ND 7000
Operating Instructions
Milling
Digital Readout

English (en)
01/2020
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This chapter contains information about the product and this manual.

1.2 Information on the product

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<th>Firmware version</th>
<th>Index</th>
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<td>ND 7000</td>
<td>1089178-xx,</td>
<td>1235720.1.2.x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1089179-xx</td>
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</table>

The ID label is provided on the back of the product.
Example:

1. Product designation
2. Index
3. Part number (ID)

1.3 Demo software for the product
ND 7000 Demo is software you can install on a computer regardless of the device. ND 7000 Demo helps you to become familiar with, try out or present the functions of the device.

You can download the current version of the software here: www.heidenhain.de

To download the installation file from the HEIDENHAIN Portal, you need access rights to the Software portal folder in the directory of the appropriate product.

If you do not have access rights to the Portal’s Software folder, you can request the access rights from your HEIDENHAIN contact person.
1.4 Documentation on the product

1.4.1 Validity of the documentation

Before using the documentation and the product, you need to verify that the documentation matches the product.

- Compare the ID number and the index indicated in the documentation with the corresponding data given on the ID label of the product
- Compare the firmware version given in the documentation with the firmware version of the product

Further information: "Device information", Page 235

- If the ID numbers and indexes as well as the firmware versions match, the documentation is valid

---

If the ID numbers and indexes do not match, so that the documentation is not valid, you will find the current documentation for the product at www.heidenhain.de.
1.4.2 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 table below lists the components of the documentation in the order of priority for reading.

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<tr>
<td>Addendum</td>
<td>An addendum supplements or supersedes the corresponding contents of the Operating Instructions and, if applicable, of the Installation Instructions. If an addendum is included in the shipment, it has the highest priority for reading. All other contents of the documentation retain their validity.</td>
</tr>
<tr>
<td>Installation Instructions</td>
<td>The Installation Instructions contain all of the information and safety precautions needed for the proper mounting and installation of the product. The Installation Instructions are contained as an excerpt from the Operating Instructions in every delivery. The Installation Instructions have the second highest level of priority for reading.</td>
</tr>
<tr>
<td>Operating Instructions</td>
<td>The Operating Instructions contain all of the information and safety precautions needed for the proper operation of the product according to its intended use. The Operating Instructions are included on the supplied storage medium and can also be downloaded in the download area from <a href="http://www.heidenhain.de">www.heidenhain.de</a>. The Operating Instructions must be read before the unit is put into service. The Operating Instructions have the third highest level of priority for reading.</td>
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Have you found any errors or would you like to suggest changes?
We continuously strive to improve our documentation for you. Please help us by sending your suggestions to the following e-mail address:

userdoc@heidenhain.de
1.4.3 Storage and distribution of the documentation

The instructions 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 these instructions are kept. If the instructions have become illegible, the operating company must obtain a new copy from the manufacturer. If the product is given or resold to any other party, the following documents must be passed on to the new owner:

- Addendum (if supplied)
- Installation Instructions
- Operating Instructions

1.5 About these instructions

These instructions provide all the information and safety precautions needed for the safe operation of the device.

1.5.1 Document category

Operating Instructions

These instructions are the Operating Instructions for the product.

The Operating Instructions

- Are oriented to the product life cycle
- Contain all information and safety precautions needed for the proper operation of the product according to its intended use

1.5.2 Target groups for the instructions

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

- Mounting
- Installation
- Commissioning and configuration
- Operation
- Programming
- Service, cleaning and maintenance
- Troubleshooting
- Removal and disposal
1.5.3 Target groups according to user types

The target groups of these instructions refer to the various user types of the product and their authorizations.

The product features the following user types:

**OEM user**
The OEM (Original Equipment Manufacturer) user has the highest level of permissions. This user is allowed to configure the product’s hardware (e.g. connection of encoders and sensors). He can create Setup and Operator-type users, and configure the Setup and Operator users. The OEM user cannot be duplicated or deleted. This user cannot be logged in automatically.

**Setup user**
The Setup user configures the product for use at the place of operation. This user can create Operator-type users. The Setup user cannot be duplicated or deleted. This user cannot be logged in automatically.

**Operator user**
The Operator user is permitted to use the basic functions of the product. An Operator-type user cannot create additional users, but is allowed to edit various operator-specific settings, such as his name or the language. A user of the Operator group can be logged in automatically as soon as the product is switched on.

1.5.4 Contents of the chapters

The table below shows:
- from which chapters these instructions are derived from
- which information the chapters of the instructions contain
- to which target groups the chapters of the instructions mainly apply

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<td>✓  ✓</td>
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<td>5 &quot;Installation&quot;</td>
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... the user interface of the product  
... basic functions of the product | ✓ ✓ ✓ |
| 7 "Commissioning" | ... commissioning the product | ✓ |
| 8 "Setup" | ... a typical manufacturing process based on a sample workpiece | ✓ |
| 9 "Quick Start" | ... the "Manual" mode of operation  
... using the "Manual" mode of operation | ✓ ✓ |
| 10 "Manual operation" | ... the "MDI" mode of operation  
... using the "MDI" mode of operation  
... executing single blocks | ✓ ✓ |
| 11 "MDI mode" | ... the "Program Run" mode of operation  
... using the "Program Run" mode of operation  
... executing previously created programs | ✓ ✓ |
| 12 "Program run (software option)" | ... the "Program Run" mode of operation  
... using the "Program Run" mode of operation  
... executing previously created programs | ✓ ✓ |
| 13 "Programming (software option)" | ... causes of faults or malfunctions of the product  
... corrective actions for faults or malfunctions of the product | ✓ ✓ ✓ |
| 14 "File management" | ... setting options and associated setting parameters for the product | ✓ ✓ ✓ |
| 15 "Settings" | ... general maintenance work on the product | ✓ ✓ ✓ |
| 16 "Servicing and maintenance" | ... disassembly and disposal of the product  
... environment protection specifications | ✓ ✓ ✓ |
| 17 "What to do if ..." | ... the technical data of the product  
... product dimensions and mating dimensions (drawings) | ✓ ✓ ✓ |
| 18 "Removal and disposal" | ... the functions of the "File management" menu | ✓ ✓ ✓ |
| 19 "Specifications" | ... setting options and associated setting parameters for the product | ✓ ✓ ✓ |
| 20 "Index" | This chapter enables accessing the content of these instructions according to specific topics. | ✓ ✓ ✓ |
1.5.5 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 additional or supplementary information.

- The gear symbol indicates that the function described **depends on the machine**, e.g.
  - Your machine must feature a certain software or hardware option
  - The behavior of the functions depends on the configurable machine settings

- The book symbol represents a **cross reference** to external documentation, e.g. the documentation of your machine tool builder or other supplier.
### 1.5.6 Symbols and fonts used for marking text

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

<table>
<thead>
<tr>
<th>Depiction</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ ...</td>
<td>Identifies an action and the result of this action</td>
</tr>
<tr>
<td>▶ ...</td>
<td>Example:</td>
</tr>
<tr>
<td>▶ Tap <strong>OK</strong></td>
<td></td>
</tr>
<tr>
<td>▶ The message is closed</td>
<td></td>
</tr>
<tr>
<td>■ ...</td>
<td>Identifies an item of a list</td>
</tr>
<tr>
<td>■ ...</td>
<td>Example:</td>
</tr>
<tr>
<td>■ TTL interface</td>
<td></td>
</tr>
<tr>
<td>■ EnDat interface</td>
<td></td>
</tr>
<tr>
<td>■ ...</td>
<td></td>
</tr>
<tr>
<td><strong>Bold</strong></td>
<td>Identifies menus, displays and buttons</td>
</tr>
<tr>
<td><strong>Bold</strong></td>
<td>Example:</td>
</tr>
<tr>
<td>▶ Tap <strong>Shut down</strong></td>
<td></td>
</tr>
<tr>
<td>▶ The operating system shuts down</td>
<td></td>
</tr>
<tr>
<td>▶ Turn the power switch off</td>
<td></td>
</tr>
</tbody>
</table>
2 Safety
2.1 Overview

This chapter provides important safety information needed for the proper operation of the unit.

2.2 General safety precautions

General 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 product.

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 products of the ND 7000 series are advanced digital readouts for use on manually operated machine tools. In combination with linear and angle encoders, digital readouts of the ND 7000 series return the position of the tool in more than one axis and provide further functions for operating the machine tool.

The products of this series:
- must only be used in commercial applications and in an industrial environment
- must be mounted on a suitable stand or holder to ensure the correct and intended operation of the product
- are intended for indoor use in an environment in which the contamination caused by humidity, dirt, oil and lubricants complies with the requirements of the specifications

The products support the use of peripheral devices from different manufacturers. HEIDENHAIN cannot make any statements on the intended use of these devices. The information on their intended use, which is provided in the respective documentation, must be observed.

2.4 Improper use

In particular, the products of the ND 7000 series must not be used in the following applications:
- Use and storage outside the operating conditions specified in “Specifications”
- Outdoor use
- Use in potentially explosive atmospheres
- Use of the products of the ND 7000 series as part of a safety function
2.5 Personnel qualification

The personnel for mounting, installation, operation, service, maintenance and removal must be appropriately qualified for this work and must have obtained sufficient information from the documentation supplied with the product and with the connected peripherals.

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.

**Operator**

The operator uses and operates the product within the framework specified for the intended use. He is informed by the operating company about the special tasks and the potential hazards resulting from incorrect behavior.

**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 product supports the use of a wide variety of peripheral devices from different manufacturers. HEIDENHAIN cannot make any statements on the specific safety precautions to be taken for these devices. The safety precautions provided in the respective documentation must be observed. If there is no documentation at hand, it must be obtained from the manufacturers concerned.

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

2.7.1 Symbols on the product

The following symbols are used to identify the product:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️</td>
<td>Observe the safety precautions regarding electricity and the power connection before you connect the product.</td>
</tr>
<tr>
<td>🌡️</td>
<td>Functional ground connection as per IEC/EN 60204-1. Observe the information on installation.</td>
</tr>
<tr>
<td>🐇</td>
<td>Product seal. Breaking or removing the product seal will result in forfeiture of warranty and guarantee.</td>
</tr>
</tbody>
</table>
2.7.2 Electrical safety precautions

⚠️ WARNING
Hazard of contact with live parts when opening the unit.
This may result in electric shock, burns or death.
- Never open the housing
- Only the manufacturer is permitted to access the inside of the product

⚠️ WARNING
Hazard of dangerous amount of electricity passing through the human body upon direct or indirect contact with live electrical parts.
This may result in electric shock, burns or death.
- Work on the electrical system and live electrical components is to be performed only by trained specialists
- For power connection and all interface connections, use only cables and connectors that comply with applicable standards
- Have the manufacturer exchange defective electrical components immediately
- Regularly inspect all connected cables and all connections on the product. Defects, such as loose connections or scorched cables, must be removed immediately

⚠️ NOTICE
Damage to internal parts of the product!
If you open the product, the warranty and the guarantee will become void.
- Never open the housing
- Only the product manufacturer is permitted to access the inside of the product
Transport and storage
3.1 Overview

This chapter contains information on the transportation and storage of the product and provides an overview of the items supplied and the available accessories for the product.

The following steps must be performed only by qualified personnel.

Further information: “Personnel qualification”, Page 29

3.2 Unpacking

- Open the top lid of the box
- Remove the packaging materials
- Unpack the contents
- Check the delivery for completeness
- Check the delivery for damage

3.3 Items supplied and accessories

3.3.1 Items supplied

The following items are included in delivery:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addendum (optional)</td>
<td>Supplements or supersedes the contents of the Operating Instructions and, if applicable, of the Installation Instructions.</td>
</tr>
<tr>
<td>Operating Instructions</td>
<td>PDF issue of the Operating Instructions on a memory medium in the currently available languages</td>
</tr>
<tr>
<td>Product</td>
<td>Digital Readout ND 7000</td>
</tr>
<tr>
<td>Installation Instructions</td>
<td>Printed issue of the Installation Instructions in the currently available languages</td>
</tr>
<tr>
<td>Single-Pos stand</td>
<td>Stand for rigid mounting, inclination angle 20°, fixing hole pattern 50 mm x 50 mm</td>
</tr>
</tbody>
</table>
3.3.2 Accessories

Software options need to be enabled on the product via a license key. Before you can use the associated hardware components, you need to enable the respective software option.

Further information: “Activating the Software options”, Page 96

The following accessories are optionally available and can be ordered from HEIDENHAIN:

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Name</th>
<th>Description</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>For operation</td>
<td>ND 7000 PGM software option</td>
<td>Entry of the part programs for the production of workpieces</td>
<td>1089225-02</td>
</tr>
<tr>
<td></td>
<td>ND 7000 PGM software option</td>
<td>Entry of part programs for the production of workpieces; 60-day trial version</td>
<td>1089225-52</td>
</tr>
<tr>
<td></td>
<td>ND 7000 RD software option</td>
<td>Support for radial drilling machines and rapid radial drilling machines</td>
<td>1089225-01</td>
</tr>
<tr>
<td></td>
<td>ND 7000 RD Trial software option</td>
<td>Support for radial drilling machines and rapid radial drilling machines; 60-day trial version</td>
<td>1089225-51</td>
</tr>
<tr>
<td>For installation</td>
<td>Cables</td>
<td>For information on connecting cables, see “Cables and Connectors for HEIDENHAIN Products” brochure.</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>KT 130 edge finder</td>
<td>Touch probe for probing a workpiece (for setting presets)</td>
<td>283273-xx</td>
</tr>
<tr>
<td></td>
<td>Power cable</td>
<td>Power cable with European plug (type F), length: 3 m</td>
<td>223775-01</td>
</tr>
<tr>
<td></td>
<td>USB connecting cable</td>
<td>USB connecting cable for connector type A to type B</td>
<td>354770-xx</td>
</tr>
<tr>
<td>For mounting</td>
<td>Duo-Pos stand</td>
<td>Stand for rigid mounting, inclination angle 20° or 45°, fixing hole pattern 50 mm x 50 mm</td>
<td>1089230-06</td>
</tr>
<tr>
<td></td>
<td>Multi-Pos holder</td>
<td>Holder for fastening the device on an arm, continuously tiltable within an angle of 90°, fixing hole pattern 50 mm x 50 mm</td>
<td>1089230-08</td>
</tr>
</tbody>
</table>
### 3.4 In case of damage in transit

- Have the shipping agent confirm the damage
- Keep the packaging materials for inspection
- Notify the sender of the damage
- Contact the distributor or machine manufacturer for replacement parts

If damage occurred during transit:
- Keep the packaging materials for inspection
- Contact HEIDENHAIN or the machine manufacturer

This applies also if damage occurred to requested replacement parts during transit.

### 3.5 Repackaging and storage

Repackage and store the product carefully in accordance with the conditions stated below.

#### 3.5.1 Repackaging the product

Repackaging should correspond to the original packaging as closely as possible.

- Re-attach all mounting parts and dust protection caps to the product as received from the factory, or repackage them in the original packaging as received from the factory
- Repackage the product in such a way that
  - it is protected from impact and vibration during transit
  - it is protected from the ingress of dust or humidity
- Place all accessories that were included in the shipment in the original packaging

**Further information**: "Items supplied and accessories", Page 34

- Enclose all the documentation that was included in the original packaging

**Further information**: "Storage and distribution of the documentation", Page 21

If the device is returned for repair to the Service Department:

- Ship the device without accessories, without encoders and without peripherals

#### Accessories

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Pos stand</td>
<td>Stand for continuously variable tilting with a tilting range of 90°, fixing hole pattern 50 mm x 50 mm</td>
<td>1089230-07</td>
</tr>
<tr>
<td>Single-Pos stand</td>
<td>Stand for rigid mounting, inclination angle 20°, fixing hole pattern 50 mm x 50 mm</td>
<td>1089230-05</td>
</tr>
</tbody>
</table>
3.5.2 Storage of the product

- Package the product as described above
- Observe the specified ambient conditions
  Further information: "Specifications", Page 293
- Inspect the product for damage after any transport or longer storage times
4
Mounting
4.1 Overview

This chapter describes the mounting of the product. It contains instructions about how to correctly mount the product on stands or holders.

The following steps must be performed only by qualified personnel.

Further information: “Personnel qualification”, Page 29

4.2 Assembly of the product

General mounting information

The mount for the mounting variants is provided on the rear panel. The mounting hole pattern corresponds to a grid of 50 mm x 50 mm.

![Figure 1: Dimensions of rear panel of the product](image)

The materials for attachment of the mounting variants on the device are included in delivery.

You will also need the following:

- Torx T20 screwdriver
- Torx T25 screwdriver
- Allen key, size 2.5 (Duo-Pos stand)
- Materials for mounting on a supporting surface

The unit must be mounted to a stand or a holder to ensure the correct and intended use of the product.
4.2.1 Mounting on Single-Pos stand

You can fasten the Single-Pos stand to the product at a 20° angle.

- Use the provided M4 x 8 ISO 14581 countersunk head screws to fasten the stand to the upper threaded holes on the rear panel.

Comply with the permissible tightening torque of 2.6 Nm

- Fasten the stand with two suitable screws from above to a supporting surface or
- Attach self-adhesive rubber pads to the underside of the stand
- Route the cable from behind through the opening of the stand and then through the lateral openings to the connections

Figure 2: Product mounted on Single-Pos stand

Figure 3: Cable routing on Single-Pos stand

Further information: "Product dimensions with Single-Pos stand", Page 298
4.2.2 Mounting on Duo-Pos stand

You can fasten the Duo-Pos stand to the product at a 20° or 45° angle.

If you screw the Duo-Pos stand into the product at a 45° angle, you must attach the product at the upper end of the mounting slots. Use a power cable with an angled connector.

- Use the provided M4 x 8 ISO 7380 hexagon socket screws to fasten the stand to the lower threaded holes on the rear panel

Comply with the permissible tightening torque of 2.6 Nm

- Using the mounting slots (width = 4.5 mm), screw the stand to a supporting surface

or

- Set up the device freely at the desired location

- Route the cable from behind through the two supports of the stand and then through the lateral openings to the connections

Figure 4: Product mounted on Duo-Pos stand

Figure 5: Cable routing on Duo-Pos stand

Further information: “Product dimensions with Duo-Pos stand”, Page 299
4.2.3 Mounting on Multi-Pos stand

- Use the provided M4 x 8 ISO 14581 countersunk head screws (black) to fasten the stand to the threaded holes on the rear panel

  Comply with the permissible tightening torque of 2.6 Nm

- Using two M5 screws, you can also optionally screw the stand to a supporting surface from the bottom
- Adjust the desired angle of inclination
- To fix the stand: Tighten the T25 screw

  Comply with the tightening torque for screw T25
  - Recommended tightening torque: 5.0 Nm
  - Maximum permissible tightening torque: 15.0 Nm

- Route the cable from behind through the two supports of the stand and then through the lateral openings to the connections

Figure 6: Product mounted on Multi-Pos stand
Figure 7: Cable routing on Multi-Pos stand

Further information: "Product dimensions with Multi-Pos stand", Page 299
### 4.2.4 Mounting on Multi-Pos holder

- Use the provided M4 x 8 ISO 14581 countersunk head screws (black) to fasten the holder to the threaded holes on the rear panel.

  ![Comply with the permissible tightening torque of 2.6 Nm]

- Mount the holder with the supplied M8 screw, the washers, the handle and the M8 hexagon nut to an arm.
- Adjust the desired angle of inclination.
- To fix the holder in place: Tighten the T25 screw.

  ![Comply with the tightening torque for screw T25]
  - Recommended tightening torque: 5.0 Nm
  - Maximum permissible tightening torque: 15.0 Nm

- Route the cable from behind through the two supports of the holder and then through the lateral openings to the connections.

![Figure 8: Product mounted on Multi-Pos holder](image)

![Figure 9: Cable routing on Multi-Pos holder](image)

**Further information:** "Product dimensions with Multi-Pos holder", Page 300
Installation
5.1 Overview

This chapter describes the Installation of the product. It contains information about the product’s connections and instructions about how to correctly connect the peripheral devices.

The following steps must be performed only by qualified personnel.
Further information: “Personnel qualification”, Page 29

5.2 General information

NOTICE

Interference from sources of high electromagnetic emission!
Peripheral devices, such as frequency inverters or servo drives, may cause interference.
To increase the noise immunity to electromagnetic influences:
► Use the optional functional ground connection as per IEC/EN 60204-1
► Use only USB peripherals with continuous shielding, e.g. by metalized film and metal braiding or a metal housing. The degree of coverage provided by the braiding must be 85 % or higher. The shield must be connected around the entire circumference of the connectors (360° connection).

NOTICE

Damage to the device from the engaging and disengaging of connecting elements during operation!
Damage to internal components may result.
► Do not engage or disengage any connecting elements while the unit is under power

NOTICE

Electrostatic discharge (ESD)!
This device contains electrostatic 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 device connections
### Notic e

**Damage to the product due to incorrect wiring!**

The incorrect wiring of inputs or outputs can cause damage to the unit or to peripheral devices.

- Comply with the pin layouts and specifications of the product
- Assign only pins or wires that will be used

**Further information:** ‘Specifications’, Page 293

---

#### 5.3 Device overview

The connections on the rear panel of the device are protected by dust protection caps from contamination and damage.

---

### Notic e

**Contamination or damage may result if the dust protection caps are missing!**

If no dust protection caps are fitted to unused connections, this may impair the proper functioning of the contacts or destroy them.

- Remove dust protection caps only when connecting measuring devices or peripherals
- If you remove a measuring device or peripheral, re-attach the dust protection cap to the connection

---

The type of connections for encoders may vary depending on the product version.
Rear panel without dust protection caps

Figure 10: Rear panel on devices with ID 1089178-xx
Connections:

5  **X1 to X3**: Device variant with 15-pin D-sub connections for encoders with
    1 Vpp interface
7  **X32**: USB 2.0 Hi-speed connection (type A) for printers, input devices or USB mass
    storage
10 **Speaker**
8  **Functional ground connection as per IEC/EN 60204-1**
6  **X116**: RJ45 Ethernet connection for communication and data exchange with subsequent systems or PC
4  **X113**: 15-pin D sub connection for touch probes (e.g., HEIDENHAIN touch probe)
9  **X100**: Power switch and power connection

Additional connections on devices with ID 1089179-xx:

2  **X105**: 37-pin D-sub connection for digital interface (DC 24 V; 24 switching inputs, 8
    switching outputs)
3  **X106**: 15-pin D-sub connection for analog interface (4 inputs, 4 outputs)
1  **X104**: 9-pin D-sub connection for universal relay interface (2x relay changeover
    contacts)
5.4 Connecting encoders

For encoders with an EnDat 2.2 interface: If the corresponding encoder input has already been assigned to an axis in the device settings, then the encoder is automatically detected upon restart, and the settings are adapted. Alternatively, you can assign the encoder input after you have connected the encoder.

- Comply with the pin layout
- Remove and save the dust protection cap
- Route the cables depending on the mounting variant

Further information: “Assembly of the product”, Page 40
- Connect the encoder cables tightly to the respective connections

Further information: “Device overview”, Page 47
- If the cable connectors include mounting screws, do not overtighten them

Pin layout of X1, X2, X3

1 V<sub>PP</sub>, 11 µA<sub>app</sub>, EnDat 2.2

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 V&lt;sub&gt;PP&lt;/sub&gt;</td>
<td>A+</td>
<td>0 V</td>
<td>B+</td>
<td>U&lt;sub&gt;p&lt;/sub&gt;</td>
<td>/</td>
<td>/</td>
<td>R−</td>
<td>/</td>
</tr>
<tr>
<td>11 µA&lt;sub&gt;app&lt;/sub&gt;</td>
<td>I&lt;sub&gt;1+&lt;/sub&gt;</td>
<td>I&lt;sub&gt;2+&lt;/sub&gt;</td>
<td></td>
<td></td>
<td>/</td>
<td></td>
<td>Internal shield</td>
<td>l&lt;sub&gt;0+&lt;/sub&gt;</td>
</tr>
<tr>
<td>EnDat</td>
<td>/</td>
<td>/</td>
<td>DATA</td>
<td>shield</td>
<td>/</td>
<td>CLOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 V&lt;sub&gt;PP&lt;/sub&gt;</td>
<td>A−</td>
<td>Sense 0 V</td>
<td>B−</td>
<td>Sense U&lt;sub&gt;p&lt;/sub&gt;</td>
<td>/</td>
<td>R+</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>11 µA&lt;sub&gt;app&lt;/sub&gt;</td>
<td>I&lt;sub&gt;1−&lt;/sub&gt;</td>
<td>I&lt;sub&gt;2−&lt;/sub&gt;</td>
<td></td>
<td></td>
<td>/</td>
<td>l&lt;sub&gt;0+&lt;/sub&gt;</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>EnDat</td>
<td>/</td>
<td>/</td>
<td>DATA</td>
<td>/</td>
<td>CLOCK</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.5 Connecting touch probes

The following touch probes can be connected to the unit:

- HEIDENHAIN KT 130 edge finder

Further information: "Items supplied and accessories", Page 34

- Comply with the pin layout
- Remove and save the dust protection cap
- Route the cables depending on the mounting variant

Further information: "Assembly of the product", Page 40

- Connect the touch probe firmly

Further information: "Device overview", Page 47

- If the cable connectors include mounting screws, do not overtighten them

Pin layout of X 113

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED+</td>
<td>B 5 V</td>
<td>B 12 V</td>
<td>Dout 0</td>
<td>DC 12 V</td>
<td>DC 5 V</td>
<td>Din 0</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Din 1</td>
<td>Din 2</td>
<td>TP</td>
<td>GND</td>
<td>TP</td>
<td>Din 3</td>
<td>LED–</td>
<td></td>
</tr>
</tbody>
</table>

B – Probe signals, readiness
TP – Touch Probe, normally closed

Digital inputs:

Digital outputs:

Touch probe:
5.6 Wiring switching inputs and outputs

Depending on the peripherals to be connected, the connection work may need to be carried out by an electrical specialist.

Example: Safety Extra Low Voltage (SELV) exceeded

Further information: “Personnel qualification”, Page 29

The product fulfills the requirements of standard IEC 61010-1 only if the power to the peripheral devices is supplied from a secondary circuit with current limitation as per IEC 61010-1\(^{3\text{rd Ed.}}\), Section 9.4 or with power limitation as per IEC 60950-1\(^{2\text{nd Ed.}}\), Section 2.5 or from a Class 2 secondary circuit as specified in UL1310.

In place of IEC 61010-1\(^{3\text{rd Ed.}}\), Section 9.4, the corresponding sections of standards DIN EN 61010-1, EN 61010-1, UL 61010-1 and CAN/CSA-C22.2 No. 61010-1can be used, and, in place of IEC 60950-1\(^{2\text{nd Ed.}}\), Section 2.5, the corresponding sections of standards DIN EN 60950-1, EN 60950-1, UL 60950-1, CAN/CSA-C22.2 No. 60950-1 can be applied.

- Wire switching inputs and outputs in accordance with the following pin layout
- Remove and save the dust protection cap
- Route the cables depending on the mounting variant

Further information: ”Assembly of the product”, Page 40

- Connect the connecting cables of the peripherals tightly to their connectors

Further information: ”Device overview”, Page 47

- If the cable connectors include mounting screws, do not overtighten them

The digital or analog inputs and outputs must be assigned in the device settings of the respective switching function.

Pin layout of X104

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-0</td>
<td>R-0</td>
<td>NO</td>
<td>R-1</td>
<td>R-1</td>
<td>NO</td>
<td>R-0</td>
<td>CO</td>
<td>R-1</td>
</tr>
<tr>
<td>NC</td>
<td>/</td>
<td>R-1</td>
<td>NO</td>
<td>R-1</td>
<td>NC</td>
<td>R-0</td>
<td>CO</td>
<td>/</td>
</tr>
</tbody>
</table>

CO – Change Over
NO – Normally Open
NC – Normally Closed

Relay outputs:
Pin layout of X 105

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Din 0</td>
<td>Din 2</td>
<td>Din 4</td>
<td>Din 6</td>
<td>Din 8</td>
<td>Din 10</td>
<td>Din 12</td>
<td>Din 14</td>
<td></td>
</tr>
<tr>
<td>Din 16</td>
<td>Din 18</td>
<td>Din 20</td>
<td>Din 22</td>
<td>Dout 0</td>
<td>Dout 2</td>
<td>Dout 4</td>
<td>Dout 6</td>
<td></td>
</tr>
<tr>
<td>DC 24 V</td>
<td>DC 24 V</td>
<td>GND</td>
<td>Din 1</td>
<td>Din 3</td>
<td>Din 5</td>
<td>Din 7</td>
<td>Din 9</td>
<td></td>
</tr>
<tr>
<td>Din 11</td>
<td>Din 13</td>
<td>Din 15</td>
<td>Din 17</td>
<td>Din 19</td>
<td>Din 21</td>
<td>Din 23</td>
<td>Dout 1</td>
<td></td>
</tr>
<tr>
<td>Dout 3</td>
<td>Dout 5</td>
<td>Dout 7</td>
<td>DC 24 V</td>
<td>GND</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Digital inputs:

Digital outputs:
Pin layout of X 106

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aout 0+</td>
<td>Aout 1+</td>
<td>Aout 2+</td>
<td>Aout 3+</td>
<td>GND</td>
<td>GND</td>
<td>Ain 1</td>
<td>Ain 3</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Aout 0–</td>
<td>Aout 1–</td>
<td>Aout 2–</td>
<td>Aout 3–</td>
<td>DC 5 V</td>
<td>Ain 0</td>
<td>Ain 2</td>
<td></td>
</tr>
</tbody>
</table>

Analog inputs:

B – Probe signals, readiness
TP – Touch Probe, normally closed

Pin layout of X 113

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED+</td>
<td>B 5 V</td>
<td>B 12 V</td>
<td>Dout 0</td>
<td>DC 12 V</td>
<td>DC 5 V</td>
<td>Din 0</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Din 1</td>
<td>Din 2</td>
<td>TP</td>
<td>GND</td>
<td>TP</td>
<td>Din 3</td>
<td>LED–</td>
<td></td>
</tr>
</tbody>
</table>

Digital inputs:

Digital outputs:
5.7 Connecting a printer

Connecting a USB printer
- Comply with the pin layout
- Remove and save the dust protection cap
- Route the cables based on the mounting variant

**Further information:** "Assembly of the product", Page 40
- Connect USB printer to USB Type-A port (X32). Make sure the USB cable connector is fully inserted

**Further information:** "Device overview", Page 47

**Pin layout X32**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 5 V</td>
<td>Data (–)</td>
<td>Data (+)</td>
<td>GND</td>
</tr>
</tbody>
</table>

Connecting an Ethernet printer
- Comply with the pin layout
- Remove and save the dust protection cap
- Route the cables based on the mounting variant

**Further information:** "Assembly of the product", Page 40
- Connect the Ethernet printer to the Ethernet port X116 using a standard CAT.5 cable. The cable connector must firmly engage in the port

**Further information:** "Device overview", Page 47

**Pin layout of X116**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1+ (TX+)</td>
<td>D1- (TX-)</td>
<td>D2+ (RX+)</td>
<td>D3+</td>
<td>D3-</td>
<td>D2- (RX-)</td>
<td>D4+</td>
<td>D4-</td>
</tr>
</tbody>
</table>

5.8 Connecting input devices

- Comply with the pin layout
- Remove and save the dust protection cap
- Route the cables based on the mounting variant

**Further information:** "Assembly of the product", Page 40
- Connect USB mouse or USB keyboard to USB Type-A port (X32). Make sure the USB cable connector is fully inserted

**Further information:** "Device overview", Page 47
5.9 Connecting a network peripheral

- Comply with the pin layout
- Remove and save the dust protection cap
- Route the cables depending on the mounting variant

**Further information:** "Assembly of the product", Page 40

- Connect the network peripheral to Ethernet port X116 using a standard CAT.5 cable. The cable connector must firmly engage in the port

**Further information:** "Device overview", Page 47

<table>
<thead>
<tr>
<th>Pin layout of X116</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>D1+  (TX+)</td>
</tr>
</tbody>
</table>

| 5 | 6 | 7 | 8 |
| D2-  (RX-) | D4+  | D4-  |
6.10 Connecting the line voltage

**WARNING**

Risk of electric shock!
Improper grounding of electrical devices may result in serious personal injury or death by electric shock.

- Always use 3-wire power cables
- Make sure the ground wire is correctly connected to the ground of the building's electrical installations

**WARNING**

Fire hazard due to wrong power cable!
Use of a power cable that does not meet the requirements of the mounting location may cause a fire hazard.

- Use only a power cable that meets at least the national requirements of the respective country in which the product is mounted

- Comply with the pin layout
- Connect the power connection to a 3-wire grounded power outlet using a power cable that meets requirements

Further information: "Device overview", Page 47

Pin layout X100

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/N</td>
<td>N/L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Basic operation
6.1 Overview
This chapter describes the user interface, operating elements, and basic functions of the unit.

6.2 Using the touchscreen and input devices

6.2.1 Touchscreen and input devices
The operating elements on the user interface of the unit are operated via a touchscreen or a connected USB mouse. To enter data, you can use the screen keyboard of the touchscreen or a connected USB keyboard.

**NOTICE**

Malfunctions of the touchscreen caused by humidity or contact with water!
Humidity or water can impair the proper functioning of the touchscreen.
- Protect the touchscreen from humidity or contact with water

Further information: “Product data”, Page 294

6.2.2 Gestures and mouse actions
To activate, switch or move the operating elements of the user interface, you can use the unit’s touchscreen or a mouse. Gestures are used to operate the touchscreen and the mouse.

- The gestures for operating the touchscreen may differ from the gestures for operating the mouse.
- If the gestures for operating the touchscreen differ from those for operating the mouse, then these instructions describe both operating options as alternative actions.
- The alternative actions for operating the touchscreen or the mouse are identified by the following symbols:
  - Operation using the touchscreen
  - Operation using the mouse

The following overview describes the different gestures for operating the touchscreen or the mouse:

**Tapping**
- Means touching the screen briefly with your fingertip
- Means pressing the left mouse button once
Basic operation | Using the touchscreen and input devices

The actions initiated by tapping include
- Selection of menus, features or parameters
- Entering characters with the screen keyboard
- Closing dialogs

Holding (long press)
- Means touching the screen and holding your finger(s) on it for a few seconds
- Means pressing the left mouse button once and holding it down

The actions initiated by holding are
- Quickly changing the values in input fields with plus and minus buttons

Dragging
- Is a combination of long press and then swipe, moving a finger over the touchscreen when at least the starting point of motion is defined
- Means pressing the left mouse button once and holding it down while moving the mouse; at least the starting point of the motion is defined

The actions initiated by dragging include
- Scrolling through lists and texts
6.3 General operating elements and functions

The operating elements described below are available for configuration and operating the product via the touchscreen or input devices.

Screen keyboard
With the screen keyboard, you can enter text into the input fields of the user interface. Depending on the input field, a numeric or alphanumeric screen keyboard is shown.

Figure 12: Screen keyboard

- To enter values, tap an input field
- The input field is highlighted
- The screen keyboard is displayed
- Enter text or numbers
- The correctness of the entry in the input field is shown with a green check mark
- If the entry is incomplete or incorrect, a red exclamation mark is displayed. In this case, the entry cannot be completed
- To apply the values, confirm the entry with RET
- The values are displayed
- The screen keyboard disappears

Input fields with plus and minus buttons
To adjust a numerical value, use the + (plus) and - (minus) buttons to the left and right of the numerical value.

- Tap + or - until the desired value is displayed
- Long-press + or - to scroll through the values more quickly
- The selected value is displayed
**Toggle switch**
Use the toggle switch to switch between functions.

- Tap the desired function
- The active function is shown in green
- The inactive function is shown in light gray

**Slide switch**
With the sliding switch, you can activate or deactivate a function.

- Drag the slider to the desired position
- Tap the slider
- The function is activated or deactivated

**Drop-down list**
Buttons that open drop-down lists are indicated by a triangle pointing down.

- Tap the button
- The drop-down list opens
- The active entry is highlighted in green
- Tap the desired entry
- The selected entry is applied

**Undo**
With this button, you can undo the last action.
Processes that have already been concluded cannot be undone.

- Tap **Undo**
- The last action is undone

**Add**

- To add a feature, tap **Add**
- The new feature is added

**Close**

- Tap **Close** to close a dialog

**Confirm**

- Tap **Confirm** to conclude an activity
6.4 ND 7000 – switch-on and switch-off

6.4.1 Switching on the ND 7000

Before using the product, you need to perform the commissioning and setup steps. Depending on the purpose of use, you may have to configure additional setup parameters.

Further information: “Commissioning”, Page 91

- Turn the power switch on
  The power switch is located on the rear side of the product
- The unit powers up. This can take a moment
- If automatic user login is active and the last user who logged in was of the Operator type, the user interface opens with the Manual operation menu
- If automatic user login is not active, the User login menu is displayed

Further information: “User login and logout”, Page 65

6.4.2 Activating and deactivating the energy saving mode

If you will not be using the unit for a while, you should activate the energy-saving mode. This switches the unit to an inactive state without interrupting the power supply. The screen is switched off in this state.

Activating energy-saving mode

- Tap Switch off in the main menu

Deactivating energy-saving mode

- Tap anywhere on the touchscreen
- An arrow appears at the bottom of the screen
- Drag the arrow up
- The screen is switched on and shows the user interface last displayed
6.4.3 Switching off the ND 7000

**NOTICE**

Damage to the operating system!
Disconnecting the power source while the product is on can damage the operating system of the product.
- Use the **Switch-off** menu to shut down the product
- Do not disconnect the power source while the product is on
- Do not turn the power switch off until the product has shut down

- Tap **Switch off** in the main menu
- Tap **Shut down**
- The operating system shuts down
- Wait until the following message appears on the screen: **You can switch off the device now.**
- Turn the power switch off

6.5 User login and logout

In the **User login** menu, you can log in and out of the product as a user.
Only one user can be logged in to the product at a time. The logged-in user is displayed. Before a new user can log in, the logged-in user has to log out.

- The product provides various authorization levels that grant the user full or restricted access to management and operation functionality.
6.5.1 User login

- Tap User login in the main menu
- Select the user in the drop-down list
- Tap the Password input field
- Enter the user’s password

<table>
<thead>
<tr>
<th>User</th>
<th>Default password</th>
<th>Target group</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM</td>
<td>oem</td>
<td>Commissioner, machine tool builder</td>
</tr>
<tr>
<td>Setup</td>
<td>setup</td>
<td>Setup engineer, system configurer</td>
</tr>
<tr>
<td>Operator</td>
<td>operator</td>
<td>Operator</td>
</tr>
</tbody>
</table>

Further information: "Logging in for Quick Start", Page 159

- Confirm entry with RET
- Tap Log in
  - The user is logged in and the Manual operation menu is displayed

Further information: "Target groups according to user types", Page 22

6.5.2 User logout

- Tap User login in the main menu
- Tap Log out
  - The user is logged out
  - All functions of the main menu are inactive, except for Switch off
  - The product can only be used again after a user has logged in
6.6 Setting the language

The user interface language is English. You can change to another language, if desired.

- Tap **Settings** in the main menu
- Tap **User**
- The logged-in user is indicated by a check mark
- Select the logged-in user
- The language selected for the user is indicated by a national flag in the **Language** drop-down list
- Select the flag for the desired language from the **Language** drop-down list
- The user interface is displayed in the selected language

6.7 Performing the reference mark search after startup

If the reference mark search after unit start is active, then all of the unit’s functions will be disabled until the reference mark search has been successfully completed.

**Further information**: “Reference marks (Encoder)”, Page 259

The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.

If the reference mark search is active on the unit, then a wizard will ask you to traverse the reference marks of the axes.

- After logging in, follow the instructions of the wizard
- The Reference symbol stops blinking upon successful completion of the reference mark search

**Further information**: “Operating elements of the position display”, Page 80
**Further information**: “Activating the reference mark search”, Page 101

6.8 User interface

The unit is available in different versions, which are variously equipped. The user interface and available functions may vary depending on the version.
6.8.1 User interface after switch-on

**Factory default user interface**

The illustration shows the user interface the way it looks when you switch on the product for the first time.

This user interface will also be displayed after the product has been reset to its factory default settings.

![User interface after switch-on](image)

*Figure 13: The user interface in the product’s factory default setting*

**User interface after startup**

If automatic user login is activated, and the last user who logged in was of the **Operator** type, then the product displays the **Manual operation** menu after starting up.

**Further information**: "Manual operation menu", Page 71

If automatic user login is not activated, then the product opens the **User login** menu.

**Further information**: "User login menu", Page 78
6.8.2 Main menu of the user interface

User interface (in Manual operation mode)

Figure 14: User interface (in Manual operation mode)

1. Message display area, displays the time and the number of unclosed messages
2. Main menu with operating elements

Main menu operating elements

<table>
<thead>
<tr>
<th>Control</th>
<th>Function</th>
</tr>
</thead>
</table>
| ![Message icon] | **Message**  
Display of an overview of all messages as well as the number of messages that have not been closed  
*Further information: “Messages”, Page 87*
| ![Manual operation icon] | **Manual operation**  
Manual positioning of machine axes  
*Further information: “Manual operation menu”, Page 71*
| ![MDI mode icon] | **MDI mode**  
Direct input of the desired axis movements (Manual Data Input); the distance to go is calculated and displayed  
*Further information: “MDI menu”, Page 72*
| ![Program run icon] | **Program run (software option)**  
Execution of a previously created program with user interface  
*Further information: “Program run menu (software option)”, Page 74*
| ![Programming icon] | **Programming (software option)**  
Creation and management of individual programs  
*Further information: “Programming menu (software option)”, Page 75* |
### Control | Function

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| File management | Management of the files that are available on the product  
Further information: “File management menu”, Page 77 |
| User login | Login and logout of the user  
Further information: "User login menu", Page 78 |
| Settings | Settings of the product, such as setting up users, configuring sensors, or updating the firmware  
Further information: “Settings menu”, Page 79 |
| Switch-off | Shutdown of the operating system or activation of power-saving mode  
Further information: “Switch-off menu”, Page 80 |

**Selecting grouped operating elements**

When Software-Option ND 7000 PGM is activated, the following operating elements are grouped in the main menu:

- MDI mode
- Program run
- Programming

You can identify grouped operating elements by an arrow.

- To select an operating element from the group, tap the operating element with the arrow (e.g., tap **MDI mode**)
- The operating element is shown as active
- Tap the operating element again
- The group opens
- Select the desired operating element
- The selected operating element is shown as active

If a user with additional permissions (Setup or OEM user type) is logged in, then the gear symbols appears.
6.8.3 Manual operation menu

Activation

- Tap Manual operation in the main menu
- The user interface for manual operation is displayed

![Manual operation menu]

Figure 15: Manual operation menu

1. Axis key
2. Reference
3. Position display
4. Status bar
5. Spindle speed (machine tool)

In the Manual operation menu, the workspace shows the position values measured at the machine axes.
The status bar provides auxiliary functions.
Further information: "Manual operation", Page 175
6.8.4 MDI menu

Activation

- Tap **MDI** in the main menu

The operating element can belong to a group (based on the configuration).

**Further information**: “Selecting grouped operating elements”, Page 70

- The user interface for MDI mode is displayed

![MDI menu diagram](image)

Figure 16: **MDI** menu

1. Axis key  
2. Actual position  
3. Distance-to-go  
4. Status bar  
5. Spindle speed (machine tool)
**MDI block dialog box**

- Tap **MDI** in the main menu

  The operating element can belong to a group (based on the configuration).

  **Further information:** “Selecting grouped operating elements”, Page 70

- Tap **Create** on the status bar

  > The user interface for MDI mode is displayed

---

**Figure 17: MDI block dialog box**

1. View bar
2. Block parameters
3. MDI block
4. Status bar
5. Block tools

The **MDI** (Manual Data Input) menu enables you to enter the desired axis movements directly. You specify the distance to the target point, and the distance to go is then calculated and displayed.

The status bar provides additional measured values and functions.

**Further information:** “MDI mode”, Page 189
6.8.5 Program run menu (software option)

Calling up

- Tap **Program run** in the main menu

  The operating element belongs to a group.

**Further information:** “Selecting grouped operating elements”, Page 70

- The user interface for Program Run is displayed

![Program run menu](image)

Figure 18: **Program run** menu

1. View bar
2. Status bar
3. Program control
4. Spindle speed (machine tool)
5. Program management

The **Program run** menu makes it possible to execute a program that has previously been created in the Programming operating mode. During execution, a wizard will guide you through the individual program steps.

In the **Program run** menu, you can display a simulation window that visualizes the selected block.

The status bar provides additional measured values and functions.

**Further information:** "Program run (software option)", Page 203
6.8.6  Programming menu (software option)

Calling up

- Tap **Programming** in the main menu

The operating element belongs to a group. **Further information**: “Selecting grouped operating elements”, Page 70

- The user interface for programming is displayed

The status bar and the optional OEM bar are not available in the **Programming** menu.

You can see a visualization of the selected block in the optional simulation window.

![Programming menu](image)

Figure 19: Programming menu

1  View bar
2  Toolbar
3  Program management
In the **Programming** menu, you can create and manage programs. You define individual machining steps or machining patterns as blocks. A sequence of blocks then forms a program.

**Further information:** “Programming (software option)”, Page 211
6.8.7 File management menu

Calling up

- Tap File management in the main menu
- The file management user interface is displayed

Short description

The File management menu shows an overview of the files stored in the g133 product’s memory.

Any connected USB mass storage products (FAT32 format) or available network drives are shown in the list of storage locations. The USB mass storage products and the network drives are displayed with their name or drive designation.

Further information: “File management”, Page 225
6.8.8  User login menu

Calling up

- Tap User login in the main menu
- The user interface for user login and logout is displayed

Short description

Figure 22: User login menu

1 Display of the logged-in user
2 User login

The User login menu shows the logged-in user in the column on the left. The login of a new user is displayed in the right-hand column.

To log in another user, the logged-in user must first log out.

Further information: "User login and logout", Page 65
6.8.9  **Settings menu**

**Calling up**

- Tap **Settings** in the main menu
- The user interface for the product settings is displayed

**Short description**

![Settings menu diagram](image)

Figure 23: **Settings** menu

1. List of setting options
2. List of setting parameters

The **Settings** menu shows all of the options for configuring the product. With the setting parameters, you can adapt the product to on-site requirements.

**Further information:** "Settings", Page 233

The product provides various authorization levels that grant the user full or restricted access to management and operation functionality.
6.8.10 Switch-off menu

Activation

- Tap Switch off in the main menu
- The operating elements for shutting down the operating system, for activating the energy-saving mode and for activating the cleaning mode are displayed

Short description

The Switch off menu provides the following options:

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
</table>
| ![Switch off icon] | Shut down
Shuts down the operating system |
| ![Energy saving mode icon] | Energy saving mode
Switches the screen off and puts the operating system into energy-saving mode |
| ![Cleaning mode icon] | Cleaning mode
Switches the screen off; the operating system continues unchanged |

Further information:
- “ND 7000 – switch-on and switch-off”, Page 64
- “Cleaning the screen”, Page 280

6.9 Position display

The unit’s position display shows the axis positions and additional information about the configured axes (if applicable).

6.9.1 Operating elements of the position display

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Axis key icon]</td>
<td>Axis key</td>
</tr>
<tr>
<td>Axis key functions:</td>
<td></td>
</tr>
<tr>
<td>- Tapping the axis key: opens the input field for position value (Manual operation) or dialog box MDI block (MDI mode)</td>
<td></td>
</tr>
<tr>
<td>- Holding down the axis key: sets the current position as zero point</td>
<td></td>
</tr>
<tr>
<td>- Dragging the axis key to the right: opens menu if functions are available for the axis</td>
<td></td>
</tr>
<tr>
<td>![Reference mark search icon]</td>
<td>Reference mark search performed successfully</td>
</tr>
<tr>
<td>![Reference mark search icon]</td>
<td>Reference mark search not performed or no reference mark detected</td>
</tr>
<tr>
<td>![Selected gear stage icon]</td>
<td>Selected gear stage of the gear spindle</td>
</tr>
<tr>
<td>Further information: “Setting the gear stage for gear spindles”, Page 82</td>
<td></td>
</tr>
</tbody>
</table>
### Symbol | Meaning
--- | ---
[ ![ ](image) ](image) | Spindle speed cannot be achieved with selected gear stage
   - Select a higher gear stage
[ ![ ](image) ](image) | Spindle speed cannot be achieved with selected gear stage
   - Select a lower gear stage
[ ![ ](image) ](image) | In MDI mode and Program Run, a scaling factor is applied to the axis
   - Further information: “Adjusting settings in the quick access menu”, Page 83

#### 6.9.2 Position display functions

**Setting the spindle speed**

The following information applies only to units with ID number 1089179-xx.

You can control the spindle speed depending on the configuration of the connected machine tool.

- Tap or long-press + or - to set the spindle speed to the desired value
- Tap the Spindle speed input field, enter the value and tap RET to confirm
- The product applies the entered spindle speed as the nominal value and controls the spindle of the machine tool accordingly
Setting the gear stage for gear spindles

The following information applies only to units with ID number 1089179-xx.

If your machine tool uses a gear spindle, then you can select the gear stage used.

The selection of the gear stages can also be controlled via an external signal.

Further information: “Spindle axis S”, Page 263

In the working space, drag the S axis key to the right

- Tap Gear stage
- The Set gear stage dialog appears
- Tap the desired gear stage
- Tap Confirm
- The selected gear stage is now adopted as the new value
- Drag the S axis key to the left
- The icon for the selected gear stage appears next to the S axis key

If the desired spindle speed cannot be attained with the selected gear stage, then the gear stage icon will flash with an upward pointing arrow (higher gear stage) or with a downward pointing arrow (lower gear stage).

6.10 Status bar

The status bar and the optional OEM bar are not available in the Programming menu.

In the status bar, the product shows the feed rate and traversing speed. The operating elements of the status bar also give you direct access to the preset table and tool table, as well as to the stopwatch and calculator features.

6.10.1 Operating elements of the status bar

The status bar provides the following operating elements:
### Basic operation | Status bar

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quick access menu</strong>&lt;br&gt;<img src="image" alt="mm Degree" /></td>
<td></td>
</tr>
<tr>
<td>Setting of the units for linear values and angular values, configuration of a scaling factor; tapping opens the quick access menu</td>
<td></td>
</tr>
<tr>
<td><strong>Further information:</strong> &quot;Adjusting settings in the quick access menu&quot;, Page 83</td>
<td></td>
</tr>
<tr>
<td><strong>Preset table</strong>&lt;br&gt;<img src="image" alt="Wheel" /></td>
<td></td>
</tr>
<tr>
<td>Display of the current preset; tapping opens the preset table</td>
<td></td>
</tr>
<tr>
<td><strong>Further information:</strong> &quot;Creating a preset table&quot;, Page 149</td>
<td></td>
</tr>
<tr>
<td><strong>Tool table</strong>&lt;br&gt;<img src="image" alt="Tool" /></td>
<td></td>
</tr>
<tr>
<td>Display of the current tool; tapping opens the tool table</td>
<td></td>
</tr>
<tr>
<td><strong>Further information:</strong> &quot;Creating a tool table&quot;, Page 147</td>
<td></td>
</tr>
<tr>
<td><strong>Stopwatch</strong>&lt;br&gt;<img src="image" alt="Stopwatch" /></td>
<td></td>
</tr>
<tr>
<td>Time display with Start / Stop function in h:mm:ss format</td>
<td></td>
</tr>
<tr>
<td><strong>Further information:</strong> &quot;Stopwatch&quot;, Page 84</td>
<td></td>
</tr>
<tr>
<td><strong>Calculator</strong>&lt;br&gt;<img src="image" alt="Calculator" /></td>
<td></td>
</tr>
<tr>
<td>Calculator with the most important mathematical functions and speed calculator</td>
<td></td>
</tr>
<tr>
<td><strong>Further information:</strong> &quot;Calculator&quot;, Page 85</td>
<td></td>
</tr>
<tr>
<td><strong>Feed rate</strong>&lt;br&gt;<img src="image" alt="Feed rate" /></td>
<td></td>
</tr>
<tr>
<td>Display of the actual feed rate of the currently fastest axis</td>
<td></td>
</tr>
<tr>
<td><strong>Auxiliary functions</strong>&lt;br&gt;<img src="image" alt="Auxiliary functions" /></td>
<td></td>
</tr>
<tr>
<td>Auxiliary functions in Manual operation mode, depending on the configured application mode</td>
<td></td>
</tr>
<tr>
<td><strong>Further information:</strong> &quot;Additional functions in Manual operation mode&quot;, Page 85</td>
<td></td>
</tr>
<tr>
<td><strong>MDI block</strong>&lt;br&gt;<img src="image" alt="MDI block" /></td>
<td></td>
</tr>
<tr>
<td>For creating machining blocks in MDI mode</td>
<td></td>
</tr>
</tbody>
</table>

### 6.10.2 Adjusting settings in the quick access menu

With the quick access menu, you can adjust the following settings:

- The availability of settings in the quick access menu depends on the user which user is logged in.
- Unit for linear values (Millimeters or Inch)
- Unit for angular values (Radian, Decimal degrees or Deg-Min-Sec)
- The Scaling factor by which the stored position is multiplied during execution of an MDI block or program block
Setting units

- Tap the quick access menu on the status bar
- Select the desired Unit for linear values
- Select the desired Unit for angular values
- Tap Close to close the quick access menu
- The selected units are displayed in the quick access menu

Activating Scaling factor

During execution of an MDI block or a program block, the Scaling factor is multiplied by the position stored in the block. This allows you to mirror or scale an MDI block or program block on one or more axes, without altering the block.

- Tap the quick access menu on the status bar
- To navigate to the desired setting, drag the view to the left
- Activate Scaling factor with the ON/OFF slide switch
- Enter the desired Scaling factor for every axis
- Confirm each entry with RET
- To close the quick access menu, tap Close
- For an active scaling factor ≠ 1, the corresponding icon appears in the position display

6.10.3 Stopwatch

The status bar provides a stopwatch for measuring the machining times, etc. The stopwatch uses the time display format h:mm:ss and operates on the same principle as a standard stopwatch, i.e. it measures elapsed time.

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>Starts time measurement or resumes time measurement after Pause</td>
</tr>
<tr>
<td>Pause</td>
<td>Interrupts time measurement</td>
</tr>
<tr>
<td>Stop</td>
<td>Stops time measurement and resets it to 0:00:00</td>
</tr>
</tbody>
</table>
6.10.4 **Calculator**

For calculations, the product provides various calculators in the status bar. To enter the numerical values, use the numeric keys as on a normal computer.

<table>
<thead>
<tr>
<th>Calculator</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Contains the most important mathematical functions</td>
</tr>
<tr>
<td>Speed calculator</td>
<td>▶ Enter the Diameter (mm) and Cutting speed (m/min) in the provided fields</td>
</tr>
<tr>
<td></td>
<td>▶ The speed is calculated automatically</td>
</tr>
</tbody>
</table>

6.10.5 **Additional functions in Manual operation mode**

To call the additional functions, tap **Additional functions** in the status bar.

The following operating elements are available:

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
</table>
| ![Reference marks icon] | **Reference marks**  
For starting the reference mark search  
**Further information:** "Activating the reference mark search", Page 101 |
| ![Probing icon] | **Probing**  
For probing the edge of a workpiece  
**Further information:** "Defining presets", Page 178 |
| ![Probing icon] | **Probing**  
For finding the centerline of a workpiece  
**Further information:** "Defining presets", Page 178 |
| ![Probing icon] | **Probing**  
For finding the center point of a circular feature (hole or cylinder)  
**Further information:** "Defining presets", Page 178 |

6.11 **OEM bar**

The status bar and the optional OEM bar are not available in the **Programming** menu.

The optional OEM bar allows you to control the configuration of the functions of the connected machine tool, independently of its configuration.
6.11.1 Operating elements of the OEM bar

The operating elements that are available on the OEM bar depend on the configuration of the device and of the connected machine tool.

Further information: "Configuring the OEM bar", Page 115

The following operating elements are typically available in the OEM bar:

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logo</td>
<td>Displays the configured OEM logo</td>
</tr>
<tr>
<td>Spindle speed</td>
<td>Shows one or more default values for the spindle speed</td>
</tr>
<tr>
<td></td>
<td>Further information: &quot;Configuring nominal values for the spindle speed&quot;, Page 116</td>
</tr>
</tbody>
</table>

6.11.2 Calling functions of the OEM bar

The operating elements that are available on the OEM bar depend on the configuration of the device and of the connected machine tool.

Further information: "Configuring the OEM bar", Page 115

The operating elements in the OEM bar allow you to control special functions (e.g., spindle functions).

Further information: "Configuring special functions", Page 118

Setting spindle speed

- Tap the Spindle speed field on the OEM bar
- The product applies the predefined voltage value at which the spindle of the connected machine tool is brought to the selected rotational speed (with no load on the spindle)

Programming spindle speed

- Tap or long-press + or - to bring the spindle to the desired rotational speed
- Press and hold the desired Spindle speed field on the OEM bar
- The background color of the field is highlighted in green
- The product applies the current spindle speed as the nominal value and displays it in the Spindle speed field
6.12 Messages and audio feedback

6.12.1 Messages

The messages that appear at the top of the workspace are triggered by, for example, operator errors or uncompleted processes. The messages are displayed upon occurrence of the message cause or via tapping on the **Messages** display area at the top left of the screen.

**Viewing messages**

- Tap **Messages**
- The message list opens

**Resizing the display area**

- To enlarge the message display area, drag the **handle** down
- To make the message display area smaller, drag the **handle** up
- To close the display area, drag the **handle** up out of the screen
- The number of unclosed messages is indicated in **Messages**
Closing messages

Depending on the content of the messages, you can close messages by means of the following operating elements:

- To close an informational message, tap **Close**
  - The message disappears

  or

- To close a message that potentially has an effect on the application, tap **OK**
  - If applicable, the message will now be taken into account by the application
  - The message disappears

6.12.2 Wizard

![Figure 25: Support from the wizard for action steps](image)

1 Wizard (example)

The wizard assists you in carrying out action steps, programs, or teach processes. The following operating elements of the wizard are shown based on the action step or process.

- To return to the last action step or to repeat the process, tap **Undo**

- To confirm the displayed action step, tap **Confirm**
  - The wizard proceeds to the next step or completes the process

- Tap **Next** to proceed to the next step
  - Tap **Back** to return to the previous step

- Tap **Close** to close the wizard
6.12.3 Audio feedback

The product can provide audio feedback to indicate user actions, completed processes or malfunctions.

The available sounds are grouped into categories. The sounds differ within a category.

You can define the audio feedback settings in the Settings menu.

Further information: “Sounds”, Page 238
Commissioning
7.1 Overview

This chapter contains all the information necessary for commissioning the product.

During commissioning, the machine manufacturer’s commissioning engineer (OEM) configures the product for use on the specific machine tool.

The settings can be reset to the factory defaults.

Further information: “Reset”, Page 269

Make sure that you have read and understood the “Basic operation” chapter before carrying out the actions described below.

Further information: “Basic operation”, Page 59

The following steps must be performed only by qualified personnel.

Further information: “Personnel qualification”, Page 29

7.2 Logging in for commissioning

7.2.1 User login

To commission the product, the OEM user must log in.

- Tap User login in the main menu
- If required, log out the user who is currently logged in
- Select the OEM user
- Tap the Password input field
- Enter the password “oem”

If the password does not match the default password, ask a Setup user or OEM user for the assigned password.

If the password is no longer known, contact a HEIDENHAIN service agency.

- Confirm the entry with RET
- Tap Log in
- The user is logged in
- The product opens the Manual operation mode
7.2.2 Performing the reference mark search after startup

- If the reference mark search after unit start is active, then all of the unit’s functions will be disabled until the reference mark search has been successfully completed.
- Further information: "Reference marks (Encoder)", Page 259

The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.

If the reference mark search is active on the unit, then a wizard will ask you to traverse the reference marks of the axes:
- After logging in, follow the instructions of the wizard
- The Reference symbol stops blinking upon successful completion of the reference mark search

Further information: "Operating elements of the position display", Page 80
Further information: "Activating the reference mark search", Page 101

7.2.3 Setting the language

The user interface language is English. You can change to another language, if desired.

- Tap Settings in the main menu
- Tap User
  - The logged-in user is indicated by a check mark
  - Select the logged-in user
  - The language selected for the user is indicated by a national flag in the Language drop-down list
  - Select the flag for the desired language from the Language drop-down list
  - The user interface is displayed in the selected language
7.2.4 Changing the password
You must change the password to prevent unauthorized configuration.
The password is confidential and must not be disclosed to any other person.

- Tap **Settings** in the main menu
- Tap **User**
  - The logged-in user is indicated by a check mark
- Select the logged-in user
- Tap **Password**
- Enter the current password
- Confirm entry with **RET**
- Enter the new password and repeat it
- Confirm entry with **RET**
- Tap **OK**
- Close the message with **OK**
- The new password is available the next time the user logs in

7.3 Steps for commissioning

The following commissioning steps build on each other.
- To correctly commission the product, make sure to perform the steps in the order described here

**Prerequisite:** You are logged on as a user of the **OEM** type (see “Logging in for commissioning”, Page 92).

**Basic settings**
- Selecting the Application
- Activating the Software options
- Setting the date and time
- Setting the units of measure

**Configuring a touch probe**
- Configuring a touch probe
### Configuring the axes

<table>
<thead>
<tr>
<th>For EnDat interfaces:</th>
<th>For $1 \text{ V}<em>{PP}$ or $11 \mu\text{A}</em>{PP}$ interfaces:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Configuring axes for encoders with EnDat interface</td>
<td></td>
</tr>
<tr>
<td>- Performing error compensation for linear encoders</td>
<td></td>
</tr>
<tr>
<td>- Ascertaining the line count per revolution</td>
<td></td>
</tr>
<tr>
<td>- Activating the reference mark search</td>
<td></td>
</tr>
<tr>
<td>- Configuring the axes for encoders with a $1 \text{ V}<em>{PP}$ or $11 \mu\text{A}</em>{PP}$ interface</td>
<td></td>
</tr>
<tr>
<td>- Performing error compensation for linear encoders</td>
<td></td>
</tr>
<tr>
<td>- Ascertaining the line count per revolution</td>
<td></td>
</tr>
</tbody>
</table>

### Configuring M functions

- Configuring M functions

### OEM area

- Adding documentation
- Adding a startup screen
- Configuring the OEM bar
- Adjusting the display
- Defining error messages
- Back-up OEM-specific folders and files
- Configuring the unit for screenshots

### Backing up data

- Back up settings
- Back up user files

### NOTICE

**Loss of or damage to configuration data!**

If the product is disconnected from the power source while it is on, the configuration data can be lost or corrupted.

- Back up the configuration data and keep the backup for recovery purposes
7.3.1 Basic settings

Selecting the Application
When putting the product into service, you can choose between the standard application modes of **Milling** and **Turning**.
In its factory default setting, the product is already set to the **Milling** application mode.

When you change the unit’s application mode, then all of the axis settings will be reset.

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Settings**
- In the **Application** drop-down list, select the **Milling** application mode

Activating the Software options
Additional **Software options** can be enabled on the product via a **License key**.

You can view the enabled **Software options** on the overview page.
Further information: “Checking the Software options”, Page 98

Requesting license key
You can request a license key by using the following procedure:
- Reading out device information for the license key request
- Creating a license key request

Reading out device information for the license key request

- Tap **Settings** in the main menu.
- Tap **General**
- Tap **Device information**
  - An overview of the device information appears
  - The product designation, ID number, serial number, and firmware version are displayed
- Contact a HEIDENHAIN service agency and submit the displayed device information in order to request a license key for the product
  - The license key and the license file are generated and sent by e-mail
Creating a license key request

- Tap **Settings** in the main menu.
- Tap **Service**
- Tap **Software options**
- To request a software option that is available for a fee, tap **Request options**
- To request a free trial option, tap **Request trial options**
- To select the desired software option, tap its check mark

**i** To deselect an entry, tap the check mark for the respective software option

- Tap **Creating a request**
- In the dialog, select the storage location in which you want to save the license key request
- Enter a suitable file name
- Confirm entry with RET
- Tap **Save as**
- The license key request is created and saved in the selected folder
- If the license key request is stored on the unit, move the file to a connected USB mass storage device (FAT32 format) or to the network drive

**Further information:** "Moving a file", Page 228
- Contact a HEIDENHAIN service agency and submit the file you created in order to request a license key for the product
- The license key and the license file are generated and sent by e-mail

Activating a license key

You can activate a license key by
- Reading the license key from the provided license file into the product
- Entering the license key manually into the product
Uploading license key from license file

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **Software options**
  - **Activate options**
- Tap **Read license file**
- Select the license file in the file system, on the USB mass storage device or on the network drive
- Confirm your selection with **Select**
- Tap **OK**
- The license key is activated
- Tap **OK**
- You may need to restart the product, depending on the software option
- Confirm the restart with **OK**
- The activated software option is available

Entering license key manually

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **Software options**
  - **Activate options**
- Enter the license key into the **License key** input field
- Confirm the entry with **RET**
- Tap **OK**
- The license key is activated
- Tap **OK**
- You may need to restart the product, depending on the software option
- Confirm the restart with **OK**
- The activated software option is available

Checking the Software options

On the overview page, you can check which **Software options** are enabled for the product.

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **Software options**
  - **Overview**
- A list of enabled **Software options** is displayed
Setting the date and time

- Tap **Settings** in the main menu
- Tap **General**
- Tap **Date and time**
- The set values are displayed in the following format: Year, month, day, hour, minute
- To set the date and time in the middle line, drag the columns up or down
- Tap **Set** to confirm
- Select the desired format from the **Date format** list:
  - MM-DD-YYYY: Display as month, day, year
  - DD-MM-YYYY: Display as day, month, year
  - YYYY-MM-DD: Display as year, month, day

**Further information:** "Date and time", Page 240

Setting the units of measure

You can set various parameters to define the units of measure, rounding methods and decimal places.

- Tap **Settings** in the main menu
- Tap **General**
- Tap **Units**
- To set a unit of measure, tap the corresponding drop-down list and select the unit
- To set the rounding method, tap the corresponding drop-down list and select the rounding method
- To set the number of decimal places displayed, tap - or +

**Further information:** "Units", Page 241
7.3.2 Configuring a touch probe

You can use probing functions to set presets with a HEIDENHAIN KT 130 Edge Finder. The stylus of the edge finder can be additionally fitted with a ruby ball tip. In order to use the KT 130 edge finder, you need to configure the relevant parameters. The parameters are taken into account by the probing functions.

- Tap **Settings** in the main menu
- Tap **Sensors**
- Tap **Touch probe**
  - In the **Touch probe** drop-down list, select the **KT 130** model for edge detection
  - Use the **ON/OFF** slide switch to activate or deactivate the **Always use touch probe for probing** option as needed
  - Enter the length difference of the touch probe in the **Length** input field
  - Confirm the entry with **RET**
  - Enter the stylus diameter of the touch probe in the **Diameter** input field
  - Confirm the entry with **RET**

7.3.3 Configuring the axes

The procedure varies depending on the interface type of the connected encoder and on the type of axis:

- **Encoders with EnDat interface:**
  The encoder applies the parameters automatically
  Further information: “Configuring axes for encoders with EnDat interface”, Page 102
- **Encoders with 1 Vpp or 11 µApp interface:**
  The parameters must be configured manually
- **Axis type Spindle or Gear spindle:**
  The inputs, outputs, and additional parameters must be configured manually
  Further information: “Spindle axis S”, Page 263

For the parameters of HEIDENHAIN encoders that are typically connected to the product, refer to the overview of typical encoders.

Further information: “Overview of typical encoders”, Page 105
Activating the reference mark search

The product uses the reference marks to reference the machine table to the machine. If the reference mark search has been activated, a wizard appears on startup of the product and asks the user to move the axes for the reference mark search.

Requirement: The installed encoders have reference marks that have been configured in the axis parameters.

The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.

The automatic reference mark search on startup of the product can be canceled depending on the configuration.

Further information: “Reference marks (Encoder)”, Page 259

- Tap **Settings** in the main menu
- Tap **Axes**
- Open in the sequence
  - **General settings**
  - **Reference marks**
- Use the **ON/OFF** slide switch to activate the **Reference mark search after unit start** function
- The reference marks must be traversed every time the product is started
- The functions of the product will only be available after the reference mark search has been completed
- The Reference symbol stops blinking upon successful completion of the reference mark search

Further information: “Operating elements of the position display”, Page 80
Configuring axes for encoders with EnDat interface

If the corresponding encoder input has already been assigned to an axis, a connected encoder with EnDat interface is automatically detected upon restart, and the settings are adapted. Alternatively, you can assign the encoder input after you have connected the encoder.

**Requirement:** An encoder with EnDat interface is connected to the product.

The configuration procedure is the same for each axis. The procedure will now be explained using one axis as an example.

- Tap **Settings** in the main menu.
- Tap **Axes**
- Tap the axis name or **Not defined** if appropriate
- If applicable, select the axis name for the axis in the **Axis name** drop-down list
- Tap **Encoder**
- Select the connection for the corresponding encoder from the **Encoder input** drop-down list:
  - X1
  - X2
  - X3
- The available encoder information is transmitted to the product
- The settings are updated
- Select the type of encoder from the **Encoder model** drop-down list:
  - Linear encoder
  - Angle encoder
  - Angle encoder as linear encoder
- If you selected **Angle encoder as linear encoder**, then enter the **Mechanical ratio**
- If you selected **Angle encoder**, then select the **Display mode**
- Tap **Reference point displacement**
- Use the **ON/OFF** slide switch to activate or deactivate **Reference point displacement** (calculation of the offset between the reference mark and the machine zero point)
- If activated, enter the offset value for **Reference point displacement**
- Confirm the entry with **RET** or
- To apply the current position as the offset value, tap **Apply** under **Current position for reference point shift**
- To switch to the previous display, tap **Back**
- To view the electronic ID label of the encoder, tap **ID label**
- In order to see the results of the encoder diagnosis, tap **Diagnosis**

**Further information:** "<Axis name> (settings of the axis)", Page 256
Configuring the axes for encoders with a 1 V<sub>PP</sub> or 11 µA<sub>PP</sub> interface

The configuration procedure is the same for each axis. The procedure will now be explained using one axis as an example.

- Tap **Settings** in the main menu
- Tap **Axes**
- Tap the axis name or **Not defined** if applicable
- If applicable, select the axis name for the axis in the **Axis name** drop-down list
- Tap **Axis type**
- Select the **Linear axis**
- In order to switch to the previous axis, tap **Back**
- Tap **Encoder**
- Select the connection for the corresponding encoder from the **Encoder input** drop-down list:
  - X1
  - X2
  - X3
- Select the type of incremental signal from the **Incremental signal** drop-down list:
  - 1 V<sub>PP</sub>: Sinusoidal voltage signal
  - 11 µA<sub>PP</sub>: Sinusoidal current signal
- Select the encoder model from the **Encoder model** drop-down list:
  - Linear encoder: Linear axis
  - Angle encoder: Rotary axis
  - Angle encoder as linear encoder: A rotary axis is displayed as a linear axis
- Depending on the selection, enter further parameters:
  - For **Linear encoder**, enter the **Signal period** (see "Linear encoders", Page 105)
  - For **Angle encoder**, enter the **Line count** (see "Angle encoders and rotary encoders", Page 105), or determine it using a teach sequence (see "Ascertaining the line count per revolution", Page 111)
  - For an **Angle encoder as linear encoder**, enter the **Line count** and the **Mechanical ratio**
- Confirm each input with RET
- For **Angle encoder**, select the **Display mode** if applicable
- Tap **Reference marks**
- Select the reference mark from the **Reference mark** drop-down list:
  - None: There is no reference mark
  - One: The encoder has one reference mark
  - Coded: The encoder has distance-coded reference marks
If the linear encoder has coded reference marks, enter the **Maximum traverse path**
(see "Linear encoders", Page 105)

If the angle encoder has coded reference marks, enter the parameter for the **Nominal increment**
(see "Angle encoders and rotary encoders", Page 105)

Confirm the entry with **RET**

Use the ON/OFF slide switch to activate or deactivate **Inversion of reference mark pulses**

Tap **Reference point displacement**

Use the ON/OFF slide switch to activate or deactivate **Reference point displacement**
(calculation of the offset between the reference mark and the machine zero point)

If activated, enter the offset value for **Reference point displacement**

Confirm the entry with **RET**

To apply the current position as the offset value, tap **Apply** under **Current position for reference point shift**

In order to switch to the previous display, tap **Back** twice

In the **Analog filter frequency** drop-down list, select the frequency of the low-pass filter for suppressing high-frequency interference signals:

- **33 kHz**: Interference frequencies above 33 kHz
- **400 kHz**: Interference frequencies above 400 kHz

Use the ON/OFF slide switch to activate or deactivate the **Terminating resistor** function

---

The terminating resistor is automatically deactivated for incremental signals of the current signal type
(11 $\mu$A$_{pp}$)

Select the type of error monitoring from the **Error monitor** drop-down list:

- **Off**: Error monitoring not active
- **Amplitude**: Error monitoring of the signal amplitude
- **Frequency**: Error monitoring of the signal frequency
- **Frequency & amplitude**: Error monitoring of the signal amplitude and signal frequency

Select the desired counting direction from the **Counting direction** drop-down list:

- **Positive**: The direction of traverse is in the counting direction of the encoder
- **Negative**: The direction of traverse is opposite to the counting direction of the encoder

**Further information**: "<Axis name> (settings of the axis)", Page 256
Overview of typical encoders

The following overview lists the parameters of the HEIDENHAIN encoders that are typically connected to the product.

When connecting other encoders, refer to the encoder’s documentation for the required parameters.

Linear encoders

Examples of incremental encoders that are typically used

<table>
<thead>
<tr>
<th>Encoder series</th>
<th>Interface</th>
<th>Signal period</th>
<th>Reference mark</th>
<th>Maximum traverse path</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS 388C/688C</td>
<td>1 Vpp</td>
<td>20 μm</td>
<td>Coded</td>
<td>20 mm</td>
</tr>
<tr>
<td>LS 187/487C</td>
<td>1 Vpp</td>
<td>20 μm</td>
<td>Coded</td>
<td>20 mm</td>
</tr>
<tr>
<td>LB 382C</td>
<td>1 Vpp</td>
<td>40 μm</td>
<td>Coded</td>
<td>80 mm</td>
</tr>
</tbody>
</table>

Examples of absolute encoders that are typically used

<table>
<thead>
<tr>
<th>Encoder series</th>
<th>Interface</th>
<th>Measuring step</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC 415</td>
<td>EnDat 2.2</td>
<td>5 nm</td>
</tr>
</tbody>
</table>

Angle encoders and rotary encoders

<table>
<thead>
<tr>
<th>Encoder series</th>
<th>Interface</th>
<th>Line count/output signals per revolution</th>
<th>Reference mark</th>
<th>Nominal increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>RON 285C</td>
<td>1 Vpp</td>
<td>18000</td>
<td>Coded</td>
<td>20°</td>
</tr>
<tr>
<td>ROD 280C</td>
<td>1 Vpp</td>
<td>18000</td>
<td>Coded</td>
<td>20°</td>
</tr>
<tr>
<td>ROD 480</td>
<td>1 Vpp</td>
<td>1000 ... 5000</td>
<td>One</td>
<td>-</td>
</tr>
<tr>
<td>ERN 180</td>
<td>1 Vpp</td>
<td>1000 ... 5000</td>
<td>One</td>
<td>-</td>
</tr>
<tr>
<td>ERN 480</td>
<td>1 Vpp</td>
<td>1000 ... 5000</td>
<td>One</td>
<td>-</td>
</tr>
</tbody>
</table>

The formulae below enable you to calculate the nominal increment of the distance-coded reference marks with angle encoders:

Nominal increment = \( \frac{360° \div \text{number of reference marks}}{2} \)

Nominal increment = \( \frac{(360° \times \text{nominal increment in signal periods})}{\text{line count}} \)

Examples of absolute encoders that are typically used

<table>
<thead>
<tr>
<th>Encoder series</th>
<th>Interface</th>
<th>Measuring step</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROC 425</td>
<td>EnDat 2.2</td>
<td>25 bits</td>
</tr>
<tr>
<td>RCN 5310</td>
<td>EnDat 2.2</td>
<td>26 bits</td>
</tr>
</tbody>
</table>
Configuring the spindle axis

Depending on the configuration of the connected machine tool, you must configure the inputs and outputs and further parameters of the spindle axis prior to operation. If your machine tool uses a gear spindle, then you can also configure the corresponding gear stages.

- Tap **Settings** in the main menu
- Tap **Axes**
- Tap S or, if applicable, **Not defined**
- Tap **Axis type**
- Select the **Axis type**:
  - Spindle
  - Gear spindle
- To switch to the previous display, tap **Back**
- If applicable, select the axis name S for the axis from the **Axis name** drop-down list
- Tap **Outputs**
- Enter the parameters for the analog outputs used (refer to Page 264)
- To switch to the previous display, tap **Back**
- Tap **Inputs**
- Enter the parameters for the digital and analog inputs used (refer to Page 265)
- To switch to the previous display, tap **Back**
- If, under **Axis type**, the **Gear spindle** option is selected, then tap **Gear stages**
- Tap **Add**
- Tap the gear stages and enter the parameters for the gear stages (refer to Page 266)
- To switch to the previous display, tap **Back**
- If, under **Axis type**, the **Gear spindle** option is selected, then activate or deactivate **Gear stage selection through an external signal** using the **ON/OFF** slider
- Enter the corresponding values in the **Start-up time for upper spindle speed range** and **Start-up time for lower spindle speed range** fields
- If, under **Axis type**, the **Spindle** option is selected, then enter the corresponding values in the **Break point of characteristic curve for start-up times** and **Minimum spindle speed** fields
- If applicable, enter the corresponding values in the **Maximum spindle speed for oriented spindle stop** and **Maximum spindle speed for thread cutting** fields

**Further information:** "Spindle axis S", Page 263
Minimum configuration for outputs and inputs

For operating a spindle, you must assign at least one analog output to the spindle axis. A spindle axis can be started and stopped either via the M3/M4 M functions or manually.

If no M3/M4 M functions are available, then the spindle can be operated only manually. To do so, you must configure the parameters of the Spindle start and Spindle stop digital inputs. This results in the minimum configuration for the outputs and inputs:

<table>
<thead>
<tr>
<th>Control of the spindle axis</th>
<th>Analog output</th>
<th>Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manually</td>
<td>Assigned</td>
<td>Spindle start</td>
</tr>
<tr>
<td></td>
<td>Assigned</td>
<td>Spindle stop</td>
</tr>
<tr>
<td>M functions M3/M4</td>
<td>Assigned</td>
<td>Not connected</td>
</tr>
<tr>
<td></td>
<td>Not connected</td>
<td>Not connected</td>
</tr>
</tbody>
</table>

Performing error compensation for linear encoders

Mechanical influences such as guideway errors, tilting in the end positions, tolerances of the mounting surface or poor mounting (Abbe error) may lead to measuring errors. Error compensation enables the device to automatically compensate for systematic measuring errors during machining of the workpieces. One or more compensation factors can be defined by comparing nominal and actual values.

A distinction is made between the following methods:

- Linear error compensation (LEC): The compensation factor is calculated based on the specified length of a calibration standard (nominal length) and the actual distance traversed (actual length). The compensation factor is applied linearly to the entire measuring range.
- Segmented linear error compensation (SLEC): The axis is divided into multiple segments with the help of a maximum of 200 supporting points. A distinct compensation factor is defined and applied for every segment.

NOTICE

Subsequent modifications to the encoder settings can result in measuring errors

If encoder settings such as the encoder input, encoder model, signal period, or reference marks are changed, previously determined compensation factors may no longer apply.

- If you change encoder settings, then you need to reconfigure the error compensation

For all methods, the actual error curve must be exactly measured (e.g., with the help of a comparator measuring device or calibration standard).

Linear error compensation and segmented linear error compensation cannot be combined with each other.

If you enable a reference point shift, then you need to reconfigure the error compensation. This helps you avoid measuring errors.
Configuring linear error compensation (LEC)

With linear error compensation (LEC) the product applies a compensation factor that is calculated from the specified length of a reference standard (nominal length) and the actual traverse path (actual length). The compensation factor is applied to the complete measuring range.

- Tap **Settings** in the main menu
- Tap **Axes**
- Select the axis
- Open in the sequence
  - **Error compensation**
  - **Linear error compensation (LEC)**
- Enter the length of the reference standard (nominal length)
- Confirm the entry with **RET**
- Enter the length of the actual traverse path determined by measure (actual length)
- Confirm the entry with **RET**
- Use the **ON/OFF** slider to activate the **Compensation** function

You can also use **Linear error compensation (LEC)** for angle encoders if the rotation angle is less than 360°.

**Further information:** "Linear error compensation (LEC)", Page 261
Configuring segmented linear error compensation (SLEC)
For a segmented linear error compensation (SLEC), you divide the axis into short segments by defining up to 200 supporting points. The deviations between the actual distance traversed and the segment length in the individual segments determine the compensation values that compensate the mechanical influences acting on the axis.

- Tap **Settings** in the main menu
- Tap **Axes**
- Select the axis
- Open in the sequence
  - **Error compensation**
  - **Segmented linear error compensation (SLEC)**
- Use the **ON/OFF** slider to deactivate the **Compensation** function
- Tap **Create table of supporting points**
- Tap + or - to set the desired **Number of supporting points** (max. 200)
- Enter the desired **Spacing of the supporting points**
- Confirm the entry with **RET**
- Enter a value in **Start point**
- Confirm the entry with **RET**
- Tap **Create** to create the table of supporting points
- The table of supporting points is created
- The table lists the **supporting point positions (P)** and the **compensation values (D)** of the individual segments
- Enter the compensation value (D) "0.0" for supporting point 0
- Confirm the entry with **RET**
- Enter the measured compensation value into the **compensation value (D)** input field for each supporting point created
- Confirm the entry with **RET**
- To switch to the previous display, tap **Back** twice
- Use the **ON/OFF** slider to activate the **Compensation** function
- The error compensation for the axis is applied

**Further information:** "Segmented linear error compensation (SLEC)", Page 262
Adjusting an existing table of supporting points

After a table of supporting points for segmented linear error compensation has been created, this table can then be modified as needed.

- Tap Settings in the main menu
- Tap Axes
- Select the axis
- Open in the sequence
  - Error compensation
  - Segmented linear error compensation (SLEC)
- Use the ON/OFF slider to deactivate the Compensation function
- Tap Table of supporting points
  - The table lists the supporting point positions (P) and the compensation values (D) of the individual segments
  - Adjust the compensation value (D) for the supporting points
  - Confirm the entries with RET
- To switch to the previous display, tap Back
- Use the ON/OFF slider to activate the Compensation function
- The adjusted error compensation for the axis is applied

Further information: "Segmented linear error compensation (SLEC)", Page 262
Ascertaining the line count per revolution

For angle encoders with interfaces of the type 1 V\text{pp} or 11 \mu\text{A}\text{pp} you can use a teach sequence to ascertain the exact line count per revolution.

- Tap Settings in the main menu
- Tap Axes
  - Tap the desired axis designation or Not defined, if applicable
  - If applicable, select the name of the axis in the Axis name drop-down list.
- Tap Encoder
  - From the Encoder model drop-down list, select the Angle encoder type
  - For Display mode select the - ... option
- Tap Reference marks
  - Select one of the following options from the Reference mark drop-down list:
    - None: There is no reference mark
    - One: The encoder has one reference mark
- In order to switch to the previous axis, tap Back
- To start the teach sequence, tap Start
- The teach sequence is started and the wizard is displayed
- Follow the instructions of the wizard
- The line count determined during the teach sequence is transferred to the Line count field

The ascertained line count remains stored if you select a different display mode after the teach sequence.

Further information: "Settings for encoders with interfaces of the type 1 V\text{pp} or 11 \mu\text{A}\text{pp}", Page 257
7.3.4 Configuring M functions

The following information applies to units with ID number 1089178-xx only to a limited extent.

Depending on the configuration of the machine tool, you can also use M functions (machine functions) for machining operations. You can use M functions to influence the following factors:
- functions on the machine tool, such as switching the spindle rotation and coolant on and off
- the path behavior of the tool, and
- the program execution

You can use all M functions as block type in programming and program run.

Further information: “Machine functions”, Page 214

A graphic can also be optionally displayed for calling the M functions in the program run.

Further information: “Configuring M functions”, Page 276

The product differentiates between standard M functions and the manufacturer-specific M functions.

Standard M functions

The product supports the following standard M functions (oriented to DIN 66025/ISO 6983):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2</td>
<td>Program STOP, spindle STOP, coolant OFF</td>
</tr>
<tr>
<td>M3</td>
<td>Spindle rotation in clockwise direction</td>
</tr>
<tr>
<td>M4</td>
<td>Spindle rotation in counterclockwise direction</td>
</tr>
<tr>
<td>M5</td>
<td>Spindle STOP</td>
</tr>
<tr>
<td>M8</td>
<td>Coolant ON</td>
</tr>
<tr>
<td>M9</td>
<td>Coolant OFF</td>
</tr>
<tr>
<td>M30</td>
<td>Program STOP, spindle STOP, coolant OFF</td>
</tr>
</tbody>
</table>

These M functions are independent of the machine; some M functions however depend on the machine tool configuration (e.g. spindle functions).

Manufacturer-specific M functions

The manufacturer-specific M functions M100 to M120 are only available if the connected output has been previously configured.

Further information: “Configuring M functions”, Page 255

The product also supports manufacturer-specific M functions with the following characteristics:
- Number range definable from M100 to M120
- Function depends on the machine manufacturer
- Use in the button of the OEM bar

Further information: “Configuring the OEM bar”, Page 115
7.4   OEM area

In the OEM area, commissioning engineers can customize the product in various ways:

- **Documentation**: Adding the OEM documentation, e.g. service information
- **Startup screen**: Defining a startup screen with the OEM’s company logo
- **OEM bar**: Configuring an OEM bar with specific functions
- **Settings**: Selecting the application, customizing the display elements and messages
- **Screenshots**: Configuring the unit for screenshots with the program Screen-shotClient

7.4.1   Adding documentation

You can store and display the product’s documentation right on the product.

Only documents in the *.pdf file format can be added as a documentation. The product does not display documents provided in other file formats.

1. Tap **Settings** in the main menu
2. Tap **Service**
3. Open in the sequence
   - **OEM area**
   - **Documentation**
   - **Add OEM service info**
4. If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
5. To navigate to the desired file, tap the location where the file is stored
   - If you have accidentally tapped the wrong folder, you can return to the previous folder.
     - Tap the file name that is displayed above the list
6. Navigate to the folder containing the file
7. Tap the file name
8. Tap **Select**
   - The file is copied to the product’s Service info area
   - **Further information**: “Service info”, Page 242
9. Confirm the successful transfer with **OK**

**Further information**: “Documentation”, Page 278
Safely removing a USB mass storage device

- Tap **File management** in the main menu
- Navigate to the list of storage locations
- Tap **Safely remove**
- The message **The storage medium can be removed now.** appears
- Disconnect the USB mass storage device

7.4.2 Adding a startup screen

You can define an OEM-specific startup screen, e.g. the company name or logo, which will be displayed when the product is switched on. An image file with the following properties needs to be stored on the product for this purpose:

- File type: PNG or JPG
- Resolution: 96 ppi
- Image format: 16:10 (other formats will be scaled proportionally)
- Image size: Max. 1280 x 800 px

**Adding a startup screen**

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Startup screen**
  - **Add startup screen**
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- To navigate to the desired file, tap the location where the file is stored

  ![If you have accidentally tapped the wrong folder, you can return to the previous folder.]
  - Tap the file name that is displayed above the list

- Navigate to the folder containing the file
- Tap the file name
- Tap **Select**
- The graphic file is copied to the product and displayed as the startup screen the next time the product is started
- Confirm the successful transfer with **OK**
Safely removing a USB mass storage device

- Tap **File management** in the main menu
- Navigate to the list of storage locations
- Tap **Safely remove**
- The message **The storage medium can be removed now.** appears
- Disconnect the USB mass storage device

When you save the user files, the OEM-specific opening screen is also saved and can be restored.

**Further information**: "Back up user files", Page 127

### 7.4.3 Configuring the OEM bar

You can configure the appearance and the menu items of the OEM bar.

If you configure more menu entries than can be shown in the **OEM bar**, then you can scroll the **OEM bar** vertically.

#### Showing or hiding the OEM bar

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
- **OEM area**
- **OEM bar**
- Use the **ON/OFF** slider to activate or deactivate the **Show bar** function

#### Configuring the OEM logo

You can display an OEM-specific company logo on the OEM bar. By tapping the OEM logo, you can optionally open a PDF file of the OEM documentation.
Configuring an OEM logo

- Tap **Settings** in the main menu
- Tap **Service**
  - Open in the sequence
  - **OEM area**
  - **OEM bar**
  - **Bar items**
- Tap **Add**
  - Tap the **Description** input field
  - Enter a description for the menu item
  - Confirm the entry with RET
  - Tap **Logo** in the **Type** drop-down list
  - Tap **Select logo** to choose a stored image file
  - If required, tap **Upload image file** to select a new image file
  - Further information: "OEM bar item: Logo", Page 272
  - Navigate to the folder containing the image file, and select the file
  - Tap **Select**
  - Select the desired option from the **Link to documentation** drop-down list

Configuring nominal values for the spindle speed

On the OEM bar, you can define menu items that control the spindle speeds depending on the configuration of the machine tool.

You can overwrite configured spindle speeds with the value of the currently set speed of the spindle axis by pressing and holding the desired **Spindle speed** field.

Further information: "Calling functions of the OEM bar", Page 86

Configuring nominal values for the spindle speed

- Tap **Settings** in the main menu
- Tap **Service**
  - Open in the sequence
  - **OEM area**
  - **OEM bar**
  - **Bar items**
- Tap **Add**
  - Tap the **Description** input field
  - Enter a description for the menu item
  - Confirm the entry with RET
  - Tap **Spindle speed** in the **Type** drop-down list
  - Tap the name of the spindle in the **Spindle** drop-down list
  - Enter the desired nominal value into the **Spindle speed** input field
Configuring M functions

The following information applies to units with ID number 1089178-xx only to a limited extent.

On the OEM bar, you can define menu items that control the use of M functions depending on the configuration of the machine tool.

The manufacturer-specific M functions M100 to M120 are only available if the connected output has been previously configured.

Further information: “Configuring M functions”, Page 255

Configuring M functions

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - OEM area
  - OEM bar
  - Bar items
- Tap Add
- Tap the Description input field
- Enter a description for the menu item
- Confirm the entry with RET
- Tap M function in the Type drop-down list
- Enter the number into the Number of the M function input field:
  - 100.T ... 120.T (TOGGLE switches between the states when tapped)
  - 100.P ... 120.P (PULSE outputs a short pulse when activated; it can be extended by setting the Pulse time)
- Confirm the entry with RET
- For every M function, you can also define corresponding images for displaying the status using Select image for active function and Select image for inactive function

Further information: "OEM bar item: M function", Page 273
Configuring special functions

The following information applies only to units with ID number 1089179-xx.

On the OEM bar, you can define menu items that control special functions of the connected machine tool.

The available functions depend on the configuration of the device and of the connected machine tool.

Configuring special functions

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - OEM area
  - OEM bar
  - Bar items
- Tap **Add**
- Tap inside the **Description** input field
- Enter a description for the menu item
- Confirm the entry with RET
- Tap **Special functions** in the **Type** drop-down list
- Tap the desired special function in the **Function** drop-down list
  - Thread cutting
  - Spindle direction
  - Coolant
  - Coolant during spindle operation
  - Zero the tool axis
- For each special function, you can also define corresponding images for displaying the status using **Select image for active function** and **Select image for inactive function**

Further information: “OEM bar item: Special functions”, Page 274
Configuring documents

On the OEM bar, you can define menu items that display additional documents. The file to be displayed needs to be stored in PDF format on the product for this purpose.

Configuring documents

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - OEM area
  - OEM bar
  - Bar items
- Tap **Add**
- Tap the **Description** input field
- Enter a description for the menu item
- Confirm the entry with **RET**
- Tap **Document** in the **Type** drop-down list
- Tap **Select a document** to choose a stored document
- Tap **Select image for display** to select the image file you want to display
- Navigate to the folder containing the image file, and select the file
- Tap **Select**

Deleting menu items

You can delete individual menu items from the OEM bar.

Deleting menu items

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - OEM area
  - OEM bar
  - Bar items
- Tap the desired menu item
- Tap **Remove bar entry**
- Tap **OK** to confirm deletion
- The menu item is deleted from the OEM bar
7.4.4 Adjusting the display
You can adjust the override display in the Manual operation and MDI menus. You can also define the layout of the screen keyboard.

Defining the keyboard design

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - OEM area
  - Settings
- Select the desired layout for the screen keyboard from the Keyboard theme drop-down list

7.4.5 Defining error messages
As an OEM, you can define specific error messages that overwrite standard error messages or are triggered by defined input signals as additional messages. For this purpose, you can create a text database that contains your specific error messages.
Creating a Text database

To create a text database containing the OEM-specific error messages, you create a file of the *.xml type and add your entries for the individual message texts to this file.

The XML file must be in UTF-8 format. The following figure shows the correct structure of the XML file:

```
<entry id="ID_OEM_EMERGENCY_STOP">
  <text lang="de">Der Not-Aus ist aktiv.</text>
  <text lang="en">The emergency stop is active.</text>
  <text lang="fr">L'arrêt d'urgence est activé.</text>
  <text lang="it">La parada d'urgenza è attiva.</text>
  <text lang="ja">緊急停止が有効です。</text>
  <text lang="pl">Włączone emergency jest aktywne.</text>
  <text lang="pt">O desligamento de emergência está ativo.</text>
  <text lang="ru">Аварийный выключатель включён.</text>
  <text lang="zh">緊急停止被啟動了。</text>
  <text lang="ko">비상 멜리가 작동 중입니다.</text>
  <text lang="tr">Acil kapatma aktiv.</text>
  <text lang="nl">De noodstop is actief.</text>
</entry>
```

Figure 26: Example – XML file for text database

Then you import the XML file by means of a USB mass storage device (FAT32 format) into the product and save it, for example, to the Internal/Oem storage location.
Importing a Text database

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Text database**
- To navigate to the desired file, tap the location where the file is stored

[If you have accidentally tapped the wrong folder, you can return to the previous folder.]
  - Tap the file name that is displayed above the list

- Navigate to the folder containing the XML file
- Tap the file name
- Tap **Select**
- Confirm the successful transfer with **OK**
- You have now successfully imported the Text database

**Further information:** "Text database", Page 276
Configuring error messages
The OEM-specific error messages can be gated to inputs as additional messages. The error messages will then be displayed when the input is activated. For this to work, you need to assign the error messages to the desired input signals.

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Settings**
  - **Messages**
- Tap **Add**
- Tap the **Name** input field
- Enter a unique name
- Confirm the entry with **RET**
- Tap the **Text ID or text** input field
- Enter the new message text or
  - Enter the text ID of a message text from the text database
- Select the desired message type from the **Message type** drop-down list:
  - **Standard**: The message is displayed as long as the input is active
  - **Acknowledgment by user**: The message is displayed until the user acknowledges it
- Tap **Input**
- Select the desired digital input
- To switch to the previous display, tap **Back**

Further information: "Messages", Page 277

Deleting error messages
You can delete individual existing error messages.

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Settings**
  - **Messages**
- Tap the desired message entry
- Tap **Remove the entry**
- Tap **OK** to confirm deletion
- The error message is deleted
7.4.6 Backing up and restoring OEM settings

All settings of the OEM area can be backed up as a file so that they are available after a reset to the factory default settings has been performed or for installation on multiple units.

Back-up OEM-specific folders and files

The settings of the OEM area can be backed up as a ZIP file on a USB mass storage device or connected network drive.

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Back up and restore**
  - **Back-up OEM-specific folders and files**
  - **Save as ZIP**
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Select the folder to which you want to copy the data
- Specify a name for the data, e.g. "<yyyy-mm-dd>_OEM_config"
- Confirm the entry with **RET**
- Tap **Save as**
- Tap **OK** to confirm the successful backup of the data
- The data were saved

Restore OEM specific folders and files

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - **OEM area**
  - **Back up and restore**
  - **Restore OEM specific folders and files**
  - **Load as ZIP**
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Navigate to the folder containing the backup file
- Select the backup file
- Tap **Select**
- Confirm the successful transfer with **OK**
Safely removing a USB mass storage device

- Tap **File management** in the main menu
- Navigate to the list of storage locations
- Tap **Safely remove**
- The message **The storage medium can be removed now.** appears
- Disconnect the USB mass storage device

### 7.4.7 Configuring the unit for screenshots

**ScreenshotClient**

With the ScreenshotClient PC software, you can use a computer to take screenshots of the active screen of the product.

![ScreenshotClient user interface](image)

**Figure 27: The ScreenshotClient user interface**

1. Connection status
2. File path and file name
3. Language selection
4. Status messages

**i** ScreenshotClient is included in the standard installation of **ND 7000 Demo**.

For a detailed description, please refer to the **ND 7000 Demo User’s Manual**. This User’s Manual is available in the “Documentation” folder of the product website.

**Further information:** “Demo software for the product”, Page 18
Activating remote access for screenshots
To connect ScreenshotClient with the product via the computer you need to activate Remote access for screenshots on the product.

- Tap **Settings** in the main menu
- Tap **Service**
- Tap **OEM area**
- Use the **ON/OFF** slider to activate the Remote access for screenshots function

Further information: "OEM area", Page 270

7.5 Back up settings
The product’s settings can be backed up as a file so that they are available after a reset to the factory default settings has been performed or for installation on multiple units.

- Tap **Settings** in the main menu
- Tap **Service**
- Open in the sequence
  - Back up and restore
  - Back up settings

Performing a Complete backup
During a complete backup of the configuration, all settings of the product are backed up.

- Tap **Complete backup**
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Select the folder to which you want to copy the configuration data
- Specify a name for the configuration data, e.g. "<yyyy-mm-dd>_config"
- Confirm the entry with **RET**
- Tap **Save as**
- Tap **OK** to confirm the successful backup of the configuration
- The configuration file was backed up

Further information: "Back up and restore", Page 268

Safely removing a USB mass storage device

- Tap **File management** in the main menu
- Navigate to the list of storage locations
- Tap **Safely remove**
- The message The storage medium can be removed now. appears
- Disconnect the USB mass storage device
7.6 Back up user files

The user files of the product can be backed up as a file to make it available after a reset to the factory default settings. This, together with the backing up of the settings, enables you to back up the complete configuration of your product.

Further information: "Back up settings", Page 126

All files from all user groups that are stored in the respective folders are backed up and can be restored as user files. The files in the System folder are not restored.

Performing back up

The user files can be backed up as a ZIP file on a USB mass storage device or connected network drive.

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - Back up and restore
  - Back up user files
- Tap Save as ZIP
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Select the folder to which you want to copy the ZIP file
- Specify a name for the ZIP file, e.g. "<yyyy-mm-dd>_config"
- Confirm the entry with RET
- Tap Save as
- Tap OK to confirm successful backup of the user files
- The user files were backed up.

Further information: "Back up and restore", Page 268

Safely removing a USB mass storage device

- Tap File management in the main menu
- Navigate to the list of storage locations
- Tap Safely remove
- The message The storage medium can be removed now. appears
- Disconnect the USB mass storage device
8.1 Overview

This chapter contains all the information necessary for setting up the product.

During setup, the setup engineer (Setup) configures the product for use on the machine tool in the respective applications. This includes, for example, setting up operators and creating preset tables and tool tables.

Make sure that you have read and understood the "Basic operation" chapter before carrying out the actions described below.

Further information: "Basic operation", Page 59

The following steps must be performed only by qualified personnel.

Further information: "Personnel qualification", Page 29

8.2 Logging in for setup

8.2.1 User login

To set up the product, the Setup user must log in.

- Tap User login in the main menu
- If required, log out the user who is currently logged in
- Select the Setup user
- Tap the Password input field
- Enter the password "setup"

If the password does not match the default password, ask a Setup user or OEM user for the assigned password.

If the password is no longer known, contact a HEIDENHAIN service agency.

- Confirm the entry with RET
- Tap Log in
8.2.2 Performing the reference mark search after startup

If the reference mark search after unit start is active, then all of the unit’s functions will be disabled until the reference mark search has been successfully completed.

Further information: “Reference marks (Encoder)”, Page 259

The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.

If the reference mark search is active on the unit, then a wizard will ask you to traverse the reference marks of the axes.

- After logging in, follow the instructions of the wizard
- The Reference symbol stops blinking upon successful completion of the reference mark search

Further information: “Operating elements of the position display”, Page 80
Further information: “Activating the reference mark search”, Page 101

8.2.3 Setting the language

The user interface language is English. You can change to another language, if desired.

- Tap Settings in the main menu
- Tap User
  - The logged-in user is indicated by a check mark
  - Select the logged-in user
  - The language selected for the user is indicated by a national flag in the Language drop-down list
  - Select the flag for the desired language from the Language drop-down list
  - The user interface is displayed in the selected language
8.2.4 Changing the password

You must change the password to prevent unauthorized configuration. The password is confidential and must not be disclosed to any other person.

- Tap **Settings** in the main menu
- Tap **User**
  - The logged-in user is indicated by a check mark
- Select the logged-in user
- Tap **Password**
- Enter the current password
- Confirm entry with **RET**
- Enter the new password and repeat it
- Confirm entry with **RET**
- Tap **OK**
- Close the message with **OK**
- The new password is available the next time the user logs in
8.3 Single steps for setup

The following setup steps build on each other.

- To correctly set up the product, make sure to perform the steps in the order described here.

**Prerequisite:** You are logged on as a user of the Setup type (see "Logging in for setup", Page 130).

### Basic settings
- Setting the date and time
- Setting the units of measure
- Entering and configuring users
- Adding the Operating Instructions
- Configuring the network
- Configuring the network drive
- Configuring the printer
- Configuring operation with a mouse or touchscreen
- Configuring the USB keyboard

### Preparing machining processes
- Creating a tool table
- Creating a preset table

### Setting up the measuring application

### Backing up data
- Back up settings
- Back up user files

**NOTICE**

**Loss of or damage to configuration data!**

If the product is disconnected from the power source while it is on, the configuration data can be lost or corrupted.

- Back up the configuration data and keep the backup for recovery purposes.

### 8.3.1 Basic settings

The commissioning engineer (**OEM**) may have already carried out several basic settings.
Setting the date and time

- Tap **Settings** in the main menu
- Tap **General**
- Tap **Date and time**
  - The set values are displayed in the following format: Year, month, day, hour, minute
  - To set the date and time in the middle line, drag the columns up or down
  - Tap **Set** to confirm
- Select the desired format from the **Date format** list:
  - MM-DD-YYYY: Display as month, day, year
  - DD-MM-YYYY: Display as day, month, year
  - YYYY-MM-DD: Display as year, month, day

Further information: "Date and time", Page 240

Setting the units of measure

You can set various parameters to define the units of measure, rounding methods and decimal places.

- Tap **Settings** in the main menu
- Tap **General**
- Tap **Units**
  - To set a unit of measure, tap the corresponding drop-down list and select the unit
  - To set the rounding method, tap the corresponding drop-down list and select the rounding method
  - To set the number of decimal places displayed, tap - or +

Further information: "Units", Page 241

Entering and configuring users

The following user types, which have different rights, are defined in the product’s factory default settings:
- OEM
- Setup
- Operator
Creating a user and password
You can create new Operator users. You can use any characters for the user ID and the password. These entries are case-sensitive.

Requirement: An OEM or Setup user is logged in.

It is not possible to create new OEM or Setup-type users.

1. Tap Settings in the main menu
2. Tap User
3. Tap Add
4. Tap the User ID input field

The User ID is displayed for user selection, e.g. at the login prompt.
The User ID cannot be changed once it has been defined.

5. Enter the user ID
6. Confirm the entry with RET
7. Tap the Name input field
8. Enter the name of the new user
9. Confirm the entry with RET
10. Tap the Password input field
11. Enter the new password and repeat it
12. Confirm the entry with RET

You can show the contents of the password fields in plain text and hide them again.
- Use the ON/OFF sliding switch to show or hide the contents

13. Tap OK
14. A message appears
15. Close the message with OK
16. The user is created with the basic data. The user can then further edit the data himself later
Configuring the user

After creating a new **Operator**-type user, you can add or edit the following user data:
- Name
- First name
- Department
- Password
- Language
- Auto login

If automatic user login is active for one or more users, the last user who logged in is automatically logged in when the product is switched on. Neither the user ID nor the password needs to be entered.

- Tap **Settings** in the main menu
- Tap **User**
- Select the user
- Tap the input field whose contents you want to edit: **Name**, **First name**, **Department**
- Edit the contents and confirm your changes with **RET**
- To change the password, tap **Password**
- The **Change password** dialog appears
- When changing the password of the logged-in user, enter the current password
- Confirm the entry with **RET**
- Enter the new password and repeat it
- Confirm the entries with **RET**
- Tap **OK**
- A message appears
- Close the message with **OK**
- To change the language, select the flag for the desired language in the **Language** drop-down list
- Use the **ON/OFF** slider to activate or deactivate the **Auto login** function
Deleting users
You can remove Operator-type users that are no longer needed.

OEM and Setup-type users cannot be deleted.

Requirement: A user of OEM or Setup-type is logged in.

- Tap Settings in the main menu
- Tap User
- Tap the user you want to delete
- Tap Remove user account
- Enter the password of the authorized user (OEM or Setup)
- Tap OK
- The user is deleted

Adding the Operating Instructions
The product provides the possibility to upload the corresponding Operating Instructions in the desired language. You can copy the Operating Instructions from the supplied USB mass storage device to the product.
The most recent version of the Operating Instructions is also available at www.heidenhain.de.

Requirement: The Operating Instructions are available as a PDF file.

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - Documentation
  - Add Operating Instructions
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Navigate to the folder containing the new Operating Instructions

If you have accidentally tapped the wrong folder, you can return to the previous folder.
- Tap the file name that is displayed above the list

- Select file
- Tap Select
- The Operating Instructions are copied to the product
- Any existing Operating Instructions will be overwritten
- Confirm the successful transfer with OK
- The Operating Instructions can be opened and displayed on the product
Configuring the network

Network settings

Contact your network administrator for the correct network settings for configuring the product.

Requirement: The unit is connected to a network.
Further information: “Connecting a network peripheral”, Page 56

» Tap Settings in the main menu

» Tap Interfaces

» Tap Network

» Tap the X116 interface

» The MAC address is detected automatically

» Depending on the network environment, use the ON/OFF slider to activate or deactivate the DHCP function

» If DHCP is active, the network settings are obtained automatically as soon as the IP address is assigned

» If DHCP is not active, enter the IPv4 address, IPv4 subnet mask and IPv4 standard gateway

» Confirm the entries with RET

» Depending on the network environment, use the ON/OFF slider to activate or deactivate the IPv6 SLAAC function

» If IPv6 SLAAC is active, the network settings are obtained automatically as soon as the IP address is assigned

» If IPv6 SLAAC is not active, enter the IPv6 address, IPv6 subnet prefix length and IPv6 standard gateway

» Confirm the entries with RET

» Enter the Preferred DNS server and, if required, the Alternative DNS server

» Confirm the entries with RET

» The configuration of the network connection is applied

Further information: “Network”, Page 244
Configuring the network drive
You will need the following data for configuring the network drive:
- Name
- Server IP address or host name
- Shared folder
- User name
- Password
- Network drive options

Contact your network administrator for the correct network settings for configuring the product.

Requirement: The product is connected to a network and a network drive is available.
Further information: “Connecting a network peripheral”, Page 56

- Tap Settings in the main menu
- Tap Interfaces
- Tap Network drive
- Enter the network drive details
- Confirm the entries with RET
- Use the ON/OFF slider to activate or deactivate the Show password function
- If required, select Network drive options
  - Select Authentication for encrypting the password in the network
  - Configure the Mount options
  - Tap OK
- Tap Mount
- The connection to the network drive is established

Further information: “Network drive”, Page 245

Configuring the printer
The product can print stored PDF files with a printer connected via USB or the network. The product supports several printer models from various manufacturers. See the product area at www.heidenhain.de for a complete list of supported printers.
If this list contains the used printer, the appropriate driver is available on the product and you can directly configure the printer. If this is not the case, you will need a printer-specific PPD file.
Further information: "Finding PPD files", Page 143
Adding a USB printer

Requirement: A USB printer is connected to the product.

Further information: "Connecting a printer", Page 55

- Tap **Settings** in the main menu
- Tap **General**
- Tap **Printers**
- If no default printer has been set up yet, a message appears
- Tap "Close" in the message

- Open in succession:
  - **Add printer**
  - **USB printer**
- Connected USB printers are detected automatically

- Tap **Located printers**
- The list of detected printers is displayed
- If only one printer is connected, the printer is selected automatically
- Select the desired printer
- Tap **Located printers** once again
- The available printer information, e.g. name and description, is displayed
- If required, enter a name for the printer into the **Name** input field

  The text must not contain slashes ("/"), hash characters ("#") or spaces.

- Confirm your input with **RET**
- If required, enter an optional description for the printer into the **Description** input field, e.g. "Color printer"
- Confirm your input with **RET**
- If required, enter an optional location into the **Location** input field, e.g. "Office"
- Confirm your input with **RET**
- If required, enter the connection parameters into the **Connection** input field, if they have not been entered automatically
- Confirm your input with **RET**
- Tap **Select the driver**
- Select the appropriate driver for the printer type

  If the appropriate driver is not listed, a suitable PPD file must be copied to the product.

  Further information: "Finding PPD files", Page 143

- The driver is activated
- Tap **Close** in the message
Setup | Single steps for setup

- Tap **Set standard values**
- Tap **Resolution** to set the printer resolution
- Select the desired resolution
- Tap **Resolution** once again
- Tap **Paper size** to set the paper size
- Select the desired paper size
- Depending on the type of printer, select further values such as type of paper or duplex print
- Tap **Properties**
  - The entered values are saved as defaults
  - The printer is added and can be used

Use the CUPS web interface to configure the enhanced settings of the connected printer. You can also use this web interface if the printer information fails over the product.

**Further information:** "Using CUPS", Page 144

**Further information:** "Printers", Page 239
Adding a network printer

**Requirement:** A network printer or network is connected to the product.

**Further information:** "Connecting a printer", Page 55

**Further information:** "Connecting a network peripheral", Page 56

- Tap **Settings** in the main menu

- Tap **General**
- Tap **Printers**
- Open in the sequence
  - **Add printer**
  - **Network printer**

- Printers available on the network are detected automatically

- Tap **Located printers**
- The list of detected printers is displayed
- If only one printer is connected, the printer is selected automatically
- Select the desired printer
- Tap **Located printers** once again
- The available printer information, e.g. name and description, is displayed
- If required, enter a name for the printer into the **Name** input field

  The text must not contain slashes ("/"), hash characters ("#") or spaces.

- Confirm your input with **RET**
- If required, enter an optional description for the printer into the **Description** input field, e.g. "Color printer"
- Confirm your input with **RET**
- If required, enter an optional location into the **Location** input field, e.g. "Office"
- Confirm your input with **RET**
- If required, enter the connection parameters into the **Connection** input field, if they have not been entered automatically
- Confirm your input with **RET**
- Tap **Select the driver**
- Select the appropriate driver for the printer type

  If the appropriate driver is not listed, a suitable PPD file must be copied to the product.

**Further information:** "Finding PPD files", Page 143

- The driver is activated
- Tap **Close** in the message
- Tap **Set standard values**
- Tap **Resolution** to set the printer resolution
Setup | Single steps for setup

- Select the desired resolution
- Tap **Resolution** once again
- Tap **Paper size** to set the paper size
- Select the desired paper size
- Depending on the type of printer, select further values such as type of paper or duplex print
- Tap **Properties**
- The entered values are saved as defaults
- The printer is added and can be used

Use the CUPS web interface to configure the enhanced settings of the connected printer. You can also use this web interface if the printer information fails over the product.

**Further information:** "Using CUPS", Page 144

**Further information:** "Printers", Page 239

**Unsupported printers**
To set up an unsupported printer, the product needs a 'PPD' file containing information about the printer properties and drivers

- This unit supports only drivers that are provided by Gutenprint (www.gutenprint.sourceforge.net).

Alternatively, you can select a similar printer from the list of supported printers. The scope of functionality may be limited but printing should generally be possible.

**Finding PPD files**
Locate the required PPD file as follows:
- Search for the printer manufacturer and printer model at www.openprinting.org/printers
- Download the appropriate PPD file
- Search for a Linux driver for the printer model on the website of the printer manufacturer
- Download the appropriate PPD file

**Using PPD files**
When configuring an unsupported printer, during the driver selection step you need to copy the located PPD file to the product:
- Tap **Select the driver**
- In the **Select the manufacturer** dialog tap **Select PPD file**
- Tap **Select file**
- To navigate to the desired PPD file, tap the **location** where the file is stored
- Navigate to the folder containing the downloaded PPD file
- Select the PPD file
- Tap **Select**
- The PPD file is copied to the product
- Tap **Continue**
- The PPD file is loaded and the driver is activated
- Tap **Close** in the message
Enhanced printer settings

Using CUPS

For printer control the product uses the Common Unix Printing System (CUPS). In the network, CUPS enables connected printers to be set up and managed using a web interface. These functions depend on whether the product uses a USB printer or network printer.

The CUPS web interface enables you to configure the enhanced settings of the printer connected to the product. You can also use this web interface if printer setup via the product fails.

Requirement: The product is connected to a network.

Further information: “Connecting a network peripheral”, Page 56

- Tap Settings in the main menu
- Tap Interfaces
- Tap Network
- Tap the X116 interface
- Determine the product’s IP address from IPv4 address and write it down
- On a computer in the network, call the web interface of CUPS via the following URL: http://[IP address of the product]:631 (e.g. http://10.6.225.86:631)
- In the web interface, click on the Administration tab and select the desired action

See the Online Help tab for detailed information about the CUPS web interface.
Modifying the resolution and paper size for a printer

- Tap **Settings** in the main menu
- Tap **General**
- Tap **Printers**
- If multiple default printers have been set up for the product, select the desired printer in the **Default printer** drop-down list
- Tap **Properties**
- Tap **Resolution** to set the printer resolution
- The resolutions provided by the driver are displayed
- Select the resolution
- Tap **Resolution** once again
- Tap **Paper size** to set the paper size
- The paper sizes provided by the driver are displayed
- Select the paper size
- The entered values are saved as defaults

Depending on the type of printer, select further values such as type of paper or duplex print under **Properties**.

**Further information:** “Printers”, Page 239

Removing a printer

- Tap **Settings** in the main menu
- Tap **General**
- Open in the sequence:
  - **Printers**
  - **Remove printer**
- In the **Printers** drop-down list, select the printer you no longer need
- The model, location and connection of the printer are displayed
- Tap **Remove**
- Confirm with **OK**
- The printer is removed from the list and can no longer be used
Configuring operation with a mouse or touchscreen
The product can be operated either via the touchscreen or a connected (USB) mouse. If the product is in its factory default setting, touching the touchscreen deactivates the mouse. Alternatively, you can set that the product is operated either only via the mouse or only via the touchscreen.

Requirement: A USB mouse is connected to the product.
Further information: “Connecting input devices”, Page 55

- Tap Settings in the main menu
- Tap General
- Tap Input devices
- Select the desired option from the Mouse substitute for multitouch gestures drop-down list

Further information: “Input devices”, Page 238

Configuring the USB keyboard
The factory default language for the keyboard assignment is English. You can switch the keyboard assignment to the desired language.

Requirement: A USB keyboard is connected to the product.
Further information: “Connecting input devices”, Page 55

- Tap Settings in the main menu
- Tap General
- Tap Input devices
- Select the flag for the desired language from the USB keyboard layout drop-down list
- The keyboard assignment corresponds to the selected language

Further information: “Input devices”, Page 238
8.3.2 Preparing machining processes

Depending on the intended use, the machine setter (Setup) can prepare the unit for a special machining process through configuration of the tool tables and preset tables.

The following activities can also be performed by Operator-type users.

Creating a tool table

You usually enter the coordinates in accordance with how the workpiece is dimensioned in the drawing.

By means of tool radius compensation, the product can calculate the path of the tool center point. To do this, you must specify the Tool length and Diameter for every tool.

From the status bar, you can access the tool table, which contains these specific parameters for each tool that is used. The product can store up to 99 tools in the tool table.

![Figure 28: Tool table with tool parameters](image)

1. Tool type
2. Tool diameter
3. Tool length
4. Edit tool table

Tool parameters

You can define the following parameters:

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool type</td>
<td>Diameter D</td>
</tr>
<tr>
<td>Designation that uniquely identifies the tool</td>
<td>Diameter of the tool contact surface</td>
</tr>
<tr>
<td>Length L</td>
<td>Tool length along the tool axis</td>
</tr>
</tbody>
</table>
Creating a tool

- Tap **Tools** on the status bar
  - The **Tools** dialog box appears
  - Tap **Open table**
  - The **Tool table** dialog box appears
  - Tap **Add**
  - Enter a name in the **Tool type** input field
  - Confirm the entry with RET
  - Tap the input fields one after the other, and enter the corresponding values
  - Change the unit of measure in the selection menu, if required
  - The entered values are converted
  - Confirm the entry with RET
  - The defined tool is added to the tool table
  - To protect the entry for a tool from accidental changes or deletion, tap the **Lock** symbol next to the tool’s entry
    - The symbol changes and the entry is locked

- Tap **Close**
  - The **Tool table** dialog box is closed

Deleting a tool

- Tap **Tools** on the status bar
  - The **Tools** dialog box appears
  - Tap **Open table**
  - The **Tool table** dialog box appears
  - To select one or more tools, tap the checkbox in the relevant row
    - The active checkbox is highlighted in green
  - Tap **Delete**
    - A message appears
    - Close the message with OK
    - The selected tool is deleted from the tool table
  - Tap **Close**
    - The **Tool table** dialog box is closed

The entry for a tool can be locked to prevent accidental changes or deletion.
- Tap the **Unlock** symbol next to the entry
  - The symbol changes and the entry is unlocked
Creating a preset table

You can access the preset table on the status bar. The preset table contains the absolute positions of the presets with respect to the reference mark. You can save a maximum of 99 presets in the preset table.

![Preset table with absolute positions](image)

Figure 29: Preset table with absolute positions

1 Designation
2 Coordinates
3 Edit preset table

Defining presets

You can define the preset table in the following ways:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probing</td>
<td>Probing of a workpiece with a HEIDENHAIN KT 130 edge finder. The unit automatically transfers the presets into the preset table</td>
</tr>
<tr>
<td>Touch-off</td>
<td>Probing a workpiece using a tool. You must define the respective tool position manually as a preset</td>
</tr>
<tr>
<td>Numerical input</td>
<td>You must manually enter the numeric value of the preset in the preset table</td>
</tr>
</tbody>
</table>

Depending on the application, users of the type Operator define the presets.
**Functions for the probing of presets**
A wizard assists you in setting presets by probing.
The following functions are available for probing a workpiece:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Function</th>
<th>Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Icon" /></td>
<td>Probe the edge of a workpiece (one probing procedure)</td>
<td><img src="image2" alt="Scheme" /></td>
</tr>
<tr>
<td><img src="image3" alt="Icon" /></td>
<td>Determine the centerline of a workpiece (two probing procedures)</td>
<td><img src="image4" alt="Scheme" /></td>
</tr>
<tr>
<td><img src="image5" alt="Icon" /></td>
<td>Determine the center point of a circular form (hole or cylinder) (three probing procedures with tool, four probing procedures with edge finder)</td>
<td><img src="image6" alt="Scheme" /></td>
</tr>
</tbody>
</table>

In the Manual operation chapter, you can find various examples for how you can probe a preset.
Probing or touching off of presets

- Tap **Manual operation** in the main menu
- The user interface for manual operation is displayed
- Tap **Auxiliary functions** in the status bar

- In the dialog box, tap the desired function under **Probing** (e.g., **Probe edge**)
- Select the inserted tool in the **Select the tool** dialog box:
  - When using a HEIDENHAIN KT 130 edge finder: Activate **Using touch-probes**
  - When using a tool:
    - Deactivate **Using touch-probes**
    - Enter the desired value in the **Tool diameter** input field
    - Select the corresponding tool from the tool table

- Tap **Confirm** in the wizard
- Follow the instructions in the wizard
- Keep in mind when probing:
  - Move the edge finder toward the workpiece edge until the red LED on the edge finder lights up
  - Move the tool until it touches the workpiece edge
  - Confirm each step in the wizard
  - Retract the edge finder or tool after the last probing operation

- The **Select preset** dialog box appears after the last probing procedure
- Select the desired preset in the **Selected preset** input field:
  - To overwrite an existing preset, select an entry from the preset table
  - To add a new preset, enter a number that has not yet been assigned in the preset table
  - Confirm the entry with **RET**

- Enter the desired value in the **Set position values** input field:
  - Leave the input field empty to load the measured value
  - To define a new value, enter the desired value
  - Confirm the entry with **RET**

- Tap **Confirm** in the wizard
- The new coordinates are applied as the preset
Manual presetting
If you create presets manually in the preset table, the following applies:
- The entry in the preset table assigns the new position values to the current actual position of the individual axes
- Clearing the entry with CE resets the position values for the individual axes to the machine zero point again. The new position values are thus always referenced to the machine zero point

In the status bar, tap **Presets**
- The **Presets** dialog box appears
- Tap **Edit preset table**
- The **Preset table** dialog box appears
- Tap **Add**
- Enter a name in the **Description** input field
- Tap the input field for one or more desired axes and enter the appropriate position value
- Confirm the entry with **RET**
- The defined preset is added to the preset table
- To protect the entry for a preset from accidental changes or deletion, tap the **Lock** symbol next to the preset’s entry
- The symbol changes and the entry is locked

- Tap **Close**
- The **Preset table** dialog box is closed
Deleting presets

- In the status bar, tap **Presets**
- The **Presets** dialog appears
- Tap **Edit preset table**
- The **Preset table** dialog appears

The entries in the preset table can be locked to prevent accidental modification or deletion. So you might need to unlock an entry first in order to edit it.

- If necessary, tap **Unlock** at the end of the row
  - The symbol changes and the entry can now be edited
  - To select one or more presets, tap the checkbox in the relevant row
  - The active checkbox is highlighted in green
- Tap **Delete**
  - A message appears
  - Close the message with **OK**
  - The selected preset(s) is/are deleted from the preset table
- Tap **Close**
  - The **Preset table** dialog is closed
8.4 **Back up settings**

The product’s settings can be backed up as a file so that they are available after a reset to the factory default settings has been performed or for installation on multiple units.

- Tap **Settings** in the main menu
- Tap **Service**
  - Open in the sequence
    - **Back up and restore**
    - **Back up settings**

**Performing a Complete backup**

During a complete backup of the configuration, all settings of the product are backed up.

- Tap **Complete backup**
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Select the folder to which you want to copy the configuration data
- Specify a name for the configuration data, e.g. `<yyyy-mm-dd>_config`
- Confirm the entry with RET
- Tap **Save as**
- Tap **OK** to confirm the successful backup of the configuration
- The configuration file was backed up

**Further information:** “Back up and restore”, Page 268

**Safely removing a USB mass storage device**

- Tap **File management** in the main menu
- Navigate to the list of storage locations
- Tap **Safely remove**
  - The message **The storage medium can be removed now.** appears
  - Disconnect the USB mass storage device
8.5 Back up user files

The user files of the product can be backed up as a file to make it available after a reset to the factory default settings. This, together with the backing up of the settings, enables you to back up the complete configuration of your product.

Further information: "Back up settings", Page 126

All files from all user groups that are stored in the respective folders are backed up and can be restored as user files.
The files in the System folder are not restored.

Performing back up

The user files can be backed up as a ZIP file on a USB mass storage device or connected network drive.

- Tap Settings in the main menu
- Tap Service
  - Open in the sequence
  - Back up and restore
  - Back up user files
- Tap Save as ZIP
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Select the folder to which you want to copy the ZIP file
- Specify a name for the ZIP file, e.g. "yyyy-mm-dd_config"
- Confirm the entry with RET
- Tap Save as
- Tap OK to confirm successful backup of the user files
- The user files were backed up.

Further information: "Back up and restore", Page 268

Safely removing a USB mass storage device

- Tap File management in the main menu
- Navigate to the list of storage locations
- Tap Safely remove
  - The message The storage medium can be removed now. appears
  - Disconnect the USB mass storage device
9.1 Overview

This chapter describes the production of an example workpiece. As you produce the example workpiece, this chapter leads you step by step through the product’s operating modes based on various machining scenarios. The following machining steps are necessary for successful machining of the flange:

<table>
<thead>
<tr>
<th>Machining step</th>
<th>Mode of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine preset 0</td>
<td>Manual operation</td>
</tr>
<tr>
<td>Machine a through hole</td>
<td>Manual operation</td>
</tr>
<tr>
<td>Machine a rectangular pocket</td>
<td>MDI mode</td>
</tr>
<tr>
<td>Machine a fit</td>
<td>MDI mode</td>
</tr>
<tr>
<td>Determine preset 1</td>
<td>Manual operation</td>
</tr>
<tr>
<td>Machine a bolt hole circle</td>
<td>MDI mode</td>
</tr>
<tr>
<td>Machine a row of holes</td>
<td>Programming and program run (software option)</td>
</tr>
</tbody>
</table>

Figure 30: Example workpiece

This chapter does not describe the processing of the outside contour of the example workpiece. It is assumed that the outside contour has already been machined.

For a detailed description of the individual activities, please refer to the chapters "Manual operation", "MDI mode", "Programming (software option)" and "Program run (software option)".

Make sure that you have read and understood the "Basic operation" chapter before carrying out the actions described below.

Further information: "Basic operation", Page 59
9.2 Logging in for Quick Start

**User login**
For Quick Start, the Operator user must log in.

- Tap User login in the main menu
- If required, log out the user who is currently logged in
- Select the Operator user
- Tap the Password input field
- Enter the password "operator"

> If the password does not match the default password, ask a Setup user or OEM user for the assigned password.

> If the password is no longer known, contact a HEIDENHAIN service agency.

- Confirm entry with RET
- Tap Log in
9.3 Requirements

To manufacture the aluminum flange, use a manually operated machine tool. The following dimensioned technical drawing is available for the flange:

![Technical Drawing]

**Figure 31: Example workpiece—technical drawing**

**Machine tool**
- The machine tool is switched on
- A pre-processed workpiece blank is clamped on the machine tool

**Product**
- A spindle axis is configured (only for the product with ID 1089179-xx)
- The axes have been homed

Further information: "Conducting the reference mark search", Page 177
- A HEIDENHAIN KT 130 Edge Finder is available
**Tools**

The following tools are available:
- Drill Ø 5.0 mm
- Drill Ø 6.1 mm
- Drill Ø 19.8 mm
- Reamer Ø 20 mm H6
- End mill Ø 12 mm
- Countersink Ø 25 mm 90°
- M6 tap

**Tool table**

For the example it is presumed that the tools for machining are not yet defined. For each tool used, you must therefore define the specific parameters in the tool table of the product. During subsequent machining you can access the parameters in the tool table via the status bar.

**Further information:** “Creating a tool table”, Page 147

- Tap **Tools** on the status bar
- The **Tools** dialog box appears
- Tap **Open table**
- The **Tool table** dialog box appears
- Tap **Add**
- In the **Tool type** input field, enter the name **Drill 5.0**
- Confirm the entry with **RET**
- In the **Diameter** input field, enter the value **5.0**
- Confirm the entry with **RET**
- In the **Length** input field, enter the length of the drill
- Confirm the entry with **RET**
- The defined Ø 5.0 mm drill is added to the tool table
- Repeat this procedure for the other tools, and use the naming convention [Type] [Diameter]
- Tap **Close**
- The **Tool table** dialog box is closed
9.4 Determining the preset (manual operation mode)

Initially you need to determine the first preset. Based on this preset the product then calculates all values for the relative coordinate system. Ascertain the preset with the HEIDENHAIN KT 130 Edge Finder.

![Example workpiece – finding preset D1](image)

**Figure 32: Example workpiece – finding preset D1**

**Activation**

- Tap **Manual operation** in the main menu
- The user interface for manual operation is displayed

**Probing the preset D1**

- On the machine tool, insert the HEIDENHAIN KT 130 Edge Finder into the spindle and connect it to the product
  - [Further information: “Configuring a touch probe”, Page 100](#)
- Tap **Auxiliary functions** in the status bar

- In the dialog, tap **Probe edge**
- The **Select the tool** dialog opens
- In the **Select the tool** dialog, activate the **Using touch-probes** option
- Follow the wizard’s instructions and define the preset by probing in the X direction
- Move the edge finder toward the workpiece edge until the red LED on the edge finder lights up
- The **Select preset** dialog opens
- Retract the edge finder from the workpiece edge
- In the **Selected preset** field, select the preset **0** from the preset table
- In the **Set position values** field enter the value **0** for the X direction and confirm with **RET**
- Tap **Confirm** in the wizard
- The probed coordinate is loaded in preset **0**
- Repeat the procedure and define the preset in the Y direction via probing
9.5 Machining a through hole (manual operation)

In the first machining step you drill the through hole in manual operation mode using the Ø 5.0 mm drill. You then drill the through hole with the Ø 19.8 mm drill. The values to be entered into the input fields can be taken directly from the dimensioned production drawing.

Figure 33: Example workpiece – drilling a through hole

Activation

- Tap Manual operation in the main menu
- The user interface for manual operation is displayed

9.5.1 Predrilling the through hole

- On the machine tool, insert the Ø 5.0 mm drill into the spindle
- Tap Tools on the status bar
- The Tools dialog box appears
- Tap Drill 5.0
- Tap Confirm
- The associated tool parameters are applied automatically
- The Tools dialog box is closed
- On the product, set a spindle speed of 3500 rpm
- On the machine tool move the spindles as follows:
  - X direction: 95 mm
  - Y direction: 50 mm
- Predrill the through hole and retract the spindle
- Keep positions X and Y
- You have successfully predrilled the through hole
9.5.2 Boring the through hole

- On the machine tool, insert the Ø 19.8 mm drill into the spindle
- Tap **Tools** on the status bar
- The **Tools** dialog box appears
- Tap **Drill 19.8**
- Tap **Confirm**
- The associated tool parameters are applied automatically
- The **Tools** dialog box is closed
- On the product, set a spindle speed of 400 rpm
- Bore the through hole and retract the spindle
- You have successfully bored the through hole

9.6 Machining a rectangular pocket (MDI mode of operation)

Machine the rectangular pocket in MDI mode of operation. The values to be entered into the input fields can be taken directly from the dimensioned production drawing.

Figure 34: Example workpiece – machining a rectangular pocket

**Activation**

- Tap **MDI** in the main menu

*The operating element can belong to a group (based on the configuration).*

**Further information:** “Selecting grouped operating elements”, Page 70

- The user interface for MDI mode is displayed
Quick Start | Machining a rectangular pocket (MDI mode of operation)

9.6.1 Defining the rectangular pocket

- Tap **Tools** on the status bar
- The **Tools** dialog appears
- Tap **End mill**
- Tap **Confirm**
- The associated tool parameters are applied automatically
- The **Tools** dialog is closed
- Move the tool until it touches the surface of the flange
- Press and hold the **Z** axis key in the position display
- The product displays 0 with the Z axis
- Tap **Create** on the status bar
- A new block is displayed
- In the **Block type** drop-down list, select the **Rectangular pocket** block type
- Enter the following parameters according to the dimensional data:
  - **Clearance height**: 10
  - **Depth**: -6
  - **X coordinate of center**: 80
  - **Y coordinate of center**: 50
  - **Side length in X**: 110
  - **Side length in Y**: 80
  - **Direction**: clockwise
  - **Finishing allowance**: 0.2
- Confirm each entry with **RET**
- To run the block, tap **END**
- The positioning aid is displayed
- If the simulation window is active, the rectangular pocket is visualized

9.6.2 Milling a rectangular pocket

The values for spindle speed, milling depth and feed rate depend on the end mill’s metal-removal rate and the machine tool.

- On the machine tool, insert the Ø 12 mm end mill into the spindle
- On the product, set the spindle speed to a suitable value
- Start the machining process—follow the instructions of the wizard
- The product executes the individual steps of the milling operation
- Tap **Close**
- Program run is terminated
- The wizard closes
- You have successfully machined the rectangular pocket
9.7 Machining a fit (MDI mode of operation)

Machine the fit in MDI mode of operation. The values to be entered into the input fields can be taken directly from the dimensioned production drawing.

You should chamfer the through hole before reaming. The chamfer enables a better first cut of the reamer and prevents burr formation.

Figure 35: Example workpiece – machining a fit

Activation

- Tap MDI in the main menu

The operating element can belong to a group (based on the configuration).

Further information: “Selecting grouped operating elements”, Page 70

- The user interface for MDI mode is displayed

9.7.1 Defining the fit

- Tap Tools on the status bar
- The Tools dialog box appears
- Tap Reamer
- Tap Confirm

The associated tool parameters are applied automatically

- The Tools dialog box is closed
- Tap Create on the status bar
- A new block is displayed
- In the Block type drop-down list, select the Hole block type
- Enter the following parameters according to the dimensional data:
  - X coordinate: 95
  - Y coordinate: 50
  - Z coordinate: drill through
- Confirm each entry with RET
- To run the block, tap END
- The positioning aid is displayed
- If the simulation window is active, the position and traverse path are visualized
9.7.2 Reaming the fit

- On the machine tool, insert the Ø 20 mm H6 reamer into the spindle
- On the product, set a spindle speed of 250 rpm
- Start the machining process—follow the instructions of the wizard
  - Tap Close
  - Program run is terminated
  - The wizard closes
  - You have successfully machined the fit

9.8 Determining the preset (manual operation mode)

To align the bolt hole circle and frame of holes you must set the circle center of the fit as the preset. Based on this preset the product then calculates all values for the relative coordinate system. Ascertain the preset with the HEIDENHAIN KT 130 Edge Finder.

![Figure 36: Example workpiece – finding preset D2](image)

**Activation**

- Tap **Manual operation** in the main menu
- The user interface for manual operation is displayed
Probing preset D2

- On the machine tool, insert the HEIDENHAIN KT 130 Edge Finder into spindle and connect to the product
  **Further information:** "Configuring a touch probe", Page 100
- Tap **Auxiliary functions** in the status bar

- Tap **Find circle center** in the dialog
- The **Select the tool** dialog opens
- In the **Select the tool** dialog, activate the **Using touch-probes** option
- Follow the instructions of the wizard
- Move the edge finder toward the workpiece edge until the red LED on the edge finder lights up
- The **Select preset** dialog opens
- Retract the edge finder from the workpiece edge
- In the **Selected preset** field, select preset 1
- In the **Set position values** field, enter the value 0 for position value X and position value Y and confirm with **RET**
- Tap **Confirm** in the wizard
- The probed coordinates are loaded in preset 1
Activating the preset

- Tap **Presets** on the status bar
- The **Presets** dialog opens
- Tap preset **1**
- Tap **Confirm**
- The preset is set
- On the status bar, **1** is displayed for the preset

### 9.9 Drilling a bolt hole circle (MDI mode)

Drill the circular hole pattern in MDI mode. The values to be entered into the input fields can be taken directly from the dimensioned production drawing.

![Figure 37: Example workpiece – drilling a circular hole pattern](image)

**Activation**

- Tap **MDI** in the main menu

  The operating element can belong to a group (based on the configuration).

  **Further information:** "Selecting grouped operating elements", Page 70

- The user interface for MDI mode is displayed
9.9.1 Defining the bolt hole circle

- Tap Tools on the status bar
- The Tools dialog appears
- Tap Drill 6.1
- Tap Confirm
- The associated tool parameters are applied automatically
- The Tools dialog is closed
- Tap Create on the status bar
- A new block is displayed
- In the Block type drop-down list, select the Bolt hole circle block type
- Enter the following parameters according to the dimensional data:
  - Number of holes: 8
  - X coordinate of center: 0
  - Y coordinate of center: 0
  - Radius: 25
- Confirm each entry with RET
- Keep the default values for all the other values
- To run the block, tap END
- The positioning aid is displayed
- If the simulation window is active, the rectangular pocket is visualized

9.9.2 Drilling the bolt hole circle

- On the machine tool, insert the Ø 6.1 mm drill into the spindle
- On the product, set a spindle speed of 3500 rpm
- Drill the circular hole pattern and retract the spindle
- Tap Close
- Program run is terminated
- The wizard closes
- You have successfully completed the circular hole pattern
9.10 Programming a row of holes (programming)

**Precondition:** The PGM software option is active

The row of holes is machined in Programming mode. You can reuse the program in a potential small batch production run. You can take the values directly from the dimensioned drawing and enter them in the input fields.

![Example workpiece](image)

Figure 38: Example workpiece – programming a bolt hole circle and a row of holes

**Calling up**

- Tap **Programming** in the main menu
  
  > The operating element belongs to a group.
  
  **Further information:** “Selecting grouped operating elements”, Page 70

  > The user interface for programming is displayed

**9.10.1 Creating the program header**

- Tap **Create new program** in the program management
  
  > A dialog box is opened.

  > In the dialog select the storage location, e.g. **Internal/Programs** in which you want to save the program

  > Enter a name for the program

  > Confirm the entry with **RET**

  > Tap **Create**

  > A new program containing the **Program header** start block is created

  > In **Name** enter the name **Example**

  > Confirm the entry with **RET**

  > In **Unit for linear values** select the **mm** unit of measure

  > The program has been successfully created; you can then begin with programming
9.10.2 Programming the tool

- Tap **Add block** on the toolbar
- A new block is inserted below the current position
- In the **Block type** drop-down list, select the **Tool call** block type
- Tap **Tool number**
- The **Tools** dialog appears
- Tap **Drill 5.0**
- The associated tool parameters are applied automatically
- The **Tools** dialog is closed
- Tap **Add block** on the toolbar
- A new block is inserted below the current position
- In the **Block type** drop-down list, select the **Spindle speed** block type
- In **Spindle speed**, enter the value **3000**
- Confirm the entry with **RET**

9.10.3 Programming the row of holes

- Tap **Add block** on the toolbar
- A new block is inserted below the current position
- In the **Block type** drop-down list, select the **Row of holes** block type
- Enter the following values:
  - **X coordinate of 1st hole**: -90
  - **Y coordinate of 1st hole**: -45
  - **Holes per row**: 4
  - **Hole spacing**: 45
  - **Angle**: 0°
  - **Depth**: -13
  - **Number of rows**: 3
  - **Row spacing**: 45
  - **Fill mode**: bolt hole circle
- Confirm each entry with **RET**
- Tap **Save program** in the program management
- The program is saved
9.10.4 Simulating program run

After you have successfully programmed the bolt hole circle and row of holes, you can simulate how the program will run by means of the simulation window.

![Simulation window](image)

- Tap **Simulation window**
- The simulation window is displayed
- Tap each program block, one after the other
- The tapped machining step is shown in color in the simulation window
- Check the view for programming errors, e.g. tool path intersections of holes
- If there are no programming errors you can machine the bolt hole circle and row of holes

9.11 Machining a row of holes (program run)

You have defined the individual machining steps for the row of holes in a program. You can execute the created program in Program run.

![Example workpiece](image)
9.11.1 Opening a program

- Tap Program run on the product in the main menu
- The user interface for Program Run is displayed
- Tap Open program in the program management
- A dialog box opens
- Select the Internal/Programs storage location in the dialog box
- Tap the file Example.i
- Tap Open
- The selected program is opened

9.11.2 Running a program

- On the machine, insert drill Ø 5.0 mm into the spindle
- Tap NC START on the program control
- The product highlights the program’s first Tool call block
- The wizard displays the relevant instructions
- Tap NC START again to begin machining
- The spindle speed is set, and the first machining block is highlighted
- The individual steps of the Row of holes machining block are displayed
- The axis move to the first position
- Drill all the way through with the Z axis
- Call the next step in the Row of holes machining block with Next
- The next step is called
- Move the axes to the next position
- Follow the instructions in the wizard
- After you have drilled the row of holes, tap Close
- Machining is terminated
- The program is reset
- The wizard is closed
Manual operation
10.1 Overview

This chapter describes the Manual operation mode and how to execute simple machining operations in this mode on a workpiece.

Make sure that you have read and understood the "Basic operation" chapter before carrying out the actions described below.

Further information: "Basic operation", Page 59

Short description

By traversing the reference marks on the encoder scales, you make it possible to define an absolute position. When you have completed the reference mark search in Manual mode, you then set the presets that will be used as the basis for machining the workpiece in accordance with the drawing.

Presetting in the Manual Operation mode is required in order to use the product in MDI mode.

The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.

Position measurement and tool selection for simple machining operations are described below.

Activation

- Tap Manual operation in the main menu
- The user interface for manual operation is displayed

Figure 41: Manual operation menu

1 Axis key
2 Reference
3 Position display
4 Status bar
5 Spindle speed (machine tool)
10.2 Conducting the reference mark search

With the help of reference marks, the unit can assign axis positions of the encoder to the machine.

If no reference marks for the encoder are provided by a defined coordinate system, you need to perform a reference mark search before you start measuring.

- If the reference mark search after unit start is active, then all of the unit’s functions will be disabled until the reference mark search has been successfully completed.
  
  **Further information:** "Reference marks (Encoder)", Page 259

- The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.

If the reference mark search is active on the unit, then a wizard will ask you to traverse the reference marks of the axes.

- After logging in, follow the instructions of the wizard
- The Reference symbol stops blinking upon successful completion of the reference mark search

**Further information:** "Operating elements of the position display", Page 80

**Further information:** "Activating the reference mark search", Page 101

Starting the reference mark search manually

If the reference mark search was not performed on startup, you can start it manually later.

- Tap **Manual operation** in the main menu
- The user interface for manual operation is displayed
- Tap **Auxiliary functions** in the status bar

- Tap **Reference marks**
- Existing reference marks are cleared
- The Reference symbol blinks
- Follow the instructions of the wizard
- The Reference symbol stops blinking upon successful completion of the reference mark search
10.3 Defining presets

You can define presets on a workpiece in the Manual Operation mode in the following ways:

- Probe a workpiece with a HEIDENHAIN KT 130 Edge Finder. Use this method to automatically enter the presets into the preset table.
- Probing a workpiece with a tool (touch-off). Use this method to define the respective tool position as a datum.
- Move to the position and set it as a preset, or overwrite position value

The setup engineer (Setup) may have already made settings in the datum table.

Further information: "Creating a preset table", Page 149

When touching the workpiece with a tool, the product uses the parameters stored in the tool table.

Further information: "Creating a tool table", Page 147

Requirement:
- A workpiece is clamped on the machine tool
- The axes have been homed
10.3.1 Functions for the probing of presets

A wizard assists you in setting presets by probing.

The following functions are available for probing a workpiece:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Function</th>
<th>Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="icon1.png" alt="Icon" /></td>
<td>Probe the edge of a workpiece (one probing procedure)</td>
<td><img src="scheme1.png" alt="Scheme1" /></td>
</tr>
<tr>
<td><img src="icon2.png" alt="Icon" /></td>
<td>Determine the centerline of a workpiece (two probing procedures)</td>
<td><img src="scheme2.png" alt="Scheme2" /></td>
</tr>
<tr>
<td><img src="icon3.png" alt="Icon" /></td>
<td>Determine the center point of a circular form (hole or cylinder) (three probing procedures with tool, four probing procedures with edge finder)</td>
<td><img src="scheme3.png" alt="Scheme3" /></td>
</tr>
</tbody>
</table>
10.3.2 Probing or touching off of presets

- Tap **Manual operation** in the main menu
- The user interface for manual operation is displayed
- Tap **Auxiliary functions** in the status bar

- In the dialog box, tap the desired function under **Probing** (e.g., **Probe edge**)

- Select the inserted tool in the **Select the tool** dialog box:
  - When using a HEIDENHAIN KT 130 edge finder: Activate **Using touch-probes**
  - When using a tool:
    - Deactivate **Using touch-probes**
    - Enter the desired value in the **Tool diameter** input field or
    - Select the corresponding tool from the tool table

- Tap **Confirm** in the wizard
- Follow the instructions in the wizard

- Keep in mind when probing:
  - Move the edge finder toward the workpiece edge until the red LED on the edge finder lights up
  - or
  - Move the tool until it touches the workpiece edge
  - Confirm each step in the wizard
  - Retract the edge finder or tool after the last probing operation

- The **Select preset** dialog box appears after the last probing procedure

- Select the desired preset in the **Selected preset** input field:
  - To overwrite an existing preset, select an entry from the preset table
  - To add a new preset, enter a number that has not yet been assigned in the preset table
  - Confirm the entry with RET

- Enter the desired value in the **Set position values** input field:
  - Leave the input field empty to load the measured value
  - To define a new value, enter the desired value
  - Confirm the entry with RET

- Tap **Confirm** in the wizard
- The new coordinates are applied as the preset
### 10.3.3 Example 1: Setting a preset on a corner

The following probing steps are necessary in order to set the preset on a corner of the workpiece:

<table>
<thead>
<tr>
<th>Probing function</th>
<th>steps</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Probe Y+" /></td>
<td>▶ Probe the edge in the Y+ direction</td>
<td><img src="image2" alt="Figure Y+" /></td>
</tr>
<tr>
<td><img src="image3" alt="Probe X+" /></td>
<td>▶ Probe the edge in the X+ direction</td>
<td><img src="image4" alt="Figure X+" /></td>
</tr>
<tr>
<td><img src="image5" alt="Probe Z-" /></td>
<td>▶ Probe the edge in the Z- direction</td>
<td><img src="image6" alt="Figure Z-" /></td>
</tr>
<tr>
<td></td>
<td>▶ The product defines the preset on the corner of the workpiece</td>
<td><img src="image7" alt="Final Figure" /></td>
</tr>
</tbody>
</table>
### 10.3.4 Example 2: Setting a preset centered on an edge

The following probing steps are necessary in order to set the preset centered on the edge of the workpiece:

<table>
<thead>
<tr>
<th>Probing function</th>
<th>steps</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image-1" alt="Probe the edge in the Y+ direction" /></td>
<td>▶ Probe the edge in the Y+ direction</td>
<td><img src="image-2" alt="Figure 1" /></td>
</tr>
<tr>
<td><img src="image-3" alt="Probe the edges in the X+ direction and X– direction" /></td>
<td>▶ Probe the edges in the X+ direction and X– direction</td>
<td><img src="image-4" alt="Figure 2" /></td>
</tr>
<tr>
<td><img src="image-5" alt="Probe the edge in the Z– direction" /></td>
<td>▶ Probe the edge in the Z– direction</td>
<td><img src="image-6" alt="Figure 3" /></td>
</tr>
<tr>
<td><img src="image-7" alt="The products defines the preset centered on the edge of the workpiece" /></td>
<td>▶ The products defines the preset centered on the edge of the workpiece</td>
<td><img src="image-8" alt="Figure 4" /></td>
</tr>
</tbody>
</table>
### Example 3: Setting a preset on a circle center

The following probing steps are necessary in order to set the preset on a circle center of the workpiece:

<table>
<thead>
<tr>
<th>Probing function</th>
<th>steps</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▶ Probe the hole at four points</td>
<td><img src="image1.png" alt="Figure 1" /></td>
</tr>
<tr>
<td></td>
<td>▶ Probe the edge in the Z– direction</td>
<td><img src="image2.png" alt="Figure 2" /></td>
</tr>
<tr>
<td></td>
<td>▶ The product defines the preset centered in the hold of workpiece</td>
<td><img src="image3.png" alt="Figure 3" /></td>
</tr>
</tbody>
</table>
### 10.3.6 Example 4: Setting a preset in the middle of the workpiece

The following probing steps are required in order to set the preset in the middle of the workpiece:

<table>
<thead>
<tr>
<th>Probing function</th>
<th>steps</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Probe symbol]</td>
<td>▶ Probe the edges in Y+ direction and the Y– direction</td>
<td>![Diagram of probing in Y-direction]</td>
</tr>
<tr>
<td>![Probe symbol]</td>
<td>▶ Probe the edges in the X+ direction and X– direction</td>
<td>![Diagram of probing in X-direction]</td>
</tr>
<tr>
<td>![Probe symbol]</td>
<td>▶ Probe the edge in the Z– direction</td>
<td>![Diagram of probing in Z-direction]</td>
</tr>
</tbody>
</table>

- The product defines the preset in the middle of the workpiece.
10.3.7 Setting a position as a preset

For simple machining operations, you can use the current position as a preset and perform simple position calculations.

Requirement:
- A workpiece is clamped on the machine tool
- The axes have been homed

Further information: “Conducting the reference mark search”, Page 177

Setting the current position as preset

- Approach the desired position
- Long-press the axis key
- The active preset in the preset table is overwritten with the current position
- The active preset is applied as the new value
- Perform the desired machining operation

Defining the position values of the current position

- Approach the desired position
- In the working space, tap the axis key or the position value
- Enter the desired position value
- Confirm the entry with RET
- The position value is applied to the current position
- The entered position value is linked with the current position and overwrites the active preset in the preset table
- The active preset is applied as the new value
- Perform the desired machining operation
10.4 Creating a tool

In the Manual Operation mode, you can enter the tools you want to use into the tool table.

The setup engineer (Setup) may have already made the settings in the tool table.

**Further information:** "Creating a tool table", Page 147

- A workpiece is clamped on the machine tool
- The axes have been homed

1. Tap **Tools** on the status bar
   - The **Tools** dialog box appears

2. Tap **Open table**
   - The **Tool table** dialog box appears

3. Tap **Add**
   - Enter a name in the **Tool type** input field
   - Confirm the entry with RET
   - Tap the input fields one after the other, and enter the corresponding values
   - Change the unit of measure in the selection menu, if required
   - The entered values are converted
   - Confirm the entry with RET
   - The defined tool is added to the tool table
   - To protect the entry for a tool from accidental changes or deletion, tap the **Lock** symbol next to the tool’s entry
     - The symbol changes and the entry is locked

4. Tap **Close**
   - The **Tool table** dialog box is closed
10.5 Selecting a tool

The currently selected tool is displayed on the status bar. Here you can also access the tool table where you can select the tool you want to use. The associated tool parameters are applied automatically.

The product provides a tool radius compensation feature that enables you to directly enter the workpiece dimensions as specified in the drawing. During machining, the product will then automatically display a traverse path that is increased (R+) or decreased (R−) by the tool radius.

The setup engineer (Setup) may have already made the settings in the tool table.

Further information: “Creating a tool table”, Page 147

- Tap **Tools** on the status bar
- The **Tools** dialog box appears
- Tap the tool you want to use
- Tap **Confirm**
- The associated tool parameters are applied automatically
- The selected tool is shown on the status bar
- Mount the desired tool on the machine tool
MDI mode
11.1 Overview

This chapter describes the Manual Data Input (MDI) operating mode and how to execute machining steps in single blocks in this mode.

Make sure that you have read and understood the "Basic operation" chapter before carrying out the actions described below.

Further information: "Basic operation", Page 59

Short description

MDI mode allows you to execute one machining block at a time. The values to be entered can be applied directly in the input field from a properly dimensioned production drawing.

Before you can use the product in the MDI mode, the presets must be set in the Manual Operation mode.

Further information: "Defining presets", Page 178

The functions provided by MDI mode enable efficient single-part production. For small-batch production, you can program the machining steps in Programming mode and then execute them in Program run mode.

Further information: "Programming (software option)", Page 211
Further information: "Program run (software option)", Page 203

Calling up

Tap MDI in the main menu

The operating element can belong to a group (based on the configuration).

Further information: "Selecting grouped operating elements", Page 70
Tap Create on the status bar
> The user interface for MDI mode is displayed

Figure 42: MDI menu
1 View bar
2 Block parameters
3 MDI block
4 Status bar
5 Block tools
11.2  **Block types**

You can use the following block types for machining in the MDI mode:
- Positioning functions
- Machining patterns

11.2.1  **Positioning**

You can manually define position values for positioning. Depending on the configuration of the connected machine tool, you can then move the tool to these positions either automatically or manually.

You can load the current axis position with **Actual position capture** into the appropriate input fields.

The following parameters are available:

**Positioning block**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>Tool radius compensation disabled (default setting)</td>
</tr>
<tr>
<td>R+</td>
<td>Positive tool radius compensation; the traverse path is increased by the tool radius (outside contour)</td>
</tr>
<tr>
<td>R−</td>
<td>Negative tool radius compensation; the traverse path is decreased by the tool radius (inside contour)</td>
</tr>
<tr>
<td></td>
<td>Incremental position value, i.e. the position value is referenced to the actual position</td>
</tr>
<tr>
<td></td>
<td>Through-hole drilling without a specified position value</td>
</tr>
</tbody>
</table>

11.2.2  **Machining patterns**

You can define various machining patterns to machine complex shapes. From the data you enter, the product calculates the geometry of the machining patterns and optionally displays them in the simulation window.

Before defining a machining pattern, you must:
- Define a suitable tool in the tool table
- Select the tool on the status bar

**Further information**: “Creating a tool table”, Page 147

You can load the current axis position with **Actual position capture** into the appropriate input fields.
### Hole block

Figure 43: Schematic depiction of the **Hole** block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Center point of the hole in the X plane</td>
</tr>
<tr>
<td>Y</td>
<td>Center point of the hole in the Y plane</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for drilling in the Z plane</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
</tbody>
</table>
Bolt hole circle block

Figure 44: Schematic display of the bolt hole circle block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of holes</td>
<td>Number of holes</td>
</tr>
<tr>
<td>X coordinate of center</td>
<td>Center of the bolt hole arc in the X plane</td>
</tr>
<tr>
<td>Y coordinate of center</td>
<td>Center of the bolt hole arc in the Y plane</td>
</tr>
<tr>
<td>Radius</td>
<td>Radius of the bolt hole arc</td>
</tr>
<tr>
<td>Starting angle</td>
<td>Angle of the 1st hole of the bolt hole arc</td>
</tr>
<tr>
<td>Stepping angle</td>
<td>Angle of the circle segment</td>
</tr>
<tr>
<td></td>
<td>Default: bolt hole circle</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for drilling in the Z plane</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
</tbody>
</table>
**Row of holes block**

![Diagram of a row of holes block](image)

Figure 45: Schematic display of the row of holes block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X coordinate of 1st hole</td>
<td>1st hole of the linear hole pattern in the X plane</td>
</tr>
<tr>
<td>Y coordinate of 1st hole</td>
<td>1st hole of the linear hole pattern in the Y plane</td>
</tr>
<tr>
<td>Holes per row</td>
<td>Number of holes per row</td>
</tr>
<tr>
<td>Hole spacing</td>
<td>Spacing or offset between the individual holes of a row</td>
</tr>
<tr>
<td>Angle</td>
<td>Rotation angle of the row of holes</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for drilling in the Z plane</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
<tr>
<td>Number of rows</td>
<td>Number of rows of holes in the linear hole pattern</td>
</tr>
<tr>
<td>Row spacing</td>
<td>Spacing between the individual rows of holes</td>
</tr>
<tr>
<td>Fill mode</td>
<td>Distribution of holes</td>
</tr>
<tr>
<td></td>
<td>- All holes</td>
</tr>
<tr>
<td></td>
<td>- Frame of holes</td>
</tr>
</tbody>
</table>
### Rectangular pocket block

![Schematic display of the rectangular pocket block](image)

Figure 46: Schematic display of the rectangular pocket block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance height</td>
<td>Z plane above the workpiece in which the tool is allowed to move at maximum speed</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for milling in the tool axis</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
<tr>
<td>X coordinate of center</td>
<td>Center of the rectangular pocket in the X plane</td>
</tr>
<tr>
<td>Y coordinate of center</td>
<td>Center of the rectangular pocket in the Y plane</td>
</tr>
<tr>
<td>Side length in X</td>
<td>Length of the rectangular pocket in the X-axis direction</td>
</tr>
<tr>
<td>Side length in Y</td>
<td>Length of the rectangular pocket in the Y-axis direction</td>
</tr>
<tr>
<td>Direction</td>
<td>Direction in which the rectangular pocket is roughed out (clockwise or counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>Default: counterclockwise</td>
</tr>
<tr>
<td>Finishing allowance</td>
<td>Amount of material that is to be left remaining around the rectangular pocket and will be removed in the last pass</td>
</tr>
</tbody>
</table>
When machining a rectangular pocket in MDI and Program Run modes of operation, the following applies:

- Approaching the starting position is at clearance height at rapid traverse
- If a target depth was defined, positioning is at Clearance height at the end of the machining operation

11.3 Executing blocks

You can execute a positioning function or select a machining pattern and execute this block.

If enabling signals are missing, the running program is halted and the drives of the machine are stopped. 

Further information: Manufacturer’s documentation for the machine

Executing blocks

- Tap Create on the status bar
- A new block is displayed
  - The last programmed MDI block is loaded along with all of its parameters
  - Select the desired block type from the Block type drop-down list
- Based on the block type, define the relevant parameters
- To load the current axis position, tap Actual position capture in the appropriate input fields
- Confirm each input with RET
- To execute the block, tap END
- The positioning aid is displayed
- If the simulation window is activated, the current block is visualized
- Depending on the block, user intervention may be required; the wizard will display the relevant instructions
- Follow the instructions in the wizard
In multi-step blocks, tap **Next** to jump to the next instruction.

Figure 47: Example of a block in **MDI** mode
1. Wizard
2. View bar
3. Distance-to-go display
4. MDI block
5. Status bar
6. Positioning aid
7. Spindle speed (machine tool)

### 11.4 Using the simulation window
You can display a visualization of the selected block in the optional simulation window.

The following options are available on the view bar:

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
</table>
| ![Graphic](image) | **Graphic**  
Display of simulation and blocks |
| ![Position](image) | **Position**  
Display of parameters (position values for program run, if required) and blocks |
11.4.1 *Depiction as contour view*

The simulation window displays a contour view. The contour view aids in the precise positioning of the tool or with contour tracking in the machining plane. The contour view uses the following colors (defaults):

1. Machining pattern (white)
2. Current block or machining position (green)
3. Tool contour, tool position and tool path (orange)

**Activating the simulation window**

- Tap **Graphic**
- The simulation window for the currently selected block appears
11.5 Working with the positioning aid

During positioning to the next nominal position, the product assists you by displaying a graphic positioning aid ("traversing to zero"). A scale is shown underneath each axis you traverse to zero. The graphic positioning aid is a small square that symbolizes the target position of the tool.

![Figure 49: Distance to go with position view with graphical positioning aid](image)

1. Actual value
2. Distance-to-go
3. Positioning aid

The positioning aid moves across the measuring scale when the tool center is located within a range of ± 5 mm of the nominal position. The color also changes in the following way:

<table>
<thead>
<tr>
<th>Display of positioning aid</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>The tool center is moving away from the nominal positions</td>
</tr>
<tr>
<td>Green</td>
<td>The tool center is moving toward the nominal position</td>
</tr>
</tbody>
</table>

11.6 Applying the Scaling factor

If a scaling factor is activated for one or more axes, this scaling factor is multiplied by the stored nominal position during execution of a block. This enables you to mirror and scale a block.

You can activate a scaling factor in the quick access menu.

**Further information**: "Adjusting settings in the quick access menu", Page 83
**Example:**

The following MDI block is programmed:

![Figure 50: Example – MDI block](image)

A *Scaling factor* of **-0.5** is activated for the X axis. The following MDI block will therefore be executed:

![Figure 51: Example – Execution of an MDI block with scaling factor](image)

- If the calculated dimensions cannot be attained with the selected tool, the execution of the block is aborted.

- The scaling factor cannot be changed during execution of a block.
12

Program run (software option)
12.1 Overview

This chapter describes the Program run operating mode and how to execute a previously created program in this mode.

Make sure that you have read and understood the “Basic operation” chapter before carrying out the actions described below.

Further information: “Basic operation”, Page 59

Short description

In the Program run operating mode, you use an already created program for part production. It is not possible to change the program in this operating mode, but you can check in Single Block mode when running the program.

Further information: “In Single block mode”, Page 206

During execution of a program, the wizard guides you through the individual program steps. The optional simulation window can serve as a graphical positioning aid for the axes you need to move.

Calling up

- Tap Program run in the main menu

The operating element belongs to a group.

Further information: “Selecting grouped operating elements”, Page 70

- The user interface for Program Run is displayed

1 View bar
2 Status bar
3 Program control
4 Spindle speed (machine tool)
5 Program management
12.2 Using the program

The product displays a loaded program with the blocks and, when applicable, with the individual working steps of the blocks.

If enabling signals are missing, the running program is halted and the drives of the machine are stopped.

Further information: Manufacturer’s documentation for the machine

Requirement:
- The appropriate workpiece and tool have been clamped
- A program *.i file type has been loaded

Further information: “Managing programs”, Page 210

Figure 52: Example of a program in the Program un operating mode

1 View bar
2 Distance-to-go display
3 Program blocks
4 Program control
5 Spindle speed (machine tool)
6 Program management
12.2.1 Running the program

- Tap **NC START** on the program control
- The product selects the first block of the program
- Tap **NC START** on the program control once again
- User intervention may be required, depending on the block. The wizard shows the appropriate instruction. With a tool call for example, the spindle is automatically stopped and you are requested to change the corresponding tool.
- With multi-step blocks, such as machining patterns, tap **Next** to proceed to the next step in the wizard
- Follow the wizard’s instructions for the block

**Blocks that do not require any action by the user (such as presetting) are executed automatically.**

- Tap **NC START** to execute the next block, and continue in this manner until the end of the program

**In Single block mode**

- Tap **Single block** on the program control to activate Single Block mode
- When the Single Block mode is active, the program stops after each block of the program control (this also includes blocks that do not require any action by the user)

12.2.2 Proceeding to a specific program block

To go to a specific block, you can skip blocks one by one within a program until you reach the desired block. It is not possible to jump back in the program.

- Tap **Next program step** on the program control
- The next block is selected

12.2.3 Aborting program run

If errors or problems occur, you can abort the execution of a program. The tool position and the spindle speed remain unchanged when the program run is aborted.

**The program run cannot be aborted if the current block is executing a traverse motion.**

- Tap **Stop program** in the program management
- The program run is aborted
12.2.4 **Using the simulation window**

You can display a visualization of the selected block in the optional simulation window.

The following options are available on the view bar:

<table>
<thead>
<tr>
<th>Operating element</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic</td>
<td>Display of simulation and blocks</td>
</tr>
<tr>
<td>Position</td>
<td>Display of position values and blocks</td>
</tr>
</tbody>
</table>
Depiction as contour view

The simulation window displays a contour view. The contour view aids in the precise positioning of the tool or with contour tracking in the machining plane. The contour view uses the following colors (defaults):

1. Machining pattern (white)
2. Current block or machining position (green)
3. Tool contour, tool position and tool path (orange)

You can modify the colors and line thicknesses used in the contour view.

Further information: "Simulation window", Page 237
Activating the simulation window

- To switch to the simulation window, tap Graphic
- The simulation window graphically depicts the current block
- To return to the position display, tap Position

Modifying the contour view

- Tap Detail view
- The detail view shows the tool path and the possible machining positions for the currently selected block
- Tap Overview
- The overview shows the entire workpiece

12.2.5 Applying the Scaling factor

If a scaling factor is activated for one or more axes, this scaling factor is multiplied by the stored nominal position during execution of a block. This enables you to mirror and scale a block.

You can activate a scaling factor in the quick access menu.

Further information: "Adjusting settings in the quick access menu", Page 83

12.2.6 Setting the spindle speed

The following information applies only to units with ID number 1089179-xx.

You can control the spindle speed depending on the configuration of the connected machine tool.

- Tap or long-press + or - to set the spindle speed to the desired value
  - or
- Tap the Spindle speed input field, enter the value and tap RET to confirm
- The product applies the entered spindle speed as the nominal value and controls the spindle of the machine tool accordingly
12.3 Managing programs

To run a program, open the program file, which must be of the *.i type.

The default storage location for programs is **Internal/Programs**.

12.3.1 Opening a program

- Tap **Open program** in the program management
- Select the storage location in the dialog, e.g. **Internal/Programs**
- Tap the folder containing the file
- Tap the file
- Tap **Open**
- The selected program is loaded

12.3.2 Closing a program

- Tap **Close program** in the program management
- The opened program is closed
13

Programming
(software option)
13.1 Overview

This chapter describes the Programming operating mode and how to create new programs and edit existing programs in this mode.

Make sure that you have read and understood the "Basic operation" chapter before carrying out the actions described below.

Further information: "Basic operation", Page 59

Short description

The product uses programs for recurring tasks. Programs are created through the defining of various blocks, such as positioning functions or machine functions. A sequence of multiple blocks then forms a program. You can save a maximum of 100 blocks within a program.

Programming does not require connecting the product to a machine tool.

Calling up

> Tap Programming in the main menu

The operating element belongs to a group.

Further information: "Selecting grouped operating elements", Page 70

> The user interface for programming is displayed

1 View bar
2 Toolbar
3 Program management

The status bar and the optional OEM bar are not available in the Programming menu.
13.2 **Block types**

You can use the following block types for programming:
- Positioning functions
- Change of coordinate system (preset)
- Machine functions
- Machining patterns

13.2.1 **Positioning**

You can manually define position values for positioning. Depending on the configuration of the connected machine tool, you can then move the tool to these positions either automatically or manually.

You can load the current axis position with **Actual position capture** into the appropriate input fields.

The following parameters are available:

**Positioning block**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>Tool radius compensation disabled (default setting)</td>
</tr>
<tr>
<td>R+</td>
<td>Positive tool radius compensation; the traverse path is increased by the tool radius (outside contour)</td>
</tr>
<tr>
<td>R–</td>
<td>Negative tool radius compensation; the traverse path is decreased by the tool radius (inside contour)</td>
</tr>
<tr>
<td>I</td>
<td>Incremental position value, i.e. the position value is referenced to the actual position</td>
</tr>
<tr>
<td></td>
<td>Through-hole drilling without a specified position value</td>
</tr>
</tbody>
</table>
13.2.2 Coordinate systems

To change a coordinate system, you can call presets from the preset table. The coordinate system of the selected preset will then be used after the call.

Further information: “Defining presets”, Page 178

Preset block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preset number</td>
<td>ID from the preset table</td>
</tr>
<tr>
<td>Optional: Selection from preset table</td>
<td></td>
</tr>
</tbody>
</table>

13.2.3 Machine functions

You can call machine functions to machine the workpiece.

The available functions depend on the configuration of the connected machine tool. The following blocks and parameters are available:

<table>
<thead>
<tr>
<th>Block type</th>
<th>Parameter / Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle speed</td>
<td>Rotational speed of the tool spindle</td>
</tr>
<tr>
<td>Tool call</td>
<td>Number of the tool</td>
</tr>
<tr>
<td>Optional: Selection from tool table</td>
<td></td>
</tr>
<tr>
<td>Further information: “Selecting a tool”, Page 187</td>
<td></td>
</tr>
<tr>
<td>When a tool call is run, the spindle is automatically stopped and the user is requested to load the corresponding tool.</td>
<td></td>
</tr>
<tr>
<td>M function</td>
<td>Number of the M function</td>
</tr>
<tr>
<td>Optional: Selection from function table</td>
<td></td>
</tr>
<tr>
<td>Dwell time</td>
<td>Time interval between machining steps</td>
</tr>
</tbody>
</table>
13.2.4 Machining patterns

You can define various machining patterns to machine complex shapes. From the data you enter, the product calculates the geometry of the machining patterns and optionally displays them in the simulation window.

Before defining a machining pattern, you must
- Define a suitable tool in the tool table
- Select the tool on the status bar

Further information: "Creating a tool table", Page 147

You can load the current axis position with Actual position capture into the appropriate input fields.

Hole block

Figure 54: Schematic depiction of the Hole block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Center point of the hole in the X plane</td>
</tr>
<tr>
<td>Y</td>
<td>Center point of the hole in the Y plane</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for drilling in the Z plane</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
</tbody>
</table>
Bolt hole circle block

Figure 55: Schematic display of the bolt hole circle block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of holes</td>
<td>Number of holes</td>
</tr>
<tr>
<td>X coordinate of center</td>
<td>Center of the bolt hole arc in the X plane</td>
</tr>
<tr>
<td>Y coordinate of center</td>
<td>Center of the bolt hole arc in the Y plane</td>
</tr>
<tr>
<td>Radius</td>
<td>Radius of the bolt hole arc</td>
</tr>
<tr>
<td>Starting angle</td>
<td>Angle of the 1st hole of the bolt hole arc</td>
</tr>
<tr>
<td>Stepping angle</td>
<td>Angle of the circle segment</td>
</tr>
<tr>
<td></td>
<td>Default: bolt hole circle</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for drilling in the Z plane</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
</tbody>
</table>
**Row of holes block**

![Schematic display of the row of holes block](image)

Figure 56: Schematic display of the row of holes block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X coordinate of 1st hole</td>
<td>1st hole of the linear hole pattern in the X plane</td>
</tr>
<tr>
<td>Y coordinate of 1st hole</td>
<td>1st hole of the linear hole pattern in the Y plane</td>
</tr>
<tr>
<td>Holes per row</td>
<td>Number of holes per row</td>
</tr>
<tr>
<td>Hole spacing</td>
<td>Spacing or offset between the individual holes of a row</td>
</tr>
<tr>
<td>Angle</td>
<td>Rotation angle of the row of holes</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for drilling in the Z plane</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
<tr>
<td>Number of rows</td>
<td>Number of rows of holes in the linear hole pattern</td>
</tr>
<tr>
<td>Row spacing</td>
<td>Spacing between the individual rows of holes</td>
</tr>
<tr>
<td>Fill mode</td>
<td>Distribution of holes</td>
</tr>
<tr>
<td></td>
<td>▪ All holes</td>
</tr>
<tr>
<td></td>
<td>▪ Frame of holes</td>
</tr>
</tbody>
</table>
### Rectangular pocket block

![Figure 57: Schematic display of the rectangular pocket block](image)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance height</td>
<td>Z plane above the workpiece in which the tool is allowed to move at maximum speed</td>
</tr>
<tr>
<td>Depth</td>
<td>Target depth for milling in the tool axis</td>
</tr>
<tr>
<td></td>
<td>Default: Through-hole drilling</td>
</tr>
<tr>
<td>X coordinate of center</td>
<td>Center of the rectangular pocket in the X plane</td>
</tr>
<tr>
<td>Y coordinate of center</td>
<td>Center of the rectangular pocket in the Y plane</td>
</tr>
<tr>
<td>Side length in X</td>
<td>Length of the rectangular pocket in the X-axis direction</td>
</tr>
<tr>
<td>Side length in Y</td>
<td>Length of the rectangular pocket in the Y-axis direction</td>
</tr>
<tr>
<td>Direction</td>
<td>Direction in which the rectangular pocket is roughed out (clockwise or counterclockwise)</td>
</tr>
<tr>
<td></td>
<td>Default: counterclockwise</td>
</tr>
<tr>
<td>Finishing allowance</td>
<td>Amount of material that is to be left remaining around the rectangular pocket and will be removed in the last pass</td>
</tr>
</tbody>
</table>
When machining a rectangular pocket in MDI and Program Run modes of operation, the following applies:
- Approaching the starting position is at clearance height at rapid traverse
- If a target depth was defined, positioning is at Clearance height at the end of the machining operation

13.3 Creating a program

A program always consists of a program header and a sequence of blocks. You can define various block types, edit the associated block parameters, and delete individual blocks from the program.

Figure 58: Example of a program in the Programming operating mode

1 View bar
2 Block parameters
3 Toolbar
4 Program blocks
5 Program management
13.3.1 Programming support

The product provides the following features to assist you in creating programs:

- When you add a block, the wizard displays information on the parameters that are required for the selected block type.
- If a block contains errors or undefined parameters, it is displayed in red type in the list.
- If problems occur, the wizard displays the message **The program contains incomplete program blocks.** You can switch between program blocks by tapping the arrow keys.
- The optional simulation window shows a visualization of the current block.

**Further information:** "Using the simulation window", Page 198

---

**Additional Information:**

All changes to a program can be automatically saved.

- Tap **Save program automatically** in the program management
- All changes will be automatically saved immediately

---

13.3.2 Creating a program header

- Tap **Create new program** in the program management
- In the dialog select the storage location, e.g. **Internal/Programs**, in which you want to save the program
- Enter a name for the program
- Confirm the entry with **RET**
- Tap **Create**
- A new program containing the **Program header** start block is created
- The name of the program is displayed on the toolbar
- Enter a unique name in the **Name** field
- Confirm the entry with **RET**
- Change the unit of measure with the slide switch, if required

---

13.3.3 Adding blocks

- Tap **Add block** on the toolbar
- A new block is inserted below the current position
- Select the desired block type from the **Block type** drop-down list
- Define the relevant parameters, depending on the block type

**Further information:** "Block types", Page 213

- Confirm each entry with **RET**
- If the simulation window is active, the current block is visualized
13.3.4 Deleting blocks

- Tap **Delete** on the toolbar
- The blocks contained in the program are marked with a **Delete** symbol
- Tap the **Delete** symbol for the blocks you want to delete in the program
- The selected blocks are deleted from the program
- Tap **Delete** on the toolbar again

13.3.5 Saving a program

- Tap **Save program** in the program management
- The program is saved

13.4 Using the simulation window

The simulation window visualizes the selected block. You can also use the simulation window to check a created program step by step.

The following options are available on the view bar:

<table>
<thead>
<tr>
<th>Control</th>
<th>Function</th>
</tr>
</thead>
</table>
| ![Control Graphic](image) | **Graphic**
| | Display of simulation and blocks |
| ![Control Position](image) | **Position**
| | Display of position values and blocks |
13.4.1 Depiction as contour view

The simulation window displays a contour view. The contour view aids in the precise positioning of the tool or with contour tracking in the machining plane.

The contour view uses the following colors (defaults):

1. Machining pattern (white)
2. Current block or machining position (green)
3. Tool contour, tool position and tool path (orange)

![Simulation window with contour view](image)

Figure 59: Simulation window with contour view

13.4.2 Activating the simulation window

- Tap **Graphic** on the view bar to enlarge the simulation window
- The simulation window for the highlighted block appears
- To leave the simulation window, tap **Position** in the view bar
- The parameter view is shown
13.4.3 Checking a program in the simulation window

- Tap Graphic
- The simulation window for the current program appears
- Tap each program block, one after the other
- The program steps are displayed in the simulation window; you can enlarge the detail view as needed
- To enlarge the view, tap Detail view
- To return to the overview view, tap Overview

13.5 Managing programs

After you have created a program, you can save it for automatic program run or subsequent editing.

The default storage location for programs is Internal/Programs.

13.5.1 Opening a program

- Tap Open program in the program management
- Select the storage location in the dialog, e.g. Internal/Programs
- Tap the folder containing the file
- Tap the file
- Tap Open
- The selected program is loaded

13.5.2 Closing a program

- Tap Close program in the program management
- The opened program is closed

13.5.3 Saving a program

- Tap Save program in the program management
- The program is saved
13.5.4 Saving a program under a new name

- Tap **Save program as** in the program management
- In the dialog select the storage location, e.g. **Internal/Programs**, in which you want to save the program
- Enter a name for the program
- Confirm the entry with **RET**
- Tap **Save as**
- The program is saved
- The name of the program is displayed on the toolbar

13.5.5 Saving a program automatically

- Tap **Save program automatically** in the program management
- All changes to the program will be automatically saved immediately

13.5.6 Deleting a program

- Tap **Delete the program** in the program management
- Tap **Delete selection**
- Tap **OK** to confirm deletion
- The program is deleted

13.6 Editing program blocks

You can make later changes to any block of a program. To apply the changes to the program, you need to save the program again after you have made the changes.

Editing program blocks

- Tap **Open program** in the program management
- Select the storage location in the dialog, e.g. **Internal/Programs**
- Tap the folder containing the file
- Tap the file
- Tap **Open**
- The selected program is loaded
- Tap the desired block
- The parameters of the selected block are displayed
- Edit the relevant parameters, depending on the block type
- Confirm each entry with **RET**
- Tap **Save program** in the program management
- The edited program is saved
14.1 Overview

This chapter describes the **File management** menu and its functions.

---

**Short description**

The **File management** menu shows an overview of the files stored in the g133 product’s memory. Any connected USB mass storage products (FAT32 format) or available network drives are shown in the list of storage locations. The USB mass storage products and the network drives are displayed with their name or drive designation.

**Activation**

- Tap **File management** in the main menu
- The user interface for file management is displayed

---

**Figure 60: File management menu**

1. List of available storage locations
2. List of folders in the selected storage location
14.2 **File types**

In the **File management** menu you can edit the following file types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Use</th>
<th>Manage</th>
<th>View</th>
<th>Open</th>
<th>Print</th>
</tr>
</thead>
<tbody>
<tr>
<td>*.i</td>
<td>Programs</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.mcc</td>
<td>Configuration files</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.dro</td>
<td>Firmware files</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.svg, *.ppm</td>
<td>Image files</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.jpg, *.png, *.bmp</td>
<td>Image files</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.csv</td>
<td>Text files</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.txt, *.log, *.xml</td>
<td>Text files</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>*.pdf</td>
<td>PDF files</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>✓</td>
</tr>
</tbody>
</table>

14.3 **Managing folders and files**

**Folder structure**

In the **File management** menu, the files in the **Internal** storage location are saved in the following folders:

<table>
<thead>
<tr>
<th>Folders</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documents</td>
<td>Document files with instructions and service addresses</td>
</tr>
<tr>
<td>Images</td>
<td>Image files</td>
</tr>
<tr>
<td>Oem</td>
<td>Files for configuring the OEM bar (visible only to OEM users)</td>
</tr>
<tr>
<td>System</td>
<td>Audio files and system files</td>
</tr>
<tr>
<td>User</td>
<td>User data</td>
</tr>
</tbody>
</table>

**Creating a new folder**

- Drag the icon of the folder in which you want to create a new folder to the right
- The operating elements are displayed
- Tap **Create a new folder**
- Tap the input field in the dialog and enter a name for the new folder
- Confirm entry with **RET**
- Tap **OK**
- A new folder is created
Moving a folder

- Drag the icon of the folder you want to move to the right
- The operating elements are displayed
- Tap Move to
- In the dialog, select the folder to which you want to move the folder
- Tap Select
- The folder is moved

Copying a folder

- Drag the icon of the folder you want to copy to the right
- The operating elements are displayed
- Tap Copy to
- In the dialog, select the folder to which you want to copy the folder
- Tap Select
- The folder is copied

If you copy a folder to the folder it is stored in, the suffix ‘_1’ is appended to the name of the copied folder.

Renaming a folder

- Drag the icon of the folder you want to rename to the right
- The operating elements are displayed
- Tap Rename folder
- Tap the input field in the dialog and enter a name for the new folder
- Confirm the entry with RET
- Tap OK
- The folder is renamed

Moving a file

- Drag the icon of the file you want to move to the right
- The operating elements are displayed
- Tap Move to
- In the dialog, select the folder to which you want to move the file
- Tap Select
- The file is moved
Copying a file

- Drag the icon of the file you want to copy to the right
- The operating elements are displayed
- Tap **Copy to**
- In the dialog, select the folder to which you want to copy the file
- Tap **Select**
- The file is copied

If you copy a file to the folder it is stored in, the suffix ".1" is appended to the name of the copied file.

Renaming a file

- Drag the icon of the file you want to rename to the right
- The operating elements are displayed
- Tap **Rename file**
- Tap the input field in the dialog and enter a name for the new file
- Confirm the entry with **RET**
- Tap **OK**
- The file is renamed

Deleting a folder or file

The folders and files you delete will be permanently deleted and cannot be recovered. If you delete a folder, all subfolders and files contained in that folder will also be deleted.

- Drag the icon of the file you want to delete to the right
- The operating elements are displayed
- Tap **Delete selection**
- Tap **Delete**
- The folder or file is deleted
14.4 Viewing files

Viewing files

- Tap **File management** in the main menu
- Navigate to the storage location of the desired file
- Tap the file
  - A preview image (only with PDF and image files) as well as information about the file are displayed

![Figure 61: File management menu with preview image and file information](image)

- Tap **View**
  - The file contents are displayed
- Tap **Close** to close the view

- In this view, you can print PDF files on the printer configured in the product by tapping **Print**.
14.5 Exporting files

You can export files to an external USB mass storage device (FAT32 format) or to the network drive. You can either copy or move the files:
- If you copy files, duplicates of the files will remain stored in the product
- If you move files, the files will be deleted in the product

1. Tap **File management** in the main menu
2. In the **Internal** storage location, navigate to the file you want to export
3. Drag the icon of the file to the right
4. The operating elements are displayed
5. To copy the file, tap **Copy file**
6. To move the file, tap **Move file**
7. In the dialog, select the storage location to which you want to export the file
8. Tap **Select**
9. The file is exported to the USB mass storage device or the network drive

**Safely removing a USB mass storage device**

1. Tap **File management** in the main menu
2. Navigate to the list of storage locations
3. Tap **Safely remove**
4. The message **The storage medium can be removed now.** appears
5. Disconnect the USB mass storage device
14.6 Importing files

You can import files from a USB mass storage device (FAT32 format) or a network drive into the product. You can either copy or move the files:

- If you copy files, duplicates of the files will remain on the USB mass storage device or the network drive.
- If you move files, the files will be deleted from the USB mass storage device or the network drive.

1. Tap **File management** in the main menu.
2. On the USB mass storage device or network drive, navigate to the file you want to import.
3. Drag the icon of the file to the right.
4. The operating elements are displayed.
5. To copy the file, tap **Copy file**.
6. To move the file, tap **Move file**.
7. In the dialog, select the storage location to which you want to save the file.
8. Tap **Select**.
   - The file is stored on the product.

**Safely removing a USB mass storage device**

1. Tap **File management** in the main menu.
2. Navigate to the list of storage locations.
3. Tap **Safely remove**.
   - The message **The storage medium can be removed now.** appears.
4. Disconnect the USB mass storage device.
15.1 Overview

This chapter describes the setting options and the associated settings parameters for the product.

The basic setting options and settings parameters for commissioning and product setup are outlined in the respective chapters:

Further information: “Commissioning”, Page 91
Further information: “Setup”, Page 129

Short description

Depending on the type of user that is logged in to the product, settings and settings parameters can be edited and changed (edit permission).
If a user logged in to the product has no edit permission for a setting or a settings parameter, the setting or settings parameter is grayed out and cannot be opened or edited.

Depending on the software options that have been activated on the product, various settings and settings parameters are available in the Settings menu.
If, for example, the is not activated on the unit, then the settings parameters that are necessary for this software option are not displayed on the unit.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>General settings and information</td>
</tr>
<tr>
<td>Sensors</td>
<td>Configuration of sensors and sensor-dependent functions</td>
</tr>
<tr>
<td>Interfaces</td>
<td>Configuration of interfaces and network drives</td>
</tr>
<tr>
<td>User</td>
<td>Configuration of users</td>
</tr>
<tr>
<td>Axes</td>
<td>Configuration of connected encoders and error compensation</td>
</tr>
<tr>
<td>Service</td>
<td>Configuration of software options, service functions and information</td>
</tr>
</tbody>
</table>

**Activation**

- Tap Settings in the main menu
15.2 General

This chapter describes settings for configuring the operation and display and for setting up printers.

15.2.1 Device information

Path: Settings ▶ General ▶ Device information

The overview displays basic information about the software.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Displays the information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product designation</td>
<td>Product designation of the product</td>
</tr>
<tr>
<td>Part number</td>
<td>ID number of the unit</td>
</tr>
<tr>
<td>Serial number</td>
<td>Serial number of the product</td>
</tr>
<tr>
<td>Firmware version</td>
<td>Version number of the firmware</td>
</tr>
<tr>
<td>Firmware built on</td>
<td>Firmware creation date</td>
</tr>
<tr>
<td>Last firmware update on</td>
<td>Date of most recent firmware update</td>
</tr>
<tr>
<td>Free memory space</td>
<td>Free memory space in the internal storage location Internal</td>
</tr>
<tr>
<td>Free working memory (RAM)</td>
<td>Free RAM on the system</td>
</tr>
<tr>
<td>Number of unit starts</td>
<td>Number of times the product was started up with the current firmware</td>
</tr>
<tr>
<td>Operating time</td>
<td>Operating time of the product with the current firmware</td>
</tr>
</tbody>
</table>

15.2.2 Screen

Path: Settings ▶ General ▶ Screen

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brightness</td>
<td>Brightness of the screen</td>
</tr>
<tr>
<td></td>
<td>◦ Setting range: 1 % ... 100 %</td>
</tr>
<tr>
<td></td>
<td>◦ Default setting: 85 %</td>
</tr>
<tr>
<td>Energy-save-mode timeout</td>
<td>Time until energy-save mode is activated</td>
</tr>
<tr>
<td></td>
<td>◦ Setting range: 0 min ... 120 min</td>
</tr>
<tr>
<td></td>
<td>◦ If the value is set to 0, the power-saving mode is deactivated</td>
</tr>
<tr>
<td></td>
<td>◦ Default setting: 30 minutes</td>
</tr>
<tr>
<td>Quit the energy saving mode</td>
<td>Required actions to reactivate the screen</td>
</tr>
<tr>
<td></td>
<td>◦ Tap and drag: Touch the touchscreen and drag the arrow upwards from the lower edge</td>
</tr>
<tr>
<td></td>
<td>◦ Tap: Touch the touchscreen</td>
</tr>
<tr>
<td></td>
<td>◦ Tap or axis movement: Touch the touchscreen or move the axis</td>
</tr>
<tr>
<td></td>
<td>◦ Default setting: Tap and drag</td>
</tr>
</tbody>
</table>
15.2.3 Display

Path: Settings ► General ► Display

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position display</td>
<td>Configuration of the position display in the MDI mode and Program Run operating mode. The configuration also determines the actions requested by the wizard in the MDI mode and Program Run operating mode:</td>
</tr>
<tr>
<td></td>
<td>- Position with distance to go: The wizard prompts you to move the axis to the displayed position.</td>
</tr>
<tr>
<td></td>
<td>- Distance to go with position: The wizard prompts you to move the axis to 0, and a positioning aid is shown.</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>- Position: The position is displayed in large digits</td>
</tr>
<tr>
<td></td>
<td>- Position with distance to go: The position is displayed in large digits, and the distance to go in small digits</td>
</tr>
<tr>
<td></td>
<td>- Distance to go with position: The distance to go is displayed in large digits, and the position in small digits</td>
</tr>
<tr>
<td></td>
<td>- Default setting: Distance to go with position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Position values</th>
<th>The position values can describe the actual values or nominal values of the axes.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>- Actual value</td>
</tr>
<tr>
<td></td>
<td>- Nominal value</td>
</tr>
<tr>
<td></td>
<td>- Default setting: Actual value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance-to-go indicator</th>
<th>Display of the distance-to-go indicator in MDI mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Settings: ON or OFF</td>
</tr>
<tr>
<td></td>
<td>Default value: ON</td>
</tr>
</tbody>
</table>
### Parameters and Explanations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Digits before the decimal point for size-adjusted axis display</strong></td>
<td>The number of digits in front of the decimal point indicates the size at which the position values are displayed. If the number of digits in front of the decimal point is exceeded, then the display is reduced in size so that all of the digits can be shown.</td>
</tr>
<tr>
<td></td>
<td>- Setting range: 0 ... 6</td>
</tr>
<tr>
<td></td>
<td>- Default value: 3</td>
</tr>
</tbody>
</table>
| **Simulation window**                                                    | Configuration of the simulation window for MDI mode and program run.  
**Further information:** *Simulation window*, Page 237 |

### 15.2.4 Simulation window

**Path:** Settings ► General ► Display ► Simulation window

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line thickness of tool position</td>
<td>Line thickness for displaying the tool position</td>
</tr>
<tr>
<td></td>
<td>- Settings: Standard or Bold</td>
</tr>
<tr>
<td></td>
<td>- Default value: Standard</td>
</tr>
<tr>
<td>Color of tool position</td>
<td>Definition of the color for displaying the tool position</td>
</tr>
<tr>
<td></td>
<td>- Setting range: Color scale</td>
</tr>
<tr>
<td></td>
<td>- Default setting: Orange</td>
</tr>
<tr>
<td>Line thickness of current contour element</td>
<td>Line thickness for displaying the current contour element</td>
</tr>
<tr>
<td></td>
<td>- Settings: Standard or Bold</td>
</tr>
<tr>
<td></td>
<td>- Default value: Standard</td>
</tr>
<tr>
<td>Color of current contour element</td>
<td>Definition of the color for displaying the current contour element</td>
</tr>
<tr>
<td></td>
<td>- Setting range: Color scale</td>
</tr>
<tr>
<td></td>
<td>- Default setting: Green</td>
</tr>
<tr>
<td>Tool path</td>
<td>Use of the tool path</td>
</tr>
<tr>
<td></td>
<td>- Settings: ON or OFF</td>
</tr>
<tr>
<td></td>
<td>- Default value: ON</td>
</tr>
<tr>
<td>Horizontal alignment</td>
<td>Horizontal orientation of the coordinate system in the simulation window</td>
</tr>
<tr>
<td></td>
<td>- <strong>Rightward</strong>: values increase to the right</td>
</tr>
<tr>
<td></td>
<td>- <strong>Leftward</strong>: values increase to the left</td>
</tr>
<tr>
<td></td>
<td>- Default value: Rightward</td>
</tr>
<tr>
<td>Vertical alignment</td>
<td>Vertical orientation of the coordinate system in the simulation window</td>
</tr>
<tr>
<td></td>
<td>- <strong>Upward</strong>: values increase in the upward direction</td>
</tr>
<tr>
<td></td>
<td>- <strong>Downward</strong>: values increase in the downward direction</td>
</tr>
<tr>
<td></td>
<td>- Default value: Upward</td>
</tr>
</tbody>
</table>

*The Undo buttons enable the color definitions of the simulation window to be reset to factory settings.*
15.2.5 Input devices

Path: Settings ▶ General ▶ Input devices

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse substitute for multitouch gestures</td>
<td>Specifies whether mouse operation should replace operation using the touchscreen (multitouch)</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Auto (until first multitouch):</strong> Touching the touchscreen causes mouse deactivation</td>
</tr>
<tr>
<td></td>
<td>- <strong>On (no multitouch):</strong> Operation only possible with the mouse, the touchscreen is deactivated</td>
</tr>
<tr>
<td></td>
<td>- <strong>Off (only multitouch):</strong> Operation only possible with the touchscreen, the mouse is deactivated</td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>Auto (until first multitouch)</strong></td>
</tr>
<tr>
<td>USB keyboard layout</td>
<td>If a USB keyboard is connected:</td>
</tr>
<tr>
<td></td>
<td>- Language selection of the keyboard assignment</td>
</tr>
</tbody>
</table>

15.2.6 Sounds

Path: Settings ▶ General ▶ Sounds

The available sounds are grouped into categories. The sounds differ within a category.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaker</td>
<td>Use of the built-in speaker on the rear panel of the product</td>
</tr>
<tr>
<td></td>
<td>Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>ON</strong></td>
</tr>
<tr>
<td>Speaker volume</td>
<td>Volume of the product's speaker</td>
</tr>
<tr>
<td></td>
<td>Setting range: <strong>0 % ... 100 %</strong></td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>50 %</strong></td>
</tr>
<tr>
<td>Message and Error</td>
<td>Sound to be played when a message is displayed</td>
</tr>
<tr>
<td></td>
<td>When you select a setting, the associated sound is played</td>
</tr>
<tr>
<td></td>
<td>Settings: <strong>Standard, Guitar, Robot, Outer space, No sound</strong></td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>Standard</strong></td>
</tr>
<tr>
<td>Touch tone</td>
<td>Sound to be played when using a touch element</td>
</tr>
<tr>
<td></td>
<td>When you select a setting, the associated sound is played</td>
</tr>
<tr>
<td></td>
<td>Settings: <strong>Standard, Guitar, Robot, Outer space, No sound</strong></td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>Standard</strong></td>
</tr>
</tbody>
</table>
### 15.2.7 Printers

Path: Settings ▶ General ▶ Printers

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default printer</td>
<td>List of printers configured on the product</td>
</tr>
<tr>
<td>Properties</td>
<td>Settings of the selected default printer</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> “Properties”, Page 239</td>
</tr>
<tr>
<td>Add printer</td>
<td>Adds a <strong>USB printer</strong> or <strong>Network printer</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> “Add printer”, Page 240</td>
</tr>
<tr>
<td>Remove printer</td>
<td>Removes a <strong>USB printer</strong> or <strong>Network printer</strong> connected to the product</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> “Remove printer”, Page 240</td>
</tr>
</tbody>
</table>

### 15.2.8 Properties

Path: Settings ▶ General ▶ Printers ▶ Properties

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>Print resolution in dpi</td>
</tr>
<tr>
<td></td>
<td>■ The setting range and default setting depend on the printer type</td>
</tr>
<tr>
<td>Paper size</td>
<td>Specification of paper size and dimensions</td>
</tr>
<tr>
<td></td>
<td>■ The setting range and default setting depend on the printer type</td>
</tr>
<tr>
<td>Feed tray</td>
<td>Specification of the paper feeder</td>
</tr>
<tr>
<td></td>
<td>■ The setting range and default setting depend on the printer type</td>
</tr>
<tr>
<td>Type of paper</td>
<td>Designation of the paper type</td>
</tr>
<tr>
<td></td>
<td>■ The setting range and default setting depend on the printer type</td>
</tr>
<tr>
<td>Duplex printing</td>
<td>Options for duplex printing</td>
</tr>
<tr>
<td></td>
<td>■ The setting range and default setting depend on the printer type</td>
</tr>
<tr>
<td>Color/Black and white</td>
<td>Specification of the printing mode</td>
</tr>
<tr>
<td></td>
<td>■ The setting range and default setting depend on the printer type</td>
</tr>
</tbody>
</table>
15.2.9 Add printer

Path: Settings ▶ General ▶ Printers ▶ Add printer

The following parameters are available for USB printer and Network printer.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Located printers</td>
<td>Printers detected automatically on the (USB or network) port of the product</td>
</tr>
<tr>
<td>Name</td>
<td>Arbitrary printer name for easy identification</td>
</tr>
<tr>
<td></td>
<td>The text must not contain slashes (&quot;/&quot;), hash characters (&quot;#&quot;) or spaces.</td>
</tr>
<tr>
<td>Description</td>
<td>General printer description (optional, arbitrary)</td>
</tr>
<tr>
<td>Location</td>
<td>General location description (optional, arbitrary)</td>
</tr>
<tr>
<td>Connection</td>
<td>Type of printer connection</td>
</tr>
<tr>
<td>Select the driver</td>
<td>Selection of the appropriate driver for the printer</td>
</tr>
</tbody>
</table>

15.2.10 Remove printer

Path: Settings ▶ General ▶ Printers ▶ Remove printer

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printers</td>
<td>List of printers configured on the product</td>
</tr>
<tr>
<td>Type</td>
<td>Shows the type of the configured printer</td>
</tr>
<tr>
<td>Location</td>
<td>Shows the location of the configured printer</td>
</tr>
<tr>
<td>Connection</td>
<td>Shows the connection of the configured printer</td>
</tr>
<tr>
<td>Remove the selected printer</td>
<td>Deletes the configured printer from the product</td>
</tr>
</tbody>
</table>

15.2.11 Date and time

Path: Settings ▶ General ▶ Date and time

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and time</td>
<td>Current date and time of the product</td>
</tr>
<tr>
<td></td>
<td>▪ Settings: Year, Month, Day, Hour, Minute</td>
</tr>
<tr>
<td></td>
<td>▪ Default setting: Current system time</td>
</tr>
<tr>
<td>Date format</td>
<td>Format in which the date is displayed</td>
</tr>
<tr>
<td></td>
<td>Settings: MM-DD-YYYY: month, day, year</td>
</tr>
<tr>
<td></td>
<td>▪ DD-MM-YYYY: day, month, year</td>
</tr>
<tr>
<td></td>
<td>▪ YYYY-MM-DD: year, month, day</td>
</tr>
<tr>
<td></td>
<td>▪ Default setting: YYYY-MM-DD (e.g. “2016-01-31”)</td>
</tr>
</tbody>
</table>
### 15.2.12 Units

Path: `Settings ▶ General ▶ Units`

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit for linear values</strong></td>
<td>Unit of measure for linear values</td>
</tr>
<tr>
<td></td>
<td>Settings: <code>Millimeters</code> or <code>Inch</code></td>
</tr>
<tr>
<td></td>
<td>Default setting: <code>Millimeters</code></td>
</tr>
<tr>
<td><strong>Rounding method for linear values</strong></td>
<td>Rounding method for linear values</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td><code>Commercial</code>: Decimal digits from 1 to 4 are rounded down,</td>
</tr>
<tr>
<td></td>
<td>decimal digits from 5 to 9 are rounded up</td>
</tr>
<tr>
<td></td>
<td><code>Round off</code>: Decimal digits from 1 to 9 are rounded down</td>
</tr>
<tr>
<td></td>
<td><code>Round up</code>: Decimal digits from 1 to 9 are rounded up</td>
</tr>
<tr>
<td></td>
<td><code>Truncate</code>: Decimal digits are truncated without rounding up or down</td>
</tr>
<tr>
<td></td>
<td><code>Round to 0 and 5</code>: Decimal digits ≤ 24 or ≥ 75 are rounded to 0,</td>
</tr>
<tr>
<td></td>
<td>decimal digits ≥ 25 or ≤ 74 are rounded to 5</td>
</tr>
<tr>
<td></td>
<td>Default setting: <code>Commercial</code></td>
</tr>
<tr>
<td><strong>Decimal places for linear values</strong></td>
<td>Number of decimal places for linear values</td>
</tr>
<tr>
<td></td>
<td>Setting range:</td>
</tr>
<tr>
<td></td>
<td><code>Millimeters</code>: 0 ... 5</td>
</tr>
<tr>
<td></td>
<td><code>Inch</code>: 0 ... 7</td>
</tr>
<tr>
<td></td>
<td>Default value:</td>
</tr>
<tr>
<td></td>
<td><code>Millimeters</code>: 4</td>
</tr>
<tr>
<td></td>
<td><code>Inch</code>: 6</td>
</tr>
<tr>
<td><strong>Unit for angular values</strong></td>
<td>Unit for angular values</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td><code>Radian</code>: angles in radian (rad)</td>
</tr>
<tr>
<td></td>
<td><code>Decimal degrees</code>: angles in degrees (°) with decimal places</td>
</tr>
<tr>
<td></td>
<td><code>Deg-Min-Sec</code>: angles in degrees (°), minutes (’) and seconds (”)</td>
</tr>
<tr>
<td></td>
<td>Default setting: <code>Decimal degrees</code></td>
</tr>
<tr>
<td><strong>Rounding method for angular values</strong></td>
<td>Rounding method for decimal angular values</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td><code>Commercial</code>: Decimal digits from 1 to 4 are rounded down,</td>
</tr>
<tr>
<td></td>
<td>decimal digits from 5 to 9 are rounded up</td>
</tr>
<tr>
<td></td>
<td><code>Round off</code>: Decimal digits from 1 to 9 are rounded down</td>
</tr>
<tr>
<td></td>
<td><code>Round up</code>: Decimal digits from 1 to 9 are rounded up</td>
</tr>
<tr>
<td></td>
<td><code>Truncate</code>: Decimal digits are truncated without rounding up or down</td>
</tr>
<tr>
<td></td>
<td><code>Round to 0 and 5</code>: Decimal digits ≤ 24 or ≥ 75 are rounded to 0,</td>
</tr>
<tr>
<td></td>
<td>decimal digits ≥ 25 or ≤ 74 are rounded to 5</td>
</tr>
<tr>
<td></td>
<td>Default setting: <code>Commercial</code></td>
</tr>
<tr>
<td>Parameter</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Decimal places for angular values</td>
<td>Number of decimal places for angular values</td>
</tr>
<tr>
<td></td>
<td>Setting range:</td>
</tr>
<tr>
<td></td>
<td>▪ Radian: 0 ... 7</td>
</tr>
<tr>
<td></td>
<td>▪ Decimal degrees: 0 ... 5</td>
</tr>
<tr>
<td></td>
<td>▪ Deg-Min-Sec: 0 ... 2</td>
</tr>
<tr>
<td></td>
<td>Default value:</td>
</tr>
<tr>
<td></td>
<td>▪ Radian: 5</td>
</tr>
<tr>
<td></td>
<td>▪ Decimal degrees: 3</td>
</tr>
<tr>
<td></td>
<td>▪ Deg-Min-Sec: 0</td>
</tr>
<tr>
<td>Decimal separator</td>
<td>Separator for the display of values</td>
</tr>
<tr>
<td></td>
<td>▪ Settings: Point or Comma</td>
</tr>
<tr>
<td></td>
<td>▪ Default setting: Point</td>
</tr>
</tbody>
</table>

### 15.2.13 Copyrights

**Path:** Settings ► General ► Copyrights

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning and function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open source software</td>
<td>Display of the licenses of the software used</td>
</tr>
</tbody>
</table>

### 15.2.14 Service info

**Path:** Settings ► General ► Service info

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning and function</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEIDENHAIN - Customer service</td>
<td>Display of a document containing HEIDENHAIN service addresses</td>
</tr>
<tr>
<td>OEM service info</td>
<td>Display of a document containing service information from the machine manufacturer</td>
</tr>
<tr>
<td></td>
<td>▪ Default: document containing HEIDENHAIN service addresses</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Adding documentation&quot;, Page 113</td>
</tr>
</tbody>
</table>

### 15.2.15 Documentation

**Path:** Settings ► General ► Documentation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning and function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Instructions</td>
<td>Display of the operating instructions stored on the product</td>
</tr>
<tr>
<td></td>
<td>▪ Default: no document; the document in the desired language can be added</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Documentation&quot;, Page 278</td>
</tr>
</tbody>
</table>
15.3 **Sensors**

This chapter describes settings for configuring the sensors.

15.3.1 **Touch probe**

Path:  Settings ► Sensors ► Touch probe

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Touch probe                             | Selection of the edge finder  
  Settings:  
  ▪ NONE  
  ▪ KT 130  
  ▪ Default value: NONE |
| Always use touch probe for probing      | Definition whether the edge finder should always be used for probing  
  ▪ Setting range: ON or OFF  
  ▪ Default value: OFF |
| Length                                  | Length offset of the edge finder  
  ▪ Setting range: ≥ 0.0001  
  ▪ Default value: 0.0000 |
| Diameter                                | Diameter of the edge finder  
  ▪ Setting range: ≥ 0.0001  
  ▪ Default value for selection of KT 130: 6.0000 |
15.4 Interfaces

This chapter describes settings for configuring networks, network drives, and USB mass storage devices.

15.4.1 Network

Path:  Settings ► Interfaces ► Network ► X116

Contact your network administrator for the correct network settings for configuring the product.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAC address</td>
<td>Unique hardware address of the network adapter</td>
</tr>
<tr>
<td>DHCP</td>
<td>Dynamically assigned network address of the product</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Simplified</td>
<td>Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Default value</td>
<td><strong>ON</strong></td>
</tr>
<tr>
<td>IPv4 address</td>
<td>Network address consisting of four octets</td>
</tr>
<tr>
<td></td>
<td>The network address is automatically assigned if DHCP is active, or it can be entered manually</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting range</td>
<td><strong>0.0.0.1 ... 255.255.255.255</strong></td>
</tr>
<tr>
<td>IPv4 subnet mask</td>
<td>Identifier within the network, consisting of four octets</td>
</tr>
<tr>
<td></td>
<td>The subnet mask is automatically assigned if DHCP is active, or it can be entered manually.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting range</td>
<td><strong>0.0.0.0 ... 255.255.255.255</strong></td>
</tr>
<tr>
<td>IPv4 standard gateway</td>
<td>Network address of the router connecting a network</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting range</td>
<td><strong>0.0.0.1 ... 255.255.255.255</strong></td>
</tr>
<tr>
<td>IPv6 SLAAC</td>
<td>Network address with extended namespace</td>
</tr>
<tr>
<td></td>
<td>Only required if supported in the network</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Settings</td>
<td><strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Default value</td>
<td><strong>OFF</strong></td>
</tr>
<tr>
<td>IPv6 address</td>
<td>Automatically assigned if IPv6 SLAAC is active</td>
</tr>
<tr>
<td>IPv6 subnet prefix length</td>
<td>Subnet prefix in IPv6 networks</td>
</tr>
<tr>
<td>IPv6 standard gateway</td>
<td>Network address of the router connecting a network</td>
</tr>
<tr>
<td>Preferred DNS server</td>
<td>Primary server for mapping the IP address</td>
</tr>
<tr>
<td>Alternative DNS server</td>
<td>Optional server for mapping the IP address</td>
</tr>
</tbody>
</table>
15.4.2 Network drive

Path:  Settings ► Interfaces ► Network drive

Contact your network administrator for the correct network settings for configuring the product.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Folder name displayed in the file management</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Share</strong> (cannot be changed)</td>
</tr>
<tr>
<td>Server IP address or host name</td>
<td>Name or network address of the server</td>
</tr>
<tr>
<td>Shared folder</td>
<td>Name of the shared folder</td>
</tr>
<tr>
<td>User name</td>
<td>Name of the authorized user</td>
</tr>
<tr>
<td>Password</td>
<td>Password of the authorized user</td>
</tr>
<tr>
<td>Show password</td>
<td>Display of the password in plain text</td>
</tr>
<tr>
<td></td>
<td>Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>OFF</strong></td>
</tr>
</tbody>
</table>

**Network drive options**

Configuration of the **Authentication** for encrypting the password in the network.

**Settings:**

- **None**
- **Kerberos V5 authentication**
- **Kerberos V5 authentication and packet signing**
- **NTLM password hashing**
- **NTLM password hashing with signing**
- **NTLMv2 password hashing**
- **NTLMv2 password hashing with signing**

Default value: **None**

Configuration of the **Mount options**

**Settings:**

- Default value: **nounix,noserverino**
15.4.3 USB

Path:  Settings ➤ Interfaces ➤ USB

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatically detect attached USB mass storage devices</td>
<td>Automatic recognition of a USB mass storage device</td>
</tr>
<tr>
<td></td>
<td>Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>ON</strong></td>
</tr>
</tbody>
</table>

15.4.4 Axes (switching functions)

Path:  Settings ➤ Interfaces ➤ Switching functions ➤ Axes

In the Manual operation and MDI modes of operation, all axes or individual axes can be reset to zero by setting the assigned digital input.

Not all of the described parameters and options may be available, depending on the product version, configuration and the connected encoders.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>General settings</td>
<td>Assignment of the digital input in accordance with the pin layout in order to zero all axes</td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>Not connected</strong></td>
</tr>
<tr>
<td>&lt;Axis name&gt;</td>
<td>Assignment of the digital input in accordance with pin layout in order to set all axes to zero</td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>Not connected</strong></td>
</tr>
</tbody>
</table>

15.4.5 Position-dependent switching functions

Path:  Settings ➤ Interfaces ➤ Position-dependent switching functions ➤ +

The position-dependent switching functions enable you to set logical outputs depending on the position of an axis in a defined reference system. Switching positions and position intervals are available for this.

Not all of the described parameters and options may be available, depending on the product version, configuration and the connected encoders.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the switching function</td>
</tr>
<tr>
<td>Switching function</td>
<td>Selecting whether the switching function should be activated or deactivated</td>
</tr>
<tr>
<td></td>
<td>Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>ON</strong></td>
</tr>
<tr>
<td>Parameter</td>
<td>Explanation</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Reference system</td>
<td>Selecting the desired reference system</td>
</tr>
<tr>
<td></td>
<td>- Machine coordinate system</td>
</tr>
<tr>
<td></td>
<td>- Preset</td>
</tr>
<tr>
<td></td>
<td>- Target position</td>
</tr>
<tr>
<td></td>
<td>- Tool tip</td>
</tr>
<tr>
<td>Axis</td>
<td>Selecting the desired axis</td>
</tr>
<tr>
<td>Switching point</td>
<td>Selecting the axis position of the trigger point</td>
</tr>
<tr>
<td></td>
<td>Default setting: <strong>0.0000</strong></td>
</tr>
<tr>
<td>Type of switching</td>
<td>Selecting the desired type of switching</td>
</tr>
<tr>
<td></td>
<td>- Edge from LOW to HIGH</td>
</tr>
<tr>
<td></td>
<td>- Edge from HIGH to LOW</td>
</tr>
<tr>
<td></td>
<td>- Interval from LOW to HIGH</td>
</tr>
<tr>
<td></td>
<td>- Interval from HIGH to LOW</td>
</tr>
<tr>
<td></td>
<td>- Default setting: Edge from LOW to HIGH</td>
</tr>
<tr>
<td>Output</td>
<td>Selecting the desired output</td>
</tr>
<tr>
<td></td>
<td>- X105.13 ... X105.16 (Dout 0, Dout 2, Dout 4, Dout 6)</td>
</tr>
<tr>
<td></td>
<td>- X105.32 ... X105.35 (Dout 1, Dout 3, Dout 5, Dout 7)</td>
</tr>
<tr>
<td></td>
<td>- X113.04 (Dout 0)</td>
</tr>
<tr>
<td>Pulse</td>
<td>Selecting whether the pulse should be activated or deactivated</td>
</tr>
<tr>
<td></td>
<td>- Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>- Default setting: <strong>ON</strong></td>
</tr>
<tr>
<td>Pulse time</td>
<td>Selecting the desired pulse length</td>
</tr>
<tr>
<td></td>
<td>- <strong>0.1 s ... 999 s</strong></td>
</tr>
<tr>
<td></td>
<td>- Default setting: <strong>0.0 s</strong></td>
</tr>
<tr>
<td>Lower limit</td>
<td>Selecting the lower limit of the axis position at which switching is to occur (only with Interval type of switching)</td>
</tr>
<tr>
<td>Upper limit</td>
<td>Selecting the upper limit of the axis position at which switching is to occur (only Interval type of switching)</td>
</tr>
<tr>
<td>Remove the entry</td>
<td>Removing the position-dependent switching function</td>
</tr>
</tbody>
</table>
15.5 User

This chapter describes settings for configuring users and user groups.

15.5.1 OEM

Path:  Settings ► User ► OEM

The OEM (Original Equipment Manufacturer) user has the highest level of permissions. This user is allowed to configure the product’s hardware (e.g. connection of encoders and sensors). He can create Setup and Operator-type users, and configure the Setup and Operator users. The OEM user cannot be duplicated or deleted. This user cannot be logged in automatically.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
<th>Edit permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>■ Default value: OEM</td>
<td></td>
</tr>
<tr>
<td>First name</td>
<td>First name of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>■ Default value: –</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td>Department of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>■ Default value: –</td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>Group of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>■ Default value: oem</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>Password of the user</td>
<td>OEM</td>
</tr>
<tr>
<td></td>
<td>■ Default value: oem</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>Language of the user</td>
<td>OEM</td>
</tr>
<tr>
<td>Auto login</td>
<td>On restart of the product: Automatic login of the last logged-in user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>■ Default value: OFF</td>
<td></td>
</tr>
<tr>
<td>Remove user account</td>
<td>Removal of the user account</td>
<td>–</td>
</tr>
</tbody>
</table>
### 15.5.2 Setup

Path: Settings ► User ► Setup

The Setup user configures the product for use at the place of operation. This user can create Operator-type users. The Setup user cannot be duplicated or deleted. This user cannot be logged in automatically.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
<th>Edit permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Default value: Setup</td>
<td></td>
</tr>
<tr>
<td>First name</td>
<td>First name of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Default value: –</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td>Department of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Default value: –</td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>Group of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Default value: setup</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>Password of the user</td>
<td>Setup, OEM</td>
</tr>
<tr>
<td></td>
<td>Default value: setup</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>Language of the user</td>
<td>Setup, OEM</td>
</tr>
<tr>
<td>Auto login</td>
<td>On restart of the product: Automatic login of the last logged-in user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Default value: OFF</td>
<td></td>
</tr>
<tr>
<td>Remove user account</td>
<td>Removal of the user account</td>
<td>–</td>
</tr>
</tbody>
</table>
### 15.5.3 Operator

**Path:** Settings ► User ► Operator

The Operator user is permitted to use the basic functions of the product. An Operator-type user cannot create additional users, but is allowed to edit various operator-specific settings, such as his name or the language. A user of the Operator group can be logged in automatically as soon as the product is switched on.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
<th>Edit permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name of the user</td>
<td>Operator, Setup, OEM</td>
</tr>
<tr>
<td></td>
<td>Default value: Operator</td>
<td></td>
</tr>
<tr>
<td>First name</td>
<td>First name of the user</td>
<td>Operator, Setup, OEM</td>
</tr>
<tr>
<td>Department</td>
<td>Department of the user</td>
<td>Operator, Setup, OEM</td>
</tr>
<tr>
<td></td>
<td>Default value: –</td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>Group of the user</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Default value: operator</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>Password of the user</td>
<td>Operator, Setup, OEM</td>
</tr>
<tr>
<td></td>
<td>Default value: operator</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>Language of the user</td>
<td>Operator, Setup, OEM</td>
</tr>
<tr>
<td>Auto login</td>
<td>On restart of the product: Automatic login of the last logged-in user</td>
<td>Operator, Setup, OEM</td>
</tr>
<tr>
<td></td>
<td>Settings: ON or OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default value: OFF</td>
<td></td>
</tr>
<tr>
<td>Remove user account</td>
<td>Removal of the user account</td>
<td>Setup, OEM</td>
</tr>
</tbody>
</table>

### 15.5.4 Adding a User

**Path:** Settings ► User ► +

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Adds a new user of the type Operator</td>
</tr>
</tbody>
</table>

**Further information:** "Entering and configuring users", Page 134

It is not possible to add further OEM and Setup-type users.
15.6 Axes

This chapter describes settings for configuring the axes and assigned devices.

Not all of the described parameters and options may be available, depending on the product version, configuration and the connected encoders.

15.6.1 Fundamentals of axis configuration

In order to use functions such as the execution of blocks, the configuration of the axes must comply with the requirements of the respective application.

Reference system on milling machines

When machining a workpiece on a milling machine, the right-hand rule helps you to remember the three axis directions: the middle finger points in the positive direction of the tool axis from the workpiece toward the tool (the Z axis), the thumb points in the positive X direction, and the index finger in the positive Y direction.

Figure 62: Assignment of the rectangular coordinate system to the machine axes
### 15.6.2 Reference marks

**Path:** Settings ▶ Axes ▶ General settings ▶ Reference marks

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **Reference mark search after unit start** | Setting for the reference mark search after unit start  
Settings:  
- **ON:** The reference mark search must be performed after startup  
- **OFF:** No prompt for a mandatory reference mark search is displayed after startup of the product  
- Default value: **ON** |
| **All users can cancel reference mark search** | Specifies whether the reference mark search can be canceled by all user types  
Settings  
- **ON:** The reference mark search can be canceled by users of any type  
- **OFF:** The reference mark search can only be canceled by users of the **OEM** or **Setup** type  
- Default value: **OFF** |
| **Reference mark search** | Start starts the reference mark search and opens the workspace |
| **Reference mark search status** | Indicates whether the reference mark search was successful  
Display:  
- **Successful**  
- **Unsuccessful** |
| **Stop of reference mark search** | Indicates whether the reference mark search was canceled  
Display:  
- **Yes**  
- **No** |
15.6.3 Information

Path:  Settings ► Axes ► General settings ► Information

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment of the encoder inputs to the axes</td>
<td>Shows the assignment of the encoder inputs to the axes</td>
</tr>
<tr>
<td>Assignment of the analog outputs to the axes</td>
<td>Shows the assignment of the analog outputs to the axes</td>
</tr>
<tr>
<td>Assignment of the analog inputs to the axes</td>
<td>Shows the assignment of the analog inputs to the axes</td>
</tr>
<tr>
<td>Assignment of the digital outputs to the axes</td>
<td>Shows the assignment of the digital outputs to the axes</td>
</tr>
<tr>
<td>Assignment of the digital inputs to the axes</td>
<td>Shows the assignment of the digital inputs to the axes</td>
</tr>
</tbody>
</table>

With the Reset buttons, the assignments for the inputs and outputs can be reset.

15.6.4 Switching functions

Path:  Settings ► Axes ► General settings ► Switching functions

The switching functions must not be used as a part of a safety function.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td>Assignment of the digital input for the respective switching function</td>
</tr>
<tr>
<td></td>
<td>according to the pin layout</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Inputs (Switching functions)&quot;, Page 254</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Assignment of the digital output for the respective switching function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>according to the pin layout</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Outputs (Switching functions)&quot;, Page 254</td>
</tr>
</tbody>
</table>
15.6.5 Inputs (Switching functions)

The switching functions are available only for units with ID number 1089179-xx.

The switching functions must not be used as a part of a safety function.

Path: Settings ▶ Axes ▶ General settings ▶ Switching functions ▶ Inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control voltage on</td>
<td>Assignment of the digital input for querying the external control voltage (e.g. for the machine to be controlled)</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Emergency stop active</td>
<td>Assignment of the digital input for querying whether an externally connected emergency stop switch was activated</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Not connected</strong></td>
</tr>
</tbody>
</table>

15.6.6 Outputs (Switching functions)

The switching functions are available only for units with ID number 1089179-xx.

The switching functions must not be used as a part of a safety function.

Path: Settings ▶ Axes ▶ General settings ▶ Switching functions ▶ Outputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coolant</td>
<td>Assignment of the digital output for activating or deactivating the coolant supply of the machine tool</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Operational readiness</td>
<td>Assignment of the relay output set if an error (e.g. positioning error or standstill error) occurs on an axis. The error results in interruption of the axis control and power disconnection of the configured analog outputs of the axis.</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>User-defined switching function</td>
<td>Assignment of the relay output that activates for some seconds after shutdown of the product. The relay is connected to a circuit with self-retaining function that disconnects the product and machine tool from power if this signal is applied. The circuit can couple the switch-on/off of the product to the switch-on/off of the machine tool to be controlled.</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Not connected</strong></td>
</tr>
</tbody>
</table>
### 15.6.7 Adding M functions

**Path:** Settings ► Axes ► General settings ► M functions ► +

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **Name**   | Entry of the name for the new M function  
  - Setting range: **M100 ... M120**  
  For the configuration, see "Configuring M functions", Page 255 |

### 15.6.8 Configuring M functions

**Path:** Settings ► Axes ► General settings ► M functions ► **M100 ... M120**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **Name**   | Entry of the name for the M function  
  - Setting range: **M100 ... M120** |
| **Digital output** | Assignment of the digital output for the M function according to pin layout  
  - Default value: **Not connected** |
| **Remove** | Removal of the selected M function |
15.6.9  <Axis name> (settings of the axis)

Path:  Settings ► Axes ► <Axis name>

In order to use functions such as the execution of blocks, the configuration of the axes must comply with the requirements of the respective application.

Further information: “Fundamentals of axis configuration”, Page 251

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axis name</td>
<td>Selection of the axis name displayed in the position preview</td>
</tr>
<tr>
<td></td>
<td><em>XYZ</em></td>
</tr>
<tr>
<td></td>
<td>The axis name <em>S</em> is displayed in the selection list once you have selected <em>Spindle</em> or <em>Gear spindle</em> under Axis type.</td>
</tr>
<tr>
<td>Axis type</td>
<td>Definition of the axis type</td>
</tr>
<tr>
<td>Settings:</td>
<td></td>
</tr>
<tr>
<td>Not defined</td>
<td></td>
</tr>
<tr>
<td>Linear axis</td>
<td></td>
</tr>
<tr>
<td>Spindle</td>
<td></td>
</tr>
<tr>
<td>Gear spindle</td>
<td></td>
</tr>
<tr>
<td>Default value: Linear axis</td>
<td></td>
</tr>
<tr>
<td>Encoder</td>
<td>Configuration of the connected encoder</td>
</tr>
<tr>
<td>Further information: Encoder</td>
<td>‘Encoder’, Page 257</td>
</tr>
<tr>
<td>Error compensation</td>
<td>Configuration of the linear error compensation <em>LEC</em> or segmented linear error compensation <em>SLEC</em></td>
</tr>
<tr>
<td>Further information: LEC</td>
<td>‘Linear error compensation (LEC)’, Page 261</td>
</tr>
<tr>
<td>Further information: SLEC</td>
<td>‘Segmented linear error compensation (SLEC)’, Page 262</td>
</tr>
<tr>
<td>Positioning window</td>
<td>Input of the scaling factor for the positioning aid in MDI mode</td>
</tr>
<tr>
<td>Setting range:</td>
<td>0.020 mm ... 2.000 mm</td>
</tr>
<tr>
<td>Default value:</td>
<td>0.100</td>
</tr>
<tr>
<td>Minimum dwell time in manual</td>
<td>The entered required amount of time the axis to be in the positioning window so that the block will be completed</td>
</tr>
<tr>
<td>positioning window</td>
<td>Setting range: 0 ms to 10000 ms</td>
</tr>
<tr>
<td>Default value:</td>
<td>0 ms</td>
</tr>
</tbody>
</table>
### 15.6.10 Encoder

Path: **Settings ► Axes ► <Axis name> ► Encoder**

**Settings for encoders with interfaces of the EnDat 2.2 type**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder input</td>
<td>Assignment of the encoder input to the axis of the product</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>▪ Not connected</td>
</tr>
<tr>
<td></td>
<td>▪ X1</td>
</tr>
<tr>
<td></td>
<td>▪ X2</td>
</tr>
<tr>
<td></td>
<td>▪ X3</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Device overview&quot;, Page 47</td>
</tr>
<tr>
<td>Interface</td>
<td>Automatically detected <strong>EnDat</strong> interface type</td>
</tr>
<tr>
<td>ID label</td>
<td>Information about the encoder that was read out from the electronic ID label</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Results of encoder diagnostics</td>
</tr>
<tr>
<td>Encoder model</td>
<td>Connected encoder model</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>▪ <strong>Linear encoder:</strong> Linear axis</td>
</tr>
<tr>
<td></td>
<td>▪ <strong>Angle encoder:</strong> Rotary axis</td>
</tr>
<tr>
<td></td>
<td>▪ <strong>Angle encoder as linear encoder:</strong> Rotary axis is displayed as linear axis</td>
</tr>
<tr>
<td></td>
<td>▪ Default value: Depending on the connected encoder</td>
</tr>
<tr>
<td>Mechanical ratio</td>
<td>For display of a rotary axis as a linear axis:</td>
</tr>
<tr>
<td></td>
<td>traverse path in mm per revolution</td>
</tr>
<tr>
<td></td>
<td>▪ Setting range: <strong>0.1 mm ... 1000 mm</strong></td>
</tr>
<tr>
<td></td>
<td>▪ Default value: <strong>1.0</strong></td>
</tr>
<tr>
<td>Reference point displacement</td>
<td>Configuration of the offset between the reference mark and the zero point</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Reference point displacement&quot;, Page 261</td>
</tr>
</tbody>
</table>

**Settings for encoders with interfaces of the type 1 V<sub>PP</sub> or 11 μA<sub>PP</sub>**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder input</td>
<td>Assignment of the encoder input to the axis of the product</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>▪ Not connected</td>
</tr>
<tr>
<td></td>
<td>▪ X1</td>
</tr>
<tr>
<td></td>
<td>▪ X2</td>
</tr>
<tr>
<td></td>
<td>▪ X3</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Device overview&quot;, Page 47</td>
</tr>
</tbody>
</table>
### Parameter | Explanation
--- | ---
Incremental signal | Signal of the connected encoder
Settings:
- **1 Vpp**: Sinusoidal voltage signal
- **11 µApp**: Sinusoidal current signal
- Default value: **1 Vpp**

Encoder model | Connected encoder model
Settings:
- **Linear encoder**: Linear axis
- **Angle encoder**: Rotary axis
- **Angle encoder as linear encoder**: Rotary axis is displayed as linear axis
- Default value: Depending on the connected encoder

Signal period | For linear encoders
Length of a signal period
Settings:
- Setting range: **0.001 µm ... 1000000.000 µm**
- Default value: **20.000**

Line count | For angle encoders and for display of a rotary axis as a linear axis.
Number of lines
Settings:
- Setting range: **1 ... 1000000**
- Default value: **1000**

Teach sequence | Starts the teach sequence for determining the **Line count** for an angle encoder based on a specified angle of rotation.

Display mode | For angle encoders and for the display of a rotary axis as a linear axis.
Settings:
- **-∞ ... ∞**
- **0° ... 360°**
- **-180° ... 180°**
- Default value: **-∞ ... ∞**

Mechanical ratio | For display of a rotary axis as a linear axis:
traverse path in mm per revolution
Settings:
- Setting range: **0.1 mm ... 1000 mm**
- Default value: **1.0**

Reference marks | Configuration of the **Reference marks**
**Further information**: "Reference marks (Encoder)", Page 259

Analog filter frequency | Frequency value of the analog low-pass filter
Settings:
- **33 kHz**: Suppression of interference frequencies above 33 kHz
- **400 kHz**: Suppression of interference frequencies above 400 kHz
- Default value: **400 kHz**
### Parameter | Explanation
--- | ---
Terminating resistor | Dummy load to avoid reflections
- Settings: **ON** or **OFF**
- Default value: **ON**

Error monitor | Monitoring of signal errors
- Settings:
  - **Off**: Error monitoring not active
  - **Amplitude**: Error monitoring of the signal amplitude
  - **Frequency**: Error monitoring of the signal frequency
  - **Frequency & amplitude**: Error monitoring of both signal amplitude and signal frequency
- Default value: **Frequency & amplitude**

> A warning or error message is displayed if one of the limit values for error monitoring is exceeded.

The limit values depend on the signal of the connected encoder:
- **Signal: 1 Vpp, setting: Amplitude**
  - Warning with voltage ≤ 0.45 V
  - Error message with voltage ≤ 0.18 V or ≥ 1.34 V
- **Signal: 1 Vpp, setting: Frequency**
  - Error message with frequency ≥ 400 kHz
- **Signal: 11 µApp, setting: Amplitude**
  - Warning with current ≤ 5.76 µA
  - Error message with current ≤ 2.32 µA or ≥ 17.27 µA
- **Signal: 11 µApp, setting: Frequency**
  - Error message with frequency ≥ 150 kHz

### Counting direction
Signal detection during axis movement
- Settings:
  - **Positive**: The direction of traverse corresponds to the counting direction of the encoder
  - **Negative**: The direction of traverse does not correspond to the counting direction of the encoder
- Default value: **Positive**

### 15.6.11 Reference marks (Encoder)

**Path:** Settings ➤ Axes ➤ <Axis name> ➤ Encoder ➤ Reference marks

> The reference mark search does not need to be performed for serial encoders with EnDat interface, because the axes are automatically homed.
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference mark</td>
<td>Definition of the type of reference mark</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td><strong>None</strong>: There is no reference mark</td>
</tr>
<tr>
<td></td>
<td><strong>One</strong>: The encoder has one reference mark</td>
</tr>
<tr>
<td></td>
<td><strong>Coded</strong>: The encoder has distance-coded reference marks</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>One</strong></td>
</tr>
<tr>
<td>Maximum traverse path</td>
<td>For linear encoders with coded reference marks:</td>
</tr>
<tr>
<td></td>
<td>maximum traverse path for determining the absolute position</td>
</tr>
<tr>
<td></td>
<td>Setting range: <strong>0.1 mm ... 10000.0 mm</strong></td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>20.0</strong></td>
</tr>
<tr>
<td>Nominal increment</td>
<td>For angle encoders with coded reference marks:</td>
</tr>
<tr>
<td></td>
<td>maximum nominal increment for determining the absolute position</td>
</tr>
<tr>
<td></td>
<td>Setting range: <strong>&gt; 0° ... 360°</strong></td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>10.0</strong></td>
</tr>
<tr>
<td>Interpolation</td>
<td>For encoders with TTL interface:</td>
</tr>
<tr>
<td></td>
<td>Interpolation value of the encoders and integrated interpolation</td>
</tr>
<tr>
<td></td>
<td>for the evaluation of the coded reference marks.</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td><strong>None</strong></td>
</tr>
<tr>
<td></td>
<td><strong>2-fold</strong></td>
</tr>
<tr>
<td></td>
<td><strong>5-fold</strong></td>
</tr>
<tr>
<td></td>
<td><strong>10-fold</strong></td>
</tr>
<tr>
<td></td>
<td><strong>20-fold</strong></td>
</tr>
<tr>
<td></td>
<td><strong>50-fold</strong></td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>None</strong></td>
</tr>
<tr>
<td>Inversion of reference mark</td>
<td>Specifies whether the reference mark pulses are evaluated in inverted form</td>
</tr>
<tr>
<td>pulses</td>
<td>Settings</td>
</tr>
<tr>
<td></td>
<td><strong>ON</strong>: Reference pulses are evaluated in inverted form</td>
</tr>
<tr>
<td></td>
<td><strong>OFF</strong>: Reference pulses are not evaluated in inverted form</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>OFF</strong></td>
</tr>
<tr>
<td>Reference point displacement</td>
<td>Configuration of the offset between the reference mark and the zero point</td>
</tr>
<tr>
<td></td>
<td><strong>Further information</strong>: &quot;Reference point displacement&quot;, Page 261</td>
</tr>
</tbody>
</table>
15.6.12 Reference point displacement

Path:  Settings ► Axes ► <Axis name> ► Encoder ► Reference marks ► Reference point displacement

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference point displacement</td>
<td>Activation of offset calculation between reference mark and datum of the machine</td>
</tr>
<tr>
<td></td>
<td>Setting range: ON or OFF</td>
</tr>
<tr>
<td></td>
<td>Default value: OFF</td>
</tr>
<tr>
<td>Reference point displacement</td>
<td>Manual input of the offset (in mm or degrees according to the selected encoder type) between reference mark and datum</td>
</tr>
<tr>
<td></td>
<td>Default value: 0.00000</td>
</tr>
<tr>
<td>Current position for reference point shift</td>
<td>Apply applies the current position as an offset (in mm or degrees, depending on the selected encoder model) between the reference marks and zero point</td>
</tr>
</tbody>
</table>

15.6.13 Linear error compensation (LEC)

Path:  Settings ► Axes ► <Axis name> ► Error compensation ► Linear error compensation (LEC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation</td>
<td>Mechanical influences on the axes of the machine are compensated</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>ON: Compensation is active</td>
</tr>
<tr>
<td></td>
<td>OFF: Compensation is not active</td>
</tr>
<tr>
<td></td>
<td>Default value: OFF</td>
</tr>
</tbody>
</table>

If Compensation is active, the Nominal length and Actual length cannot be edited or generated.

| Nominal length | Input field for the length of the calibration standard according to the manufacturer’s specifications |
| | Input: Millimeters or degrees (depending on the encoder) |

| Actual length | Input field for entering the measured length (actual distance traversed) |
| | Input: millimeters or degrees (depending on the encoder) |
15.6.14 Segmented linear error compensation (SLEC)

Path: Settings ► Axes ► <Axis name> ► Error compensation ► Segmented linear error compensation (SLEC)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation</td>
<td>Mechanical influences on the axes of the machine are compensated</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>- <strong>ON</strong>: Compensation is active</td>
</tr>
<tr>
<td></td>
<td>- <strong>OFF</strong>: Compensation is not active</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>OFF</strong></td>
</tr>
</tbody>
</table>

When **Compensation** is active, then the **Table of supporting points** cannot be edited or created.

<table>
<thead>
<tr>
<th>Table of supporting points</th>
<th>Opens the table of supporting points for manual editing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create table of supporting points</td>
<td>Opens the menu for creating a new <strong>Table of supporting points</strong></td>
</tr>
</tbody>
</table>

Further information: “Create table of supporting points”, Page 262

15.6.15 Create table of supporting points

Path: Settings ► Axes ► <Axis name> ► Error compensation ► Segmented linear error compensation (SLEC) ► Create table of supporting points

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of supporting points</td>
<td>Number of supporting points on the mechanical axis of the machine</td>
</tr>
<tr>
<td></td>
<td>Setting range: 2 ... 200</td>
</tr>
<tr>
<td></td>
<td>Default value: 2</td>
</tr>
<tr>
<td>Spacing of the supporting points</td>
<td>Spacing of the supporting points on the mechanical axis of the machine</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>100.00000</strong></td>
</tr>
<tr>
<td>Start point</td>
<td>The start point defines the position starting from which the compensation is applied to the axis</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>0.00000</strong></td>
</tr>
<tr>
<td>Create</td>
<td>Creates a new table of supporting points based on the entries</td>
</tr>
</tbody>
</table>
15.6.16 Spindle axis S

The switching functions are available only for units with ID number 1089179-xx.

Path: Settings ► Axes ► Spindle axis S

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Axis name  | Definition of the axis name displayed in the position preview  
  Settings:  
  - Not defined  
  - S  
  - Default setting: S |
| Axis type  | Definition of the axis type  
  Settings:  
  - Not defined  
  - Linear axis  
  - Spindle  
  - Gear spindle  
  - Default setting: Spindle |
| Outputs    | Configuration of the Outputs for the spindle  
  Further information: *Outputs (S)*, Page 264 |
| Inputs     | Configuration of the Inputs for the spindle  
  Further information: *Inputs (S)*, Page 265 |
| Gear stages| Configuration of the Gear stages for the Gear spindle  
  Further information: *Gear stages*, Page 266 |
| Gear stage selection through an external signal | Selection of the Gear stages of the Gear spindle via external signals  
  Settings:  
  - ON: Selection of the Gear stages is performed via external signals  
  - OFF: Selection of the Gear stages is performed manually in the operating modes  
  - Default value: OFF |
| Start-up time for upper spindle speed range | Definition of the required Start-up time until $S_{\text{max}}$ is reached  
  Setting range: 50 ms ... 10000 ms  
  Default value: 500 |
| Start-up time for lower spindle speed range | Definition of the required Start-up time until $S_{\text{max}}$ is reached  
  Setting range: 50 ms ... 10000 ms  
  Default value: 500 |
| Break point of characteristic curve for start-up times | Setting of the spindle speed that marks the transition from the upper to the lower spindle speed range  
  Setting range: 0 rpm ... 2000 rpm  
  Default value: 1500 |
### Parameters | Explanation

**Minimum spindle speed**
- Definition of the minimum spindle speed
- Setting range: 0 rpm ... 500 rpm
- Default value: 50

**Maximum spindle speed for oriented spindle stop**
- Definition of the maximum spindle speed for oriented spindle stop
- Setting range: 0 rpm ... 500 rpm
- Default value: 30

**Maximum spindle speed for thread cutting**
- Definition of the maximum spindle speed for thread cutting
- Setting range: 100 rpm ... 2000 rpm
- Default value: 1000

### 15.6.17 Outputs (S)

The switching functions are available only for units with ID number 1089179-xx.

Path:  Settings ► Axes ► S ► Outputs

### Parameters | Explanation

**Analog output**
- Assignment of the analog output according to pin layout
- Default value: Not connected

**Analog output is inverted**
- If this function is active, the analog signal is inverted at the output
- Default value: not active

**Smax**
- Definition of the Spindle speed attained with $U_{max}$
- Setting range: 100 rpm ... 10000 rpm
- Default value: 2000

The Maximum machine speed cannot be exceeded, even if you have defined a higher feed rate for individual axes.

**Umax**
- Maximum voltage that is output at the analog output in order to attain $S_{max}$
- Setting range: 1000 mV ... 10000 mV
- Default value: 9000

**Enable spindle CW**
- Assignment of the digital output for the clockwise spindle enable according to pin layout
- Default value: Not connected

**Enable spindle CCW**
- Assignment of the digital output for the counterclockwise spindle enable according to pin layout
- Default value: Not connected
## Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable digital movement commands</td>
<td>Use of the digital movement commands</td>
</tr>
<tr>
<td></td>
<td>- Settings: <strong>ON</strong> or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>OFF</strong></td>
</tr>
<tr>
<td>Spindle start</td>
<td>Assignment of the digital input for the spindle start according to pin layout</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Spindle stop</td>
<td>Assignment of the digital input for the spindle stop according to pin layout</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Digital enable inputs</td>
<td>Configuration of the digital inputs for the spindle enable</td>
</tr>
<tr>
<td>Spindle ready</td>
<td>Assignment of a digital input; indicates that the spindle is in reliable condition</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Spindle interrupt</td>
<td>Assignment of a digital input; in active state it immediately disconnects from power the configured analog output of the spindle. A spindle movement is stopped without a ramp, axes with automatic traverse are stopped if applicable and spindle activation is prevented.</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Spindle protection device</td>
<td>Assignment of a digital input; indicates whether an existing spindle protection device is open or closed. This signal influences error messages and program run.</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Spindle sleeve final position +</td>
<td>Assignment of a digital input for the upper limit switch of the sleeves. The input is used for reversing the spindle with thread cutting.</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Spindle sleeve final position -</td>
<td>Assignment of a digital input for the lower limit switch of the sleeves. The input is used for reversing the spindle with thread cutting.</td>
</tr>
<tr>
<td></td>
<td>- Default value: <strong>Not connected</strong></td>
</tr>
</tbody>
</table>
### Spindle position
Assignment of a digital input; the signal positions the spindle at low speed during stopping to a desired position
- Default value: **Not connected**

### 15.6.19 Adding Gear stages

**Path:** Settings ➤ Axes ➤ S ➤ Gear stages ➤ +

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Adding a new gear stage with default name</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> ‘Gear stages’, Page 266</td>
</tr>
</tbody>
</table>

### 15.6.20 Gear stages

**Path:** Settings ➤ Axes ➤ S ➤ Gear stages

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Entry of the name for the gear stage</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Stage [n]</strong></td>
</tr>
<tr>
<td>Gear stage is active</td>
<td>Assignment of the digital input for selection of the gear stage via an external signal</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>Not connected</strong></td>
</tr>
<tr>
<td>Smax</td>
<td>Definition of the <strong>Spindle speed</strong> attained with <strong>Umax</strong></td>
</tr>
<tr>
<td></td>
<td>Setting range: 100 rpm ... 10000 rpm</td>
</tr>
<tr>
<td></td>
<td>Default value: 2000</td>
</tr>
<tr>
<td>Start-up time for upper spindle speed range</td>
<td>Definition of the required <strong>Start-up time</strong> until Smax is reached</td>
</tr>
<tr>
<td></td>
<td>Setting range: 50 ms ... 10000 ms</td>
</tr>
<tr>
<td></td>
<td>Default value: 500</td>
</tr>
<tr>
<td>Start-up time for lower spindle speed range</td>
<td>Definition of the required <strong>Start-up time</strong> until Smax is reached</td>
</tr>
<tr>
<td></td>
<td>Setting range: 50 ms ... 10000 ms</td>
</tr>
<tr>
<td></td>
<td>Default value: 500</td>
</tr>
<tr>
<td>Break point of characteristic curve for start-up times</td>
<td>Setting of the spindle speed that marks the transition from the upper to the lower spindle speed range</td>
</tr>
<tr>
<td></td>
<td>Setting range: 0 rpm ... 2000 rpm</td>
</tr>
<tr>
<td></td>
<td>Default value: 1500</td>
</tr>
<tr>
<td>Minimum spindle speed</td>
<td>Definition of the minimum spindle speed</td>
</tr>
<tr>
<td></td>
<td>Setting range: 0 rpm ... 500 rpm</td>
</tr>
<tr>
<td></td>
<td>Default value: 50</td>
</tr>
<tr>
<td>Remove</td>
<td>Removal of the selected gear stage</td>
</tr>
</tbody>
</table>


15.7 Service

This chapter describes settings for product configuration, for maintaining the firmware and for enabling software options.

This chapter describes the settings for the product configuration and for the maintenance of the firmware.

15.7.1 Firmware information

Path: Settings ► Service ► Firmware information

The following information on the individual software modules is displayed for service and maintenance.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core version</td>
<td>Version number of the microkernel</td>
</tr>
<tr>
<td>Microblaze bootloader version</td>
<td>Version number of the Microblaze bootloader</td>
</tr>
<tr>
<td>Microblaze firmware version</td>
<td>Version number of the Microblaze firmware</td>
</tr>
<tr>
<td>Extension PCB bootloader version</td>
<td>Version number of the bootloader (expansion board)</td>
</tr>
<tr>
<td>Extension PCB firmware version</td>
<td>Version number of the firmware (expansion board)</td>
</tr>
<tr>
<td>Boot ID</td>
<td>ID number of the boot process</td>
</tr>
<tr>
<td>HW Revision</td>
<td>Revision number of the hardware</td>
</tr>
<tr>
<td>C Library Version</td>
<td>Version number of the C library</td>
</tr>
<tr>
<td>Compiler Version</td>
<td>Version number of the compiler</td>
</tr>
<tr>
<td>Touchscreen Controller version</td>
<td>Version number of the touchscreen controller</td>
</tr>
<tr>
<td>Number of unit starts</td>
<td>Number of times the product was switched on</td>
</tr>
<tr>
<td>Qt build system</td>
<td>Version number of the Qt compilation software</td>
</tr>
<tr>
<td>Qt runtime libraries</td>
<td>Version number of the Qt runtime libraries</td>
</tr>
<tr>
<td>Kernel</td>
<td>Version number of the Linux kernel</td>
</tr>
<tr>
<td>Login status</td>
<td>Information on the logged-in user</td>
</tr>
<tr>
<td>SystemInterface</td>
<td>Version number of the system interface module</td>
</tr>
<tr>
<td>BackendInterface</td>
<td>Version number of the backend interface module</td>
</tr>
<tr>
<td>GuiInterface</td>
<td>Version number of the user interface module</td>
</tr>
<tr>
<td>TextDataBank</td>
<td>Version number of the text database module</td>
</tr>
<tr>
<td>Optical edge detection</td>
<td>Version number of the optical edge detection module</td>
</tr>
<tr>
<td>NetworkInterface</td>
<td>Version number of the network interface module</td>
</tr>
<tr>
<td>OSInterface</td>
<td>Version number of the operating system interface module</td>
</tr>
<tr>
<td>PrinterInterface</td>
<td>Version number of the printer interface module</td>
</tr>
<tr>
<td>system.xml</td>
<td>Version number of the system parameters</td>
</tr>
<tr>
<td>axes.xml</td>
<td>Version number of the axis parameters</td>
</tr>
<tr>
<td>encoders.xml</td>
<td>Version number of the encoder parameters</td>
</tr>
<tr>
<td>ncParam.xml</td>
<td>Version number of the NC parameters</td>
</tr>
<tr>
<td>spindle.xml</td>
<td>Version number of the spindle axis parameters</td>
</tr>
</tbody>
</table>
### Parameter Explanation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>io.xml</td>
<td>Version number of the parameters for inputs and outputs</td>
</tr>
<tr>
<td>mFunctions.xml</td>
<td>Version number of the M function parameters</td>
</tr>
<tr>
<td>peripherals.xml</td>
<td>Version number of the parameters for peripherals</td>
</tr>
<tr>
<td>slec.xml</td>
<td>Version number of the parameters for segmented linear error compensation (SLEC)</td>
</tr>
<tr>
<td>lec.xml</td>
<td>Version number of the parameters for linear error compensation (LEC)</td>
</tr>
<tr>
<td>microBlazePVRegister.xml</td>
<td>Version number of the “Processor Version Register” of MicroBlaze</td>
</tr>
<tr>
<td>info.xml</td>
<td>Version number of the information parameters</td>
</tr>
<tr>
<td>audio.xml</td>
<td>Version number of the audio parameters</td>
</tr>
<tr>
<td>network.xml</td>
<td>Version number of the network parameters</td>
</tr>
<tr>
<td>os.xml</td>
<td>Version number of the operating system parameters</td>
</tr>
<tr>
<td>runtime.xml</td>
<td>Version number of the runtime parameters</td>
</tr>
<tr>
<td>users.xml</td>
<td>Version number of the user parameters</td>
</tr>
<tr>
<td>GI Patch Level</td>
<td>Patch level of the golden image (GI)</td>
</tr>
</tbody>
</table>

### 15.7.2 Back up and restore

**Path:** Settings ➤ Service ➤ Back up and restore

The unit's settings or user files can be backed up as a file so that they are available after a reset to the factory default settings has been performed or for installation on multiple units.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restore settings</td>
<td>Restoring of the backed up settings</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Restore settings&quot;, Page 284</td>
</tr>
<tr>
<td>Back up settings</td>
<td>Backing up of settings of the product</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Back up settings&quot;, Page 126</td>
</tr>
<tr>
<td>Restore user files</td>
<td>Restoring of user files of the product</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Restore user files&quot;, Page 285</td>
</tr>
<tr>
<td>Back up user files</td>
<td>Backing up of user files of the product</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Back up user files&quot;, Page 127</td>
</tr>
</tbody>
</table>
15.7.3 Firmware update

Path: Settings ► Service ► Firmware update

The firmware is the operating system of the product. You can import new versions of the firmware via the product’s USB port or the network connection.

Prior to the firmware update, you must comply with the release notes for the respective software version and the information they contain regarding reverse compatibility.

In order to be on the safe side, the current settings must be backed up if the unit’s firmware is going to be updated.

Further information: “Updating the firmware”, Page 282

15.7.4 Reset

Path: Settings ► Service ► Reset

If necessary, you can reset the unit’s settings to the factory default settings or to the condition at delivery. Software options are deactivated and subsequently need to be reactivated with the available license key.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset all settings</td>
<td>The settings are reset to factory default settings</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> “Reset all settings”, Page 286</td>
</tr>
<tr>
<td>Reset to shipping conditions</td>
<td>Resetting of the settings to the factory default setting and deletion of the user files from the unit’s memory area</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> “Reset to shipping conditions”, Page 286</td>
</tr>
</tbody>
</table>
## 15.7.5 OEM area

Path: **Settings ► Service ► OEM area**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation</td>
<td>Addition of OEM documentation, e.g. service information</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> 'Adding documentation', Page 113</td>
</tr>
<tr>
<td>Startup screen</td>
<td>Changing the startup screen (e.g., with one’s own company logo)</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> 'Startup screen', Page 270</td>
</tr>
<tr>
<td>OEM bar</td>
<td>Customization of the OEM bar with specific functions</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> 'OEM bar', Page 271</td>
</tr>
<tr>
<td>Settings</td>
<td>Adaptation of the application mode, override display, keyboard design, and program execution. Management of texts and messages.</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> 'Settings (OEM area)', Page 275</td>
</tr>
<tr>
<td>Back up and restore</td>
<td>Backing up and restoring the settings of the OEM area</td>
</tr>
<tr>
<td>Remote access for screenshots</td>
<td>Permitting a network connection with the ScreenshotClient program so that ScreenshotClient can take screenshots of the unit from a computer</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>- <strong>ON:</strong> Remote access is possible</td>
</tr>
<tr>
<td></td>
<td>- <strong>OFF:</strong> Remote access is not possible</td>
</tr>
<tr>
<td></td>
<td>Default value: <strong>OFF</strong></td>
</tr>
</tbody>
</table>

When the unit is shut down, **Remote access for screenshots** is automatically deactivated.

## 15.7.6 Startup screen

Path: **Settings ► Service ► OEM area ► Startup screen**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add startup screen</td>
<td>Selecting the image file that is to be displayed as opening screen (file type: PNG or JPG)</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> 'Adding a startup screen', Page 114</td>
</tr>
<tr>
<td>Delete startup screen</td>
<td><strong>Delete</strong> clears the user-defined opening screen and restores the default view</td>
</tr>
</tbody>
</table>


15.7.7 OEM bar

Path: Settings ► Service ► OEM area ► OEM bar

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show bar</td>
<td>Display of the OEM bar</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>▪ ON: The OEM bar is displayed on the user interface of the respective operating modes</td>
</tr>
<tr>
<td></td>
<td>▪ OFF: The OEM bar is not displayed</td>
</tr>
<tr>
<td></td>
<td>Default value: OFF</td>
</tr>
</tbody>
</table>

Bar items

Configuration of the Bar items on the OEM bar

Further information: "Adding OEM-Bar items", Page 271

15.7.8 Adding OEM-Bar items

Path: Settings ► Service ► OEM area ► OEM bar ► Bar items ► +

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the bar item on the OEM bar</td>
</tr>
<tr>
<td>Type</td>
<td>Selecting the new bar item on the OEM bar</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>▪ Empty</td>
</tr>
<tr>
<td></td>
<td>▪ Logo</td>
</tr>
<tr>
<td></td>
<td>▪ Spindle speed</td>
</tr>
<tr>
<td></td>
<td>▪ M function</td>
</tr>
<tr>
<td></td>
<td>▪ Special functions</td>
</tr>
<tr>
<td></td>
<td>▪ Document</td>
</tr>
<tr>
<td></td>
<td>Default value: Empty</td>
</tr>
</tbody>
</table>

Parameters

The available parameters depend on the type of bar item selected:

▪ Logo:
  Further information: "OEM bar item: Logo", Page 272

▪ Spindle speed:
  Further information: "OEM bar item: Spindle speed", Page 272

▪ M functions:
  Further information: "OEM bar item: M function", Page 273

▪ Special functions:
  Further information: "OEM bar item: Special functions", Page 274

▪ Document:
  Further information: "OEM bar item: Document", Page 274

Remove bar entry

Removing the bar item from the OEM bar
15.7.9 OEM bar item: Logo

Path: Settings ► Service ► OEM area ► OEM bar ► Bar items ► Logo

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the bar item on the OEM bar</td>
</tr>
<tr>
<td>Type</td>
<td>Logo</td>
</tr>
<tr>
<td>Select logo</td>
<td>Selecting the desired image for the depiction</td>
</tr>
<tr>
<td>Link to documentation</td>
<td>Using a logo for calling linked documentation</td>
</tr>
<tr>
<td></td>
<td>Settings:</td>
</tr>
<tr>
<td></td>
<td>▪ None</td>
</tr>
<tr>
<td></td>
<td>▪ Operating Instructions</td>
</tr>
<tr>
<td></td>
<td>▪ OEM service info</td>
</tr>
<tr>
<td>Default value:</td>
<td>None</td>
</tr>
<tr>
<td>Upload image file</td>
<td>Copies a selected image file to the storage location /Oem/Images</td>
</tr>
<tr>
<td></td>
<td>▪ File format: PNG, JPG, PPM, BMP, or SVG</td>
</tr>
<tr>
<td></td>
<td>▪ Image size: max. 140 x 70 px</td>
</tr>
<tr>
<td>Remove bar entry</td>
<td>Removing the bar item from the OEM bar</td>
</tr>
</tbody>
</table>

15.7.10 OEM bar item: Spindle speed

Path: Settings ► Service ► OEM area ► OEM bar ► Bar items ► Spindle speed

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the bar item on the OEM bar</td>
</tr>
<tr>
<td>Type</td>
<td>Spindle speed</td>
</tr>
<tr>
<td>Spindle</td>
<td>S</td>
</tr>
<tr>
<td>Spindle speed</td>
<td>Setting the spindle speed</td>
</tr>
<tr>
<td></td>
<td>▪ Setting range: depends on the configuration of the spindle axis S</td>
</tr>
<tr>
<td></td>
<td>▪ Default value: 0</td>
</tr>
<tr>
<td>Remove bar entry</td>
<td>Removing the bar item from the OEM bar</td>
</tr>
</tbody>
</table>
### 15.7.11 OEM bar item: M function

Path:  
Settings ► Service ► OEM area ► OEM bar ► Bar items ► M function

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the bar item on the OEM bar</td>
</tr>
<tr>
<td>Type</td>
<td>M function</td>
</tr>
<tr>
<td>Number of the M function</td>
<td>Selection of the desired M function</td>
</tr>
<tr>
<td></td>
<td>Setting ranges</td>
</tr>
<tr>
<td></td>
<td>├ 100.T … 120.T (TOGGLE: switches between the states when tapped)</td>
</tr>
<tr>
<td></td>
<td>├ 100.P … 120.P (PULSE: The length can be set in Pulse time)</td>
</tr>
<tr>
<td></td>
<td>├ Default value: Empty</td>
</tr>
<tr>
<td>Pulse time</td>
<td>Selecting the length of the high-active pulse</td>
</tr>
<tr>
<td></td>
<td>Setting range</td>
</tr>
<tr>
<td></td>
<td>├ 8 ms ... 1500 ms</td>
</tr>
<tr>
<td></td>
<td>├ Default value: 500 ms</td>
</tr>
<tr>
<td>Restart</td>
<td>Restarting the pulse duration</td>
</tr>
<tr>
<td></td>
<td>├ Settings: <strong>ON</strong>  or <strong>OFF</strong></td>
</tr>
<tr>
<td></td>
<td>├ Default value: <strong>OFF</strong></td>
</tr>
<tr>
<td>Select image for active function</td>
<td>Selecting the desired image for depicting the active function</td>
</tr>
<tr>
<td>Select image for inactive function</td>
<td>Selecting the desired image for depicting the inactive function</td>
</tr>
<tr>
<td>Upload image file</td>
<td>Copies a selected image file to the storage location <strong>/Oem/Images</strong></td>
</tr>
<tr>
<td></td>
<td>├ File format: PNG, JPG, PPM, BMP, or SVG</td>
</tr>
<tr>
<td></td>
<td>├ Image size: Max. 100 x 70 px</td>
</tr>
<tr>
<td>Remove bar entry</td>
<td>Removing the bar item from the <strong>OEM bar</strong></td>
</tr>
</tbody>
</table>
### 15.7.12 OEM bar item: Special functions

**Path:** Settings ▶ Service ▶ OEM area ▶ OEM bar ▶ Bar items ▶ Special functions

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the bar item on the OEM bar</td>
</tr>
<tr>
<td>Type</td>
<td>Special functions</td>
</tr>
<tr>
<td>Function</td>
<td>Selection of the desired special function</td>
</tr>
<tr>
<td>Settings:</td>
<td></td>
</tr>
<tr>
<td>✷ Thread cutting</td>
<td></td>
</tr>
<tr>
<td>✷ Spindle direction</td>
<td></td>
</tr>
<tr>
<td>✷ Coolant</td>
<td></td>
</tr>
<tr>
<td>✷ Coolant during spindle operation</td>
<td></td>
</tr>
<tr>
<td>✷ Zero the tool axis</td>
<td></td>
</tr>
<tr>
<td>Default value: Thread cutting</td>
<td></td>
</tr>
<tr>
<td>Spindle</td>
<td>Only with Spindle direction function:</td>
</tr>
<tr>
<td>Select image for clockwise spindle direction</td>
<td>Selecting the desired image for clockwise spindle rotation</td>
</tr>
<tr>
<td>Select image for counterclockwise spindle direction</td>
<td>Selecting the desired image for counterclockwise spindle rotation</td>
</tr>
<tr>
<td>Select image for active function</td>
<td>Selecting the desired image for depicting the active function</td>
</tr>
<tr>
<td>Select image for inactive function</td>
<td>Selecting the desired image for depicting the inactive function</td>
</tr>
<tr>
<td>Upload image file</td>
<td>Copies a selected image file to the storage location /Oem/ Images</td>
</tr>
<tr>
<td>✷ File format: PNG, JPG, PPM, BMP, or SVG</td>
<td></td>
</tr>
<tr>
<td>✷ Image size: Max. 100 x 70 px</td>
<td></td>
</tr>
<tr>
<td>Remove bar entry</td>
<td>Removing the bar item from the OEM bar</td>
</tr>
</tbody>
</table>

### 15.7.13 OEM bar item: Document

**Path:** Settings ▶ Service ▶ OEM area ▶ OEM bar ▶ Bar items ▶ Document

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the bar item on the OEM bar</td>
</tr>
<tr>
<td>Type</td>
<td>Document</td>
</tr>
<tr>
<td>Select a document</td>
<td>Selecting the desired document</td>
</tr>
<tr>
<td>Select image for display</td>
<td>Selecting the desired image for depicting the function</td>
</tr>
<tr>
<td>Upload image file</td>
<td>Copies a selected image file to the storage location /Oem/ Images</td>
</tr>
<tr>
<td>Remove bar entry</td>
<td>Removing the bar item from the OEM bar</td>
</tr>
</tbody>
</table>
### 15.7.14 Settings (OEM area)

**Path:** Settings ► Service ► OEM area ► Settings

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>The type of application mode; a change becomes active after a restart&lt;br&gt;Settings:&lt;br&gt;  - Milling&lt;br&gt;  - Turning&lt;br&gt;  - Radial drilling (software option)&lt;br&gt;Default value: Milling</td>
</tr>
<tr>
<td>Override display</td>
<td>Type of override display in Manual mode and MDI&lt;br&gt;Settings:&lt;br&gt;  - Percent: The override is displayed as a percentage of the set maximum feed rate&lt;br&gt;  - Value: Override is displayed in mm/min&lt;br&gt;Default value: Percent</td>
</tr>
<tr>
<td>Keyboard theme</td>
<td>Selection of the keyboard layout&lt;br&gt;Settings:&lt;br&gt;  - Standard: Confirm the input with (Return)&lt;br&gt;  - TNC: entry confirmed with (Enter)&lt;br&gt;Default value: Standard</td>
</tr>
<tr>
<td>Program run</td>
<td>Modifying of the program execution&lt;br&gt;&lt;strong&gt;Further information:&lt;/strong&gt; &quot;Program execution&quot;, Page 275</td>
</tr>
<tr>
<td>Text database</td>
<td>Text database with message texts that are used for OEM-specific messages&lt;br&gt;&lt;strong&gt;Further information:&lt;/strong&gt; &quot;Text database&quot;, Page 276</td>
</tr>
<tr>
<td>Messages</td>
<td>Definition of OEM-specific messages&lt;br&gt;&lt;strong&gt;Further information:&lt;/strong&gt; &quot;Messages&quot;, Page 277</td>
</tr>
</tbody>
</table>

### 15.7.15 Program execution

**Path:** Settings ► Service ► OEM area ► Settings ► Program run

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic advance on reaching upper spindle sleeve final position</td>
<td>Automatic advance when executing hole patterns always occurs when the upper spindle sleeve limit switch is reached&lt;br&gt;Settings: ON or OFF&lt;br&gt;Default value: OFF</td>
</tr>
<tr>
<td>M functions</td>
<td>For the configuration, see &quot;Configuring M functions&quot;, Page 276</td>
</tr>
</tbody>
</table>
### 15.7.16 Configuring M functions

Path: **Settings ★ Service ★ OEM area ★ Settings ★ Program run ★ M functions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of the M function</td>
<td>Enter the number of the new M function</td>
</tr>
<tr>
<td></td>
<td>Setting range: <strong>M2.0 ... M120.0</strong> (0: The output assigned to the M function is switched to inactive)</td>
</tr>
<tr>
<td></td>
<td>Setting range: <strong>M2.1 ... M120.1</strong> (1: The output assigned to the M function is switched to active)</td>
</tr>
<tr>
<td></td>
<td>Setting range: <strong>M2.2 ... M120.2</strong> (2: The output assigned to the M function generates a high active pulse of 8 ms)</td>
</tr>
<tr>
<td>Select image for dialog during program run</td>
<td>Select the desired image for display during program run</td>
</tr>
<tr>
<td>Upload image file</td>
<td>Copies a selected image file to the storage location /Oem/Images</td>
</tr>
<tr>
<td></td>
<td>File format: PNG, JPG, PPM, BMP, or SVG</td>
</tr>
<tr>
<td></td>
<td>Image size: Max. 100 x 70 px</td>
</tr>
<tr>
<td>Remove the entry</td>
<td>Remove the entry</td>
</tr>
</tbody>
</table>

### 15.7.17 Text database

Path: **Settings ★ Service ★ OEM area ★ Settings ★ Text database**

The device features the option of importing your own text database. The **Messages** parameter allows you to show various messages.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select text database</td>
<td>Selecting an XML type text database stored in the device</td>
</tr>
<tr>
<td></td>
<td><strong>Further information:</strong> &quot;Creating a Text database&quot;, Page 121</td>
</tr>
<tr>
<td>Deselect text database</td>
<td>Deselecting the currently selected text database</td>
</tr>
</tbody>
</table>
### 15.7.18 Messages

Path:  
Settings ► Service ► OEM area ► Settings ► Messages

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Description of the message</td>
</tr>
<tr>
<td>Text ID or text</td>
<td>Selecting the message to be displayed. You can enter a text ID and use it to select an existing message text from your text database. As an alternative, you can directly enter a new message text.</td>
</tr>
</tbody>
</table>

*If you change the language of your product’s user interface, the translated message texts from the text database are used. Message texts you have directly entered are shown untranslated.*

**Further information:** “Text database”, Page 276

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message type</td>
<td>Selecting the desired type of message</td>
</tr>
<tr>
<td></td>
<td><strong>Settings:</strong></td>
</tr>
<tr>
<td></td>
<td>▪ <strong>Standard</strong>: The message is displayed as long as the input is active</td>
</tr>
<tr>
<td></td>
<td>▪ <strong>Acknowledgment by user</strong>: The message is displayed until the user acknowledges it</td>
</tr>
<tr>
<td></td>
<td>▪ Default value: <strong>Standard</strong></td>
</tr>
<tr>
<td>Input</td>
<td>Assignment of the digital input in accordance with pin layout in order to show the message</td>
</tr>
<tr>
<td></td>
<td>▪ Default value: <strong>Not connected</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove the entry</td>
<td>Removing the message entry</td>
</tr>
</tbody>
</table>

### 15.7.19 Back up and restore (OEM area)

Path:  
Settings ► Service ► OEM area ► Back up and restore

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Back-up OEM-specific folders and files | Backing up the settings of the OEM area as a ZIP file  
**Further information:** "Back-up OEM-specific folders and files", Page 124 |
| Restore OEM specific folders and files | Restoring the settings of the OEM area as a ZIP file  
**Further information:** "Restore OEM specific folders and files", Page 124 |
15.7.20 Documentation

Path:  Settings ► Service ► Documentation

The product provides the possibility to upload the corresponding Operating Instructions in the desired language. The Operating Instructions can be copied from the supplied USB mass storage device to the product. The latest version can be downloaded from the download area at www.heidenhain.de.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add Operating Instructions</td>
<td>Adding the Operating Instructions in the desired language</td>
</tr>
</tbody>
</table>

15.7.21 Software options

Path:  Settings ► Service ► Software options

Software options need to be enabled on the product via a license key. Before you can use the associated hardware components, you need to enable the respective software option. Further information: "Activating the Software options", Page 96

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>Overview of all software options that are active on the product</td>
</tr>
</tbody>
</table>
| Request options            | Creation of a license key request that can be submitted to a HEIDENHAIN service agency  
Further information: "Requesting license key", Page 96 |
| Request trial options      | Creation of a license key request that can be submitted to a HEIDENHAIN service agency  
Further information: "Requesting license key", Page 96 |
| Activate options           | Activation of the software options via license key or license file  
Further information: "Activating a license key", Page 97 |
| Reset trial options        | Reset of the trial options by entering a license key               |
16
Servicing and maintenance
16.1 Overview

This chapter describes the general maintenance work on the product.

The following steps must be performed only by qualified personnel.

Further information: “Personnel qualification”, Page 29

Further information: This chapter contains a description of maintenance work for the product only. Any maintenance work on peripheral devices is not described in this chapter.

Further information: Manufacturer’s documentation for the respective peripheral devices

16.2 Cleaning

NOTICE

Cleaning with sharp-edged objects or aggressive cleaning agents

Improper cleaning will cause damage to the product.

▶ Never use abrasive or aggressive cleaners, and never use strong detergents or solvents
▶ Do not use sharp-edged objects to remove persistent contamination

Cleaning the housing

▶ Use only a cloth dampened with water and a mild detergent for cleaning the exterior surfaces

Cleaning the screen

Activate cleaning mode to clean the display. This switches the unit to an inactive state without interrupting the power supply. The screen is switched off in this state.

▶ Tap Switch-off in the main menu to activate the cleaning mode
▶ Tap Cleaning mode
▶ The screen switches off
▶ Use a lint-free cloth and a commercially available glass cleaner to clean the screen
▶ To deactivate the cleaning mode, tap anywhere on the touchscreen
▶ An arrow appears at the bottom of the screen
▶ Drag the arrow up
▶ The screen is switched on and shows the user interface last displayed
16.3 Maintenance plan

The product is largely maintenance-free.

**NOTICE**

Operating defective devices
Operating defective devices may result in serious consequential damage.
» Do not repair or operate the device if it is damaged
» Replace defective devices immediately or contact a HEIDENHAIN service agency

The following steps are only to be performed by electrical specialists.

**Further information:** "Personnel qualification", Page 29

<table>
<thead>
<tr>
<th>Maintenance step</th>
<th>Interval</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ All labels and symbols provided on the product</td>
<td>Annually</td>
<td>▶ Contact HEIDENHAIN service agency</td>
</tr>
<tr>
<td>must be checked for readability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Inspect electrical connections for damage</td>
<td>Annually</td>
<td>▶ Replace defective cables. Contact HEIDENHAIN service</td>
</tr>
<tr>
<td>and check their function</td>
<td></td>
<td>agency if required</td>
</tr>
<tr>
<td>▶ Check power cables for faulty insulation and</td>
<td>Annually</td>
<td>▶ Replace power cables according to the specification</td>
</tr>
<tr>
<td>weak points</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16.4 Resuming operation

When operation is resumed, e.g. when the product is reinstalled after repair or when it is remounted, the same measures and personnel requirements apply as for mounting and installing the product.

**Further information:** "Mounting", Page 39
**Further information:** "Installation", Page 45

When connecting the peripheral devices (e.g. encoders), the operating company must ensure safe resumption of operation and assign authorized and appropriately qualified personnel to the task.

**Further information:** "Obligations of the operating company", Page 29
16.5 Updating the firmware

The firmware is the operating system of the product. You can import new versions of the firmware via the product’s USB port or the network connection.

Prior to the firmware update, you must comply with the release notes for the respective software version and the information they contain regarding reverse compatibility.

In order to be on the safe side, the current settings must be backed up if the unit’s firmware is going to be updated.

Requirement

- The new firmware is available as a *.dro file
- To update the firmware over the USB port, the current firmware must be stored on a USB mass storage device (FAT32 format)
- To update the firmware via the network interface, the current firmware must be available in a folder on the network drive

Starting a firmware update

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - Firmware update
  - Continue
- The service application is launched
Updating the firmware

The firmware can be updated from a USB mass storage device (FAT32 format) or via a network drive.

- Tap **Firmware update**

- Tap **Select**
- If required, connect a USB mass storage device to a USB port of the product
- Navigate to the folder containing the new firmware

If you have accidentally tapped the wrong folder, you can return to the previous folder.
- Tap the file name that is displayed above the list

- Select the firmware
- Tap **Select** to confirm the selection
- The firmware version information is displayed
- Tap **OK** to close the dialog

The firmware update cannot be canceled once the data transfer has started.

- Tap **Start** to start the update
- The screen shows the progress of the update
- Tap **OK** to confirm successful update
- Tap **Finish** to terminate the service application
- The service application is terminated
- The main application is launched
- If automatic user login is active, the user interface is displayed in the Manual operation menu
- If automatic user login is not active, the User login menu is displayed

Safely removing a USB mass storage device

- Tap **File management** in the main menu
- Navigate to the list of storage locations
- Tap **Safely remove**
- The message The storage medium can be removed now. appears
- Disconnect the USB mass storage device
16.6 Restore settings

Backed-up settings can be restored to the product. The current configuration of the product is replaced in the process.

Software options that were active when the settings were backed up must be activated before restoring the settings.

A restore can be necessary in the following cases:

- During commissioning, the settings are set on a product and transferred to all identical products
  Further information: "Steps for commissioning", Page 94
- After a reset, the settings are copied back to the product
  Further information: "Reset all settings", Page 286

- Tap Settings in the main menu
- Open in the sequence
  - Service
  - Back up and restore
  - Restore settings
- Tap Complete restoration
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Navigate to the folder containing the backup file
- Select the backup file
- Tap Select
- Confirm the successful transfer with OK
- The system is shut down
- To restart the product with the transferred configuration data, switch the product off and then back on

Safely removing a USB mass storage device

- Tap File management in the main menu
- Navigate to the list of storage locations
- Tap Safely remove

- The message The storage medium can be removed now. appears
- Disconnect the USB mass storage device
16.7 Restore user files

Backed-up user files of the product can be loaded into the product again. Existing user files will be overwritten. This, together with the restoring of the settings, enables you to restore the complete configuration of a unit.

Further information: “Restore settings”, Page 284

If servicing becomes necessary, a replacement unit can be operated with the configuration of the failed unit after restoring. This requires that the version of the old firmware matches that of the new firmware or that the versions are compatible.

- All files from all user groups that are stored in the respective folders are backed up and can be restored as user files.
- The files in the System folder are not restored.

- Tap Settings in the main menu
- Open in the sequence
  - Tap Service
  - Open in the sequence
    - Back up and restore
    - Restore user files
- Tap Load as ZIP
- If required, connect a USB mass storage device (FAT32 format) to a USB port of the product
- Navigate to the folder containing the backup file
- Select the backup file
- Tap Select
- Confirm the successful transfer with OK
- To restart the product with the transferred user files, switch the product off and then back on

Safely removing a USB mass storage device

- Tap File management in the main menu
- Navigate to the list of storage locations
- Tap Safely remove
  - The message The storage medium can be removed now. appears
  - Disconnect the USB mass storage device
16.8 Reset all settings
You can reset the settings of the product to the factory defaults if required. The
software options are deactivated and must be subsequently reactivated with the
available license key.

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - Reset
  - Reset all settings
- Enter password
- Confirm the entry with RET
- To show the password in plain text, activate Show password
- Tap OK to confirm the action
- Tap OK to confirm the reset
- Tap OK to confirm shutdown of the device
- The product is shut down
- All settings are reset
- To restart the product, switch it off and then back on

16.9 Reset to shipping conditions
You can reset the settings of the product to the factory defaults and delete the
user files from product’s memory area. The software options are deactivated and
must be subsequently reactivated with the available license key.

- Tap Settings in the main menu
- Tap Service
- Open in the sequence
  - Reset
  - Reset to shipping conditions
- Enter password
- Confirm the entry with RET
- To show the password in plain text, activate Show password
- Tap OK to confirm the action
- Tap OK to confirm the reset
- Tap OK to confirm shutdown of the device
- The product is shut down
- All settings are reset and the user files are deleted
- To restart the product, switch it off and then back on
What to do if
17.1 **Overview**
This chapter describes the causes of faults or malfunctions of the product and the appropriate corrective actions.

Make sure that you have read and understood the "Basic operation" chapter before carrying out the actions described below.
Further information: "Basic operation", Page 59

17.2 **System or power failure**
Operating system data can be corrupted in the following cases:
- System or power failure
- Switching off the product without shutting down the operating system
If the firmware is damaged, the product starts a Recovery System that displays short instructions on the screen.
With restoration, the Recovery System overwrites the damaged firmware with a new firmware previously saved to a USB mass storage device. During this procedure the settings of the product are deleted.

17.2.1 **Restoring the firmware**
- On a computer, create the folder "heidenhain" on a USB mass storage device (FAT32 format).
- In the "heidenhain" folder, create the folder "update"
- Copy the new firmware to the "update" folder
- Rename the firmware "recovery.dro"
- Switch off the product
- Connect a USB mass storage device to a USB port of the product
- Switch on the product
  > The product starts the Recovery System
  > The USB mass storage device is detected automatically
  > The firmware is installed automatically
  > After a successful update, the firmware is automatically renamed "recovery.dro.[yyyy.mm.dd.hh.mm]"
- Restart the product on completion of the installation
  > The product starts up with the factory defaults
17.2.2 Restore settings

Reinstalling the firmware resets the product to the factory defaults. This deletes the setting, including the error compensation values and the activated software options.

To restore settings, you must either reconfigure them on the unit yourself or restore previously backed up settings on the unit.

- Activating software options

**Further information:** ‘Activating the Software options’, Page 96
- Restoring settings

**Further information:** ‘Restore settings’, Page 284

17.3 Malfunctions

If faults or malfunctions that are not listed in the ‘Troubleshooting’ table below occur during operation, refer to the machine tool builder’s documentation or contact a HEIDENHAIN service agency.

17.3.1 Troubleshooting

- The following troubleshooting steps must be performed only by the personnel indicated in the table.

**Further information:** “Personnel qualification”, Page 29

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause of fault</th>
<th>Correction of fault</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>The status LED remains dark after switch-on</td>
<td>There is no supply voltage</td>
<td>▶ Check the power cable</td>
<td>Electrical specialist</td>
</tr>
<tr>
<td></td>
<td>The product does not function properly</td>
<td>▶ Contact a HEIDENHAIN service agency</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td>A blue screen appears when the unit starts up</td>
<td>Firmware error during startup</td>
<td>▶ If this fault occurs for the first time, switch the product off and then on again ▶ If the fault recurs, contact a HEIDENHAIN service agency</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td>After startup, the product does not recognize any entries made on the touchscreen</td>
<td>Incorrect hardware initialization</td>
<td>▶ Switch the product off and then on again</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td>Axes do not count despite movement of the encoder</td>
<td>Incorrect connection of the encoder</td>
<td>▶ Correct the connection ▶ Contact the encoder manufacturer’s service agency</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td>Axes are miscounting</td>
<td>Incorrect settings of the encoder</td>
<td>▶ Check the encoder settings Page 103</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td>Fault</td>
<td>Cause of fault</td>
<td>Correction of fault</td>
<td>Personnel</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>----------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Spindle error</td>
<td>Incorrect settings of the spindle axis</td>
<td>▶ Check the settings of the spindle axes</td>
<td>Qualified personnel, possibly OEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Page 263</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External peripherals</td>
<td>▶ Perform systematic error search</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Page 138</td>
<td></td>
</tr>
<tr>
<td>Connection to the network is not possible</td>
<td>Defective connection</td>
<td>▶ Check the cable and the correct connection to X116</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td></td>
<td>Incorrect settings of the network</td>
<td>▶ Check the network settings</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Page 138</td>
<td></td>
</tr>
<tr>
<td>The connected USB mass storage device is not</td>
<td>Defective USB connection</td>
<td>▶ Check the correct position of the USB mass storage device in the port</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td>detected</td>
<td></td>
<td>▶ Use another USB port</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The type or formatting of the USB mass storage</td>
<td>▶ Use another USB mass storage device</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td></td>
<td>device is not supported</td>
<td>▶ Format USB mass storage device with FAT32</td>
<td></td>
</tr>
<tr>
<td>The unit starts in recovery mode (text only mode)</td>
<td>Firmware error during startup</td>
<td>▶ If this fault occurs for the first time, switch the product off and then on again</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ If the fault recurs, contact a HEIDENHAIN service agency</td>
<td></td>
</tr>
<tr>
<td>User login is not possible</td>
<td>Password does not exist</td>
<td>▶ As user with higher permission level, reset the password</td>
<td>Qualified personnel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Page 134</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ To reset the OEM password, contact the HEIDENHAIN service agency</td>
<td></td>
</tr>
</tbody>
</table>
Removal and disposal
18.1 Overview
This chapter contains information and environmental protection specifications that must be observed for correct disassembly and disposal of the device.

18.2 Removal

Removal of the product must be performed only by qualified personnel.
Further information: "Personnel qualification", Page 29

Depending on the connected peripherals, the removal may need to be performed by an electrical specialist. In addition, the same safety precautions that apply to the mounting and installation of the respective components must be taken.

Removing the product
To remove the product, follow the installation and mounting steps in the reverse order.
Further information: "Installation", Page 45
Further information: "Mounting", Page 39

18.3 Disposal

**NOTICE**
Incorrect disposal of the product!
Incorrect disposal of the product can cause environmental damage.

- Do not dispose of electrical waste and electronic components in domestic waste
- The integrated backup battery must be disposed of separately from the product
- Forward the product and the backup battery to recycling in accordance with the applicable local disposal regulations

- If you have any questions about the disposal of the product, please contact a HEIDENHAIN service agency
19.1 Overview
This chapter contains an overview of the product data and drawings with the product dimensions and mating dimensions.

19.2 Product data

<table>
<thead>
<tr>
<th>Device</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Aluminum cast housing</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>200 mm x 169 mm x 41 mm</td>
</tr>
<tr>
<td>For devices with ID 1089179-xx:</td>
<td>200 mm x 169 mm x 47 mm</td>
</tr>
<tr>
<td>Fastener system, mating dimensions</td>
<td>Mounting hole pattern 50 mm x 50 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual display unit</td>
<td>LCD Widescreen (15:9) color screen 17.8 cm (7&quot;) 800 x 480 pixels</td>
</tr>
<tr>
<td>Display step</td>
<td>Selectable, min. 0.00001 mm</td>
</tr>
<tr>
<td>User interface</td>
<td>User interface (GUI) with touchscreen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>AC 100 V ... 240 V (±10 %) 50 Hz ... 60 Hz (±5 %) max. input power 38 W</td>
</tr>
<tr>
<td>Buffer battery</td>
<td>Lithium battery type CR2032; 3.0 V</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
</tr>
<tr>
<td>Number of encoder inputs</td>
<td>3</td>
</tr>
<tr>
<td>Encoder interfaces</td>
<td>1 V_{pp}: max. current 300 mA; max. input frequency 400 kHz 11 \mu A_{pp}: Maximum current 300 mA; maximum input frequency: 150 kHz EnDat 2.2: max. current 300 mA</td>
</tr>
<tr>
<td>Interpolation at 1 V_{pp}</td>
<td>4096-fold</td>
</tr>
<tr>
<td>Touch probe connection</td>
<td>Voltage supply DC 5 V or DC 12 V 5 V or floating switching output Four digital inputs: TTL DC 0 V ... +5 V One digital output TTL DC 0 V ... +5 V Maximum load 1 k \Omega Max. cable length with HEIDENHAIN cable 30 m</td>
</tr>
</tbody>
</table>
### Electrical data

#### Digital inputs
For devices with ID 1089179-xx:

<table>
<thead>
<tr>
<th>Level</th>
<th>Voltage range</th>
<th>Current range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>DC 11 V ... 30 V</td>
<td>2.1 mA ... 6.0 mA</td>
</tr>
<tr>
<td>Low</td>
<td>DC 3 V ... 2.2 V</td>
<td>0.43 mA</td>
</tr>
</tbody>
</table>

#### Digital outputs
For devices with ID 1089179-xx:
Voltage range DC 24 V (20.4 V ... 28.8 V)
Output current max. 150 mA per channel

#### Relay outputs
For devices with ID 1089179-xx:
- Max. switching voltage AC 30 V / DC 30 V
- Max. switching current 0.5 A
- Max. switching capacity 15 W
- Max. continuous current 0.5 A

#### Analog inputs
For devices with ID 1089179-xx:
Voltage range DC 0 V ... +5 V
Resistance $100 \, \Omega \leq R \leq 50 \, k\Omega$

#### Analog outputs
For devices with ID 1089179-xx:
Voltage range DC –10 V ... +10 V
Maximum load 1 kΩ

#### 5 V voltage outputs
For devices with ID 1089179-xx:
Voltage tolerance ±5 %, maximum current 100 mA

#### Data interface
- 1 USB 2.0 Hi-Speed (Type A), maximum current 500 mA
- 1 Ethernet 10/100 Mbit/1 Gbit (RJ45)

### Environment

#### Operating temperature
$0 \, ^\circ C \ldots +45 \, ^\circ C$

#### Storage temperature
$-20 \, ^\circ C \ldots +70 \, ^\circ C$

#### Relative air humidity
10 % ... 80 % RH, non-condensing

#### Altitude
$\leq 2000 \, m$

### General information

#### Directives
- EMC Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- RoHS Directive 2011/65/EU

#### Pollution degree
2

#### Protection EN 60529
- Front panel and side panels: IP 65
- Rear panel: IP 40
**General information**

- Mass
  - 1.3 kg
  - With Single-Pos stand: 1.35 kg
  - With Duo-Pos stand 1.45 kg
  - With Multi-Pos stand: 1.95 kg
  - With Multi-Pos holder: 1.65 kg
  - For devices with ID 1089179-xx:
    - 1.5 kg
    - With Single-Pos stand: 1.55 kg
    - With Duo-Pos stand 1.65 kg
    - With Multi-Pos stand: 2.15 kg
    - With Multi-Pos holder: 1.85 kg

**19.3 Product dimensions and mating dimensions**

All dimensions in the drawings are in millimeters.

![Diagram of product dimensions](image)

Figure 63: Housing dimensions for products with ID 1089178-xx
Specifications | Product dimensions and mating dimensions

Figure 64: Housing dimensions for devices with ID 1089179-xx

Figure 65: Dimensions of the rear panel for devices with ID 1089178-xx
19.3.1 Product dimensions with Single-Pos stand

Figure 66: Dimensions of the rear panel for devices with ID 1089179-xx

Figure 67: Product dimensions with Single-Pos stand
19.3.2 Product dimensions with Duo-Pos stand

![Diagram of product dimensions with Duo-Pos stand]

Figure 68: Product dimensions with Duo-Pos stand

19.3.3 Product dimensions with Multi-Pos stand

![Diagram of product dimensions with Multi-Pos stand]

Figure 69: Product dimensions with Multi-Pos stand
19.3.4 Product dimensions with Multi-Pos holder

![Product dimensions with Multi-Pos holder](image)

Figure 70: Product dimensions with Multi-Pos holder
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<th>Contents</th>
</tr>
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