

# Operating instructions

[incl. installation manual]

Magnet module

EN

**Translation of the original operating instructions**

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# 1 General

## 1.1 Information about this manual

This manual enables you to work safely and efficiently with the product.

This manual is part of the product and must be kept in a location directly beside the product that is accessible to the personnel at all times. The personnel must have read this manual carefully and understood its contents before starting any work. The basic requirement for safe work is compliance with all stipulated safety notices and work-related instructions in this manual.

If the product is passed onto a third party, this manual must accompany it.

Illustrations in this manual are there to facilitate a basic understanding, and may differ from the actual design configuration of the product.



### **WARNING**

#### **Serious injuries caused by individual products or by inappropriate combinations of them!**

- Read and pay attention to all operating instructions for individual products and combinations of them.

## 1.2 Key to symbols

Safety instructions in this manual are designated by symbols. The safety notices are invoked by signal words that express the level of hazard involved.

Always comply with safety notices and exercise caution to avoid accidents, injury to people and damage to materials.

### **Safety notices**



### **DANGER**

... indicates an immediate and hazardous situation that can lead to death or serious injury if not avoided.



### **WARNING**

... indicates a potentially hazardous situation that can lead to death or serious injury if not avoided.



### **CAUTION**

... indicates a potentially hazardous situation that can lead to moderate or slight injuries if not avoided.



### **NOTE**

... indicates a potentially hazardous situation that can lead to damage to materials if not avoided.

### Tips and recommendations



#### INFORMATION

... highlights useful tips and recommendations as well as information for efficient and problem-free operation.



... refers to other documents relating to personal and general safety.

Warning symbols may appear on the product or its components.

Always pay attention to warning symbols, and exercise caution to avoid accidents, injury to people and damage to materials.



... warns of stored energy [for example involving springs].



... warns of hand injuries.



... prohibits persons with pacemakers or implanted defibrillators from handling the product.



... draws attention to the fact that the operating instructions of the product must be read.



### 1.3 Definition of terms

#### 1.3.1 Release setting

Release setting means that the clamping device is released. If the clamping device is released, this also releases the workpiece.

#### 1.3.2 Complete clamping force

Complete clamping force means that the actuating screw has been turned to the stop and thus the full clamping force has been generated.

### 1.4 Limitation of liability

All details and notices in this manual were compiled with due reference to applicable standards and specifications, state-of-the-art technology and our many years of expertise and experience.

The manufacturer accepts no liability for damage arising from any of the following:

- Non-compliance with this manual
- Unintended use
- Use of untrained personnel
- Autonomous conversion work
- Technical modifications
- Use of non-approved spare parts
- Use of non-approved accessories
- Installation and use of clamping elements not made by the manufacturer

Subject to any commitments agreed to in the supplier contract, the General Terms & Conditions of Business and the delivery terms of the manufacturer and all legislative stipulations valid at the time of conclusion of this contract.

### 1.5 Copyright

This manual is protected by copyright, and are only intended for internal use.

The dissemination of this manual to third parties, reproductions in any shape or form - even in part - as well as commercial use and/or communication of their contents are prohibited for anything other than internal use, except with the written consent of the manufacturer.

Infringements oblige the offending party to pay compensation. Without restriction on further claims.

### 1.6 Scope of delivery

The scope of delivery of this product includes:

- Magnet module
- The operating instructions

Additionally needed and included as optional items in the scope of delivery:

- Basic clamping device
- Clamping head
- Actuating key
- Test set

### 1.7 Spare parts and accessories



#### WARNING

**Serious injuries can be caused by incorrect or defective spare parts!**

- Always use genuine spare parts made by the original manufacturer.



#### WARNING

**Serious injuries can be caused by incorrect or defective clamping elements!**

- Always use genuine clamping elements made by the original manufacturer.



#### WARNING

**Serious injuries can be caused by incorrect or defective basic clamping devices!**

- Always use genuine basic clamping devices made by the original manufacturer.



#### NOTE

**Damage, malfunctions or total failure of the product or the machine tool caused by an incorrect or defective spare parts!**

- Always use genuine spare parts made by the original manufacturer.



#### NOTE

**Damage, malfunctions or total failure of the product or the machine tool caused by an incorrect or defective clamping elements!**

- Always use genuine clamping elements made by the original manufacturer.



**NOTE**

**Damage, malfunctions or total failure of the product or the machine tool caused by incorrect or defective basic clamping devices!**

- Always use genuine basic clamping devices made by the original manufacturer.

Spare parts and accessories can be sourced from contract dealers or directly from the manufacturer [see »Contact« chapter].

Without exception, wearing parts and components in contact with the workpiece are not covered by warranty.

### 1.8 Warranty terms

The warranty terms are included in the manufacturer's General Terms & Conditions of Business.

## 2 Safety

This section provides an overview of all the important safety aspects for optimum protection of personnel, and for safe and problem-free operation.

### 2.1 Responsibility of the operator

The product is used in the industrial sector. The operator of the product is therefore governed by the provisions of Health & Safety at Work legislation.

As well as the safety notices in this manual, the area of use of the product must also comply with locally applicable safety, accident prevention and environmental protection specifications as well as those in the manual for the machine tool.

Modifications may only be made to the product if they have been expressly approved by HAINBUCH for autonomous machining. The specified limits must never be exceeded.



#### **DANGER**

**Serious injuries caused by parts being ejected centrifugally if clamping force is insufficient!**

- Regularly perform a magnetic force measurement [see chapter »Checking the magnetic force«].

### 2.2 Personnel requirements



#### **WARNING**

**Serious injuries caused by incorrect handling of the product by insufficiently skilled or trained personnel!**

- All activities must be performed by skilled staff from the relevant specialist field.



#### **WARNING**

**Serious injuries caused by unauthorized presence of unauthorized personnel in the working area!**

- Keep unauthorized people away from the working area.
- If in doubt, speak to people and direct them to leave the working area.
- Interrupt work until unauthorized people have left the working area.



### NOTE

**Serious damage to materials caused by incorrect handling of the product by insufficiently skilled or trained personnel!**

- All activities must be performed by skilled staff from the relevant specialist field.

This manual name the following skills sets required for various different areas of activity:

#### **Skilled specialist**

Skilled specialists, due to their professional training, knowledge and experience and awareness of applicable provisions, are capable of carrying out the work entrusted to them and independently to identify and avoid potential hazards.

#### **Hydraulics specialist**

Hydraulics specialists are trained in the specific task profile for which they are employed, and are familiar with the relevant standards and legislative provisions.

Due to their vocational training and experience, hydraulics specialists can work on hydraulic systems and can independently identify and avoid potential hazards.

#### **Pneumatics specialist**

Pneumatics specialists are trained in the specific task profile for which they are employed, and are familiar with the relevant standards and legislative provisions.

Due to their vocational training and experience, pneumatics specialists can work on pneumatic systems and can independently identify and avoid potential hazards.

#### **Electricians**

Electricians are trained in the specific task profile for which they are employed, and are familiar with the relevant standards and legislative provisions.

Due to their vocational training and experience, electricians can work on electrical systems and can independently identify and avoid potential hazards.

#### **Trainees**

Trainees can only work on the machine under the supervision and direction of staff skilled in the relevant specialist field.

The only people admitted as personnel are those who can reasonably be expected to carry out their work to a reliable standard. People whose response capabilities are impaired, for example by drugs, alcohol or medication, are prohibited.

For the selection of personnel, pay attention to the stipulations applicable at the place of work governing age and specific vocational requirements.

## 2.3 Intended use

The product is only intended for installation in a CE-compliant machine tool with a separating set of guards.

This product is intended for installation in a compatible product with corresponding attachment geometry.

The product is only intended for the type of use described in this manual [see »Use« chapter]. Furthermore, an extended form of use can be agreed contractually between manufacturer and operator.

Only skilled staff from the appropriate specialist fields may install, operate, maintain and clean the product [see »Personnel requirements« chapter].

Never exceed the technical values stipulated for the product [see »General information« and »Operating conditions« chapters].

Furthermore, never exceed the limits for use of the product [see »Limits of use« chapter].

Maintain the product at regular intervals [see »Maintenance schedule« chapter].

When used for its intended purpose, the operational safety of the product is assured, subject to compliance with relevant safety stipulations, to the full extent foreseeable.

Intended use also includes compliance with all stipulations in this manual.

Any form of use beyond the scope of intended use, or other forms of use of the product, is considered as misuse, and can lead to dangerous situations.



## **WARNING**

### **Serious injuries caused by misuse of the product!**

- Only in a CE-compliant machine tool with a separating set of guards.
- Only use with compatible products.
- Only use for the type of use indicated [see »Use« chapter].
- Only skilled staff from the appropriate specialist fields may use the product [see »Personnel requirements« chapter].
- Never exceed the technical data indicated on the product [see »General information« and »Operating conditions« chapters].
- Never exceed the limits for use of the product [see »Limits of use« chapter].
- Maintain the product at regular intervals [see »Maintenance schedule« chapter].
- Only use with approved attachments and/or clamping elements.



## **NOTE**

### **Damage to materials caused by incorrect use of the product!**

- Only in a CE-compliant machine tool with a separating set of guards.
- Only use with compatible products.
- Only use for the type of use indicated [see »Use« chapter].
- Only skilled staff from the appropriate specialist fields may use the product [see »Personnel requirements« chapter].
- Never exceed the technical data indicated on the product [see »General information« and »Operating conditions« chapters].
- Never exceed the limits for use of the product [see »Limits of use« chapter].
- Maintain the product at regular intervals [see »Maintenance schedule« chapter].
- Only use with approved attachments and/or clamping elements.

Claims of all kinds will be rejected that are due to unintended use.

Here are some examples of unintended use of the product

- If workpieces are not clamped properly.

- If people fail to observe the safety stipulations when working on the product, and failing to use additional protective equipment, for example to machine clamped workpieces.
- if the product is used on clamping devices and/or workpieces for which it is not intended.

## 2.4 Personal protective equipment

During work, it is essential to wear personal protective equipment to minimize the health hazards.

Always wear the required personal protective equipment when working on any given job.

Always pay attention to any notices about personal protective equipment displayed in the working area.

### Always wear



#### Workplace clothing

Workplace clothing should be close-fitting, with low tear-resistance, narrow cuffs and no protruding parts. It serves primarily to protect the wearer from coming into contact with moving machine parts. Do not wear rings, chains or other jewelry.



#### Safety footwear

To protect the wearer from any heavy items that may fall, and from losing their footing on slippery ground.



#### Protective goggles

To protect the eyes from projectile parts and liquid splashes.



#### Hair net

To protect long hair from getting snagged in rotating parts on the machine tool.



## Additional personal protective equipment



When carrying out certain work, additional personal protective equipment is required. Separate reference is made to this in the individual chapters of this manual. The following section explains these additional items of personal protective equipment:

### Protective gloves

To protect the hands from friction, chafing, stabbing or deeper injuries and from contact with hot surfaces.

### Hard hat

To protect against falling and projectile parts and materials.

## 2.5 Particular hazards

The following section names residual risks resulting from the installation of the product in a machine tool. In all cases, the residual risks detected during a risk assessment of the machine tool need to be named by the operator.

Pay attention to the safety instructions named here, as well as the warning notices in other chapters of these operating instructions to reduce the risk of health hazards and to prevent dangerous situations.

### Moving parts



#### WARNING

##### **Serious injuries caused by touching rotating and/or moving parts!**

- Do not open guards while the system is operating.
- During operation, do not reach for rotating and/or moving parts.
- Pay attention to the gap dimensions of moving parts.
- Before opening the guards, ensure that none of the parts are moving any more.

### Insufficient workpiece clamping



#### DANGER

##### **Serious injuries caused by parts being ejected centrifugally if level of workpiece clamping is insufficient!**

- Only use workpieces with flat clamping surfaces.
- Only clamp workpieces with good ferromagnetic properties [see chapter »Limits of use«].
- If necessary, secure the workpiece with additional components to prevent it from being ejected.

## Sharp-edged parts



### WARNING

#### Serious cut injuries caused by sharp-edged parts and burrs!

- All installation of individual parts must be performed by skilled staff from the relevant specialist field.
- Also wear the following items of personal protective equipment, in addition to the basic equipment:



## Magnetism



### DANGER

#### Severe injuries due to magnetism!

- Employees with pacemakers or implanted defibrillators must not operate the product.



- The magnetic field may only be generated for clamping the workpiece. Further handling with the product must be carried out in demagnetized condition.
- Never reach between magnet and workpiece.

## Basic clamping device



### WARNING

#### Severe injuries due to unauthorized release of the basic clamping device!

- Release the basic clamping device only for disassembly of the adaptation clamping device.
- Never release the clamping of the basic clamping device to remove the workpiece. To release the workpiece, the adaptation clamping device must be actuated with the actuating key.

## Foot switch



### INFORMATION

Remove wired foot switches from the operator's reach and set them aside according to the cable length.

In case of stationary foot switches in the machine enclosure, cover them against accidental opening by attaching a protective plate.

## 2.6 Other safety instructions



### **DANGER**

**Serious injuries caused by workpieces being ejected centrifugally when clamping unit is released while still rotating!**

- Never release the clamping of the workpiece while it is still rotating.



### **DANGER**

**Serious injuries caused by projectile workpieces!**

- To assist clamping of the workpiece with long clamping devices, always use a tailstock / back rest or a brace.



### **WARNING**

**Serious head injuries caused by bending into the working area of the machine!**

- Only ever bend into the working area of the machine if there are no cutting tools or sharp objects in it, or if these are covered.
- Never move body parts under parts in the working area of the machine with the potential to drop down.



### **WARNING**

**Serious injuries caused by snagging body parts on the rotating machine spindle!**

- Never reach into the product while the machine spindle is still rotating.
- Before working on the product, ensure that the machine spindle is unable to start up.



### **WARNING**

**Serious injuries caused by reaching into slots and bores!**

- Never reach into slots or bores.



### **WARNING**

**Serious injuries caused by workpieces dropping or the clamping unit getting released!**

- Only unclamp the workpiece if it is protected against falling.



## **WARNING**

**Serious injuries caused by the use of damaged products or by their components and accessories!**

- Check products or their components and accessories on a regular basis for visible signs of damage [see »Inspections« and »Cleaning« chapters].
- Use of damaged products, their damaged components and/or their damaged accessories is prohibited.
- Report damage to the operator immediately.
- Damaged components / accessories must be replaced with genuine spare parts / accessories made by the manufacturer.



## **CAUTION**

**Cut injuries caused by sharp edges and burrs resulting from wear and/or repeated rework!**

- Remove sharp edges and burrs.
- If necessary, replace worn components with genuine parts made by the manufacturer.



## **NOTE**

**Serious damage to materials / the machine tool / the product caused by workpieces being ejected centrifugally if clamping is released while they are still rotating!**

- Never release the clamping of the workpiece while it is still rotating.



## **NOTE**

**Damage to materials caused by untightening the wrong screws!**

- Do not open the screws secured with sealing lacquer.

## 2.7 Screws



### **WARNING**

**Serious injuries caused by radially installed screws being ejected centrifugally if installed incorrectly / poor handling!**

- Do not open the screws secured with sealing lacquer.
- Screws and threaded pins fitted radially to the product that were bonded with adhesive need to be secured again using a standard, medium-strength screw adhesive and tightened to the specified tightening torque [see nomenclature or the »Screw tightening torques« chapter]. Before reinstallation, clean and degrease the screw and internal thread.
- Radially mounted screws and threaded pins that were not bonded with sealing lacquer or an adhesive need to be tightened back down to the specified tightening torque [see nomenclature or the »Screw tightening torques« chapter].
- If in doubt, contact the manufacturer immediately to determine how best to proceed.

## 2.8 Functionality



### **WARNING**

**Serious injuries caused by severe contamination of the product!**

- Always comply with the cleaning instructions and intervals [see »Cleaning« chapter].

## 2.9 Environmental protection



### NOTE

**Substantial damage to the environment can result from non-compliant handling or incorrect disposal of environmentally hazardous substances!**

- If environmentally hazardous substances enter the environment accidentally, take immediate remedial action.
- If in doubt, notify the relevant municipal authorities about the incident.

The following environmentally hazardous substances are used:

### **Lubricants, auxiliary materials and operating fluids**

Lubricants such as grease and oil can contain toxic substances. These must not enter the environment.

Dispose of environmentally hazardous substances properly [see »Disposal« chapter].

### 3 Technical data

#### 3.1 General information

Size	Clamping range [mm]	Weight [kg]	Dimensions [ø x length] [mm]	Maximum speed [ $min^{-1}$ ]	Specific holding force $H_{sph}$ [ $\frac{N}{cm^2}$ ]	Minimum axial actuating force of basic clamping device $F_{ax min.}$ [kN]	Balancing quality G in n planes
200	30-200	18.1	Ø 200 x 72	2000	140	10	10/1

Table 1: Technical data

#### 3.1.1 Machining limits

The product may be machined at certain points [see chapter »Commissioning the product«].

The length of the product may be shortened by a maximum of 5 mm.

The center bore may have a maximum diameter of 30 mm.

#### 3.2 Performance values



#### NOTE

**Material damage to the products use and/or to the machine tool caused by exceeding the maximum performance values!**

- Do not exceed the maximum performance values [see »General information« chapter].
- On all products used, do not exceed the lowest of the maximum performance values.
- Only use product in machine tools with the same performance values.



#### INFORMATION

Details of maximum performance values can be found on each product.

If, due to abrasive wear, those performance values are no long legible, refer to the operating instructions.

### 3.3 Balancing quality

The product is balanced before leaving the factory [balancing quality - see »General information« chapter].



#### **DANGER**

**Serious injuries caused by parts being ejected centrifugally if products are not balanced correctly!**

- Do not clamp rotationally symmetrical workpieces, or do so only after contacting the manufacturer.
- Never remove balancing screws and weights attached to the product.



#### **NOTE**

**Material damage caused by machining with incorrectly balanced products!**

- Do not clamp rotationally symmetrical workpieces, or do so only after contacting the manufacturer.
- Never remove balancing screws and weights attached to the product.

### 3.4 Speed

The product is authorized for rotational operation.

The maximum speed is written on the product [maximum speed, see »General information« chapter].



#### **DANGER**

**Serious injuries caused by parts being ejected centrifugally due to a non-compliant combination of several products!**

- From all of the maximum speeds indicated for the combined products, always remain at the lowest of those maximum speeds.



#### **DANGER**

**Serious injuries caused by workpieces being ejected centrifugally after a loss of clamping power!**

- If necessary, adjust the machining forces.



### 3.5 Operating conditions

Indication	Value	Unit
Ambient temperature range	15 - 65	°C
Workpiece temperature	≤ 80	°C
Humidity	≤ 80	%

Table 2: Operating conditions

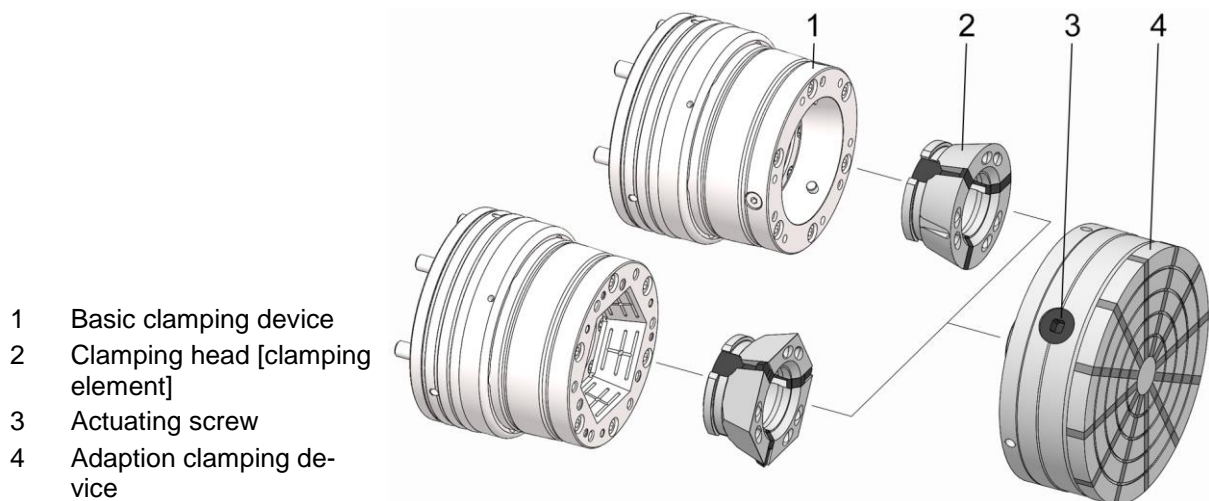
### 3.6 Type designation

The type designation is on the product and it includes the following indications:

- Manufacturer
- Product designation
- ID number [marked with a # symbol]
- Build year
- Maximum speed  $n$  [ $min^{-1}$ ]
- Minimum axial actuating force of basic clamping device  $F_{ax\ min}$  [ $kN$ ]
- Specific holding force  $H_{sph}$  [ $\frac{N}{cm^2}$ ]

## 4 Layout and function

### 4.1 Overview and brief description



The adaption clamping device clamps workpieces via a neodymium magnet.

The adaptation clamping device sits directly on the basic clamping device.

The clamping element suitable for the magnetic module is fitted in the basic clamping device and the magnet module is clamped with it.

The actuating key is used to generate the magnetic field and clamp the workpiece to be machined.

The clamping device is used to clamp the workpiece axially.

### 4.2 Accessories required

#### 4.2.1 Basic clamping device

The basic clamping device supports the adaptation clamping device.

#### 4.2.2 Clamping head

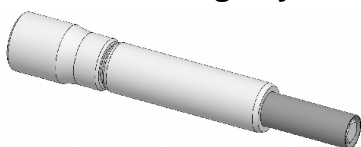
The clamping head is used to hold the adaption clamping device, for which it has a special attachment geometry.

#### 4.2.3 Test set

The test set is used to check the magnetic force.

### 4.3 Special aids

#### 4.3.1 Actuating key



The actuating key is there to actuate the product.

## 5 Use and limits of use

### 5.1 Use

The product is a clamping device that may only be used to clamp a rotationally symmetrical workpiece to enable it to be machined.

The product may only be used in combination with a suitable modular or Axzug basic clamping device from HAINBUCH.

The product may only be mounted in combination with a suitable clamping head with special attachment geometry from HAINBUCH.

As well as for its general field of application, this product was designed and developed for use, when necessary, in a specific and documented application [see clamping situation drawing or order confirmation].

Any other fields of application require the explicit approval of the manufacturer.



#### **DANGER**

**Severe injuries due to ejected workpieces in case of improper use of the product!**

- Only clamp the workpiece centrally.
- Never clamp a workpiece with a large unbalance.
- Never clamp a workpiece with a large projection.
- Only clamp a workpiece with a flat, uniform locating surface.

### 5.2 Limits of use

The clamping force of the magnet module is generated by the magnetic field of permanent magnets. The optimum clamping force is achieved when the magnetic force lines can flow unhindered through the workpiece. The magnet module does not have a form-fitting connection. The clamping is achieved solely by the magnetic holding force in ferromagnetic materials.

Specifically, before using the magnet module, two limits that must be evaluated independently of each other need to be checked.

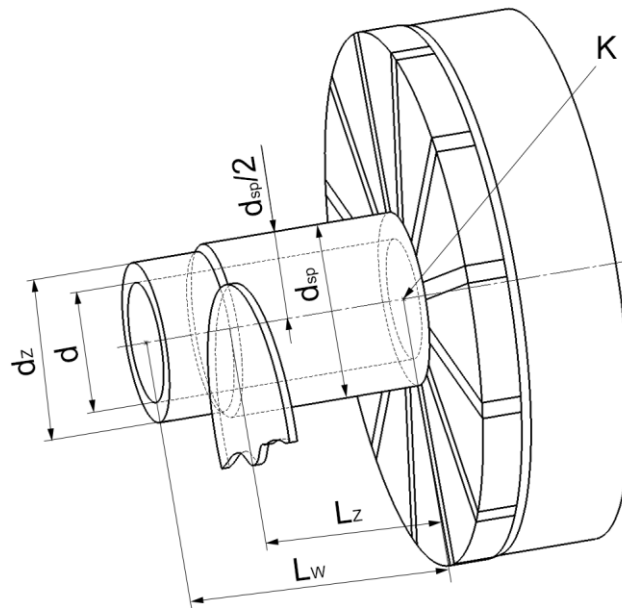
### 5.2.1 Nomenclature

Brief designation	Unit	Explanation
$A_{ab}$	$mm^2$	Contacting workpiece surface
$a_p$	$mm$	Chip-cutting depth of turning operation
$d_{sp}$	$mm$	Outer diameter of the contacting workpiece surface
$d$	$mm$	Inner diameter of the contacting workpiece surface
$d_z$	$mm$	Machining diameter of turning operation
$f$	$mm$	Feed / rotational movement of turning operation
$F_{ab}$	$N$	Pull-off force
$F_c$	$N$	Cutting force of drilling operation
$F_R$	$N$	Tangential test force
$F_{vk}$	$N$	Displacement force
$H_{sph}$	$\frac{N}{mm^2}$	Specific holding force
$K$	-	Tipping point
$k_c$	$\frac{N}{mm^2}$	Specific cutting force
$L_z$	$mm$	Distance between »Machining point - clamping point«
$M_K$	$Nmm$	Tipping torque
$M_{Üv}$	$Nmm$	Available transmissible torque
$M_Z$	$Nmm$	Machining torque
$r$	$mm$	Radial distance
$R$	-	Reducing adapter
$\mu$	-	Friction coefficient
$\vartheta$	-	Safety

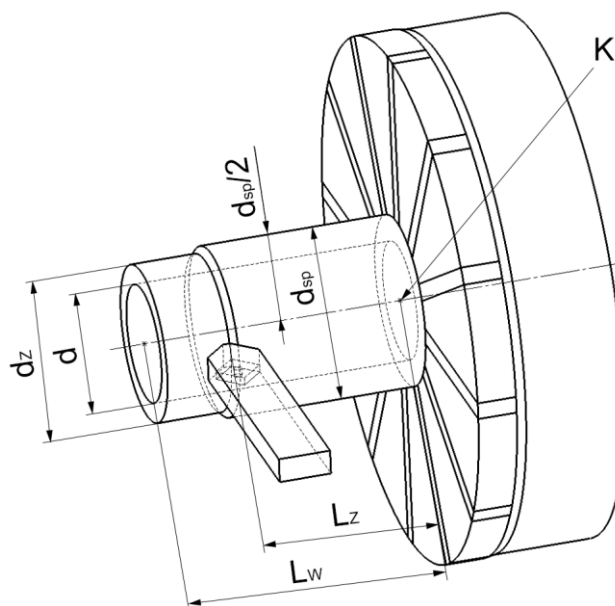
Table 3: Nomenclature limits of use

The following sketches for grinding and turning serve to graphically illustrate the forces and moments used in the following calculation examples:

### Grinding



### Turning



#### 5.2.2 First limit [clamping area]

No clamping force [magnetic force] is built up in the core area of the magnet module. The core area goes from 0 mm to 30 mm. In this area, no workpiece is allowed to be clamped, as the magnetic field is not sufficient here.

If the inner diameter of the workpiece is smaller than 30 mm, an inner diameter of 30 mm must be used to calculate the locating surface in chapter »Second limit [forces]«.

### 5.2.3 Second limit [forces]

The following sample calculation shows how to quantify the forces that are exerted on the workpiece from an external source.

#### Principles



#### WARNING

**Serious injuries caused by failure to comply with the principles that govern safe machining!**

- Those principles must be maintained at all times to assure a safe machining process.

Pay attention to the following principles:

#### 1. Principle

$$F_c \leq F_{vk}$$

AND

#### 2. Principle

$$M_z \leq M_K$$

$M_K$  around pivot point K

AND

#### 3. Principle

$$M_z \leq M_{\ddot{v}}$$

#### 5.2.3.1 Further to principle 1: $F_c \leq F_{vk}$

When machining workpieces, the resulting cutting force attempts to displace the workpiece. Therefore, the cutting force must not exceed the displacement force.

The displacement force results from the pull-off force and the surface condition of the workpiece. Therefore, the following must be ensured:

- No air gap between workpiece and clamping surface, for example due to unevenness, rough surface, burrs and / or dirt.
- Wall thickness / thickness of the workpiece is sufficiently large.
- The locating surface of the workpiece is sufficiently large.
- If possible, it is recommended to use a driving pin.

The following equations are used to determine the displacement force  $F_{vk}$ .

For computational purposes, the calculation should be based upon the point with the highest forces, that is the least favorable machining moment. If in doubt, several blade engagement situations need to be checked to record the least favorable one.

### Friction coefficient

The displacement force also depends on the friction coefficient, which must be selected taking into account the following factors:

- the surface quality of the workpiece
- the condition of the clamping surface of the product.

### Material

The displacement force depends on the material of the workpiece.

Material	Reduction <i>R</i> [%]	
	Soft condition	Heat treated condition
Pure iron	100	100
Low carbon steel [for example ST37-2]	94	94
Case-hardened steel [for example C15]	91	46
16MnCr5	82	41
Nitrided steel [for example 31CrMoV9]	75	47
Quenched and tempered steel [for example C45]	81	46
C60	80	45
Rolling bearing steel [for example 100Cr6]	82	41
Cast steel	89	89
Cast iron	44	44
Tool steel [for example 42CrMo4]	94	94
Stainless steel 430F	50	50
Nickel	10	10

Table 4: Reduction of holding force [%] per material

For other materials, please consult the manufacturer.

### Determining the displacement force

I

$$F_{vk} = F_{ab} * \mu$$



#### INFORMATION

The displacement force must not exceed ¼ of the pull-off force.

$$F_{ab} = A_{ab} * H_{sph} * R$$

$$A_{ab} = \frac{\pi}{4} * (d_{sp}^2 - d^2)$$



#### INFORMATION

For the calculation, an inner diameter of the workpiece of at least 30 mm must be taken into account [see chapter »First limit [clamping area]«.

$H_{sph}$  from chapter »General information«

$R$  from Table 4

### Determining the cutting force

II

Turning [inner and outer]

$$F_c = 1.3 * a_p * f * k_c$$

#### 5.2.3.2 Further to principle 2: $M_z \leq M_K$

The torque introduced by the machining must not exceed the tipping torque.

#### Determining the tipping torque

III

$$M_K = F_{vk} * L_z$$

The determination of  $F_{vk}$  can be calculated analogously to formula I.

#### Determining the torque due to machining

IV

$$M_Z = F_c * \frac{d_z}{2}$$

The determination of  $F_c$  can be calculated analogously to formula II.



### 5.2.3.3 Further to principle 3: $M_z \leq M_{\dot{U}v}$

The torque introduced by the machining operation must not exceed the available transmissible torque.

#### Safety

A safety of  $\vartheta = 2$  is used for the calculations.

#### Determining the available transmittable torque

V

$$M_{\dot{U}v} = \frac{F_{ab} * d_{sp}}{2 * \vartheta} * \mu$$

#### Determining the torque due to machining

To determine the torque due to machining, formula IV applies.

### 5.2.4 Sample calculation

#### Applied to a specific example

As an example, the test set was used as a workpiece dimensionally, with which the functionality of the magnet module can be tested at regular intervals.

#### Workpiece data

- Outer diameter of the contacting workpiece surface  $d_{sp} = 58.4mm$
- Inner diameter of the contacting workpiece surface  $d = 49.6mm$
- Material ST37-2 [not heat treated]

#### Process data

- Face turning at distance »machining point – clamping point«  $L_z = 20mm$
- Machining diameter  $d_z = d_{sp} = 58.4mm$  [as cylindrical component]
- Feed  $f = 0.06mm$
- Chip-cutting depth  $a_p = 0.06mm$
- Specific cutting force  $k_c = 4800 \frac{N}{mm^2}$

#### Test set magnet module

- Friction coefficient  $\mu = 0.12$

#### Detailed observation

The first condition, that the inner diameter of the workpiece must be larger than 30 mm, is met. Otherwise, the calculation would have to continue with an inner diameter of 30 mm.

To verify the second condition, it is necessary to take the principles into account.

The first principle is met because the cutting force is smaller than the displacement force.

I

$$F_{vk} = F_{ab} * \mu$$

$$F_{ab} = A_{ab} * H_{sph} * R$$

from chapter »General information«:  $H_{sph} = 1.4 \frac{N}{mm^2}$

from Table 4:  $R = 94\% = 0.94$

$$A_{ab} = \frac{\pi}{4} * (d_{sp}^2 - d^2)$$

$$A_{ab} = \frac{\pi}{4} * ((58.4mm)^2 - (49.6mm)^2) = 746.4mm^2$$

$$F_{ab} = 746.4mm^2 * 1.4 \frac{N}{mm^2} * 0.94 = 982.3N$$

$$F_{vk} = 982.3N * 0.12$$

$$F_{vk} = 117.9N$$

II

$$F_c = 1.3 * a_p * f * k_c$$

$$F_c = 1.3 * 0.06mm * 0.06mm * 4800 \frac{N}{mm^2}$$

$$F_c = 22.5N$$

The second principle is met because the torque introduced by the machining is smaller than the tipping torque.

III

$$M_K = F_{vk} * L_z$$

$$M_K = 117.9N * 20mm$$

$$M_K = 2358Nmm$$

IV

$$M_Z = F_c * \frac{d_z}{2}$$

$$M_Z = 22.5N * \frac{58.4mm}{2}$$

$$M_Z = 657Nmm$$

The third principle is met because the torque introduced by the machining is smaller than the available transmissible torque.

V

$$M_{Üv} = \frac{F_{ab} * d_{sp}}{2 * \vartheta} * \mu$$

$$M_{Üv} = \frac{982.3N * 58.4mm}{2 * 2} * 0.12$$

$$M_{Üv} = 14341.58Nmm$$

### **Result of the sample calculation**

All limits have been checked.

All three principles are met and machining can be performed.

Nevertheless, the magnetic force must be checked regularly [see chapter »Checking the magnetic force«].

## 6 Transport, packaging, storage

### 6.1 Safety, transport, packaging, storage



#### **WARNING**

**High level of physical strain due to the weight of the product or of its components if not transported properly!**

- From a weight of 10 kg, use appropriate transport equipment, lifting gear and lifting tackle.



#### **WARNING**

**Serious crushing injuries and breakages caused by falling parts if transported incorrectly!**

- Ensure that the product cannot roll away or fall.
- Place on a non-slip surface.
- When using lifting gear, use appropriate load-bearing equipment and lifting tackle.



#### **WARNING**

**Serious injuries caused by transporting off-center equipment!**

- Pay attention to marks on the packaging items.
- Attach the crane hook directly above the center of gravity.
- Raise carefully and correct the lifting points if necessary.



#### **WARNING**

**Serious injuries caused by incorrect transport with lifting gear!**

- Never raise loads above people.
- Never step under suspended loads.
- Pay attention to information about the intended lifting points. Ensure that the lifting gear is mounted on a secure base.
- Only use authorized and undamaged lifting gear, load-bearing equipment and lifting tackle.
- Never exceed the maximum load-bearing capacity of lifting gear, load-bearing equipment and lifting tackle.



### NOTE

**Damage to materials caused by falling parts if transported incorrectly!**

- Ensure that the product cannot roll away or fall.
- Place on a non-slip surface.
- When using lifting gear, use appropriate load-bearing equipment and lifting tackle.

## 6.2 Symbols on the packaging



### Fragile

Designates packaging items with fragile or breakable contents.

Handle the packaging item with care. Do not drop it and protect it against collision impacts.



### Keep it dry

Keep packaging items dry and protect them from the ingress of water.



### Position designation

Points to the correct upright position of the packaging item.

## 6.3 Transport inspection

Check the delivery on receipt immediately to ensure it is complete and has not been damaged in transit.

Proceed as follows if you find any externally visible signs of damage while in transit:

- Refuse to accept the delivery, or only subject to later approval
- Make a note of the extent of damage on the transportation documents or on the delivery note of the transportation company
- Initiate a complaint



### INFORMATION

Raise a complaint for every defect as soon as it is discovered. Compensation claims can only be enforced during the applicable complaint periods.

### 6.4 Unpacking and internal transportation

The total weight of the product depends on its size.

Depending on the weight involved, it may be necessary to use lifting gear to lift the product or its components out of the packaging safely, to transport them and to position and install them in the machine tool or on the machine table.

1. The product is packaged in a stable position, and it has threads / bores for transportation.
2. Lifting tackle can be installed in these transportation threads / bores. To lift the product out of its packaging, the front-end functional threads can if necessary be used to attach lifting tackle to upright packaged products.
3. Attach load-bearing equipment to the lifting tackle.
4. Subject to weight, use lifting gear to lift the product out of its packaging safely, and place it down on a stable, flat surface.
5. Secure the product to prevent it from rolling away.
6. When transporting on a trolley or car, ensure that the product is securely mounted on a non-slip surface before starting to move it.

### 6.5 Packaging

The individual packaging items are packaged in an appropriate manner for the type of transportation involved. Always use environmentally compatible materials for packaging purposes.

Packaging should protect individual components from damage in transit, corrosion and other forms of damage, up until installation. For this reason, do not destroy the packaging, and do not remove it until shortly before installation.



#### INFORMATION

The packaging units are packaged, wrapped in airtight film and placed in cardboard boxes. On the individual weights of each of the sizes [see »General information« chapter].

Dispose of packaging material in accordance with applicable legislative provisions and local regulations.



#### NOTE

##### **Damage to the environment caused by improper disposal of packaging materials!**

- Dispose of packaging materials in an environmentally responsible manner.
- Pay attention to local disposal regulations and, if necessary, appoint a specialist waste disposal company with this work.

### 6.6 Storage



#### INFORMATION

The packaged items may display information relating to storage and readmission to storage that extend beyond the scope of these requirements. Pay attention to these notices.

Store packaged items under the following conditions:

- Safe for storage.
- Do not store outdoors.
- Store in a dry, dust-free place.
- Avoid exposure to aggressive media.
- Protect against direct sunlight.
- Avoid mechanical vibration.
- Storage temperature: 15 to 35°C.
- Relative humidity: Maximum 60%.
- In the event of storage for more than 3 months:
  - On a regular basis, check the general condition of all parts and packaging.
  - If necessary, refresh the preservation or replace it.

### 6.7 Preservation

1. Clean the product [see »Cleaning« chapter].
2. Apply a light coating of preserving oil to the inner and outer faces of the product. Wipe away surplus preserving oil with a soft, lint-free, tear-resistant cloth.
3. Pack product air-tight in foil.
4. Return product to storage [see »Return to storage« chapter].

### 6.8 Return to storage

Return product to storage under the following conditions:

1. Preserve the product [see »Preservation« chapter].
2. The product must be stored in a safe condition. Use an appropriate container for the product, on a non-slip surface, or fit the floor of the shelving unit with an all-round safety border.
3. For storage conditions, see the »Storage« chapter.

## 7 Installation

### 7.1 Installation safety



#### **WARNING**

**Serious injuries caused by unskilled staff during installation / removal!**

- Installation and removal must be performed by skilled staff from the relevant specialist field.



#### **WARNING**

**Serious injuries can be caused if the machine tool starts up accidentally!**

- Set the machine tool into set-up mode.
- Remove all tools, auxiliary equipment and items of test equipment immediately from the working area of the machine.
- Remove all lifting gear from the product and from the working area of the machine.



#### **WARNING**

**Serious injuries caused by the escape of media under high pressure!**

- Shut down media delivery during installation and removal.
- Relieve any pressure trapped in the system.
- Shut down the system.



#### **WARNING**

**Serious crushing injuries and breakages caused by falling parts during incorrect installation or removal!**

- Ensure that the product cannot roll away or fall.
- If necessary, use an appropriate mounting aid for installation or removal on a vertically suspended machine spindle.



#### **WARNING**

**Serious crushing injuries caused by improper machine movement during installation or removal!**

- Machine movements are only permitted in set-up mode during installation and removal.
- Never reach into a gap.
- Pay attention to the gap dimensions of moving parts.





## WARNING

**Serious head injuries caused by bending into the working area of the machine!**

- Only ever bend into the working area of the machine if there are no cutting tools or sharp objects in it, or if these are covered.
- Never move body parts under parts in the working area of the machine with the potential to drop down.
- Depending on weight, use an appropriate mounting aid for installation or installing on a vertically suspended machine spindle.



## WARNING

**High level of physical strain due to the weight of the product or of its components if not transported properly!**

- From a weight of 10 kg, use appropriate transport equipment, lifting gear and lifting tackle.



## NOTE

**Damage to materials caused by lifting gear left in the product!**

- Always remove lifting gear immediately after installing the product.



## NOTE [only for aluminum components]

**Damage to materials can be caused by incorrect screw tightening torques on aluminum components!**

- Pay attention to the reduced screw tightening torques for aluminum components [see »Screw tightening torques« chapter].

## 7.2 Preliminary remarks

- In accordance with their thread size and strength class, screws must be tightened crosswise to the specified tightening torque [see »Screw tightening torques« chapter]. When tightening the screws, do so evenly to prevent any distortion under load.
- To avoid precision errors, clean all screw-fitting points and mating surfaces [Notes on cleaning, see »Cleaning« chapter]. Factory wetting of flat surfaces and, where necessary of clamping elements, only serves as a corrosion inhibitor. This is not functionally related lubrication.

- Only apply lubricant to the mechanical mating surfaces. Pay attention to notes about lubricants [see »Use of lubricants« chapter].
- Avoid too much lubricant on the locating face because this can cause face run-out errors.
- Apply grease to the sealing elements [for example O-rings, rectangular rings] and sealing surfaces. Pay attention to notes about greases [see »Use of lubricants« chapter].
- Do not damage the functional surfaces [flat, mating, tapered and sealing surfaces].

## 7.3 Screw tightening torques

The tables show the specified values.

Knowledge of the applicable guidelines and design criteria is essential.



### NOTE

#### Damage to materials caused by defective screw tightening torques!

- To secure the product to the machine, pay attention to the values specified by HAINBUCH and by the machine manufacturer for screw tightening torques. If the machine manufacturer stipulates different values, you must consult HAINBUCH.

### Metric control threads

The following table contains the guide values in Nm for screw tightening torques for achieving the highest permitted preload for metric control threads.

- Total friction coefficient  $\mu_{ges} = 0.12$

Thread designation	Tightening torque at screw quality [Nm]	
	10.9	12.9
M4	4	5
M5	7	9
M6	12	15
M8	25	38
M10	50	70
M12	100	130
M16	220	300

Thread designation	Tightening torque at screw quality [Nm]	
	10.9	12.9
M20	400	550
M24	600	800

Table 5: Screw tightening torques, metric control threads

## Aluminum components

The following table contains the reduced screw tightening torques for securing aluminum components.

Thread designation	Tightening torque [Nm]	Minimum screw depth [mm]
M6	10	12
M8	23	16
M10	46	20

Table 6: Screw tightening torques for aluminum components

## 7.4 Preparation of the machine for installation

1. Set the machine into set-up mode.
2. Remove cutting tools and/or sharp objects from the working area of the machine, or cover them.

## 7.5 Preparation of the basic clamping device

To install the adaptation clamping device, the basic clamping device must be prepared.



In addition to these operating instructions, you should also read and follow the operating instructions for the associated basic clamping device.

1. Remove the clamping element from the basic clamping device [see operating instructions for the basic clamping device].

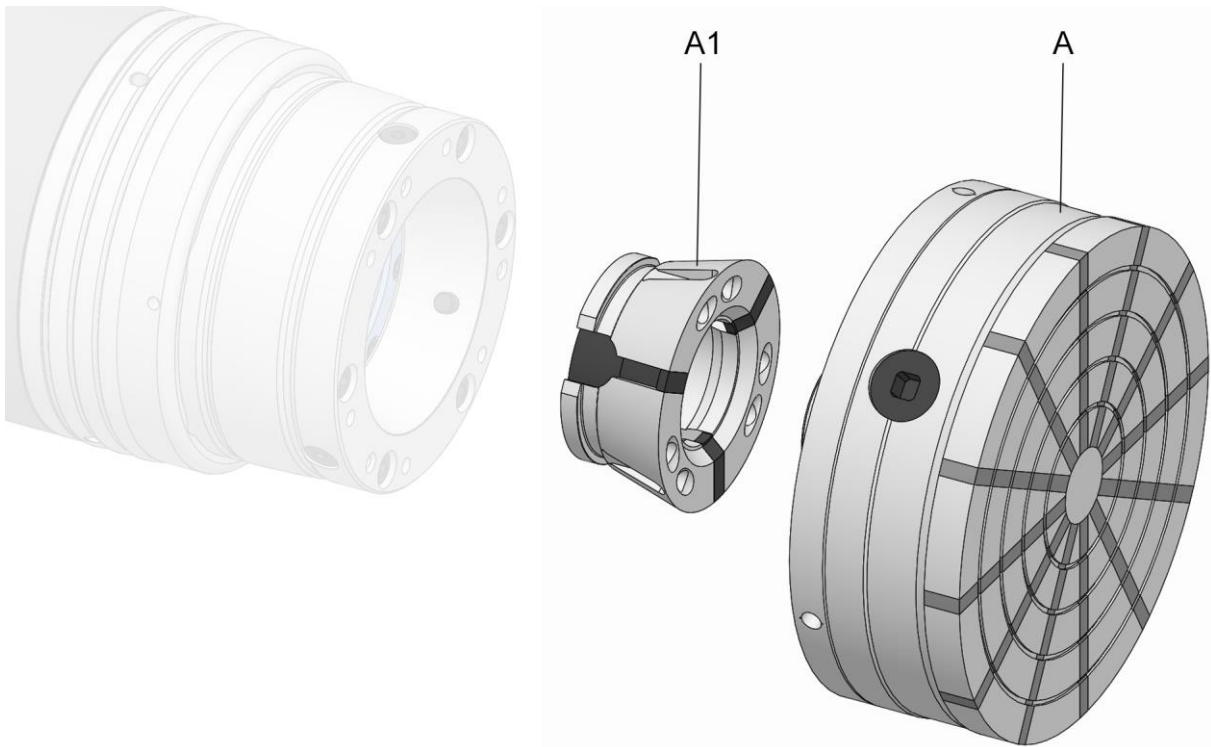


### INFORMATION

Before installation of the adaptation clamping device, the base end-stop must be removed from the basic clamping device.

2. Remove the changing parts from the basic clamping device [see operating instructions for the basic clamping device].

## 7.6 Installation of the product



- A Adaptation clamping device  
A1 Clamping head adaption clamping device [clamping element]

Before mounting the product, a basic clamping device must already be mounted on the spindle of the machine.

1. As described in the »Preparation of the machine for installation« chapter, prepare for the following steps.

### 7.6.1 Compatibility check

Check the compatibility of the product and the connection point of the basic clamping device.

For this, check that the connection point and the product share the same adaptation geometry. Also check if the actuating element / coupling element is suitable.

### 7.6.2 Preparation of the product

The product is supplied in assembled condition.

No preparatory steps are needed to install the product.

## 7.6.3 Installation of the adaptation clamping device

1. Move the basic clamping device into its release position.



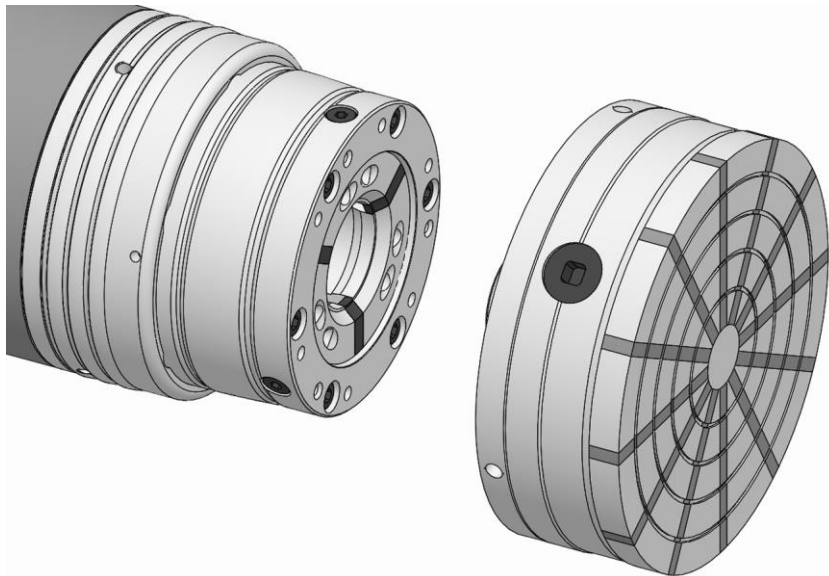
### INFORMATION

A clamping head with special attachment geometry is required for mounting the adaption clamping device.



In addition to these operating instructions, you should also read and follow the operating instructions for the associated basic clamping device.

2. Mount the clamping head adaption clamping device [see operating instructions basic clamping device].
3. Attach any lifting gear that may be required.
4. If necessary, fit the mounting aid onto a vertically suspended spindle.



5. Insert the adaption clamping device into the clamping head adaption clamping device up to the stop. The markings, if any, on the adaptation clamping device and basic clamping device must match.



### INFORMATION

For mounting the adaptation clamping device, the minimum axial actuating force of the basic clamping device must be observed [see chapter »General information«].

6. Move the basic clamping device into its clamping reserve position.



## **WARNING**

**Severe injuries due to unauthorized release of the basic clamping device!**

- Release the basic clamping device only for disassembly of the adaptation clamping device.

7. Unfasten and remove any lifting gear that may have been required.
8. Remove the mounting aid on a vertically suspended spindle if one was used.



## **INFORMATION**

In order to achieve the best possible axial run-out accuracies, the radial position of the adaptation clamping device in relation to the basic clamping device must be marked after initial mounting.

When remounting, the markings must be observed.

## 8 Commissioning

### 8.1 Commissioning safety



#### DANGER

**Serious injuries caused by workpieces being ejected centrifugally or dropping out if clamping force is insufficient!**

- Workpiece blanks must not be outside the clamping width diameter.
- Prior to commissioning, set the actuation force to the permitted, established machining value.
- Clamping of the workpiece must not be outside the defined limits [see »Limits of use« chapter].
- Check the clamping force at regular intervals and correct if necessary.



#### WARNING

**Serious injuries can be caused if the machine tool starts up accidentally!**

- Prior to commissioning, close all safety doors or hoods on the machine tool.



#### WARNING

**Serious injuries caused by tools and items of test equipment being ejected centrifugally!**

- Prior to commissioning, ensure that all tools and items of test equipment are removed from the working area of the machine.



#### NOTE

**Serious damage to materials / the product caused by workpieces being ejected centrifugally or dropping out if clamping force is insufficient!**

- Workpiece blanks must not be outside the clamping width diameter.
- Prior to commissioning, set the actuation force to the permitted, established machining value.
- Clamping of the workpiece must not be outside the defined limits [see »Limits of use« chapter].
- Check the clamping force at regular intervals and correct if necessary.



## NOTE

### **Damage to components caused by cooling lubricants with sufficient levels of corrosion inhibitor!**

- The components made of steel materials must be protected before the usual oxidation process.
- Only ever use cooling lubricants with sufficient levels of corrosion inhibitor.



## NOTE

### **Damage to materials caused by contaminated / unprocessed cooling lubricants!**

- For the product to function properly, in particular for internal flushing with cooling lubricants and/or when using tools with internal flushing, ensure that the cooling lubricant is cleaned / processed, and that it contains no particles measuring >100 microns [filtered with a mesh width of 100 microns].



## NOTE

### **Damage to seals caused by using the wrong coolant lubricants!**

- To clean the product, never use a cooling lubricant that attacks and damages the sealing elements installed. Those installed sealing elements can be made of NBR, Viton and PUR materials.
- Never use cooling lubricants that contain ester or a polar solvent.



## NOTE

### **Damage to clamping elements caused by using the wrong cooling lubricants!**

- Never use cooling lubricants that contain ester or a polar solvent.

## 8.2 Commissioning the product



## INFORMATION

In order to achieve the best possible axial run-out accuracies, the radial position of the adaptation clamping device in relation to the basic clamping device must be observed.

This was marked during initial mounting.

In order to achieve the desired axial run-out properties, the clamping surface must be reworked within the prescribed limits during initial commissioning and when the clamping surface is worn.



Every time the adaption clamping device is used on a different basic clamping device and / or a different machine, axial run-out correction may be necessary.

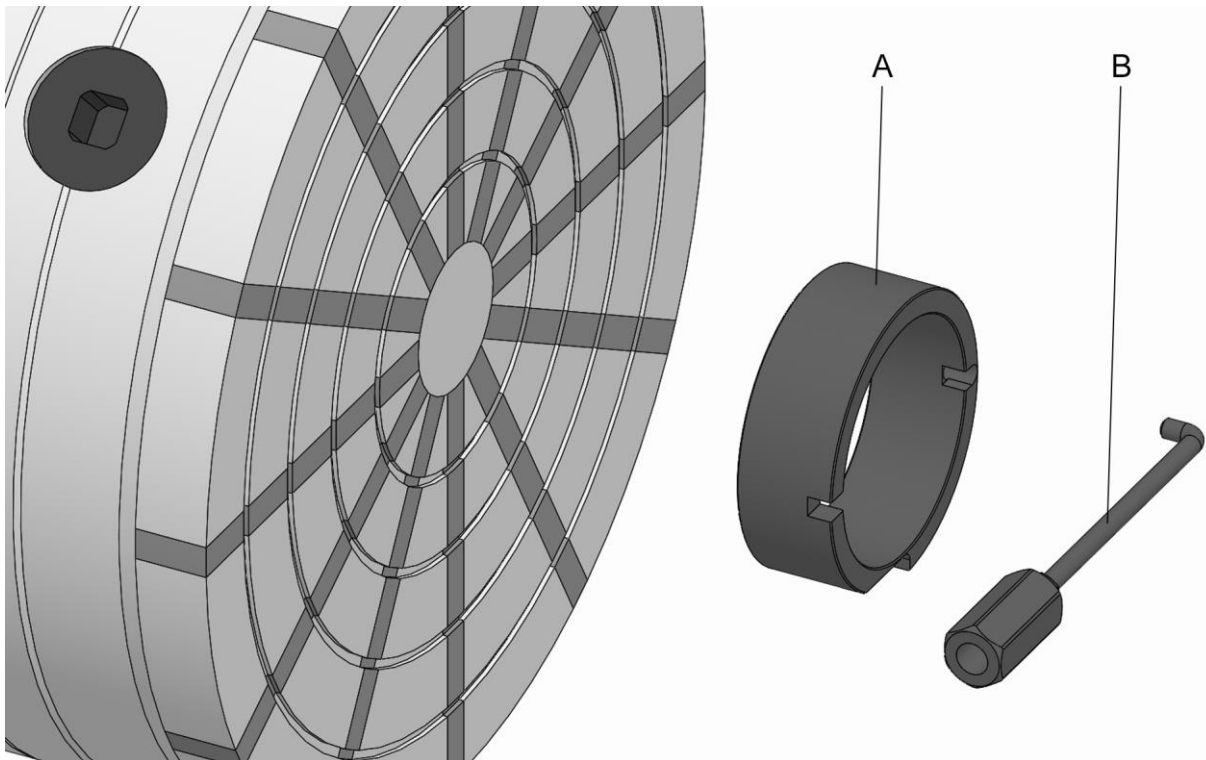
Various contours can also be included in the magnet. Here, the maximum depth of the contour is equal to the maximum shortening of the product.

A centric bore can be placed in the magnet. However, the flange must not be machined. Therefore, the magnet must be dismantled before machining [see chapter »Cleaning«].

The specified limits must be observed both for axial run-out correction and for drilling the centric bores [see chapter »General information«].

For machining the magnet, a small chip cutting depth-feed ratio  $[\frac{a_p}{f}]$  must be selected.

## 8.3 Tests



- A Test ring [test set]
- B Tool [test set]



### NOTE

**Serious damage to, or destruction of, the machine tool and the workpiece caused by damaged, incomplete or incorrectly installed products!**

- Only install undamaged and complete products properly.
- If in doubt, contact the manufacturer.

Assure the following points before every installation and/or before every time the products are put into service:

- The products used are undamaged.
- All fixing screws are present on the products, and are tightened to the correct tightening torque.
- None of the edges and races are chipped or show any signs of wear.
- The speed set on the machine tool must not exceed the maximum speed of the product. Always take the lowest value of all maximum speeds for combined products indicated.
- The determined displacement force must be observed in order to clamp the workpiece with sufficient clamping force.
- The minimum axial actuating force of the basic clamping device must be observed in order to clamp the adaptation clamping device with sufficient clamping force.
- All installation tools are removed from the machining area.
- Clamping device and workpiece are compatible.

### 8.3.1 Checking the magnetic force

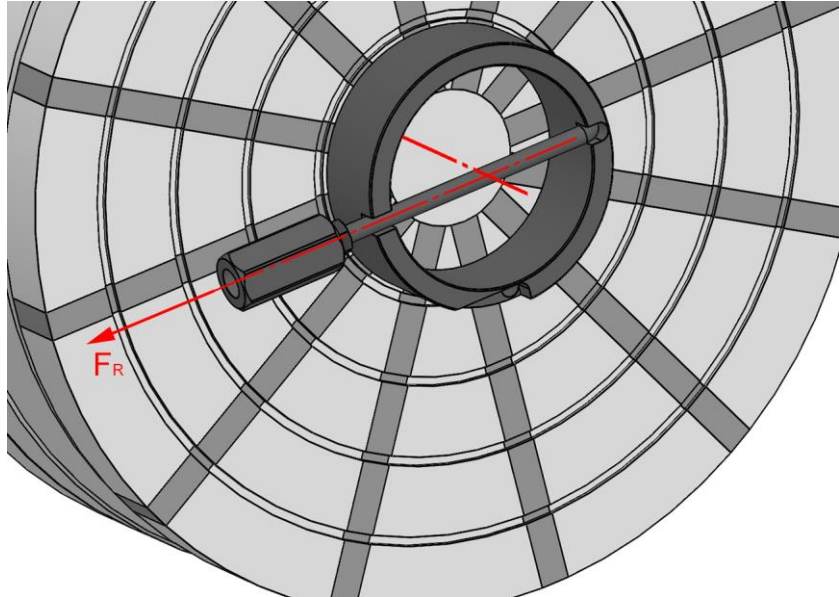
The magnetic force must be checked weekly.

To be able to check the full magnetic force, a test ring made of iron with few alloy components must be used. In our test set, a test ring made of ST37-2 [not heat treated] is used.

The check requires two measurements and should preferably be performed using a spring balance with a drag pointer. The drag pointer is necessary to determine the force when the test ring overcomes static friction and starts sliding. The spring balance can be screwed to the tool of the test set using the thread.

## Displacement force

To check the displacement force, the ring must be pulled exactly centrally.

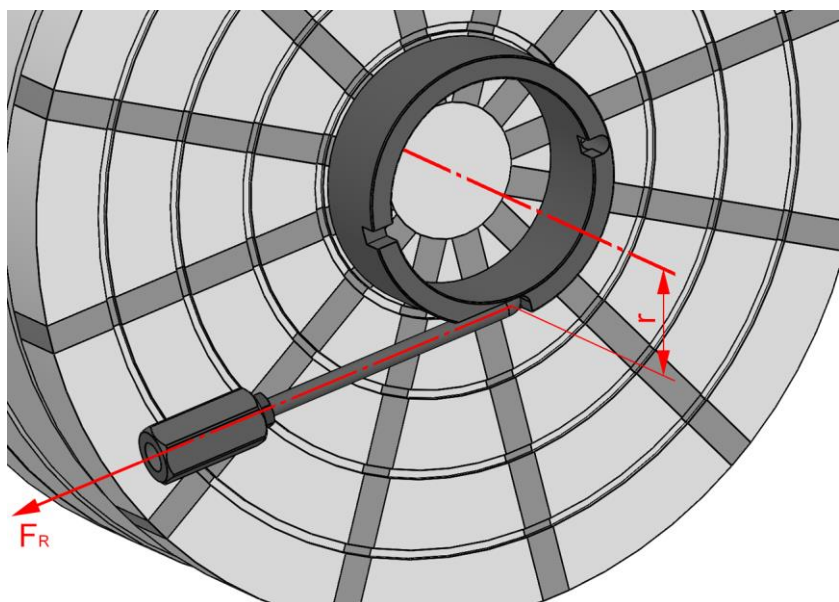


When using the test set, the measured displacement force must be greater than the determined displacement force  $F_{vk}$  of 117.9 N.

The determination of the displacement force is explained in the chapter »Limits of use«. In the example calculation in the chapter »Limits of use«, the test set was already used for the dimensions.

## Transmissible torque

In order to check the transmissible torque, the tool must be hooked in at the point of the ring that has been cleared at the circumference. This allows the tangential test force to be measured.



When using the test set, the measured tangential test force must be greater than the determined tangential test force  $F_R$  of 127.5 N.

The determined tangential test force  $F_R$  results from the following calculation approach.

$$F_R = \frac{M_{\ddot{U}v}}{r}$$

$M_{\ddot{U}v}$  according to formula V [see chapter »Limits of use«]

For checking the magnetic force, safety  $\vartheta = 1$  applies

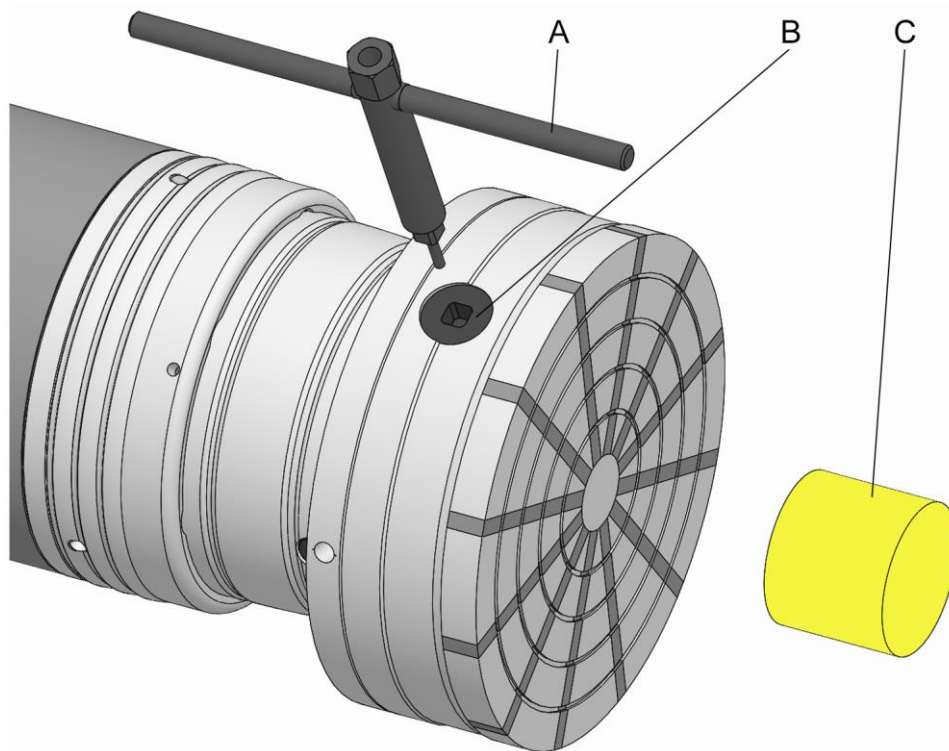
In the example calculation in the chapter »Limits of use«, the test set was already used for the dimensions. Taking into account the new safety value and the radial distance  $r = 27\text{mm}$ , the following values result:

$$F_R = \frac{M_{\ddot{U}v}}{r}$$

$$M_{\ddot{U}v} = \frac{F_{ab} * d_{sp}}{2 * \vartheta} * \mu = \frac{982.3\text{N} * 58.4\text{mm}}{2 * 1} * 0.12 = 3442\text{Nmm}$$

$$F_R = \frac{3442\text{Nmm}}{27\text{mm}} = 127.5\text{N}$$

## 8.4 Workpiece



- A Actuating key
- B Actuating screw
- C Workpiece

Special aids required:

- Actuating key



## **WARNING**

**Crushing injuries to hands / fingers if workpiece is installed incorrectly!**

- Do not place hands / fingers between workpiece and clamping device.
- Never reach into the clamping area.



## **CAUTION**

**Burns caused by high workpiece temperature!**

- Also wear the following items of personal protective equipment, in addition to the basic equipment:



## **WARNING**

**Serious injuries caused by projectile ejection of an actuating wrench!**

- Only ever use the original actuating wrench!
- Immediately after use, take the actuating wrench out of the product and remove it from the working area of the machine.
- If the self-ejector function of the actuating wrench does not work, or is impaired, it must not be used until after a new spring has been installed.

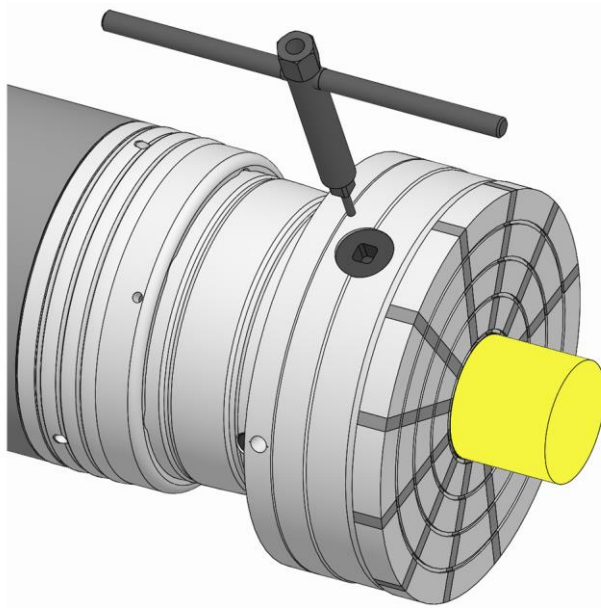


## **INFORMATION**

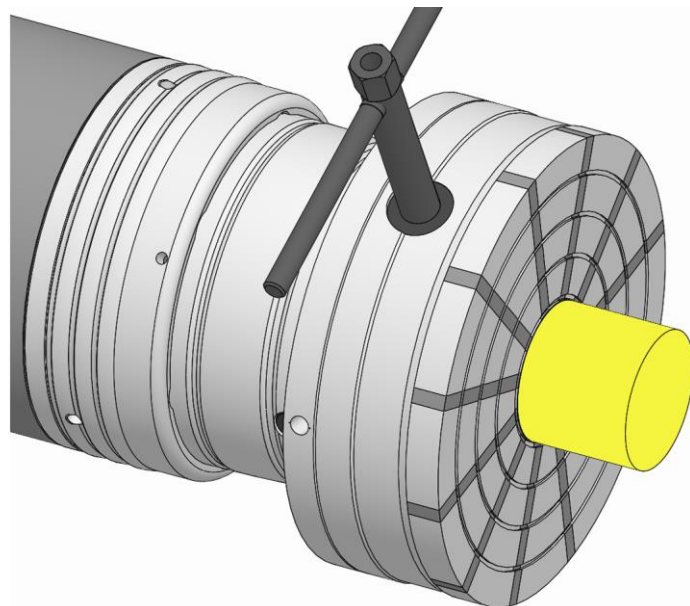
The actuating wrench is equipped with a spring that presses the actuating wrench out of the product as soon as it is released.

### **8.4.1 Clamping the workpiece**

1. Move the adaption clamping device into release position [see chapter »Releasing clamping of the workpiece«].
2. Clean the clamping surface of the adaptation clamping device and the contact surface of the workpiece with a lint-free cloth. Any burrs and unevenness must be removed.
3. Place the workpiece on the product and, if necessary, secure it to prevent it from falling.

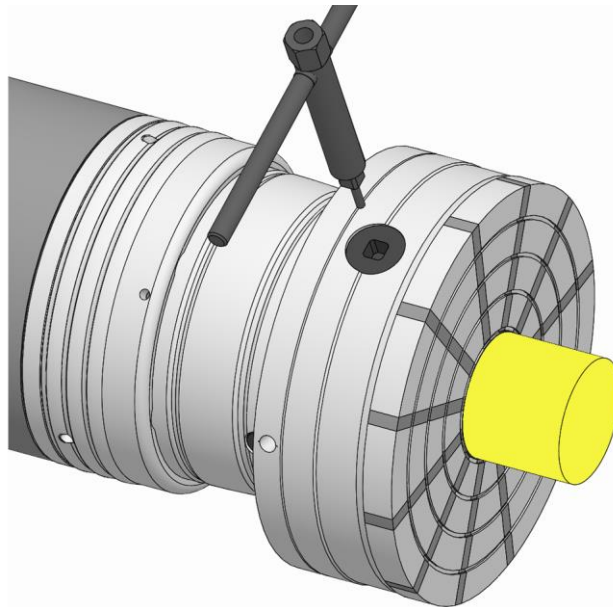


4. Install the actuating key in the actuating screw and hold it firmly.



5. Turn the actuating screw clockwise by 90° using the actuating key. This clamps the workpiece with half the clamping force.





6. Remove the actuating key from the actuating screw and remove it from the working area of the machine.

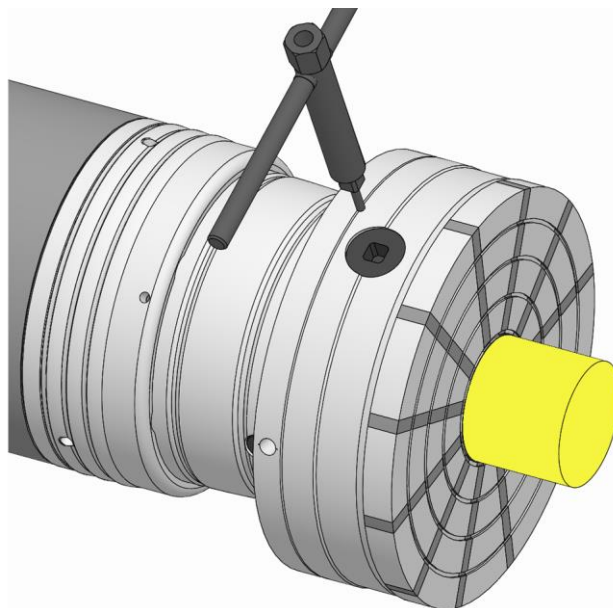


## **WARNING**

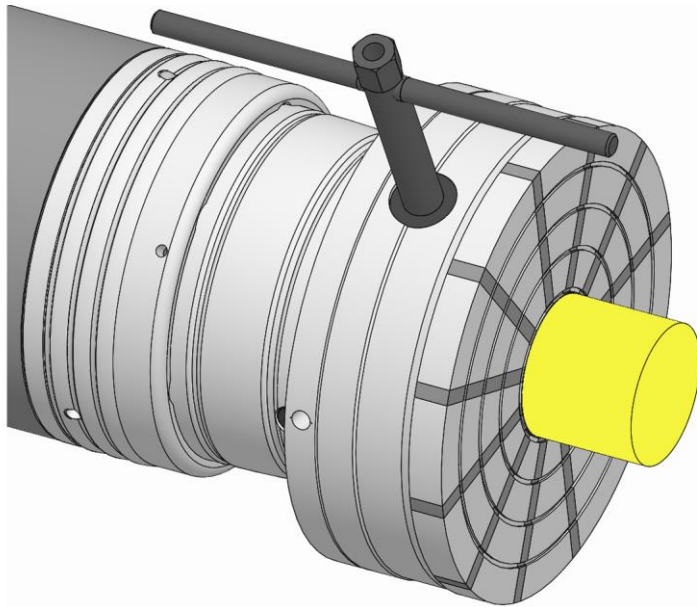
**Serious injuries caused by the imbalance of eccentrically clamped workpieces!**

- Only clamp the workpiece centrally.

7. Check the face run-out of the workpiece on a suitable test surface and, if necessary, carefully align it with a plastic hammer.



8. Install the actuating key in the actuating screw and hold it firmly.

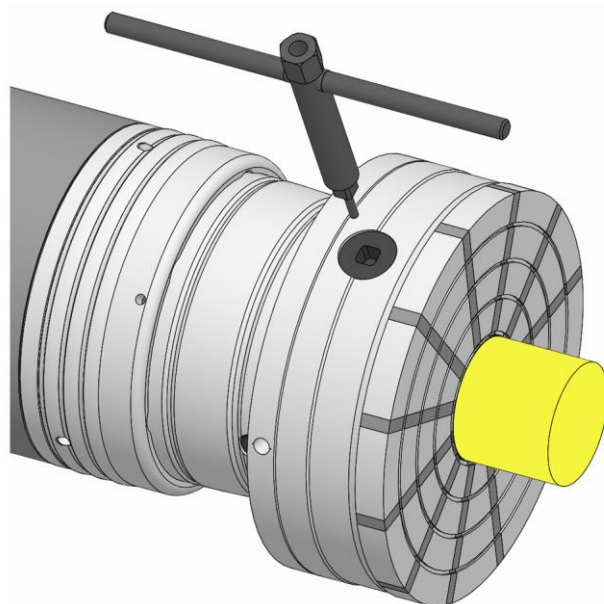


## NOTE

### Material damage due to incorrect actuation of the actuating screw!

- The actuating key may only be operated manually.
- Never use an impact screwdriver to actuate the actuating screw.
- No additional pressure must be applied to the end stop of the actuating screw, in order not to damage the stop pin.

9. Use the actuating key to turn the actuating screw clockwise up to its limit stop.



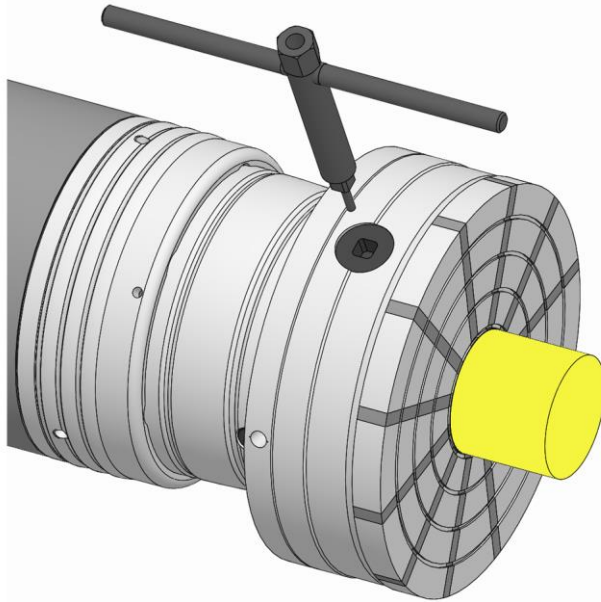
10. Remove the actuating key from the actuating screw and remove it from the working area of the machine.



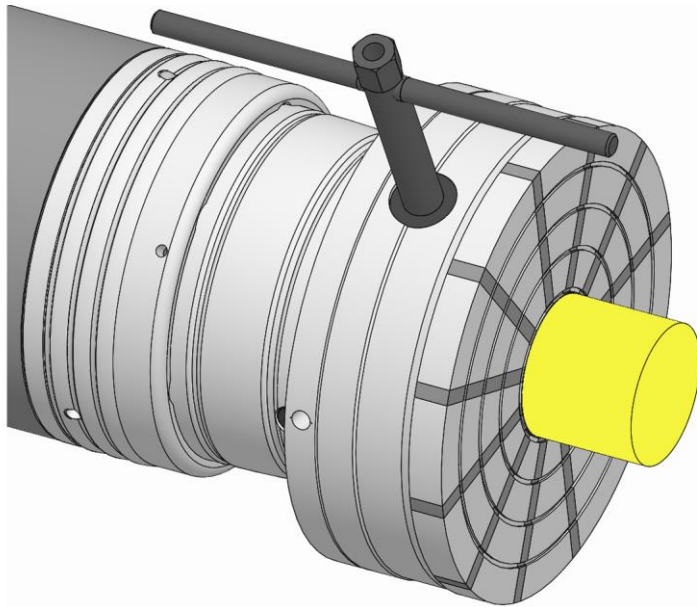
11. Remove the workpiece mounting if one was used.

## 8.4.2 Releasing tension on the workpiece

1. If necessary, secure the workpiece to prevent it from falling.



2. Install the actuating key in the actuating screw and hold it firmly.

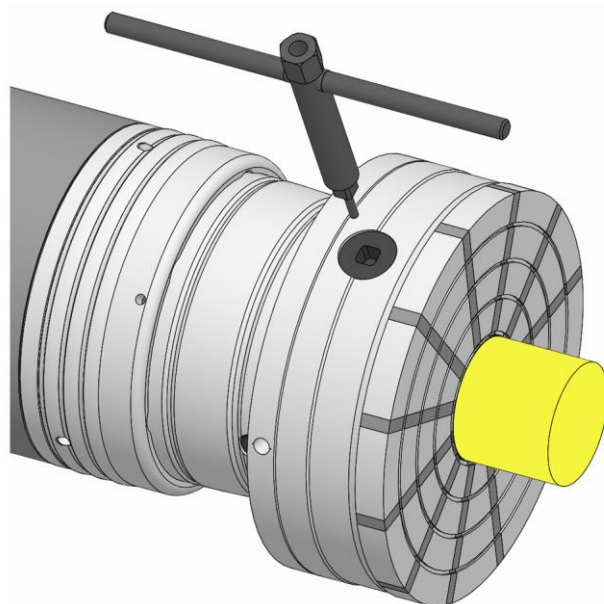


## NOTE

### Material damage due to incorrect actuation of the actuating screw!

- The actuating key may only be operated manually.
- Never use an impact screwdriver to actuate the actuating screw.
- No additional pressure must be applied to the end stop of the actuating screw, in order not to damage the stop pin.

3. Use the actuating key to turn the actuating screw counter-clockwise up to its limit stop.



4. Remove the actuating key from the actuating screw and remove it from the working area of the machine.



## INFORMATION

Release the workpiece by tapping lightly if the workpiece still sticks.

5. Remove the workpiece from the product. To do this, remove the workpiece mounting if one was used.

### 8.5 Procedure after a collision

In the event of a collision, the product and its components must be checked for cracks and damage before being used again.

For this, remove the product from the machine [see »Removal of the product« chapter] and dismantle it [for level of disassembly, see »Cleaning« chapter].

## 9 Activities after end of production

1. Switch off machine tool and secure it to prevent it from being switched back on.
2. Open the safety door / hood.



### WARNING

**Eye injuries and cuts caused by failure to wear protective clothing during cleaning operation!**

- Never use compressed air to clean the product.
- Also wear the following items of personal protective equipment, in addition to the basic equipment:



3. Clean the product of swarf and production residue with a soft, lint-free cloth and apply a light coating of oil.
4. Close the safety door / hood.

## 10 Removal

If there is a break in production, the product must be dismounted and properly stored according to the manufacturer's specifications before the machine is switched off [see chapter »Transport, packaging, storage«].

### 10.1 Safe removal



#### **WARNING**

**Serious injuries caused by unskilled staff during installation / removal!**

- Installation and removal must be performed by skilled staff from the relevant specialist field.



#### **WARNING**

**Serious injuries can be caused if the machine tool starts up accidentally!**

- Set the machine tool into set-up mode.
- Remove all tools, auxiliary equipment and items of test equipment immediately from the working area of the machine.
- Remove all lifting gear from the product and from the working area of the machine.



#### **WARNING**

**Serious injuries caused by the escape of media under high pressure!**

- Shut down media delivery during installation and removal.
- Relieve any pressure trapped in the system.
- Shut down the system.



#### **WARNING**

**Serious crushing injuries and breakages caused by falling parts during incorrect installation or removal!**

- Ensure that the product cannot roll away or fall.
- If necessary, use an appropriate mounting aid for installation or removal on a vertically suspended machine spindle.



## WARNING

**Serious crushing injuries caused by improper machine movement during installation or removal!**

- Machine movements are only permitted in set-up mode during installation and removal.
- Never reach into a gap.
- Pay attention to the gap dimensions of moving parts.



## WARNING

**Serious head injuries caused by bending into the working area of the machine!**

- Only ever bend into the working area of the machine if there are no cutting tools or sharp objects in it, or if these are covered.
- Never move body parts under parts in the working area of the machine with the potential to drop down.
- Depending on weight, use an appropriate mounting aid for installation or installing on a vertically suspended machine spindle.



## WARNING

**High level of physical strain due to the weight of the product or of its components if not transported properly!**

- From a weight of 10 kg, use appropriate transport equipment, lifting gear and lifting tackle.



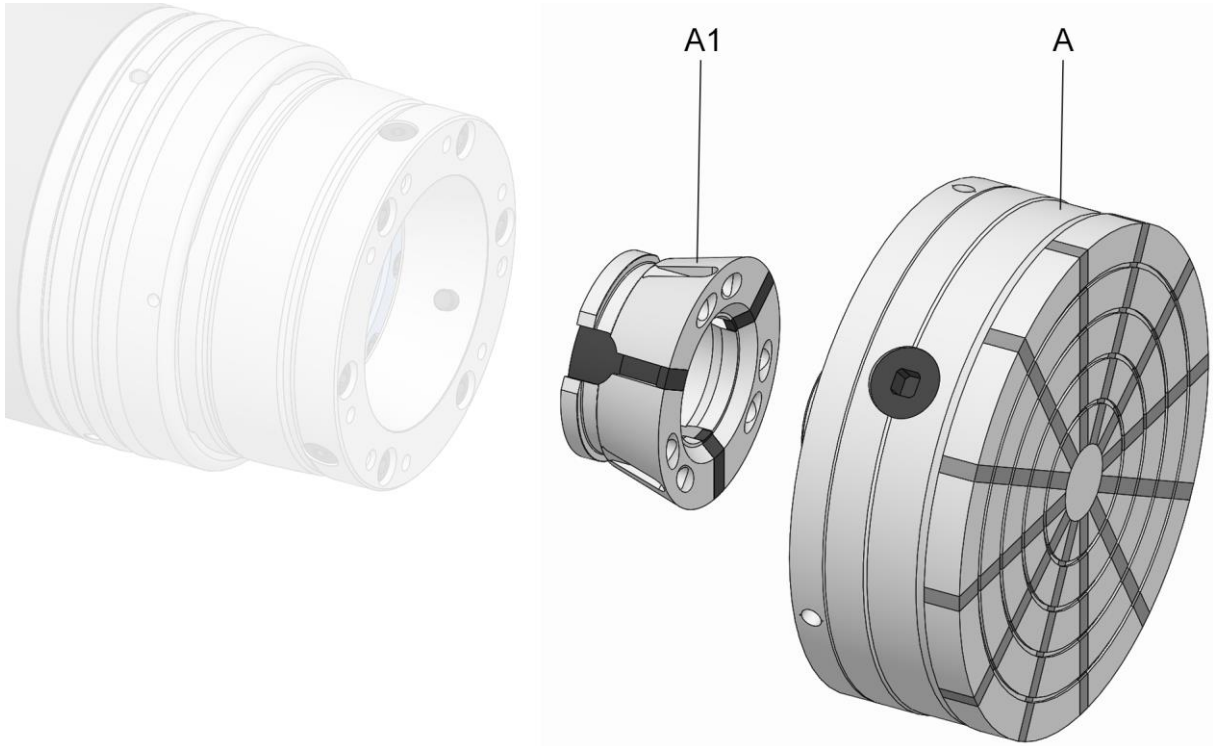
## INFORMATION

If necessary, use any forcing / extraction threads in the components of the product, changing parts or clamping elements.

## 10.2 Preparing the machine for removal

1. Set the machine into set-up mode.
2. Remove cutting tools and/or sharp objects from the working area of the machine, or cover them.
3. Remove operating and auxiliary materials as well as remaining processing materials and dispose of them in an environmentally responsible manner.

## 10.3 Removal of the product

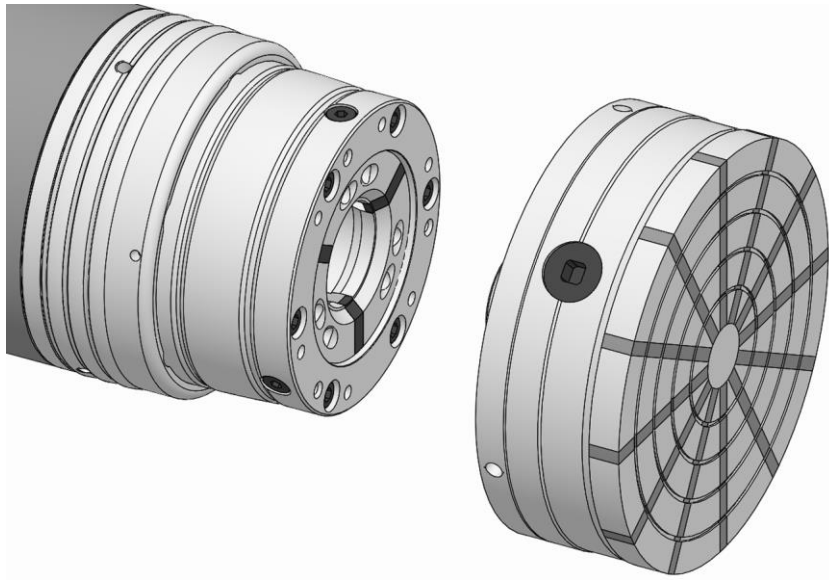


- A Adaptation clamping device
- A1 Clamping head adaption clamping device [clamping element]

1. As described in the »Preparing the machine for removal« chapter, prepare for the following steps.

## 10.3.1 Removal of the adaptation clamping device

1. Attach any lifting gear that may be required.
2. If necessary, fit the mounting aid onto a vertically suspended spindle.
3. Secure the adaptation clamping device against falling down.
4. Move the basic clamping device into its release position.



5. Remove the adaptation clamping device from the adaptation clamping device clamping head.



In addition to these operating instructions, you should also read and follow the operating instructions for the associated basic clamping device.

6. Dismount the clamping head adaptation clamping device [see operating instructions of basic clamping device].



## 11 Maintenance

### 11.1 Maintenance safety



#### WARNING

**Serious injuries caused by parts being ejected centrifugally after a loss of clamping power!**

- Maintain the maintenance and cleaning intervals of the product at all times.
- It is essential to check the maintenance status of the product at regular intervals with a structural clamping force measurement.



#### CAUTION

**Health risks caused by incorrect handling of cleaning agents!**

- Pay attention to hazard specifications and the safety data sheet of the manufacturer.



#### INFORMATION

If necessary, use any forcing / extraction threads in the components of the product, changing parts or clamping elements.

### 11.2 Maintenance schedule

The following sections describe the maintenance work needed to ensure optimum and fault-free operation.

If increased levels of wear are detected during regular checks, shorten the maintenance intervals to reflect the actual rate at which signs of wear appear.

Contact the manufacturer for questions relating to maintenance work and maintenance intervals [see »Contact« chapter].

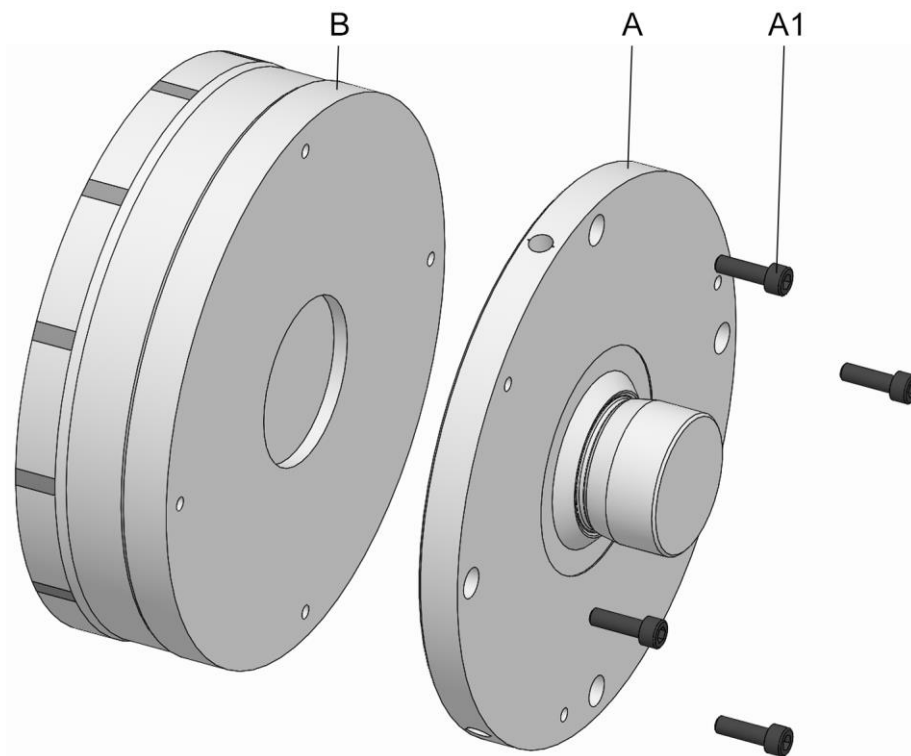
Interval	Maintenance work
daily	Visual inspection of wear locations, nicks and cracks [see »Visual inspection« chapter]
	Check the actuating screw. [see chapter »Workpiece«]. It must be able to be turned without much effort and without much clearance.
	Complete cleaning if heavily soiled [see »Cleaning« chapter]
weekly	Check magnetic force [see chapter »Tests«]
	Visual inspection of the clamping plate. It must be replaced as soon as the holes of the fixing screws become visible.
six-monthly or after 3000 operating hours*	Completely clean the product [see »Cleaning« chapter]

Interval	Maintenance work
with storage	See »Storage« chapter

\* depending upon which stipulation is achieved first

Table 7: Maintenance table

## 11.3 Cleaning



- A Flange
- A1 Flange fixing screws
- B Magnet



### WARNING

**Eye injuries and cuts caused by failure to wear protective clothing during cleaning operation!**

- Never use compressed air to clean the product.
- Also wear the following items of personal protective equipment, in addition to the basic equipment:





## NOTE

### Damage to seals caused by the wrong solvent!

- To clean the product, never use a solvent that attacks and damages the sealing elements installed. Those installed sealing elements can be made of NBR, Viton and PUR materials.
- To clean the product, never use a solvent that contains ester, nor a polar solvent.



## NOTE

### Damage to materials caused by incorrect installation of sealing elements!

- Replace missing or damaged sealing elements.
- Ensure that the sealing elements do not fall out or get damaged during installation / removal, and apply a thin coat of grease if necessary.

Cleanliness of the relevant limit stop and guide diameter are essential for achieving axial and face run-out tolerances.

1. Remove the product from the basic clamping device [see »Removal of the adaptation clamping device« chapter].



## WARNING

### Serious injuries caused by imbalance resulting from incorrect reassembly!

- The product components must be installed back in the same position.
- If necessary, mark out the relative positions of components prior to disassembly.



## NOTE

### Damage to materials caused by incorrect Removal of the product!

- More extensive disassembly than shown on the exploded drawing is prohibited.



## NOTE

### Material damage when opening the magnet by disturbing the equilibrium of the magnet system!

- Never disassemble the magnet.

2. Dismantle the product as shown on the exploded drawing.
3. Clean all oil and grease residues off all components with an ester-free, non-polar, soft, lint-free cloth and check for visible signs of damage.

4. Assemble the product as shown on the exploded drawing. Pay attention to the following during assembly:
  - Replace worn or damaged fixing screws.
  - Tighten all fixing screws to the specified tightening torque [see nomenclature and/or »Screw tightening torques« chapter]. When tightening the screws, do so evenly to prevent any distortion under load.
  - Only apply lubricant to the mechanical mating surfaces. Pay attention to notes about lubricants [see »Use of lubricants« chapter].
  - Avoid too much lubricant on the locating face because this can cause face run-out errors.
  - Apply grease to the sealing elements [for example O-rings, rectangular rings] and sealing surfaces. Pay attention to notes about greases [see »Use of lubricants« chapter].

## 11.4 Visual inspection

Perform a daily visual inspection of the product to identify any damage to the product at an early stage.

Check the product for cracks and damage, in particular on the clamping surfaces.

A check is also required to ensure that all fixing screws are tightened down.

If damage is detected, the relevant components must be exchanged immediately for genuine spare parts from the manufacturer.

Complete cleaning of the product is required if heavily soiled [see »Cleaning« chapter].

## 11.5 Use of lubricants

The lubricant is used exclusively for corrosion protection. For this, the following lubricants are recommended:

### **Special grease GL 261**

[see the HAINBUCH product catalogue]



#### **NOTE**

#### **Malfunction of the product due to a combination of different greases!**

- Never mix different greases with one another.
- Clean the product completely before using a different grease.

## 12 Disposal

If no agreement exists for return or disposal, send dismantled components off for recycling.



### NOTE

**Substantial damage to the environment can result from incorrect disposal of environmentally hazardous substances!**

- Lubricants, auxiliary materials and operating fluids are governed by legislation for the processing of special-category waste: All disposal to be performed by authorized waste disposal specialists.

Catch exchanged oils and greases in suitable containers and dispose of them in accordance with applicable local provisions.

The local municipal authority or specialist waste disposal companies can provide information about environmentally compliant disposal.

## 13 Faults

The following chapter describes possible causes for faults, and the work involved in remedial action.

If multiple faults occur, shorten the maintenance intervals in accordance with actual load levels.

Contact the manufacturer if faults occur that cannot be remedied by following these instructions [see »Contact« chapter].

### 13.1 Procedure with faults

This applies in all cases:

1. With faults that constitute an immediate danger to people or capital equipment, press the Emergency Stop button on the machine tool immediately.
2. Establish the cause of the fault.
3. If troubleshooting requires work to be conducted in the danger area, switch the machine tool into set-up mode.
4. Notify the person on location of the fault immediately.
5. Depending on the type of fault, get it remedied by authorized and appropriately skilled specialists.



#### INFORMATION

The troubleshooting table in the following section provides information about who is authorized to remedy a given fault.

6. In the event of a fault not caused by the product, the fault may be caused by something close to the machine tool. For this, refer to the operating instructions of the machine tool.

### 13.2 Fault table

Fault	Possible cause	Remedial action	Remedied by
Adaptation clamping device cannot be swapped in / out	Defective axial strokes in the basic clamping device	See operating instructions for the basic clamping device	
	Wrong clamping head	Use clamping head with suitable attachment geometry	Skilled specialist
Clamping force is too weak	Magnet not completely clamped	Build up clamping force completely	Skilled specialist
		Observe limits of use	

Fault	Possible cause	Remedial action	Remedied by
	Ferromagnetism of the workpiece not sufficient	Check displacement force	
	Face run-out error on the adaptation clamping device	Check face run-out of the adaptation clamping device and clean the mating surfaces and locating taper if necessary  Correct the face run-out by machining the clamping surface	
Geometry deviation on the workpiece	Soiled clamping surface	Clean the adaptation clamping device	Skilled specialist
		Correct the clamping surface by machining	
	Clamping force of basic clamping device too weak	Observe the minimum axial actuating force of the basic clamping device	
	Clamping force is too weak	See fault »Clamping force is too weak«	
Indentations on the clamping surface	Soiled clamping surface	Clean the adaptation clamping device	Skilled specialist
		Correct the clamping surface by machining	

Table 8: Fault table

### 13.3 Commissioning after a fault has been remedied

After the fault has been remedied, perform the following steps to recommission it:

1. Reset the emergency stop equipment.
2. Acknowledge the fault on the control unit of the machine tool.
3. Ensure that no-one is in the danger area.
4. Start the machine tool.

## 14 Annex

### 14.1 Contact

The following hotlines are available to you for orders, schedule tracking and emergencies.

#### **Order hotline**

Ordered quickly, supplied swiftly. Just phone:

+49 7144. 907-333

#### **Tracking hotline**

Current status of your order? Just call:

+49 7144. 907-222

#### **24 hour emergency phone line**

Has a system crash occurred, or some other technical emergency?

Our experts are there for you around the clock:

+49 7144. 907-444

For advice or help, you can contact the sales partners and service staff listed in [www.hainbuch.com](http://www.hainbuch.com).

### 14.2 Manufacturer certification

Manufacturer certification is supplied with the product and with this manual.





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