**

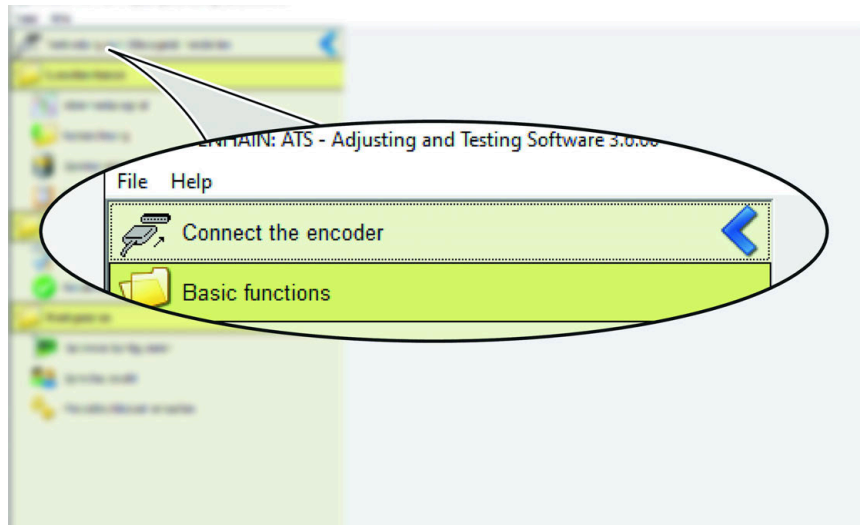


If you cannot connect the encoder using its ID, proceed as described in the "**Connecting the encoder manually**" chapter.

Next step: "Adjusting the scanning head", Page 41

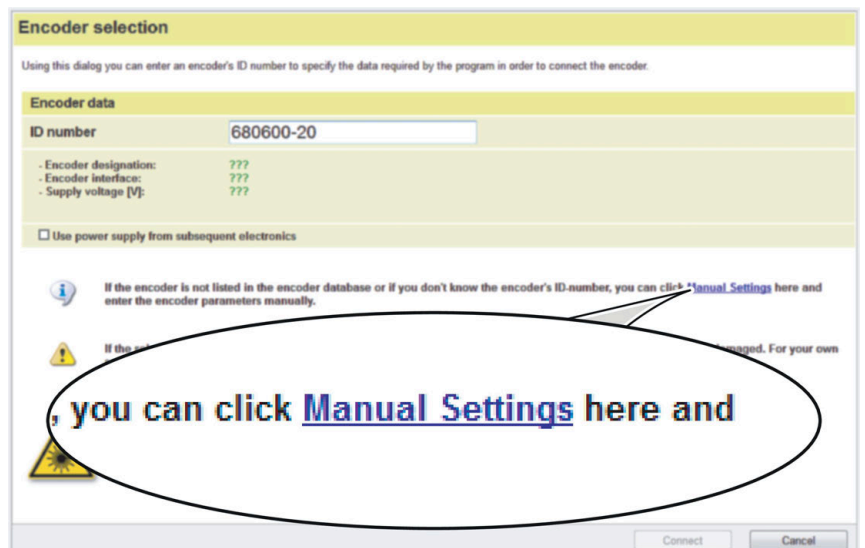
Connecting the encoder manually

- ▶ Double-click **Connect the encoder** in the function menu
- ▶ The **Encoder selection** dialog opens.



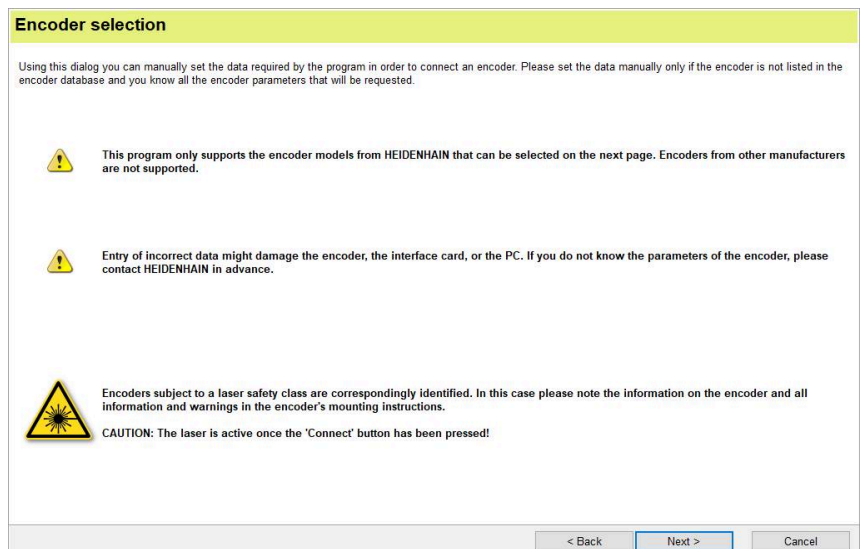
The Function menu

- ▶ Click **Manual Settings**
- ▶ The **Encoder selection** dialog opens.



The **Encoder selection** dialog

- ▶ Follow the safety instructions
- ▶ Click **Next**
- ▶ The **Encoder selection** dialog opens.



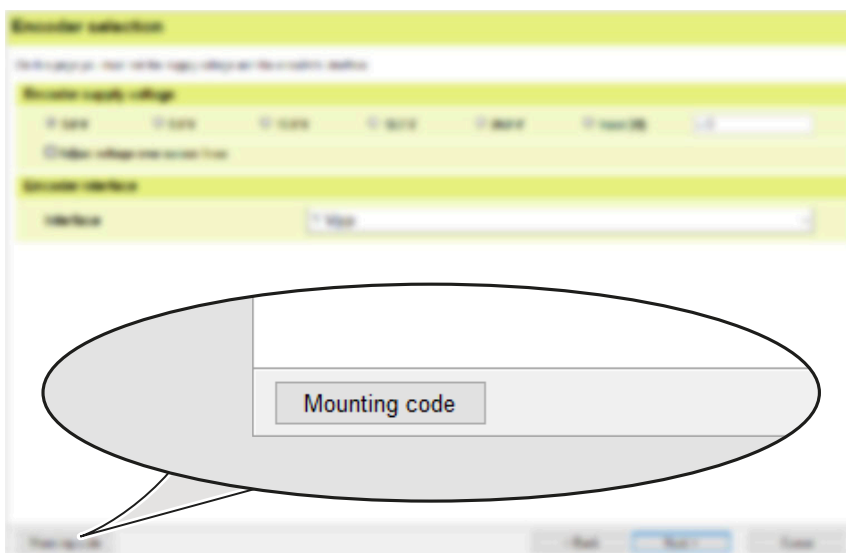
The **Encoder selection** dialog



For more information on the supply voltage and interfaces, refer to the **Modular Angle Encoders With Circular Scale** brochure.

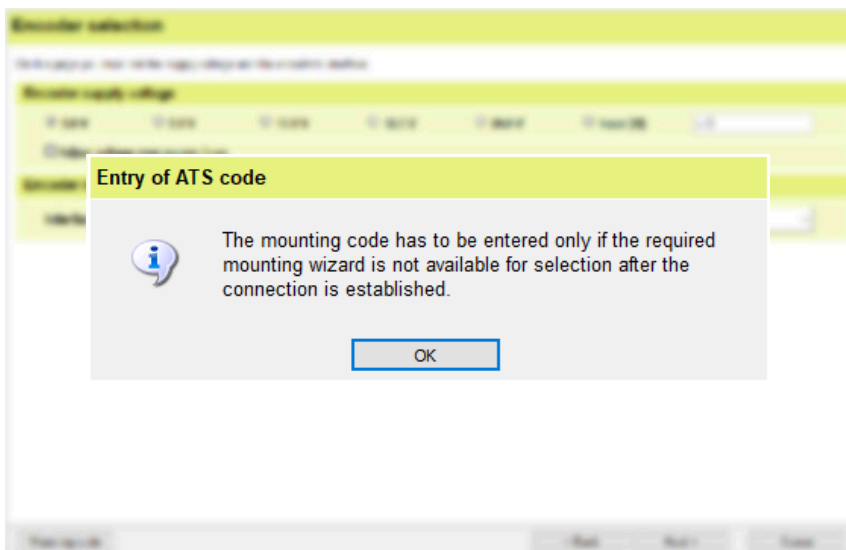
- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1401414**

- ▶ Select the permissible encoder supply voltage in the **Encoder supply voltage** section
- ▶ To activate voltage readjustment by the PWM, select the **Adjust voltage over sensor lines** checkbox
- ▶ Select the interface type in the **Encoder interface** section
- ▶ Click **Mounting code**
- ▶ The **Entry of ATS code** prompt appears.



The **Encoder selection** dialog

- ▶ Click **OK**
- ▶ The **Encoder selection** dialog with the mounting code opens.



The **Entry of ATS code** prompt

- ▶ For the **Mounting code**, enter the value:
ERP 1080: I002-A003
ERP 1070: I002-A003
ERP 1010: E003-A014
- ▶ Click **Next**
- ▶ The **Encoder selection** dialog with the encoder data opens.

The **Encoder selection** dialog with the mounting code

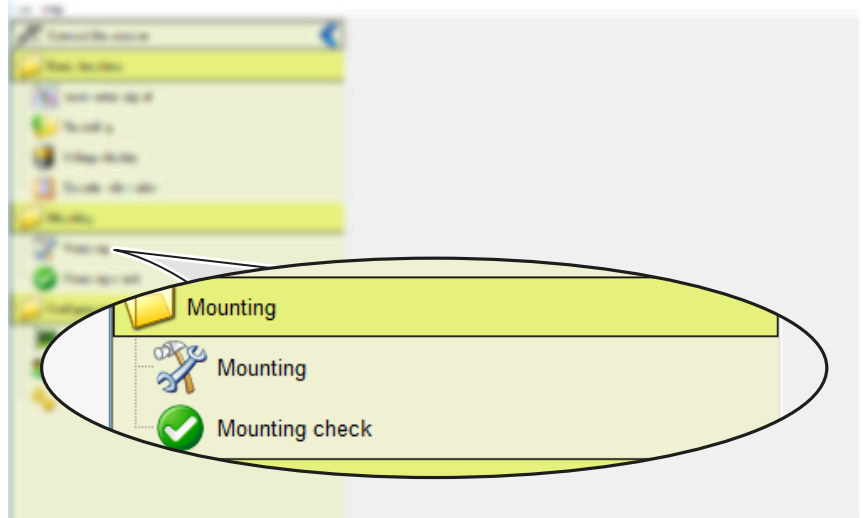
- ▶ Click **Connect**
- ▶ The connection to the encoder is established.
- ▶ The **Function menu** opens.

The **Encoder selection** dialog with the encoder data

5.4.2 Adjusting the scanning head

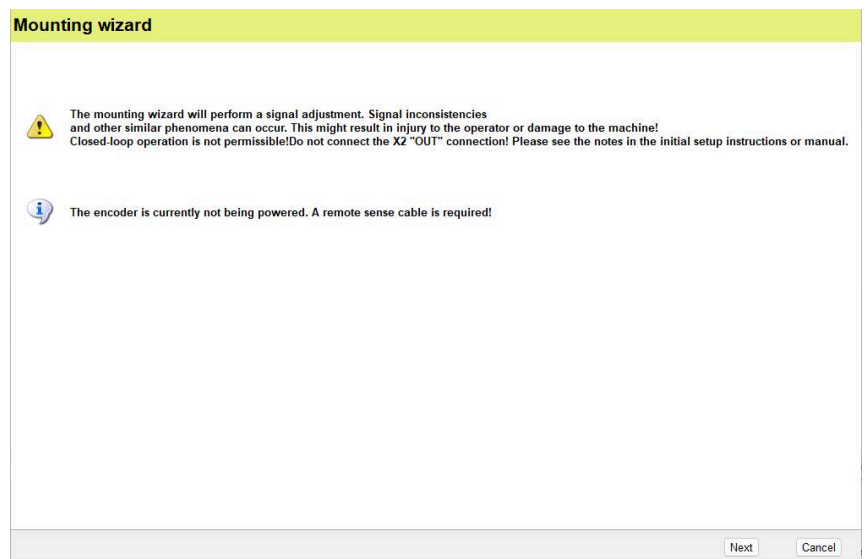
Using the mounting wizard

- ▶ Double-click **Mounting**
 - > The **Mounting wizard** opens.
- If the connection was set up by connecting the encoder manually:
- > The **Select encoder model** window opens.
 - ▶ Select the encoder
 - ▶ Click **OK**
 - > The **Mounting wizard** opens.



Function menu

- ▶ Observe the messages
- ▶ Click **Next**
- > The **Step 1: Mounting the encoder** dialog opens.



The **Mounting wizard** dialog

- ▶ Optionally, click **Settings**
- The **Settings** dialog opens.

Mounting wizard

Step 1: Mounting the encoder

Please mount the scanning head according to the mounting instructions included.
Use the supplied spacer fells for this.

Confirm that mounting has been completed with "Next >". Power will then be applied.

Settings currently set

- Electrical adjustment of reference-mark signal
- No limited traverse range
- Adjustment while continuously move back and forth

Settings Next > Cancel

The **Step 1: Mounting the encoder** dialog



If **Adjustment of reference-mark signal** is selected, the reference-mark signal is adjusted. If there is no reference mark on the encoder, deselect this function.

- ▶ If necessary, deactivate **Electrical adjustment of reference-mark signal**
- ▶ Select the adjustment mode, depending on the circular scale being used

ERP 1000,
disk/hub assembly:

Adjustment while continuously moving back and forth or
Adjustment while rotating

ERP 1002,
circular scale with hub segment:

Adjustment while continuously moving back and forth

- ▶ Click **OK**
- The **Step 1: Mounting the encoder** dialog opens.

Settings

Reference mark signal

- Adjustment of reference-mark signal
- Only limited reference-mark traverse possible

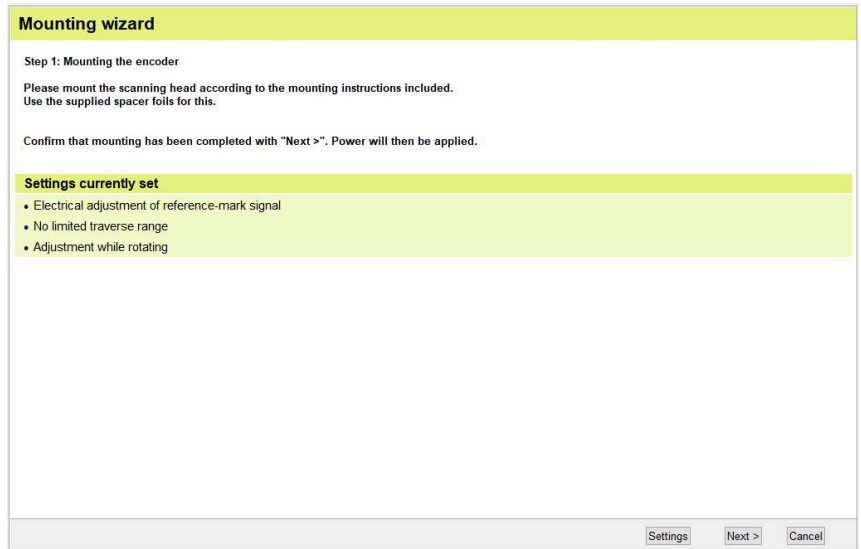
Scale used

- Adjustment in alternating table mode
- Adjustment in rotation mode

OK Cancel

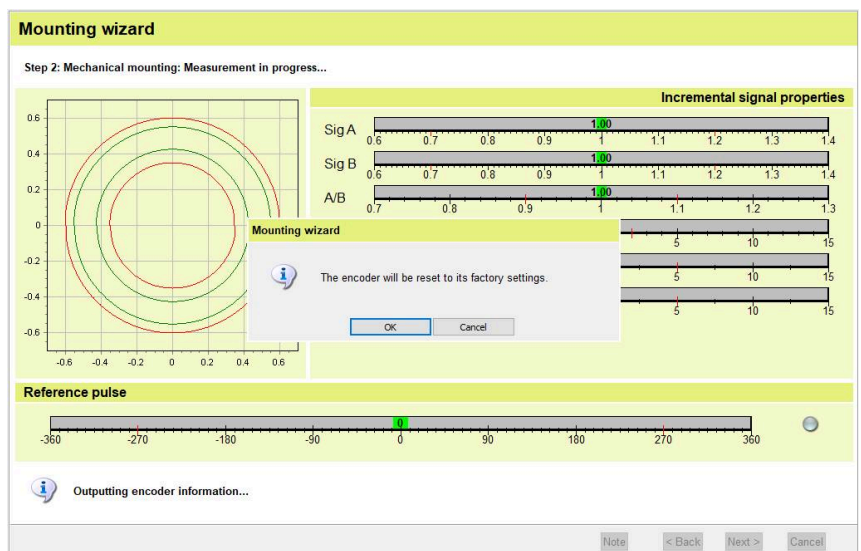
The **Settings** dialog

- ▶ Click **Next**
- The **Mounting wizard** message appears



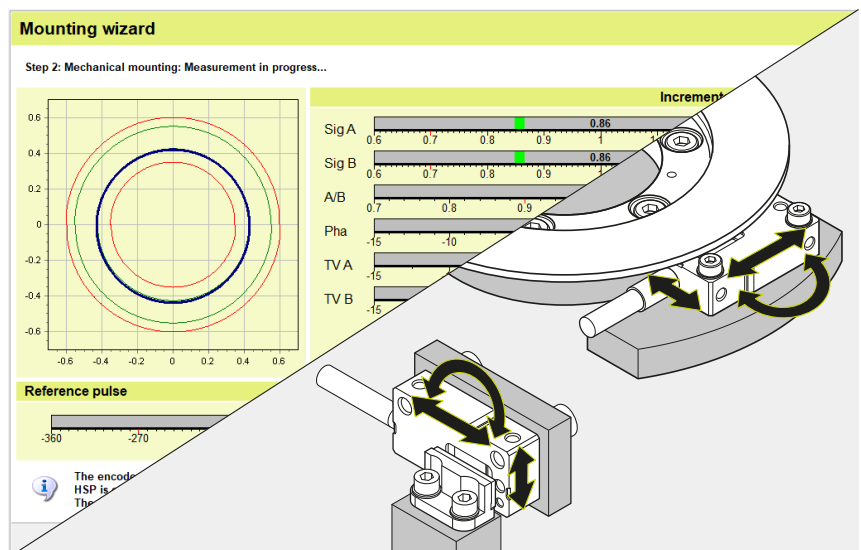
The **Step 1: Mounting the encoder** dialog

- ▶ Click **OK**
- The **Step 2: Mechanical mounting: Measurement in progress...** dialog appears.
- The encoder was reset to the factory default setting.



The **Mounting wizard** dialog

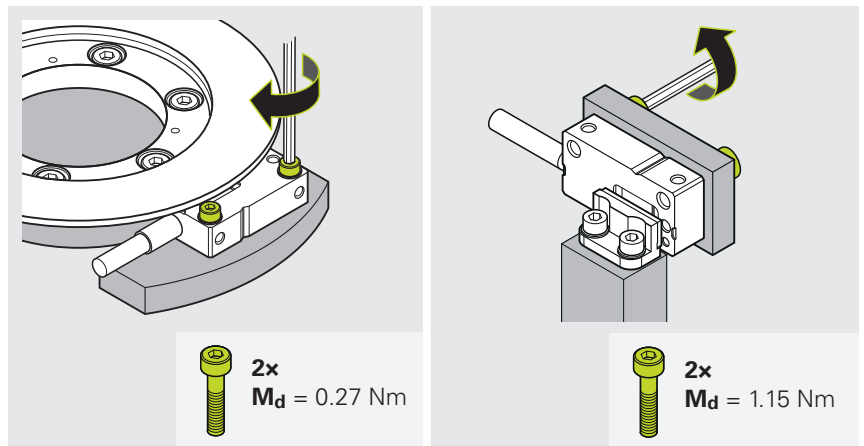
i The green circles show the limits of optimal mounting and of the recommended tolerances. The red circles are the absolute limits for permissible adjustment. Adjustment is not possible when the signals are outside of the red circles. If necessary, check the mounting and clean the scanning head.



The **Step 2: Mechanical mounting: Measurement in progress ...** dialog

i HSP is off. The encoder is now in open-loop mode.

- ▶ Ensure that the traversing speed is approx. 10 mm/s
- ▶ Rotate the scanning head during the measurement until the signal is optimally set within the permissible range.
- ▶ Tighten the screws with the specified torque
- ▶ Click **Next**



- ▶ The automatic adjustment of the incremental signals and the reference pulse is in progress.
- ▶ Continuously traverse the reference mark by moving back and forth according to the setting
- ▶ The **Adjustment was performed successfully** message appears.

Anbau-Assistent

3. Schritt: Abgleich der Inkrementalsignale und des Referenzimpulses ...

Inkrementalsignal-Eigenschaften

Sig A	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
Sig B	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
A/B	0.7	0.8	0.9	1.0	1.1	1.2	1.3		
Pha	-15	-10	-5	0	5	10	15		
TVA	-15	-10	-5	0	5	10	15		
TV B	-15	-10	-5	0	5	10	15		

Referenzimpuls

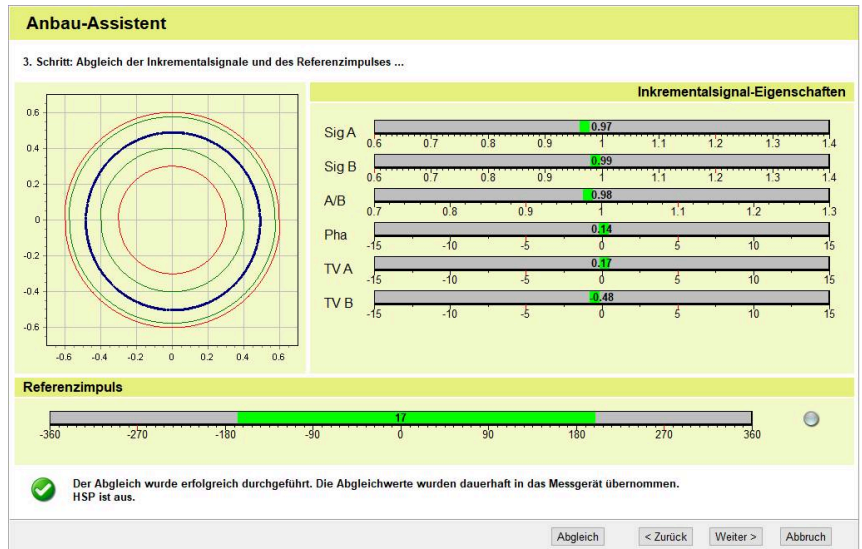
-360 -270 -180 -90 0 90 180 270 360

i Autom. Abgleich läuft. Bitte im Pendelbetrieb eine Referenzmarke kontinuierlich überfahren.
Fortschritt: 28%

Abbruch

The **Step 3: Adjusting the incremental signals and the reference pulse** dialog

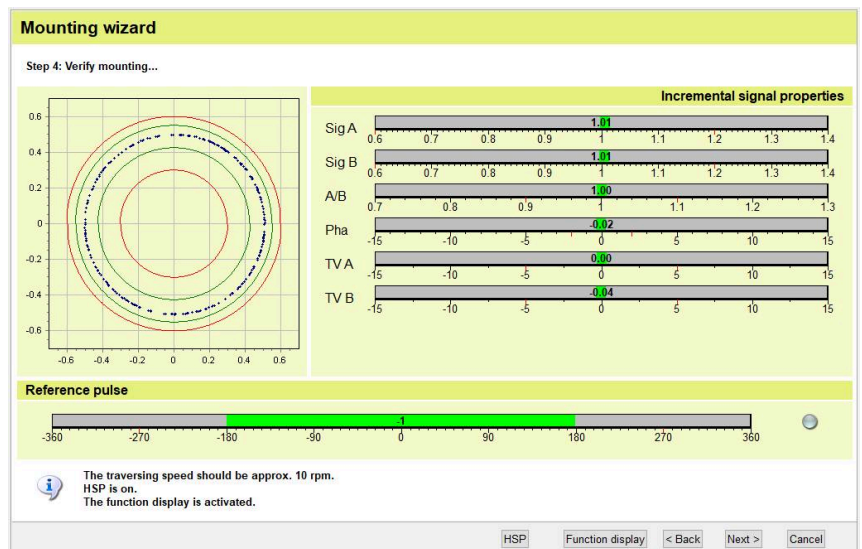
- > The adjustment values are saved in the encoder.
- ▶ Click **Next**
- > The **Step 4: Verify mounting:** dialog appears.



The **Step 3: Adjusting the incremental signals and the reference pulse** dialog

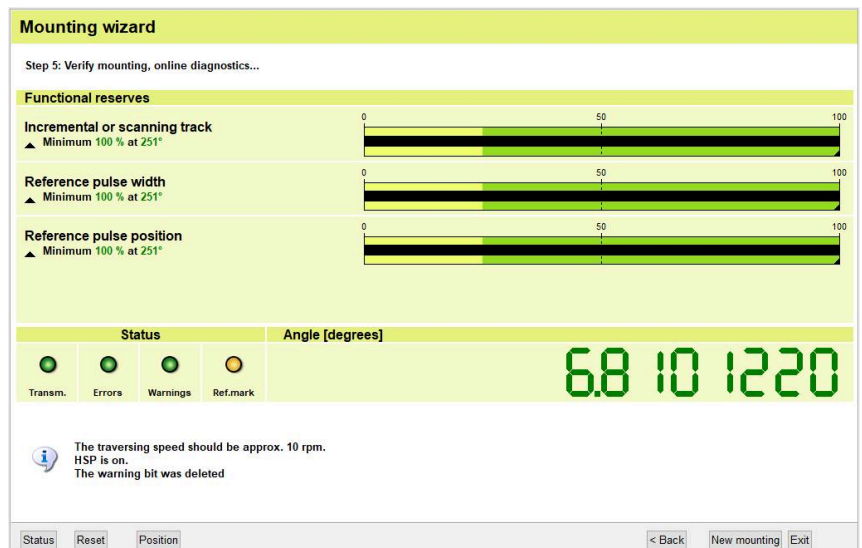
- ▶ Click **Next**
- > The **Step 5: Verify mounting, online diagnostics** dialog opens.

i HSP is on. The encoder is now in closed-loop mode.



The **Step 4: Verify mounting** dialog

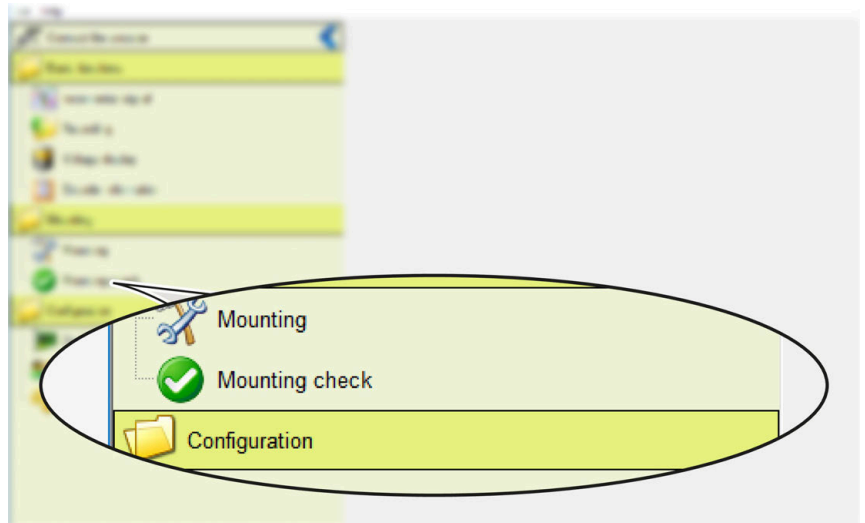
- ▶ Click **Exit**
- > The adjustment was successfully concluded.
- ▶ To finish mounting, perform the final steps.
Further information: "Final steps", Page 60



The **Step 5: Verify mounting, online diagnostics** dialog

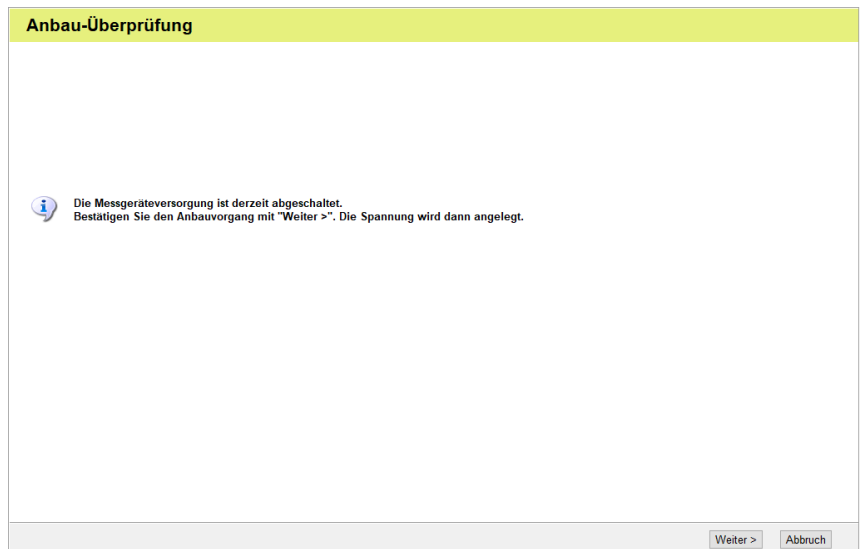
5.4.3 Checking the mounting

- ▶ Double-click **Mounting check**
- ▶ The **Mounting inspection** function opens and displays a message.
- ▶ The **Select encoder model** window opens.
- ▶ Select the encoder
- ▶ Click **OK**
- ▶ The **Mounting inspection** function opens and displays a message.



The Function menu

- ▶ Click **Next**
- ▶ The **Verify mounting, signals** dialog appears.

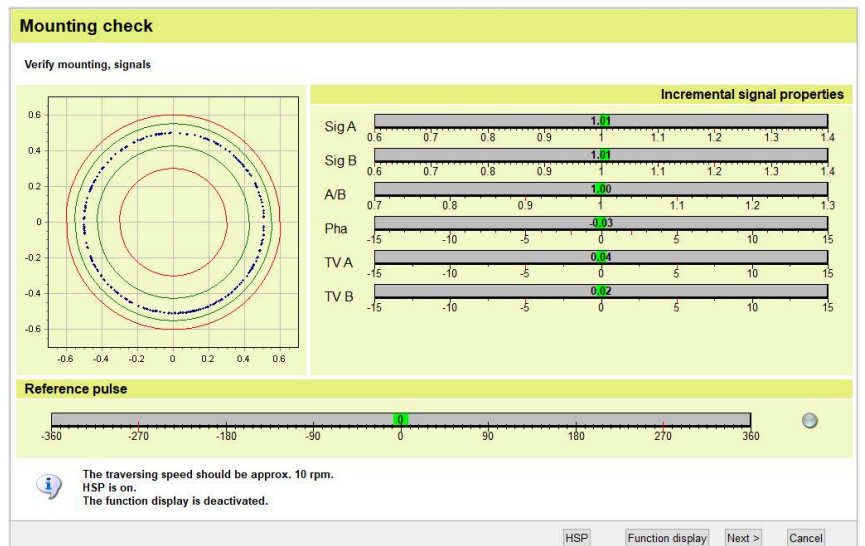


The **Mounting inspection** dialog with a message



At the start of measurement or if mounting is faulty, the reference marks are displayed in red.

- ▶ Click **Next**
- ▶ The **Verify mounting, online diagnostics** dialog appears.



The **Verify mounting, signals** dialog


- ▶ Click **Exit**
- > The **Mounting inspection** function closes.

Mounting check


Verify mounting, online diagnostics

Functional reserves

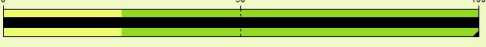
Incremental or scanning track
▲ Minimum 100 % at 251°



Reference pulse width
▲ Minimum 100 % at 251°



Reference pulse position
▲ Minimum 100 % at 251°



Status	Angle [degrees]
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> ● Transm. </div> <div style="text-align: center;"> ● Errors </div> <div style="text-align: center;"> ● Warnings </div> <div style="text-align: center;"> ● Ref.mark </div> </div>	6.8 10 1220

i The traversing speed should be approx. 10 rpm.
HSP is on.
The warning bit was deleted

Status
Reset
Position
< Back
Exit

Next step: "Final steps", Page 60

5.5 Adjustment and diagnosis of ERP 1070, ERP 1080

5.5.1 Connecting the encoder to the ATS

Connecting the encoder

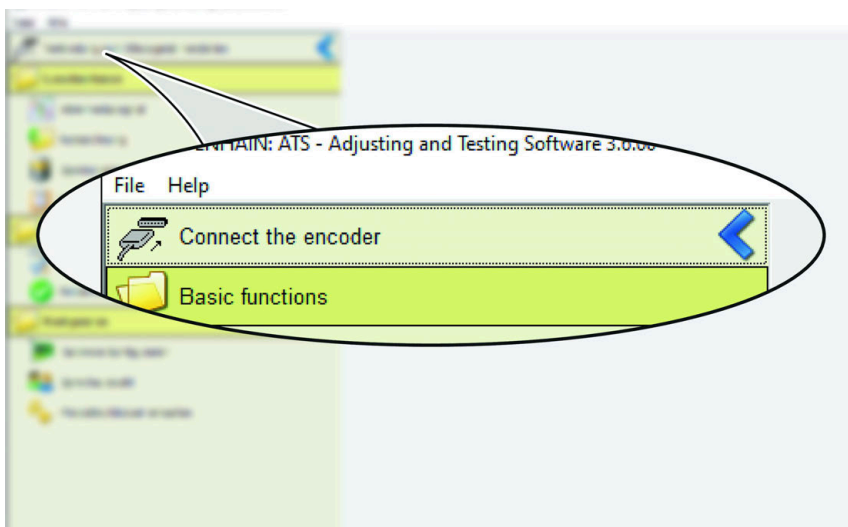
- ▶ Connect the encoder to the PWM 21
- ▶ Switch on the PWM 21

Selecting the connection

Connection options	
Connecting the encoder using its ID	Connecting the encoder manually
Recommended option with automatic determination of the measuring parameters.	Alternative option if the encoder cannot be connected using its ID.
Page 37	Page 38

Connecting the encoder using its ID

- ▶ Double-click **Connect the encoder** in the function menu
- > The **Encoder selection** dialog opens

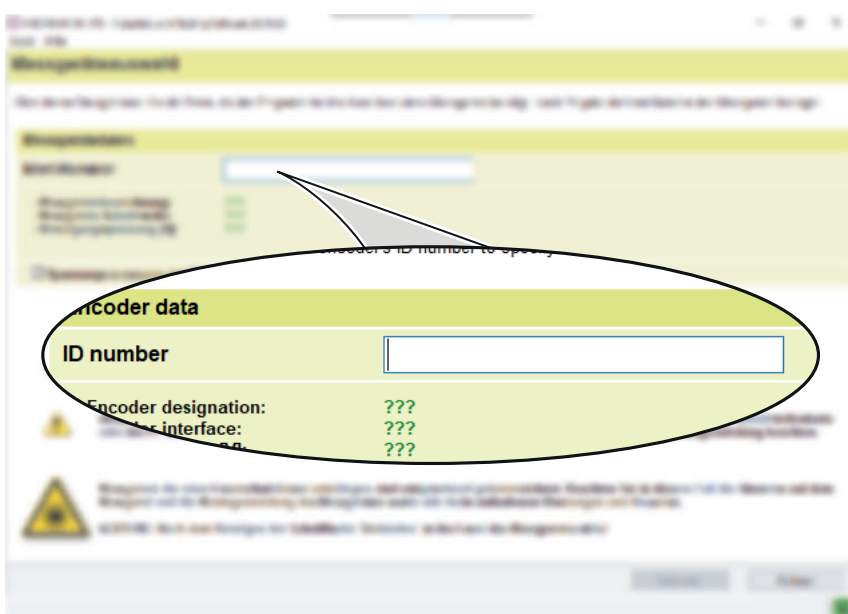


The **Function menu**

- ▶ Enter the product ID of the scanning head in the **ID number** field
- > The determined encoder parameters are shown in the **Encoder data** field.

i If the ID number is not recognized, please enter the variant **XXXXXXXX-00**.

- ▶ Click **Connect**
- > The connection to the encoder is established.
- > The **Function menu** is displayed.



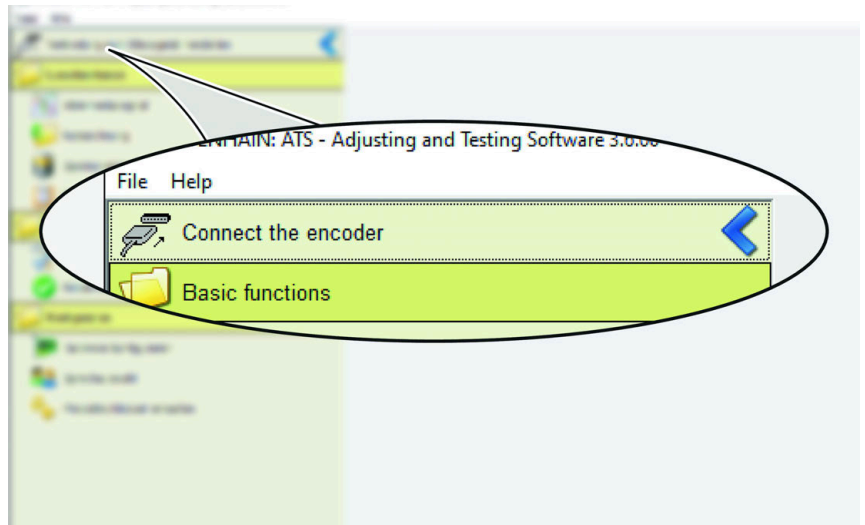
The **Encoder selection dialog**

i If you cannot connect the encoder using its ID, proceed as described in the "**Connecting the encoder manually**" chapter.

Next step: "Adjusting the scanning head", Page 53

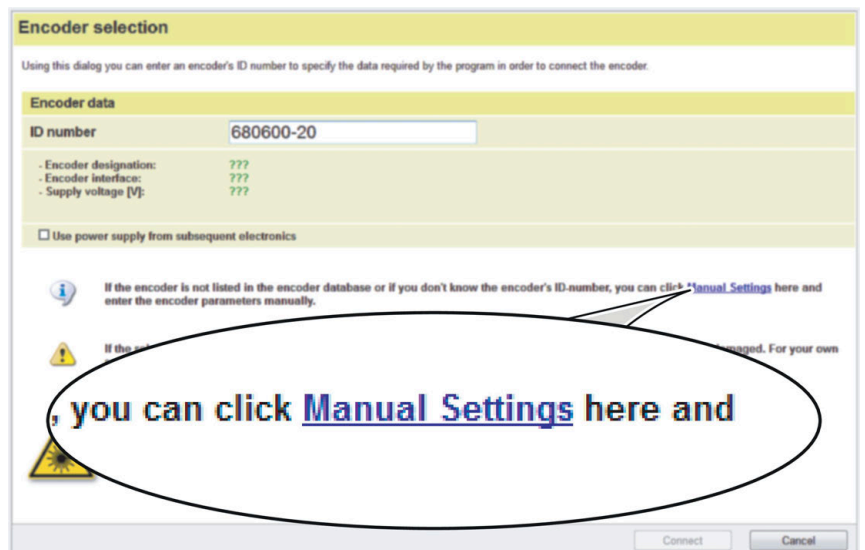
Connecting the encoder manually

- ▶ Double-click **Connect the encoder** in the function menu
- > The **Encoder selection** dialog opens.



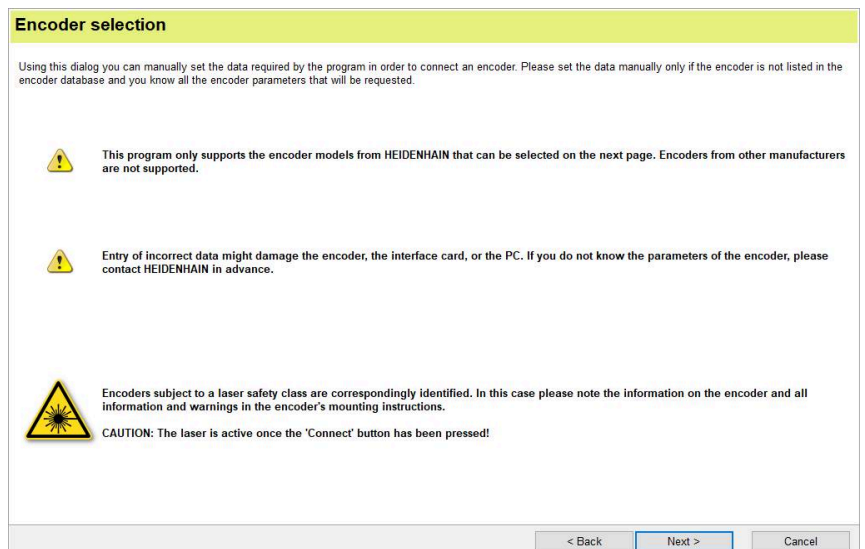
The Function menu

- ▶ Click **Manual Settings**
- > The **Encoder selection** dialog opens.



The **Encoder selection** dialog

- ▶ Follow the safety instructions
- ▶ Click **Next**
- > The **Encoder selection** dialog opens.



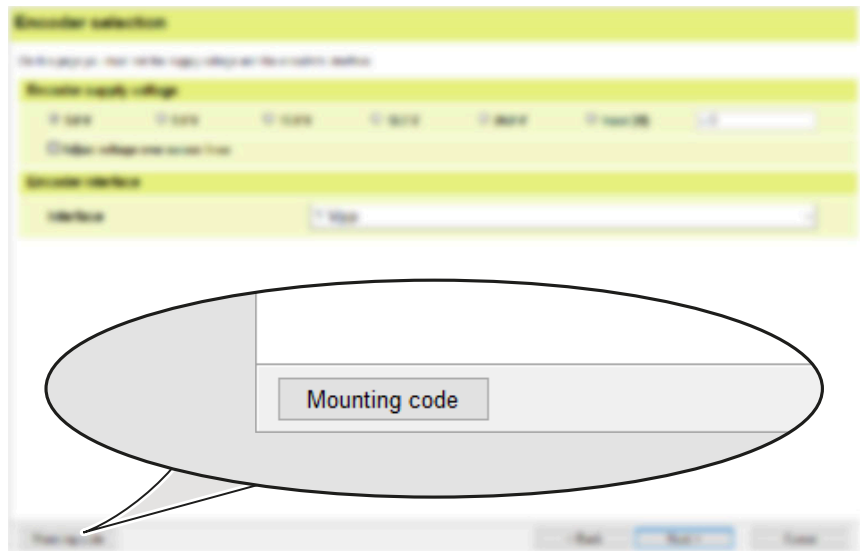
The **Encoder selection** dialog



For more information on the supply voltage and interfaces, refer to the **Modular Angle Encoders With Circular Scale** brochure.

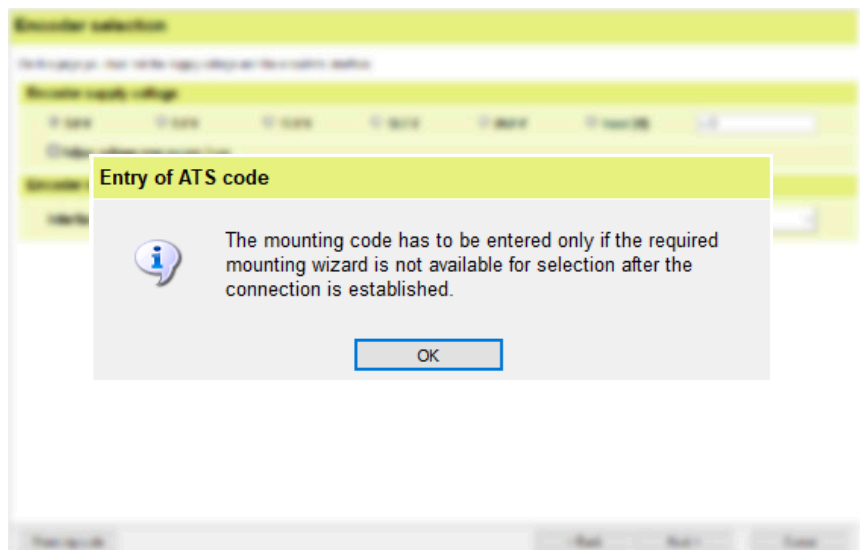
- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1401414**

- ▶ Select the permissible encoder supply voltage in the **Encoder supply voltage** section
- ▶ To activate voltage readjustment by the PWM, select the **Adjust voltage over sensor lines** checkbox
- ▶ Select the interface type in the **Encoder interface** section
- ▶ Click **Mounting code**
- ▶ The **Entry of ATS code** prompt appears.



The **Encoder selection** dialog

- ▶ Click **OK**
- ▶ The **Encoder selection** dialog with the mounting code opens.



The **Entry of ATS code** prompt

- ▶ For the **Mounting code**, enter the value:
ERP 1080: I002-A003
ERP 1070: I002-A003
ERP 1010: E003-A014
- ▶ Click **Next**
- ▶ The **Encoder selection** dialog with the encoder data opens.

The screenshot shows the 'Encoder selection' dialog box. The 'Mounting code' section is highlighted with a black oval. Below it, the 'ATS / Communication code' field is visible. The dialog box has a yellow header and a white body with various input fields and buttons.

The **Encoder selection** dialog with the mounting code

- ▶ Click **Connect**
- ▶ The connection to the encoder is established.
- ▶ The **Function menu** opens.

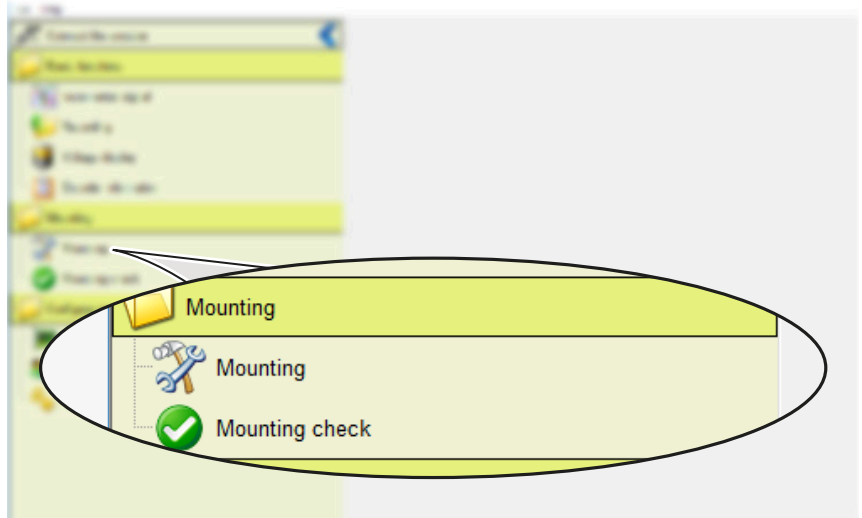
The screenshot shows the 'Encoder selection' dialog box with the 'Encoder data' section. It includes a warning message about incorrect data and a laser safety warning. The dialog box has a yellow header and a white body with various input fields and buttons.

The **Encoder selection** dialog with the encoder data

5.5.2 Adjusting the scanning head

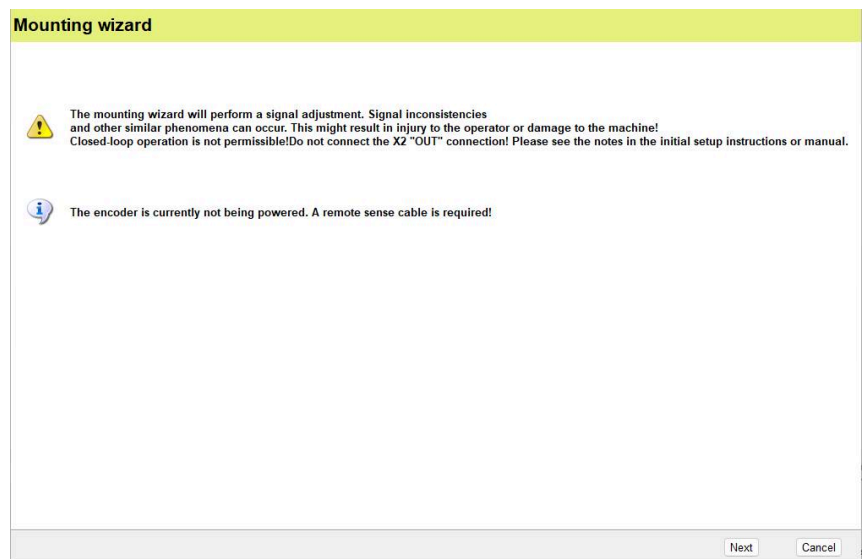
Using the mounting wizard

- ▶ Double-click **Mounting**
 - > The **Mounting wizard** opens.
- If the connection was set up by connecting the encoder manually:
- > The **Select encoder model** window opens.
 - ▶ Select the encoder
 - ▶ Click **OK**
 - > The **Mounting wizard** opens.



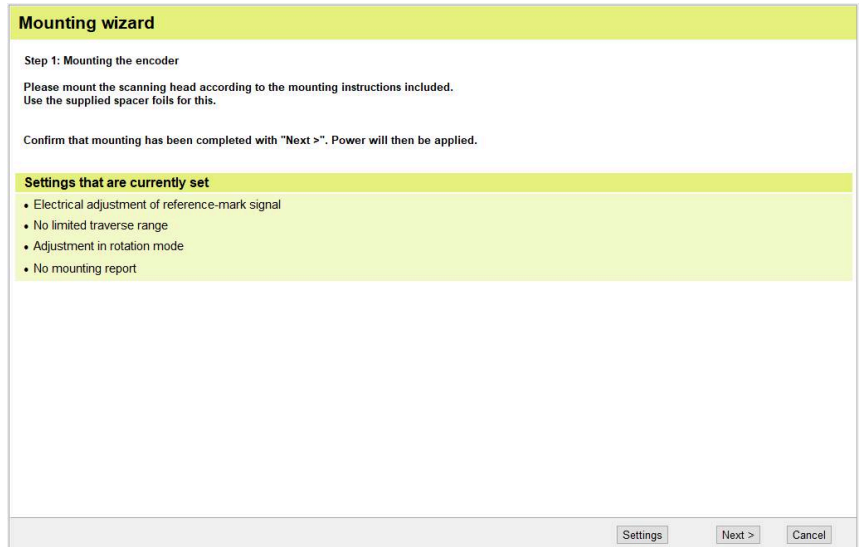
Function menu

- ▶ Observe the messages
- ▶ Click **Next**
- > The **Step 1: Mounting the encoder** dialog opens.



The **Mounting wizard** dialog

- ▶ Optionally, click **Settings**
- ▶ The **Settings** dialog opens.



The **Step 1: Mounting the encoder** dialog



If **Adjustment of reference-mark signal** is selected, the reference-mark signal is adjusted. If there is no reference mark on the encoder, deselect this function.

- ▶ If necessary, deactivate **Electrical adjustment of reference-mark signal**
- ▶ Select the adjustment mode, depending on the circular scale being used

ERP 1000,
disk/hub assembly:

Adjustment while continuously moving back and forth or
Adjustment while rotating

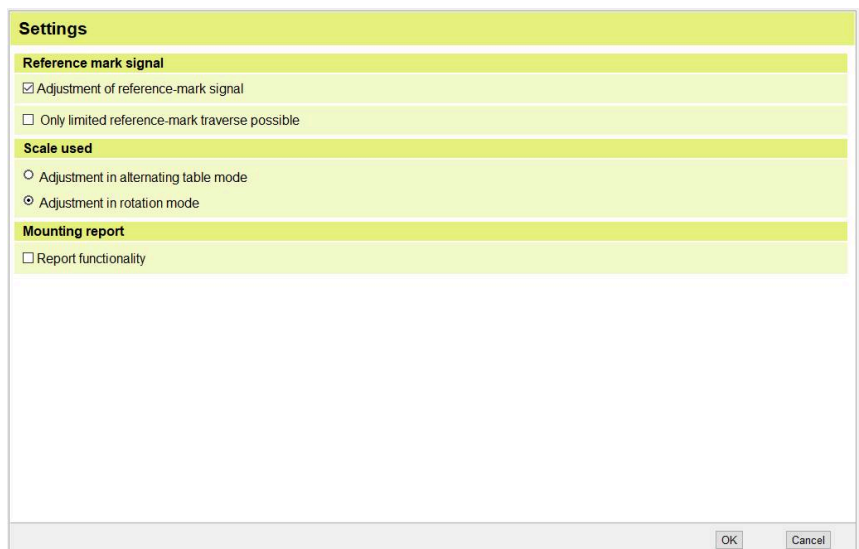
ERP 1002,
circular scale with hub segment:

Adjustment while continuously moving back and forth



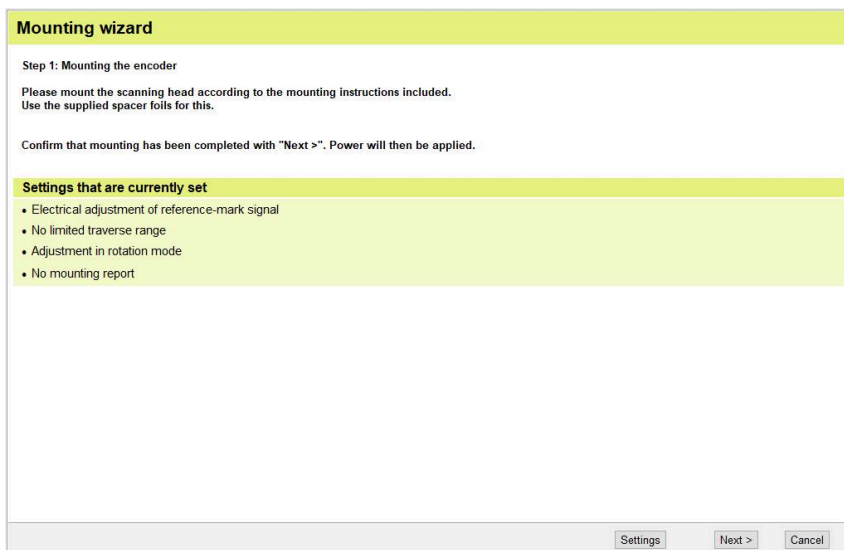
The **Report functionality** generates a report in .json format. This report is stored in the root directory of the project.

- ▶ Select the **Report functionality**, if required
- ▶ Click **OK**
- ▶ The **Step 1: Mounting the encoder** dialog opens.



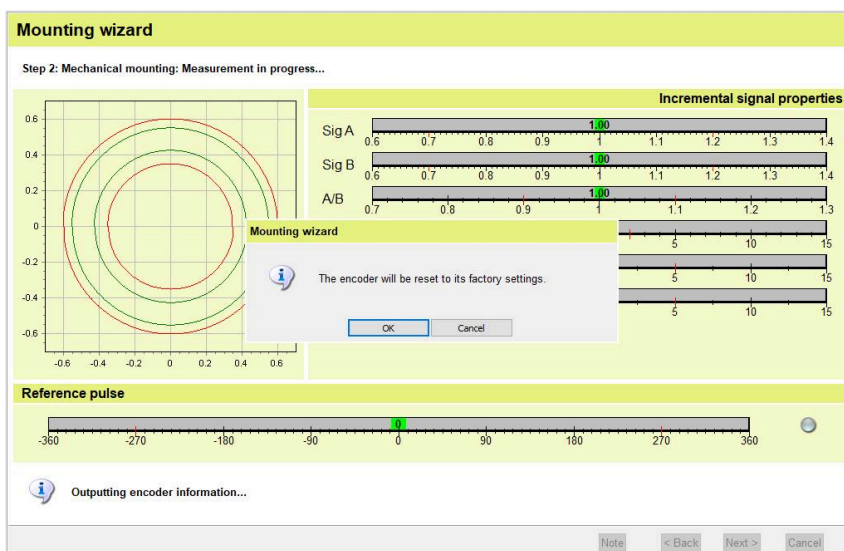
The **Settings** dialog

► Click **Next**



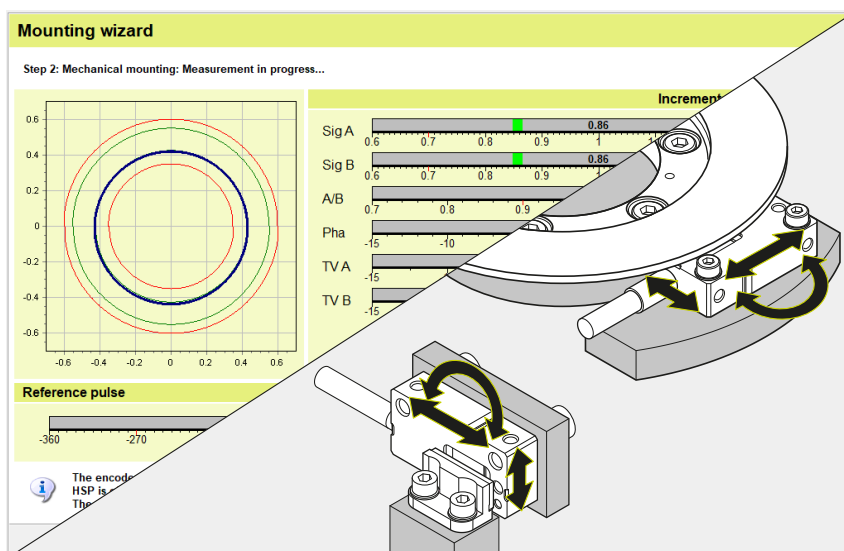
The **Step 1: Mounting the encoder** dialog

- Click **OK**
- The **Step 2: Mechanical mounting: Measurement in progress...** dialog appears.
- The encoder was reset to the factory default setting.



The **Mounting wizard** dialog

i The green circles show the limits of optimal mounting and of the recommended tolerances. The red circles are the absolute limits for permissible adjustment. Adjustment is not possible when the signals are outside of the red circles. If necessary, check the mounting and clean the scanning head.

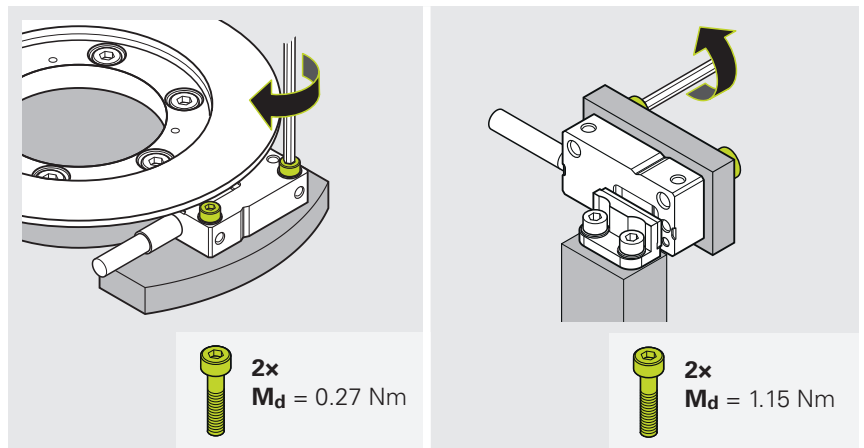


The **Step 2: Mechanical mounting: Measurement in progress ...** dialog



HSP is off. The encoder is now in open-loop mode.

- ▶ Ensure that the traversing speed is approx. 10 mm/s
- ▶ Rotate the scanning head during the measurement until the signal is optimally set within the permissible range.
- ▶ Tighten the screws with the specified torque
- ▶ Click **Next**



- ▶ The automatic adjustment of the incremental signals and the reference pulse is in progress.
- ▶ Continuously traverse the reference mark by moving back and forth according to the setting
- ▶ The **Adjustment was performed successfully** message appears.

Anbau-Assistent

3. Schritt: Abgleich der Inkrementalsignale und des Referenzimpulses ...

Inkrementalsignal-Eigenschaften

Sig A	1.00
Sig B	1.00
A/B	1.00
Pha	0.00
TVA	0.00
TV B	0.00

Referenzimpuls

-360 -270 -180 -90 0 90 180 270 360

Autom. Abgleich läuft. Bitte im Pendelbetrieb eine Referenzmarke kontinuierlich überfahren.
Fortschritt: 28%

Abbruch

The **Step 3: Adjusting the incremental signals and the reference pulse** dialog

- > The adjustment values are saved in the encoder.
- ▶ Click **Next**
- > The **Step 4: Verify mounting:** dialog appears.

Anbau-Assistent

3. Schritt: Abgleich der Inkrementalsignale und des Referenzimpulses ...

Inkrementalsignal-Eigenschaften

Sig A	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4
Sig B	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4
A/B	0.7	0.8	0.9	1	1.1	1.2	1.3		
Pha	-15	-10	-5	0	5	10	15		
TV A	-15	-10	-5	0	5	10	15		
TV B	-15	-10	-5	0	5	10	15		

Referenzimpuls

-360 -270 -180 -90 0 90 180 270 360

Der Abgleich wurde erfolgreich durchgeführt. Die Abgleichwerte wurden dauerhaft in das Messgerät übernommen.
HSP ist aus.

Abgleich < Zurück Weiter > Abbruch

The **Step 3: Adjusting the incremental signals and the reference pulse** dialog

i HSP is on. The encoder is now in closed-loop mode.

- ▶ Click **Exit**
- > The adjustment was successfully concluded.
- ▶ To finish mounting, perform the final steps.
Further information: "Final steps", Page 60

Mounting wizard

Step 4: Verify mounting

Incremental signal characteristics

Sig A	6	7	8	9	10	11	12	13	14	15	16
Sig B	6	7	8	9	10	11	12	13	14	15	16
A/B	0.7	0.8	0.9	1	1.1	1.2	1.3				
Pha	-15	-10	-5	0	5	10	15				
TV A	-15	-10	-5	0	5	10	15				
TV B	-15	-10	-5	0	5	10	15				

Reference pulse

-360 -270 -180 -90 0 90 180 270 360

The traversing speed should be approx. 10 mm/s.HSP is on.
The function display is activated.

Function display < Back New mounting | Exit

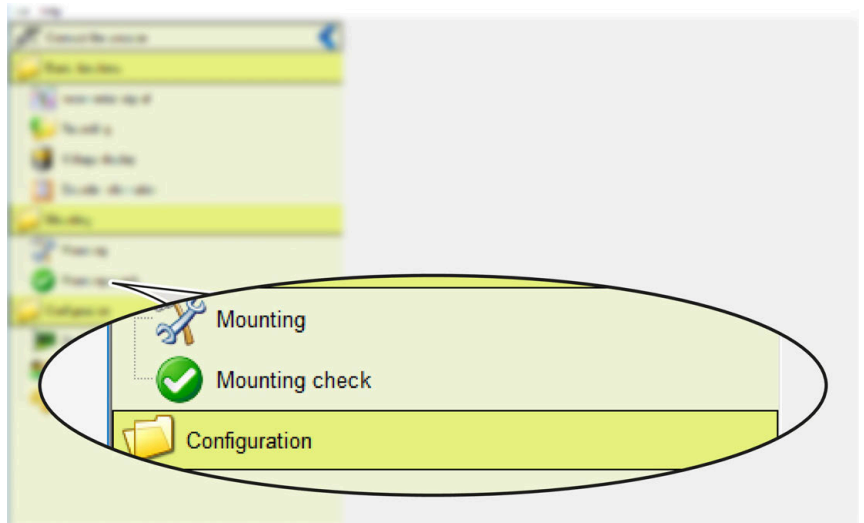
The **Step 4: Verify mounting** dialog

5.5.3 Checking the mounting

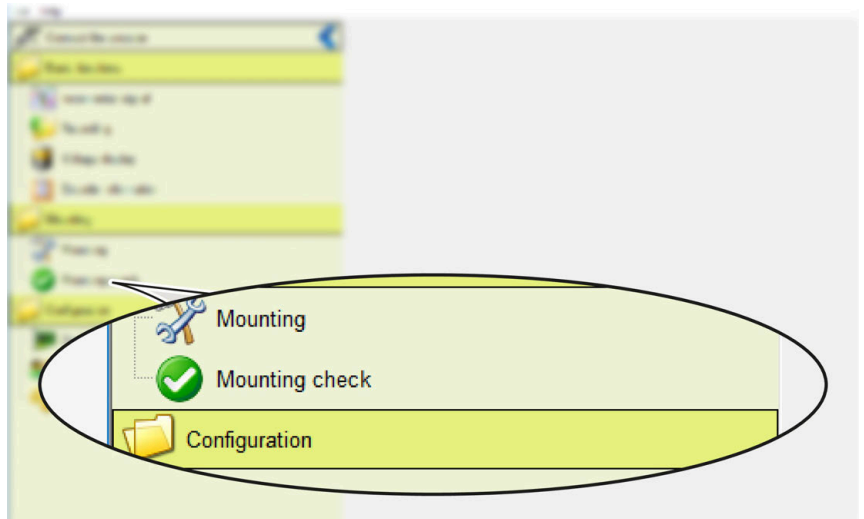
- ▶ Double-click **Mounting check**
- > The **Mounting inspection** function opens and displays a message.

If the connection was set up by connecting the encoder manually:

- > The **Select encoder model** window opens.
- ▶ Select the encoder
- ▶ Click **OK**
- > The **Mounting inspection** function opens and displays a message.

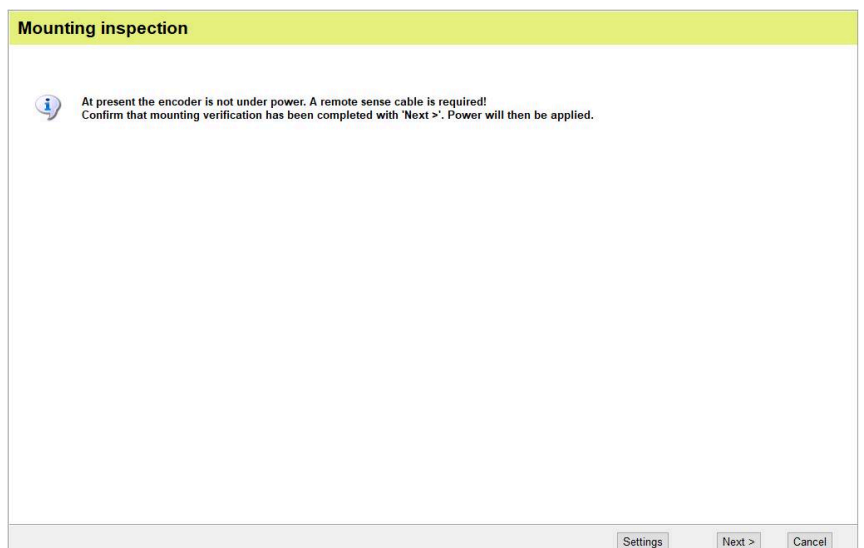


Function menu



The Function menu

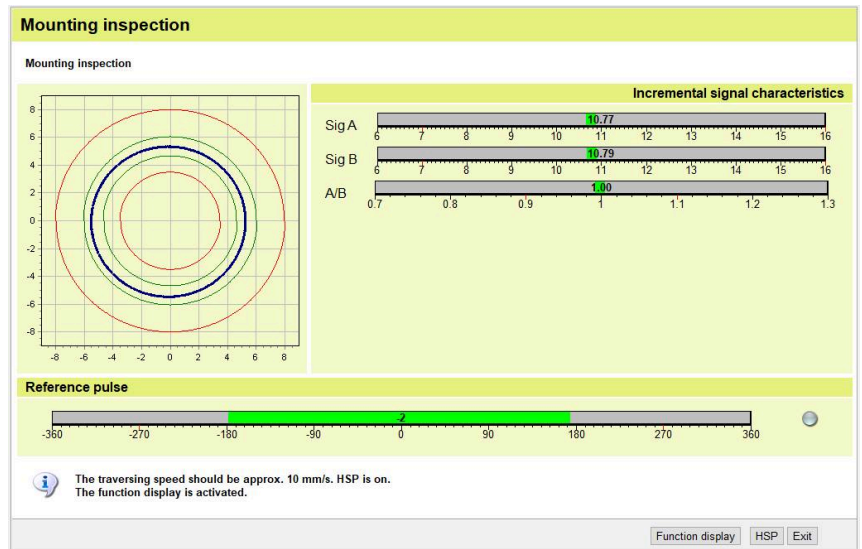
- ▶ Click **Next**
- > The **Mounting inspection** dialog appears.



The **Mounting inspection** dialog with a message

i At the start of measurement or if mounting is faulty, the reference marks are displayed in red.

- ▶ Click **Exit**
- > The **Mounting inspection** function closes.



The **Verify mounting...** dialog

Next step: "Final steps", Page 60

6 Final steps

6.1 Connecting the encoder to the downstream electronics

WARNING

Danger of electric shock due to plug connections under voltage!

Connecting and disconnecting live cables and plug connections in the equipment can result in death or serious injury.

- Only connect and disconnect cables and plug connections when no current is flowing through them
- Disconnect the downstream electronics from power before connecting the product
- For cables without connectors, pay attention to the pin layout

- ▶ Connect the encoder to the downstream electronics

NOTICE

Property damage resulting from incorrect routing of the connecting cable!

Connecting cables may become damaged as a result of incorrect routing.

- ▶ Observe the maximum permissible bend radii
- ▶ Do not cross connecting cables in drag chains
- ▶ Route connecting cables professionally



For more information on the cable characteristics and cable routing, refer to the **Cables and Connectors** brochure.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1206103**



For more information on the pin layouts of pre-assembled cables, refer to the **Cables and Connectors** brochure.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1206103**



For more information on sources of interference, refer to the **Interfaces of HEIDENHAIN Encoders** brochure.

- ▶ www.heidenhain.com/documentation
- ▶ Enter the document ID **1078628**

7 Removal

This chapter describes the disassembly of the product.

7.1 Safety precautions regarding removal

⚠ WARNING

Live plug connections!

If you disengage plug connections while the equipment is under power, this may result in fatal accidents or severe personal injury.

- ▶ Do not engage or disengage any connecting elements while the product is under power

⚠ WARNING

Moving machine parts!

Risk of injury due to moving machine parts depending on the installation location and the application

- ▶ Observe all of the machine manufacturer's notes on working on the machine (e.g., always disconnect the machine from the power supply)

7.2 Removing the encoder

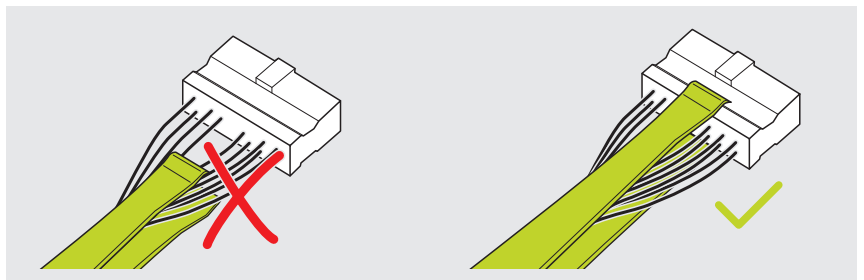
- ▶ Disconnect the encoder from the downstream electronics
- ▶ If necessary, use the mounting aid to remove the cable assembly

NOTICE

Property damage due to improper mounting or removal of the cable assembly!

Tensile forces on the wires of the cable assembly can cause damage to the cable assembly.

- ▶ Use the mounting aid
 - ▶ Apply the mounting aid to the female header
- ▶ Remove the encoder in the reversed sequence of mounting.
Further information: "Mounting", Page 15



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