



Installation manual

EN

TOPlus mini

- pull-back
- deadlength

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1 General

1.1 Information about this manual

This manual enables safe and efficient handling of the clamping device.

The manual is a component of the clamping device and must be kept in the immediate vicinity of the clamping device where it is accessible for personnel at all times. Personnel must have carefully read and understood this manual prior to starting all tasks. The basic prerequisite for safe work is compliance with all the safety instructions and handling instructions in this manual.

Illustrations in this manual are provided for a basic understanding and may deviate from the actual model of the clamping device.

It is assumed that the reader is familiar with standard procedures, such as cleaning the mounting surfaces.

1.2 Description of variants

Two variants of the TOPlus mini clamping device are presented in this manual:

- TOPlus mini pull-back
- TOPlus mini deadlength

If the variants differ in structure, installation, disassembling and maintenance or fault correction, they will be described separately.

Based on the headers, sections and action steps can always be assigned to a specific variant.

1.3 Explanation of symbols

Safety instructions

Safety instructions are indicated by symbols in this operating manual. The safety instructions are introduced by signal words that express the scope of the hazard.

The safety instructions must be strictly adhered to. You must act prudently to prevent accidents, personal injury, and material damage.



DANGER

... indicates an imminent dangerous situation than can result in death or serious injury if it is not avoided.



WARNING

... indicates a possible dangerous situation that can result in death or serious injury if it is not avoided.



CAUTION

... indicates a possible dangerous situation that can result in minor or light injury if it is not avoided.



NOTE

... indicates a possible dangerous situation that can result in material damage if it is not avoided.

Tips and recommendations



... indicates useful tips and recommendations, as well as information for efficient and trouble-free operation.

1.4 Limitations of liability

All information and instructions in this operating manual have been provided under due consideration of applicable standards and regulations, the current state of technology, as well as our many years of experience.

The manufacturer assumes no liability for damage due to:

- Failure to follow the instructions in the manual
- Non-intended use
- Deployment of untrained personnel
- Unauthorized conversions
- Technical changes
- Use of non-approved spare parts
- Use of non-approved accessories

The actual scope of delivery can vary from the explanations and graphic representations provided in this manual in the case of special versions, if supplemental order options are desired, or on the basis of the latest technical changes.

The agreed obligations in the delivery contract, the general terms and conditions, as well as delivery conditions of the manufacturer, and the statutory regulations valid at the time the contract was concluded, apply.

1.5 Balance quality



CAUTION!

Our clamping devices are balanced with balance quality $G = 4$, in one level $n = 1$.

The data on the rotation balance refers to rotationally symmetrical workpieces.

The clamping of not rotationally symmetrical workpieces may not be clamped and/or only be clamped after consultation with the manufacturer.

Balancing bolts and balancing weights at the clamping devices may not be removed / disassembled!

1.6 Max. RPM



CAUTION!

The maximum permissible speed is marked on the product.

By the combination of a clamping device and an add on clamping device a reduction of the maximum permissible speed may be necessary.

- Of all RPMs of the groups specified, the **lowest given RPM** must always be used.

Note that the clamping force is influenced by the centrifugal force of the clamping elements.

- If necessary, adjust the machining force!

1.7 Copyright

This manual is protected by copyright and is provided exclusively for internal purposes.

Delivery of the operating manual to third parties, duplication in any form – including excerpts – as well as exploitation and/or communication of the content, are not permitted [except for internal use] without written approval from the manufacturer.

Actions to the contrary make damage compensation mandatory. We reserve the right to enforce additional claims.

1.8 Scope of delivery



All tools and accessories that are not included in the scope of delivery are marked as optional.

In scope of delivery of the clamping device:

- 1 spindle flange
- 1 clamping unit
- 1 base end-stop

Optionally the scope of delivery of the clamping device includes:

- Eye bolts
- Threaded adapter

1.9 Spare parts



WARNING!

Safety risk if the wrong spare parts are used!

Incorrect or defective spare parts can cause damage, malfunction, or total failure; they can also impair safety.

- Only use manufacturer's original spare parts.

Only purchase spare parts from authorized dealers or direct from the manufacturer. Addresses are in the appendix.

1.10 Warranty terms

The warranty terms are included in the manufacturer's terms and conditions.

1.11 CFK

Clamping devices »TOPlus mini« with carbon fiber clamping element are used in highly dynamic machines to reduce the total mass moment of inertia.



Attention!

The spindle flange in the carbon fiber design is made of aluminum!

Reduced torque for cylindrical screws:

Thread	Torque	Minimum screw-in depth
M6	9,6 Nm	12 mm
M8	23 Nm	16 mm
M10	46 Nm	20 mm



In case of visible damage or visible wear of the carbon parts:

- Further processing only after consultation with HAINBUCH.

2 Safety

This section provides an overview of all the important safety aspects for optimal protection of personnel, as well as for safe and trouble-free operation.

2.1 Responsibility of the customer

The product is used in industrial applications. Consequently the owner of the product is subject to legal industrial safety obligations.

In addition to the safety instruction in this manual, generally valid safety and accident protection guidelines, and environmental protection guidelines as well as the machines' manual must be adhered to and complied with for the area of implementation of the device.

Note in particular that the status scans of the machine must be adjusted to the respective product.



DANGER!

Risk of injury due to thrown out parts!

Incorrect machine settings may lead to the throwing out of parts.

- The status scans the machine must be set to the respective clamping device.
- Regularly check the status scans of the machine, see chapter »Maintenance Schedule«. If the end position can not be reached the product may no longer be used.
- Observe the operating instructions of the machine.



WARNING!

Risk of injury!

Declining operating force, for example by declining energy supply, may cause serious personal injury.

- The product may be used only on machines where it is ensured, that during use, the operating force does not drop.



WARNING!

Risk of injury!

An incorrect media supply [hydraulic, pneumatic], e.g. by damaged or missing seals or pipes, can cause serious personal injury.

- Hydraulic and / or pneumatic tubes must be secured by the machine by check valves and a permanent pressure monitoring!

2.2 Personnel requirements



WARNING!

Danger of injury due to insufficient qualification!

Improper handling of the clamping device can cause serious injury or material damage.

- Only have activities performed by personnel who are qualified to perform these activities.

The following qualifications are cited in the operating manual for the various activity areas.

■ **Specialized personnel**

are personnel who due to their specialized training, skills, and experience, as well as knowledge of the applicable regulations, are capable of executing the tasks assigned to them and of recognizing and avoiding possible hazards on their own.

■ **Hydraulic specialist**

The hydraulic specialist has been trained for the particular task area in which he is active and is familiar with the relevant standards and regulations. Due to his specialized training and experience the hydraulic specialist can perform tasks on hydraulic equipment and recognize and avoid possible dangers on his own.

■ **Electric specialist**

The electric specialist has been trained for the particular task area in which he is active and is familiar with the relevant standards and regulations. Due to his specialized training and experience the electric specialist can perform tasks on electric equipment and recognize and avoid possible dangers on his own.

Only persons from whom it can be expected that they reliably execute their work are considered as person-

nel. Persons whose capability to react is impaired, for instance through drugs, alcohol, or medication, are not approved.

- Comply with age-specific and job-specific regulations that are applicable at the installation site when selecting personnel.

2.3 Intended use

The clamping device is designed for installation in a machine tool according to CE compliant. Within the machine tool the clamping device is designed exclusively as a through-bore chuck for bar work and / or as an end-stop chuck for chuck work.

The clamping device should only be mounted, operated, maintained, and cleaned by instructed, specialized personnel.

Intended use also includes compliance with all the instructions in this manual.

The clamping device is to be used for the case of application contractually agreed between the producer/deliverer and the user, as well as such cases of application described in the product description which are also in accordance with the technical values.

The safe function of the clamping device is, as far as it can be foreseen, guaranteed when it is used for the intended purpose in accordance with the appropriate safety regulations.

Any use that extends beyond the intended use, or any other use of the clamping device is considered to be misuse and can cause dangerous situations.



WARNING!

Danger due to misuse!

Misuse of the clamping device can cause dangerous situations.

Particularly refrain from the following uses of the clamping device:

- Use in machines other than machine tools.
- Use in machine tools with technical data other than that specified on the clamping device.

Claims of any type due to damage arising from non-intended use are excluded.

Unintended and improper use of the Power Chuck is for

example

- If workpieces are not clamped properly
- If safety regulations are disregarded and persons are working at the clamping device without additional protective devices e.g. for machining.
- If the clamping device is used for machines or tools for which it is not intended.

2.4 Personal protective equipment

Wearing of personal protective equipment is required to minimize health hazards when working with the device.

- Always wear the protective equipment necessary for the respective task when working with the device.
- Follow the instructions that have been posted in the work area.

Always wear



For all tasks always wear:

Protective work clothing

is tight-fitting work clothing with low resistance to tearing, with tight sleeves, and without projecting parts. It is primarily used to protect against entanglement by moving machine parts.

Do not wear rings, chains, or other jewelry.



Safety footwear

for protection against heavy falling parts and slipping on slippery substrates.

For special tasks wear



Special protective equipment is required when executing special tasks. Separate reference is made to this equipment in the specific sections of this manual. This special protective equipment is explained below:

Hard hat

to protect against falling and flying parts and materials.



Protective goggles

to protect eyes from flying parts and liquid splashes.



Protective gloves

to protect hands from friction, abrasion, puncture wounds, or deeper injuries, as well as from contact with hot surfaces.

2.5 Special dangers

In the following section residual risks are cited that occur due to installation of the clamping device in a machine tool. In each case the residual risks that have been determined based on a risk analysis of the machine must be specified by the customer.

- Follow the safety instructions listed here and the warnings in the other sections of this manual to reduce health hazards and to avoid dangerous situations.

Horizontal / lying parts



WARNING!

Danger of injury due to horizontal parts!

Before transporting the clamping device in horizontal condition:

- Put the clamping device on a non-slip pad
- Screw in the eye bolts

Suspended loads



WARNING!

Life-threatening danger due to suspended loads!

Clamping device with weight more than 15 kg must be lifted with a crane. When lifting the clamping device there is a life-threatening hazard due to falling parts or parts swinging out of control.

- Never step under suspended loads.
- Comply with the instructions concerning the intended attachment points. Ensure that the sling gear is securely seated!
- Do not attach lifting gear in projecting components.
- Only use approved hoists and sling gear with sufficient bearing capacity.
- Do not use rope and belts that are torn or frayed.

Moving parts



WARNING!

Danger of injury due to moving parts!

Rotating parts of the clamping device can cause serious injuries.

- Do not reach into moving parts or handle moving parts during operation.
- Pay attention to the clearance of moving parts.
- Do not open covers when the device is in operation.
- Be aware of afterrun time:
Prior to opening the covers ensure that all parts have come to a standstill.
- Wear tight-fitting protective work clothing in the danger zone.

Wrong clamping of the workpiece



WARNING!

Danger of injury due to incorrect clamping of the workpiece!

Incorrect workpiece clamping may lead to the ejection of the workpiece and result in serious injuries.

Under dimensioned parts can lead to incorrect clamping!

- Check the unmachined workpieces at random on dimensional accuracy.

Too low axial clamping force can lead to the reduction of radial clamping force!

Too high axial clamping force can lead to damage of the components of the clamping device!

- Check and adjust, if necessary, the axial clamping force regularly.

Missing changing parts



WARNING!

Danger of injury due to missing changing parts!

When operating the clamping device without changing parts [clamping heads, work piece end-stops] there is a higher danger of crushing injuries due to the stroke of movable components of the clamping device.

- The clamping process may not be initiated without assembled clamping heads and/or work piece end-stop.

Parts with sharp edges



WARNING!

Risk of injury!

When screwing in individual components such as for example work piece end-stops, threaded adapters and similar devices that are equipped with an external thread or wear caused by burrs, there is risk of cutting.

- The operation must be done only by qualified personnel.
- Wearing of gloves / [PSA] is required!



CAUTION!

Risk of injury!

A special use-dependent or job-based design can result in variations in the clamping strokes and thus the clamping force.

- The notes on the associated clamping situations or product drawing must always be observed

2.6 Further warnings



WARNING!

Risk of injury!

Never reach for the clamping device while the spindle is rotating. Before starting to work on the mandrel, make sure the machine spindle cannot be put in motion.

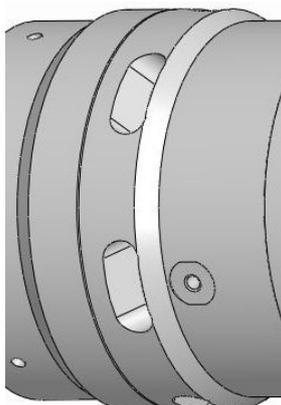


Fig. 1



CAUTION!

Risk of injury through slots and / or holes!

The clamping device can be provided with large slots and/or holes [e.g. chips drain holes].

- **Never** reach into the slots and/or holes, either during assembly / disassembly as well as during machining.



WARNING!

Risk of injury!

Falling down of the clamping device or its parts can cause severe bruises and fractures.

The dead weight of the clamping device or its parts can lead to high physical stress.



WARNING!

Risk of injury!

By repeated reworking or wear and tear of the clamping surfaces sharp edges and burrs may appear and lead to severe cutting damages.



WARNING!

Risk of injury!

Escaping [sprayed out] hydraulic oil from adjacent machine components can cause serious personal injuries.

- Make sure that all O-rings / seals for the hydraulic and/or pneumatic connections are available and undamaged!



WARNING!

Damage of clamping device!

The clamping device may be released exclusively in the non-rotating condition!

2.7 Clamping force

The achieved clamping force can vary due to the maintenance condition of the clamping device [state of lubrication and degree of contamination] [see chapter »Maintenance«].

The clamping force must be checked at regular intervals. This requires the use of static clamping force measuring devices.



CAUTION!

Damages due to excessive draw and compressive force!

An excessive draw force and/or compressive force may damage the clamping device and/or the drawtube adapter.

- The max. draw force and compressive force may not be exceeded.

2.8 Screws

Moving parts



WARNING!

Danger of injury due to screws and stud screws being accelerated out of the device!!

Screws and stud screws radially attached to the product can be accelerated out of the device and cause severe injuries.

- At the product radially mounted screws and stud screws which were loosened for assembly and maintenance must be re-tightened with the correct tightening torque!
The tightening torque is given at the product itself, near the screw or threaded pin, and/or given in chapter »Bolt torque«.
- All screws or stud screws that are not marked with a tightening torque specification are tightened with the prescribed tightening torque and locked [medium-strength bonding] in the factory and should only be unscrewed after consultation with the manufacturer. If in doubt you must contact the manufacturer immediately do determine the subsequent procedure.

2.9 Functionality



NOTICE!

With high contamination of the clamping device the functionality is no longer guaranteed.

- The cleaning and maintenance intervals must be observed.

2.10 Implementation limits

Clamping head chucks are designed and developed for location of workpieces for machining of rotationally-symmetric workpieces. Other fields of application require an explicit approval by the manufacturer.

The chucks are also subject to limits in the area of machining of workpieces.

Specifically, prior to using the chucks, four limits that are independent of each other must be checked.

2.10.1 Nomenclature

Brief description	Unit	Explanation
a_p	mm	Depth of cut, turning operation
c	-	Contact factor
D_B	mm	Drill bit diameter
d_{sp}	mm	clamping diameter
d_z	mm	Machining \varnothing turning operation
f	mm	Feed / turn turning operation Feed / cutting edge drilling operation
F_B	N	Feed force, drilling operation
F_c	N	Cutting force, turning operation
$F_c \text{ max}$	N	Max. cutting force, turning operation
F_{fz}	N	Clamping force contingency for rotation compensation
F_G	N	Weight force, workpiece
f_n	mm	Feed / turn drilling operation
F_q	N	Transverse force
$F_q \text{ max}$	N	Max. permissible transverse force
F_{rad}	N	Radial clamping force
F_{raderf}	N	Required radial clamping force
F_{sk}	N	Clamping force for preventing the workpiece from levering out
F_{sz}	N	Clamping force for location of the machining forces and machining moments when turning or drilling in the direction of the chuck axis
F_t	kN	Tailstock force
$F_t \text{ max.}$	kN	Max. tailstock force
kc	N/mm ²	Specific cutting force

Brief description	Unit	Explanation
L_a	mm	unclamping length
L_g	mm	Distance, center of gravity - workpiece - clamping position
L_q	mm	Distance: „radial drilling – clamping position“
L_{sp}	mm	clamping length
L_{spmin}	mm	Minimum required clamping length
L_w	mm	Workpiece length
L_z	mm	Distance: „machining point – clamping position“ when turning
m	kg	Mass of the clamping head
m_w	kg	Workpiece mass
M_B	Nmm	Torque, drilling operation
M_q	Nm	Moment due transverse force relative to the chuck axis
M_{qmax}	Nm	Max. Max. moment due to transverse force relative to the chuck axis
n	1/min	Speed
p	-	Machining code
rs	mm	Distance center of mass SK segment relative to the axis of rotation of the chuck
S	-	Clamping force spread factor
μ_a	-	Coefficient of friction in the axial direction
μ_t	-	Coefficient of friction in the radial direction

The following sketch is provided for graphic illustration of the forces and torques used below in the calculating examples:

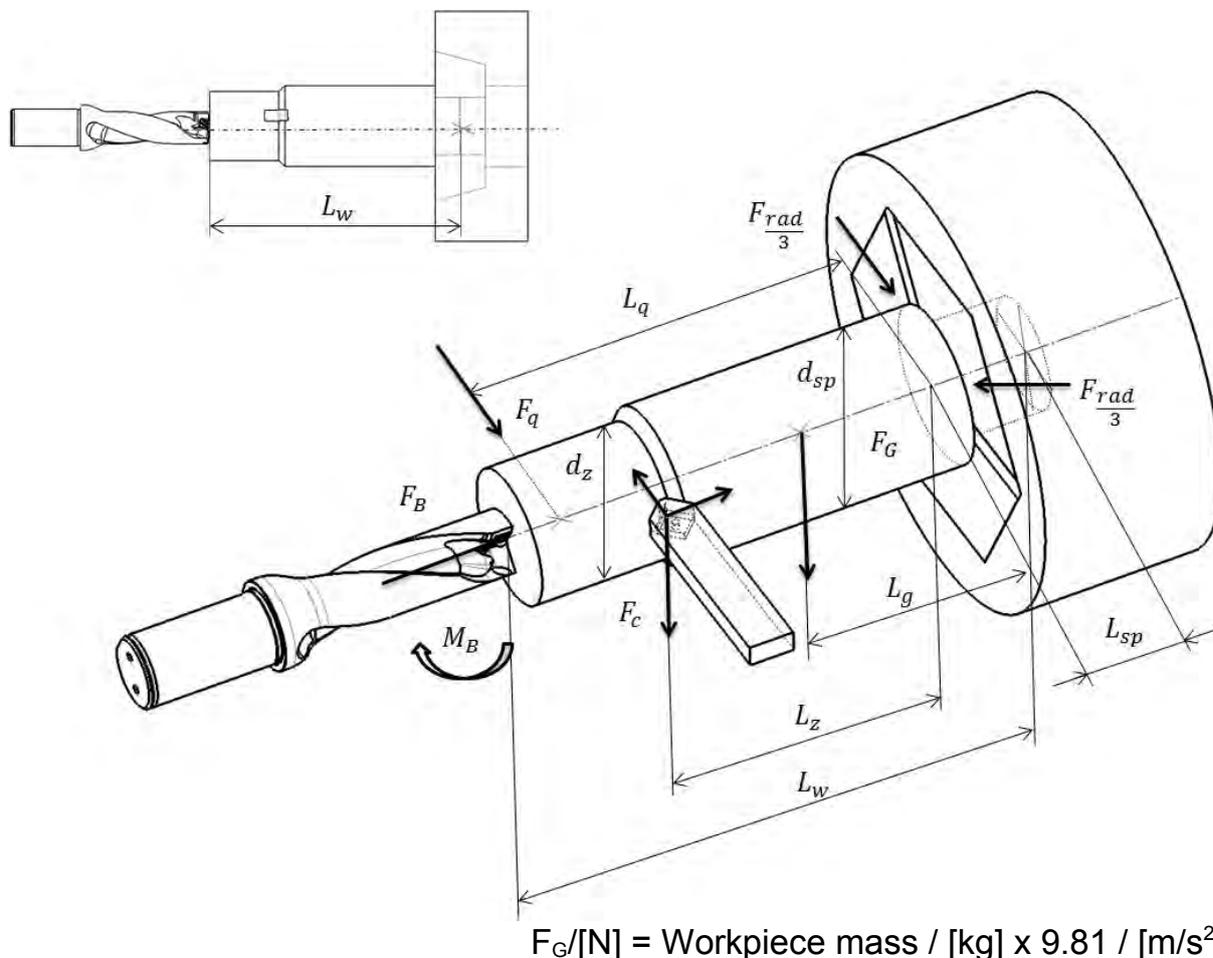


Fig. 2

**2.10.2 First limit
[workpiece
length]**

The max. unclamping length that can be machined without the aid of steady rest or tailstock is specified at max. 6x the clamping diameter.

**2.10.3 Second limit
[workpiece
mass]**

The maximum workpiece mass depends on the chuck size and is shown in Table 1. [Values apply for individual workpieces; separate limit values apply for bar work]

Chuck size	Max. workpiece mass [m_w/kg]	
	Horizontal use	Vertical use
26	8	12
40	18	22
52	28	40
65	40	60
80	50	75
100	65	100
125	80	120

Table 1: Max. workpiece mass

2.10.4 Third limit [clamping length]

Minimum clamping length within the chuck taper $L_{sp,min}$.

[Attention! In this regard clamping head extension lengths remain completely unconsidered].

General $L_{sp} \geq 0,08 \cdot d_{sp}$

Moreover, the following also applies:

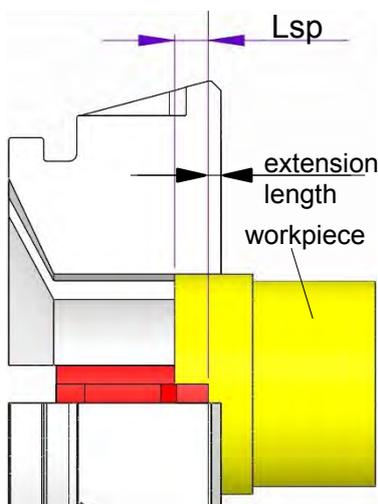


Fig. 3

$L_{sp} \geq 2,8 \text{ mm}$

[Use of clamping heads with smooth clamping bore]

$L_{sp} \geq 13 \text{ mm}$

[Use of clamping heads with longitudinal and radial grooves]¹

$L_{sp} \geq 7 \text{ mm}$

[Use of clamping heads with Z-serration]

$L_{sp} \geq 5 \text{ mm}$

[Use of clamping heads with F-serration]

2.10.5 Fourth limit [forces]

The forces acting on the workpiece from the outside. Determination of these forces is explained in the following calculation approach.

In this regard it must be determined whether

1. the clamping force necessary for absorbing the external forces and torques, can be applied through the clamping device.
2. the clamping device is damaged visibly or in a manner that is not apparent through the external forces.

¹ Values that deviate from the above apply for use of clamping heads with a closed first duct; these values could even be higher. If required these values must be requested from the manufacturer.

The forces and moments acting on the clamping element [clamping head] and ultimately on the clamping device [chuck] are essentially

- a) Machining forces and machining moments that must be absorbed
- b) The weight force of the workpiece itself,
- c) Centrifugal forces due to the weight of the clamping head
- d) Tailstock forces

Principles for the forces acting on the workpiece from the outside



NOTE!

For safe machining², the following must apply at all times:

1. Principle $F_{\text{rad}} \geq F_{\text{raderf}}$

AND

2. Principle $F_t \leq F_{t_{\text{max}}}$

AND

3. Principle $F_c \leq F_{c_{\text{max}}}$

[Relevant for turning jobs or axial drilling operation]

AND

4. Principle $F_q \leq F_{q_{\text{max}}}$

[relevant in the case of a radial drill operation directed at the center or at an equivalent³ load]

AND

5. Principle $M_q \leq M_{q_{\text{max}}}$

[relevant in the case of a radial drill operation directed at the center or at an equivalent³ load]

² With these principles it is assumed that the chuck is used for turning jobs or for axial or radial drill operation on the workpiece. The possibility that the chuck can also be used for other machining tasks, such as peripheral milling or plunge milling, is not fundamentally excluded. However, in this regard the user must ensure that the forces and moments occurring in the process are compared with the permissible equivalent values of a turning process or drilling process in order to verify the permissibility of the application.

³ If radial forces and the resulting moments are not directed towards the center, this can be taken into account through a quasi-cutting force outside the center.

2.10.5.1 For principle 1: $F_{rad} \geq F_{raderf}$

Determination of the required clamping force

Determination of the required clamping force F_{raderf} at speed.

The equations apply for longitudinal turning operations, as well as face turning operations. Drilling operations on the face of the workpieces can also be calculated. Overlaid, simultaneous processing, e.g. through multiple tools or turrets, must also be mathematically overlaid, i.e. the required radial clamping forces of the individual machining procedures must be added.

However axial drilling and turning jobs are rarely overlaid; because as a rule, they cannot run simultaneously, due to opposite directions of rotation.

For the calculation, the point with the highest forces, i.e. the most unfavorable torque of the machining must serve as the mathematical basis. If in doubt, a check of multiple cutting edge engagement situations is required to determine the most unfavorable.

If radial drilling operations are undertaken, in addition to determination of the required, radial clamping force F_{raderf} , primarily verification of the introduced transverse force F_q and the resulting moment Mq also play a central role.

Spread of the clamping force

Chuck size SPANNTOP	Radial clamping reserve in diameter [mm]	Clamping force spread factor S ⁴	Clamping force spread factor S »verified« ⁵
26	0,6	2,0 ⁶	1,3
40	0,8	1,7 ⁶	1,3
52	1,0	1,7 ⁶	1,3
65	1,0	1,6 ⁶	1,3
80	1,0	1,6 ⁶	1,3
100	1,5	1,6	1,3
125	2,5	1,6	1,3

Table 2: Spread of the clamping force

4 These values are based on a regularly maintained and lubricated operating status as specified in the operating manual.

5 If the radial clamping force is measured before each commissioning, and continuously every 100 clamping set-ups, with a measuring device that is suitable for this purpose, then work can be performed with the reduced clamping force spread factor shown.

6 If due to more dimensionally accurate workpieces the radial clamping reserve of the chuck [see Table 2] is only utilized up to a limit of 50%, the clamping force spread factor can be reduced by a factor of 0.85 [example: TOPlus size 52 $S=2.0 \cdot 0.85=1.7$].

Forms of contact

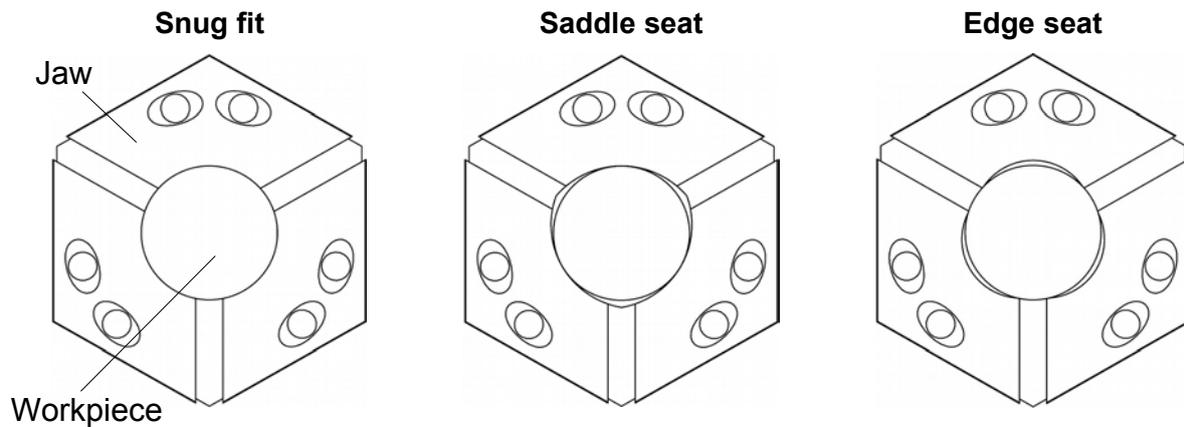


Fig. 4: Forms of contact between smooth top jaws and workpiece

Contact case

Snug fit	The clamping diameter of the clamping head is equal to the clamping diameter on the workpiece.
Saddle seat	The clamping diameter of the clamping head is greater than the clamping diameter on the workpiece.
Edge seat	The clamping diameter of the clamping head is less than the clamping diameter on the workpiece.

Contact factor c	Machining conditions	Snug fit and saddle seat	Edge seat
Smooth clamping head	Dry	1,1	1,0
	Wet or MQL ⁷	1,3	1,2
Clamping head with longitudinal or transverse serration	Dry	1,1	1,0
	Wet or MQL 7	1,3	1,2
Clamping head with Z-serration or F-serration	Dry	1,0	1,0
	Wet or MQL 7	1,2	1,1

Table 3: Contact factor

Specific cutting forces k_c [N/mm²]

Corresponding to the relatively imprecise classification of the materials, these are guide values. Thus, in some case greater deviations relative to the real values can be present.

For deviating workpiece materials, or for machining tasks in the limit area of the clamping device, the respective k_c values of the material that will be machined must be precisely determined, or requested from the supplier of the material.

⁷ Wet machining
MMS [MQL]:

Use of cooling lubricant [CLF]
Use of minimum quantity lubrication

Workpiece materials		Specific cutting forces k_c [N/mm ²] at $f=0.1$ mm ^{8,9,10}	Specific cutting forces k_c [N/mm ²] at $f=0.5$ mm ^{11,12}	Specific cutting forces k_c [N/mm ²] at $f=1.0$ mm ^{13,14}
Gray cast iron	e.g. EN-GJL-250	1980	1260	900
Nodular cast iron [unhardened]	e.g. EN-GJS-400-15	2120	1190	1060
Unalloyed/low-alloy construction steels [with average strength] / case-hardened steels [unhardened]	e.g.: S235JR [1.0037] S275JR [1.0044] Ck10 [1.1121] 16MnCr5 [1.7131] 18CrNi8 [1.5920]	2920	1840	1500
Unalloyed/low-alloy construction steels [unhardened, with high strength]	S355J2G3 [1.0570] E360 [1.0070]	3350	2000	1600
Heat-treated steels [prehardened]	C45 [1.0503] C60 [1.0601] 42CrMo4 [1.7225] 34CrNiMo6 [1.6582]	2850	1960	1660
Unalloyed/low-alloy tool steels [unhardened]	C105W1 [1.1545]	3100	2100	1690
Machining steels	35S20 [1.0726] 60S20 [1.0728]	1700	1480	1400
Stainless steels		3600	2450	2100
Hardened steels		4800		
Aluminum wrought-alloy <16%Si		1340	900	750
Aluminum cast-alloy <16%Si		1520	1000	850
Brass		1300	850	700

Table 4: Specific cutting forces k_c / [N/mm²]

- 8 For feeds, between 0.1 and 0.5 mm you must interpolate.
For feeds >0.5 mm, the values of column $f=0.5$ mm must be used.
- 9 For drilling operations with double-edged tools $f=fn/2$ applies
- 10 For feeds, between 0.05 and 0.1 mm the value at $f=0.1$ with 20% contingency must be used.
- 11 For feeds, between 0.1 and 0.5 mm you must interpolate.
For feeds >0.5 mm, the values of column $f=0.5$ mm must be used.
- 12 For drilling operations with double-edged tools $f=fn/2$ applies
- 13 For feeds, between 0.5 and 1.0 mm you must interpolate.
- 14 For drilling operations with double-edged tools $f=fn/2$ applies

Coefficients of friction

For workpieces of a material other than steel, the values shown must be multiplied with the correction values specified below.

For hardened steel as the material, the values of the smooth clamping heads always apply for ground workpiece surfaces.



NOTE

Clamping of hardened materials or materials with extremely high strength values [$R_m > 1300 \text{ N/mm}^2$] is only permitted with clamping heads with smooth, longitudinal and transverse serration!

Other clamping head designs can be damaged and lose their capacity of achieving higher coefficients of friction with soft materials.

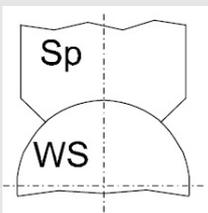
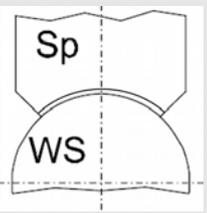
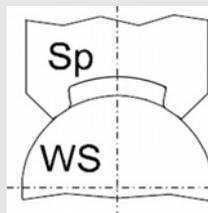
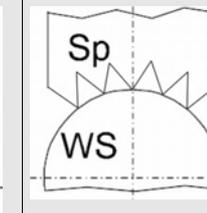
Workpiece surface	Clamping surface			
				
	Smooth clamping head	Clamping head with longitudinal and transverse serration	Clamping head with Z-serration	Clamping head with F-serration
Finely finished, ground	$\mu_t = 0,06$ $\mu_a = 0,08$	$\mu_t = 0,07$ $\mu_a = 0,09$	$\mu_t = 0,15$ $\mu_a = 0,20$	$\mu_t = 0,17$ $\mu_a = 0,22$
Smoothed to roughed	$\mu_t = 0,10$ $\mu_a = 0,13$	$\mu_t = 0,11$ $\mu_a = 0,15$	$\mu_t = 0,18$ $\mu_a = 0,25$	$\mu_t = 0,23$ $\mu_a = 0,28$
Rough machined or unmachined	$\mu_t = 0,14$ $\mu_a = 0,16$	$\mu_t = 0,16$ $\mu_a = 0,18$	$\mu_t = 0,20$ $\mu_a = 0,28$	$\mu_t = 0,25$ $\mu_a = 0,30$
Material correction values	Aluminum alloys = 0,97 Ms 58 = 0,92 GG-18 = 0,80			

Table 5: Friction coefficient for steel workpieces

SK mass m / [kg] and distance rs from the center of mass of clamping head segments to the axis of rotation / [m]		
Distance of center of mass rs in the smallest position		
SK – size	rs / [m]	SK mass m / [kg]
26	0,013	0,24
40	0,018	0,65
52	0,022	0,95
65	0,026	1,60
80	0,032	1,80
100	0,040	3,40
125	0,062	6,80

Table 6: SK mass m / [kg] and distance rs from the center of mass of clamping head segments to the axis of rotation / [m]



S	from table 2
c	from table 3
kc	from table 4
μ_a, μ_t	from table 5
r_s, m	from table 6

I

$$F_{raderf} = S * c * (1,6 * (F_{sz} + F_{sk}) + F_{fz})$$



The factor 1.6 takes possible fluctuations in machining that occur force into account.

II

$$F_{sz} = 1,3 * \sqrt{\left(\frac{F_c * d_z + 2M_B}{d_{sp} * \mu_t}\right)^2 + \left(\frac{F_c + F_B}{\mu_a}\right)^2}$$

Turning [inside & outside]

$$F_c = 1,3 * a_p * f * kc$$

Drilling

[full drilling, two-edged tool in the central direction of the workpiece axis]

$$F_B = 0,45 * D_B * f_n * kc$$

$$M_B = \frac{f_n * D_B^2 * kc}{5700}$$

For calculation of the machining forces, a degree of blunting that corresponds to a wear mark width of 0.3 mm is taken into account.

III

$$F_{sk} = \frac{(0,27 * L_z / dsp + 0,63) * \sqrt{(F_c * L_z + F_G * L_g)^2 + (F_c * p)^2}}{0,5 * (0,67 * (1,9 * Lsp - 4,5 \text{ mm}) + \mu_a * dsp)}$$

Longitudinal turning: $p = \frac{dz}{2}$

Face turning/plunging: $p = L_z$

If the workpiece is supported with a tail-stock, further calculation with 20% of the computed F_{sk} suffices.

IV

$$F_{fz} = (m * r_s) * \left(\frac{\pi * n}{30}\right)^2$$

In accordance with the principle defined above, this means that the radial clamping force of the chuck must at least equal the calculated, required radial clamping force F_{raderf} , in order to execute this machining task using the chuck.

If this condition is not satisfied, then the chuck is not suitable. The machining task must not be executed in this manner.

For clamping and machining of workpieces with greater concentricity errors and face runout, note that the clamping cross section fluctuates significantly. The resulting punctiform increase of the cutting force must be considered separately.

Radial drilling

For radial drilling operations, determination of the radial clamping force F_{raderf} likewise occurs in accordance with the approach

$$F_{raderf} = S * c * (1,6 * (F_{sz} + F_{sk}) + F_{fz})$$

however the components F_{sz} and $F_{fz}=0$ can be used, which results in a simplified form [pure transverse force]:

$$F_{raderf} = S * c * 1,6 * F_{sk}$$

For drilling that engages radially to the clamping device axis, determination of F_{sk} can be calculated similarly to formula III as follows:

$$F_{sk} = \frac{(0,27 * Lz / dsp + 0,63) * (F_q * L_z + F_G * L_g)}{0,5 * (0,67 * (1,9 * Lsp - 4,5 \text{ m m}) + \mu_a * dsp)}$$

For calculation of F_q see section 2.10.5.4

$$F_q = F_B = 0,45 * D_B * f_n * kc$$

2.10.5.2 For principle 2: $F_t \leq F_{tmax}$ ¹⁵

Tailstock force

Due to the additional spreading force on the chuck, the max. permissible tailstock force is limited to the following values in accordance with the chuck size:

Chuck size	Ft max / [kN]
26	2
40	4
52	6
65	8
80	8
100	8
125	8

Table 7: Maximum permissible tailstock force

¹⁵ With use of a tailstock, by using an end-stop in the chuck, it must be ensured that the workpiece cannot be axially displaced.

2.10.5.3 For principle 3: $F_c \leq F_{cmax}$

The cutting force for turning operations can take on extremely high values, particularly with short projection lengths of the workpiece, although fundamentally processing without slip or levering out of the clamping set-up would still be possible. Consequently, this cutting force must also be limited in accordance with chuck size, to avoid chuck damage.

Chuck size	Maximum chuck length [mm]	Fc max / [N]
26	< 120	1.600
40	< 125	3.200
52	< 125	3.600
65	< 140	5.000
80	< 140	6.000
100	< 160	8.000
125	< 200	12.000

Table 8: Maximum permissible cutting force

With extended chuck length, the maximum permissible cutting force must be reduced in the ratio of the feed lengths, e.g. size 26, L=150mm

$$\frac{120\text{mm}}{150\text{mm}} * 1600\text{N} = 1280\text{N}$$

2.10.5.4 For principle 4: $F_q \leq F_{qmax}$

For drilling tasks radial to the workpiece axis, due to the feed force of the tool, transverse forces occur that ultimately act on the chuck. This load when drilling must be viewed as equivalent to the cutting force when turning, and consequently it must also be limited. The permissible maximum values are provided in the table below.

Occurring feed force F_B when drilling [transverse force]

[Full-drilling, two-edged tool, machining direction 90° transverse to the chuck axis]

$$F_q = F_B = 0,45 * D_B * f_n * k_c$$



kc from table 4

Chuck size	Maximum chuck length [mm]	Fq max / [N]
26	< 120	1.800
40	< 125	3.600
52	< 125	4.200
65	< 140	6.000
80	< 140	7.200
100	< 160	9.000
125	< 200	13.000

Table 9: Maximum permissible transverse force

With extended chuck length, the maximum permissible cutting force must be reduced in the ratio of the feed lengths, e.g. size 26, L=150mm

$$\frac{120\text{mm}}{150\text{mm}} * 1800\text{N} = 1440\text{N}$$

2.10.5.5 For principle 5: $Mq \leq Mq \text{ max}$

For drilling tasks radial to the workpiece axis, the transverse force verified under principle 4 generates an additional torque Mq on the clamping head or on the chuck. This moment as well must not limitlessly increase without the chuck being damaged, although perhaps the clamping set-up would nonetheless still securely clamp the workpiece. Again, the table below shows the permissible maximum values.

Occurring torque Mq through introduction of the transverse force Fq

$$Mq = Fq * Lq$$

Chuck size	Maximum chuck length [mm]	Mq max [Nm]
26	< 120	90
40	< 125	180
52	< 125	210
65	< 140	300
80	< 140	360
100	< 160	450
125	< 200	650

Table 10: Maximum permissible moment Mq due to transverse force Fq

With extended chuck length, the maximum permissible cutting force must be reduced in the ratio of the feed lengths, e.g. size 26, L=150mm

$$\frac{120\text{mm}}{150\text{mm}} * 900\text{Nm} = 72\text{Nm}$$

2.10.6 Sample calculation

Applied to a specific example

Longitudinal turning of an offset shaft of 16MnCr5 [pre-machined clamping diameter] without tailstock support in horizontal position.

Workpiece data

- Clamping diameter $d_{sp} = 60 \text{ mm}$
- Workpiece length $L_w = 150\text{mm}$ [151.5mm roh]
- Machining diameter – turning operation
 $d_z = 57,0 \text{ mm}$
- Workpiece mass $m_w = 3,3 \text{ kg}$
 $\rightarrow F_G = m_w * 9,81 \text{ m/s}^2$
 $\rightarrow F_G = 33 \text{ N}$

Process data

- Speed $n=800 \text{ 1/min}$
- Feed $f=0,25 \text{ mm}$
- Depth of cut $a_p=1,5 \text{ mm}$
- Use of cooling lubricant
- Clamping length $L_{sp}=20 \text{ mm}$

Chuck

- TOPlus pull-back size 65
- Clamping head used:
D=60 mm, smooth, extension length=3 mm

Detailed consideration

The first condition, namely that the workpiece length may equal up to six times the clamping diameter, is satisfied.

The second condition, namely that the workpiece mass must not exceed 40 kg, at chuck size 65 is satisfied.

The third condition, that the workpiece must be clamped at least $0.08 \cdot d_{sp} = 0.08 \cdot 60 \text{ mm} = 4.8 \text{ mm}$, is more than satisfied with clamping length 20 mm – 3 mm extension length = 17 mm.

To verify the fourth condition, first it is necessary, in accordance with principle 1, to determine the required radial clamping force.



S	from table 2
c	from table 3
kc	from table 4 [interpolated for f=0.25]
μ_a, μ_t	from table 5
m, r_s	from table 6

$$F_{raderf} = S \cdot c \cdot (1,6 \cdot (F_{sz} + F_{sk}) + F_{fz})$$

from table 2: S=1,6

from table 3: c=1,3

$$F_{raderf} = 1,6 \cdot 1,3 \cdot (1,6 \cdot (F_{sz} + F_{sk}) + F_{fz})$$

$$F_{sz} = 1,3 \cdot \sqrt{\left(\frac{(F_c \cdot d_z + 2M_B)^2}{d_{sp} \cdot \mu_t}\right) + \left(\frac{F_c + F_B}{\mu_a}\right)^2}$$

from table 5: $\mu_t = 0,14$
 $\mu_a = 0,16$

$$F_{sz} = 1,3 \cdot \sqrt{\left(\frac{1226 \text{ N} \cdot 57 \text{ mm}}{60 \text{ mm} \cdot 0,14}\right)^2 + \left(\frac{1226 \text{ N}}{0,16}\right)^2} = 14.703 \text{ N}$$

Turning:

$$F_c = 1,3 \cdot 1,5 \text{ m} \cdot 0,25 \text{ m} \cdot 2515 \frac{\text{N}}{\text{m} \cdot \text{m}^2}$$

$$F_c = 1226 \text{ N}$$

Drilling:

Here not relevant, because drilling is not intended. Consequently

$$M_B = 0 \text{ Nmm}$$

$$F_B = 0 \text{ N}$$

$$F_{sk} = \frac{(0,27 * L_z / dsp + 0,63) * \sqrt{(F_c * L_z + F_G * L_g)^2 + (F_c * p)^2}}{0,5 * (0,67 * (1,9 * L_{sp} - 4,5 \text{ m m}) + \mu_a * dsp)}$$

$$F_{sk} = \frac{(0,27 * 133 \text{ mm} / 60 \text{ mm} + 0,63) * \sqrt{(1226 \text{ N} * 133 \text{ mm} + 33 \text{ N} * 75 \text{ mm})^2 + (1226 \text{ N} * 28,5 \text{ m m})^2}}{(0,5 * (0,67 * (1,9 * 17 \text{ mm} - 4,5 \text{ m m}) + 0,16 * 60 \text{ mm}))}$$

$$F_{sk} = \frac{207.838 \text{ Nm m}}{14,11 \text{ m m}} = 14.727 \text{ N}$$

$L_z = L_w = 133 \text{ mm}$, because the shaft on the front end should be longitudinally finished-turned.

$L_g = 75 \text{ mm}$, because the center of gravity is in the middle of the longitudinal workpiece axis.

$L_{SP} = 17 \text{ mm}$, corresponds to the full clamping length minus the extension length of the clamping head

$$p = \left(\frac{d_z}{2}\right) = \frac{57}{2} = 28,5$$

, because of longitudinal turning operation

$$F_{fz} = (m * rs + q) * \left(\frac{\pi * n}{30}\right)^2$$

from table 6: $m = 1,60 \text{ kg}$
 $rs = 0,026 \text{ m}$

$$F_{fz} = (1,6 \text{ kg} * 0,026 \text{ m}) * \left(\frac{\pi * 800 \frac{1}{\text{min}}}{30}\right)^2 = 292 \text{ N}$$

$$F_{raderf} = 1,6 * 1,3 * (1,6 * (F_{sz} + F_{sk}) + F_{fz})$$

$$F_{raderf} = 1,6 * 1,3 * (1,6 * (14.703 + 14.727) + 292) = 97.525 \text{ N}$$

$$F_{raderf} = 98 \text{ kN}$$

Because the size 65 chuck can apply a maximum radial clamping force $F_{rad} \text{ max.} = 120 \text{ kN}$, principle 1 would thus be satisfied.

In this example principle 2 is not relevant, because you are working without tailstock anyway.

Principle 3 would also be satisfied because the calculated cutting force of $F_c = 1226 \text{ N}$ is far below the limit of 4500 N .

In this example, principles 4 and 5 are again irrelevant because both principles must only be considered for radial drilling work.

Result of the sample calculation

All four limits are verified.

At full axial loading of the chuck with $F_{ax}=45\text{kN}$ a nominal 120 kN is applied radially on the workpiece. This satisfies the condition $F_{rad} \geq F_{raderf}$.

Thus the machining can be executed.

It must be ensured that the chuck is in good condition relative to degree of contamination and lubrication.

A check of the radial clamping force with a suitable clamping force gauge must be executed in advance of the machining as a precautionary measure. The values determined in this process must be within the range shown in section 3.2.1 »Clamping force diagram « shown for RPM.

2.11 Environmental protection



NOTE!

Environmental hazard due to incorrect handling!

Incorrect handling of environmentally hazardous substances, particularly improper disposal, can cause significant environmental damage.

- Always comply with the instructions cited below
- If environmentally harmful substances should inadvertently get into the environment, initiate suitable measures immediately. If in doubt notify the responsible municipal authority about the damage.

The following environmentally harmful substances are used:

Lubricants

Lubricants like greases and oils can contain toxic substances. Ensure that they do not get into the environment.

The device must be disposed of by a specialized disposal company.

To achieve trouble-free operational performance of the clamping device only use HAINBUCH lubricants. See the appendix for reference addresses.

3 Technical data

3.1 General Information

Size	Variant	Clamping range [mm]	Release stroke radial [mm]	Clamping reserve radial [mm]	Weight clamping device [kg]	Weightn spindle flange [kg]	Weight clamping unit [kg]	Dimensions clamping unit [\emptyset x length in mm]	Connection spidnele flange [\emptyset in mm]	RPM max. [1/min]	Clamping force F_{ax} max. [kN]	Clamping force F_{rad} max. [kN]	Tailstock force max. [kN]
26	pull-back	4-26	2	1	3,7	1,2	2,5	\emptyset 113x55,5	KK4 KK5	10000	16	35	4 ¹⁶
	deadlength				3,9	1,2	2,6	\emptyset 113x55	KK4 KK5	10000	16	35	4
40	pull-back	4-40	2	2	6,4	2,2	4,2	\emptyset 131x70	KK4 KK5 KK6 IP120	7000	33	103	4 ¹⁶
	deadlength				7	2,5	4,5	\emptyset 132x69	KK4 KK5 KK6 IP120	7000	33	103	4
52	pull-back	4-52	2,5	2	8,4	2,4	6	\emptyset 147x67	KK4 KK5 KK6 IP120 IP140	7000	40	108	8 ¹⁶
	deadlength				8,2	2,3	5,9	\emptyset 147x66	KK4 KK5 KK6 IP120 IP140	7000	40	108	8

KK = short taper size, IP = inner fit dimensions

¹⁶ When using an end-stop, F_{rad} max is significantly lower.

TOPlus mini – Technical data

Size	Variant	Clamping range [mm]	Release stroke radial [mm]	Clamping reserve radial [mm]	Weight clamping device [kg]	Weightn spindle flange [kg]	Weight clamping unit [kg]	Dimensions clamping unit [ø x length in mm]	Connection spidnele flange [ø in mm]	RPM max. [1/min]	Clamping force F _{ax} max. [kN]	Clamping force F _{rad} max. [kN]	Tailstock force max. [kN]
65	pull-back	5 - 65	2,5	2	11,4	4,4	7	ø160x73	KK5 KK6 KK8 IP140 IP170 IP220	6000	45	120	8 ¹⁷
	deadlength				15,2	7,3	7,9	ø166x71	KK5 KK6 KK8 IP140 IP170 IP220				8
100	pull-back	16 - 100	5	3	28	11,1	16,9	ø216x95	KK5 KK6 KK8 KK11 IP 170 IP 220	5000	65	172	8 ¹⁷
	deadlength				30,5	11,9	18,6	ø220x99	KK5 KK6 KK8 KK11 IP 170 IP 220				8

KK = short taper size, IP = inner fit dimensions



At an extended clamping device length the specified total weight deviates!



For special variants, there are deviations from the above-mentioned table.

- Consider possibly the accompanying drawings.

¹⁷ When using an end-stop, F_{rad} max is significantly lower.



WARNING!

Risk of injury!

Using false technical data can lead to serious personal injury and property damage.

- The technical data [label on the product, assembly drawing] must be observed and may not be modified by the operator!

3.2 Clamping force diagram

In the diagrams, the effects of friction and the clamping diameter are included.



NOTE!

The measured values for the radial clamping force F_{rad} may not leave the permitted area. Under optimal conditions, the values for F_{rad} are below the top, in bad conditions above the lower limit.

- If the measured clamping forces are outside the allowed range, the maintenance is mandatory to perform. After servicing, the clamping forces have to be re-examined.
- If the clamping force even after the maintenance is not in the permitted area please contact the manufacturer.

Example for size 52:

With an axial force F_{ax} of 25 kN the radial clamping force F_{rad} is, depending on the maintenance state of the clamping device, in the range between 37 kN and 67.7 kN. He must not be less than 37 kN.

3.2.1 Clamping force diagram – TOPlus size 26

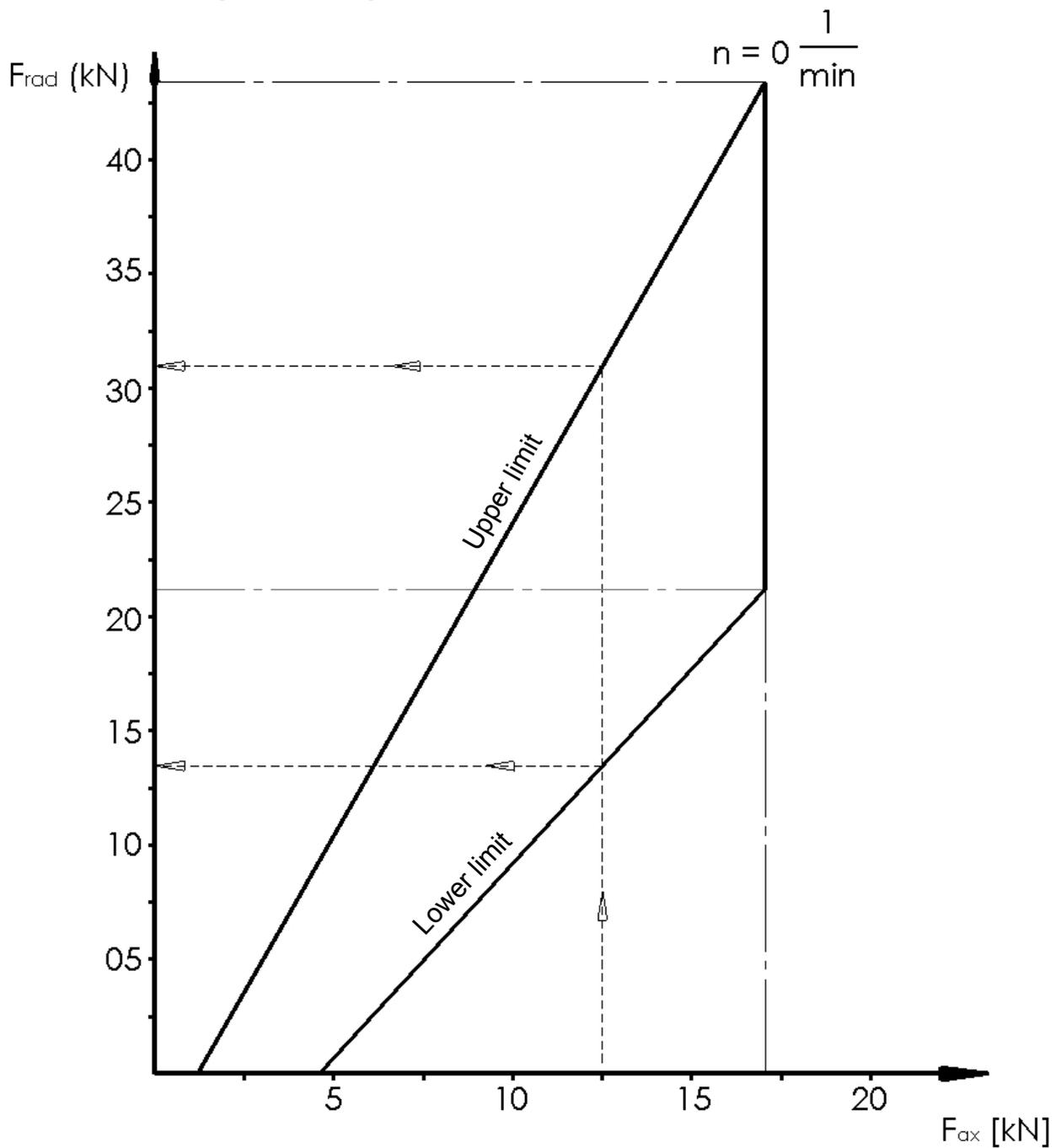


Fig. 5

TOPlus mini – Technical data

3.2.2 Clamping force diagram – TOPlus size 40

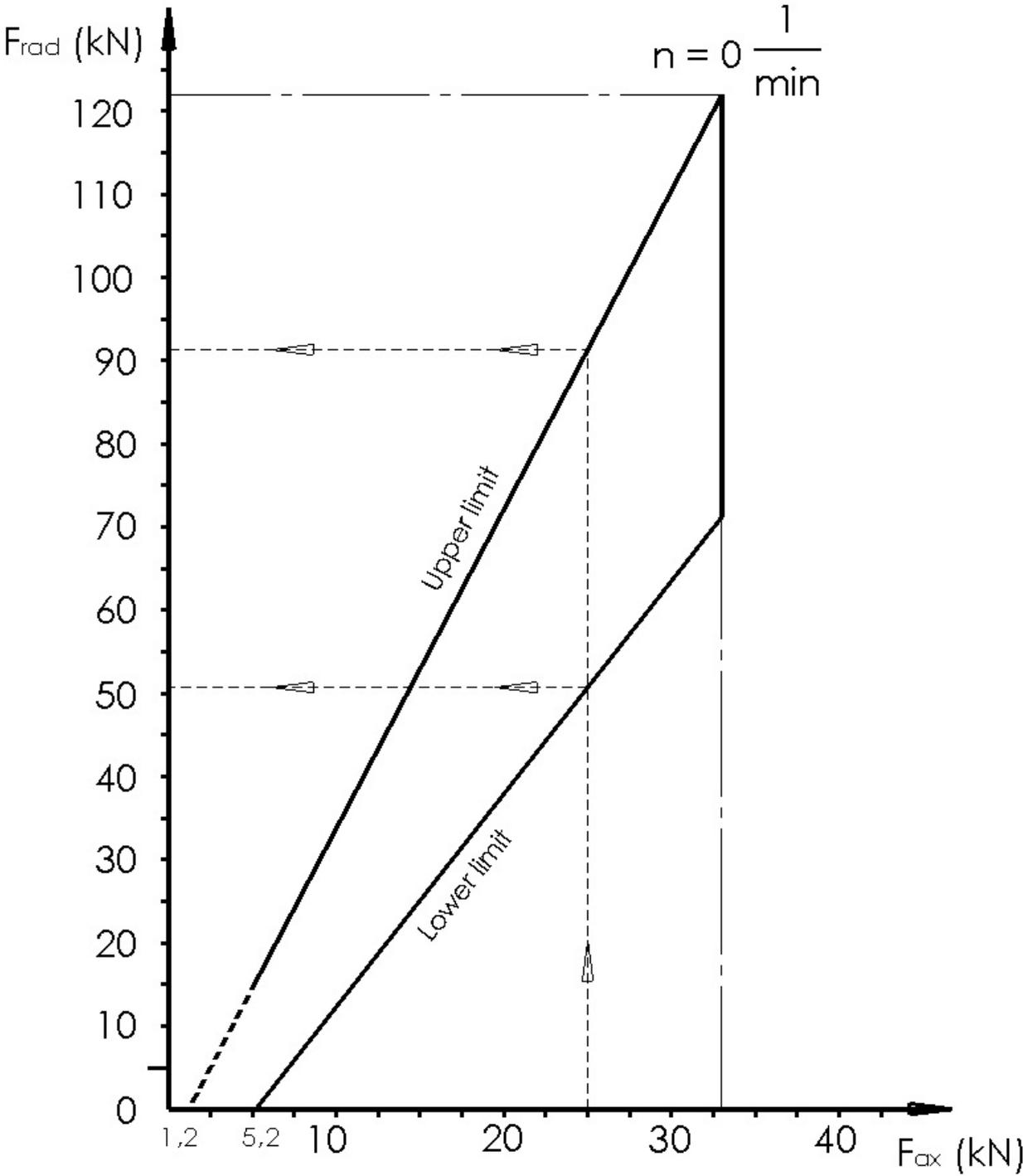


Fig. 6

3.2.3 Clamping force diagram – TOPlus size 52

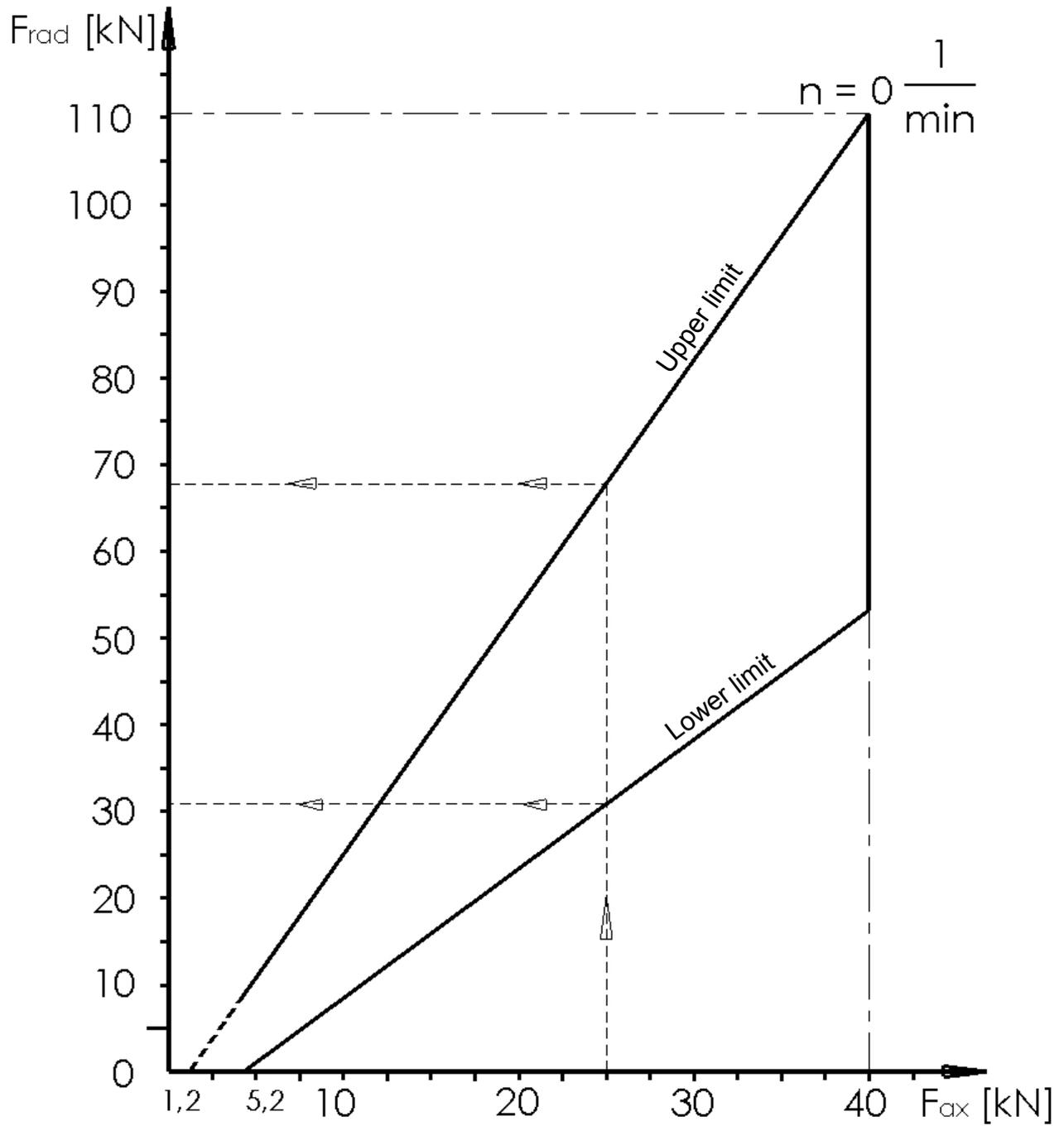


Fig. 7

3.2.4 Clamping force diagram – TOPlus size 65/80

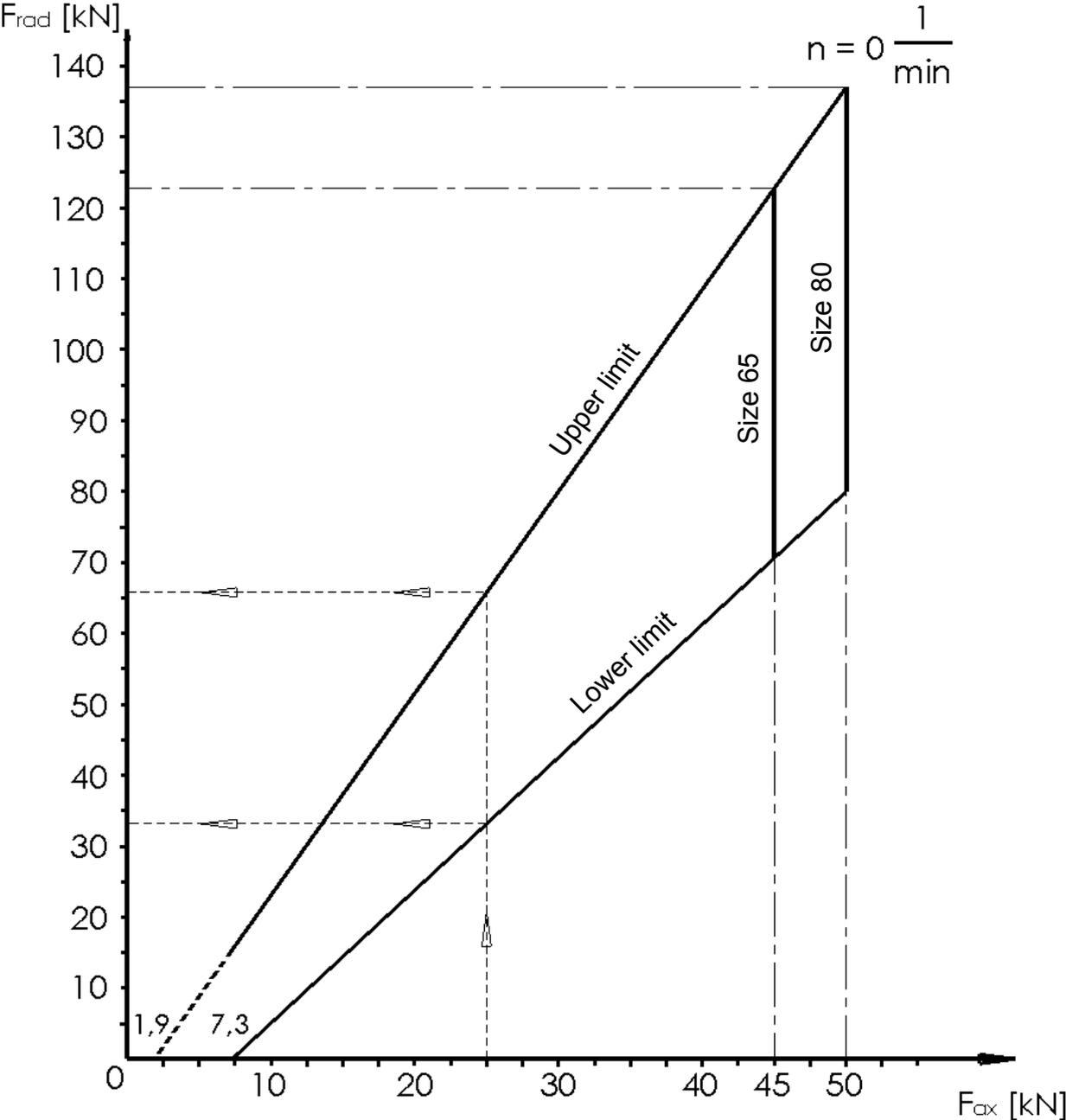


Fig. 8

3.2.5 Clamping force diagram – TOPlus size 100/125

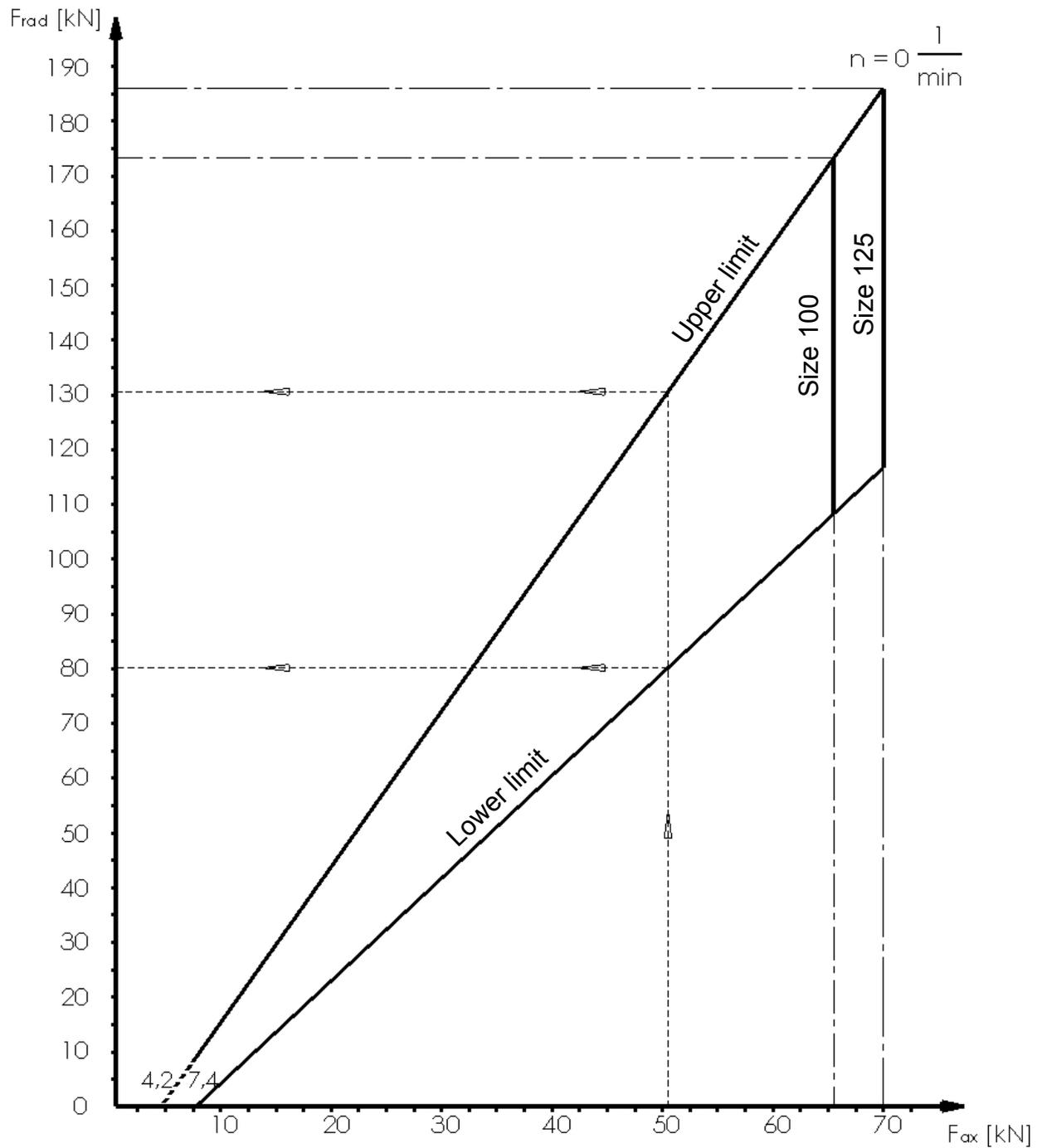


Fig. 9

3.3 Operating conditions

Environment	Specification	Value	Unit
	Temperature range	15 - 65	°C

Mechanical actuating In each possible operating condition the maximum draw force and compressive force may not be exceeded!

3.4 Power specifications



NOTE!

Material damage if the power specifications do not agree!

If the power specifications of clamping device, machine adapter and machine do not agree, severe damage extending to total damage can occur.

- Only operate clamping devices and adapters in machines with the same power specifications.

Information on maximum clamping force and draw-tube force is provided on the clamping device and the adapter.

- If the power values become unreadable through the abrasive effect, please refer from the manual and/or get in contact to the manufacturer.

3.5 Check

Static test

Used coefficient: **1.25**

3.6 Type designation

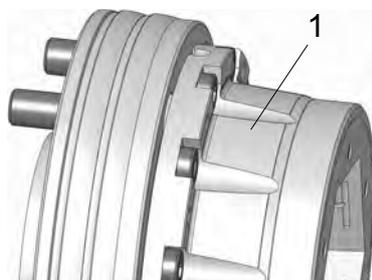


Fig. 10

The type designation [1] is on the product and includes the following information:

- 1 ID no. [marked with the # symbol]
- 2 Maximum speed [rpm]
- 3 Maximum clamping force [kN]

4 Structure and function

4.1 Overview and brief description of the TOPlus mini pull-back

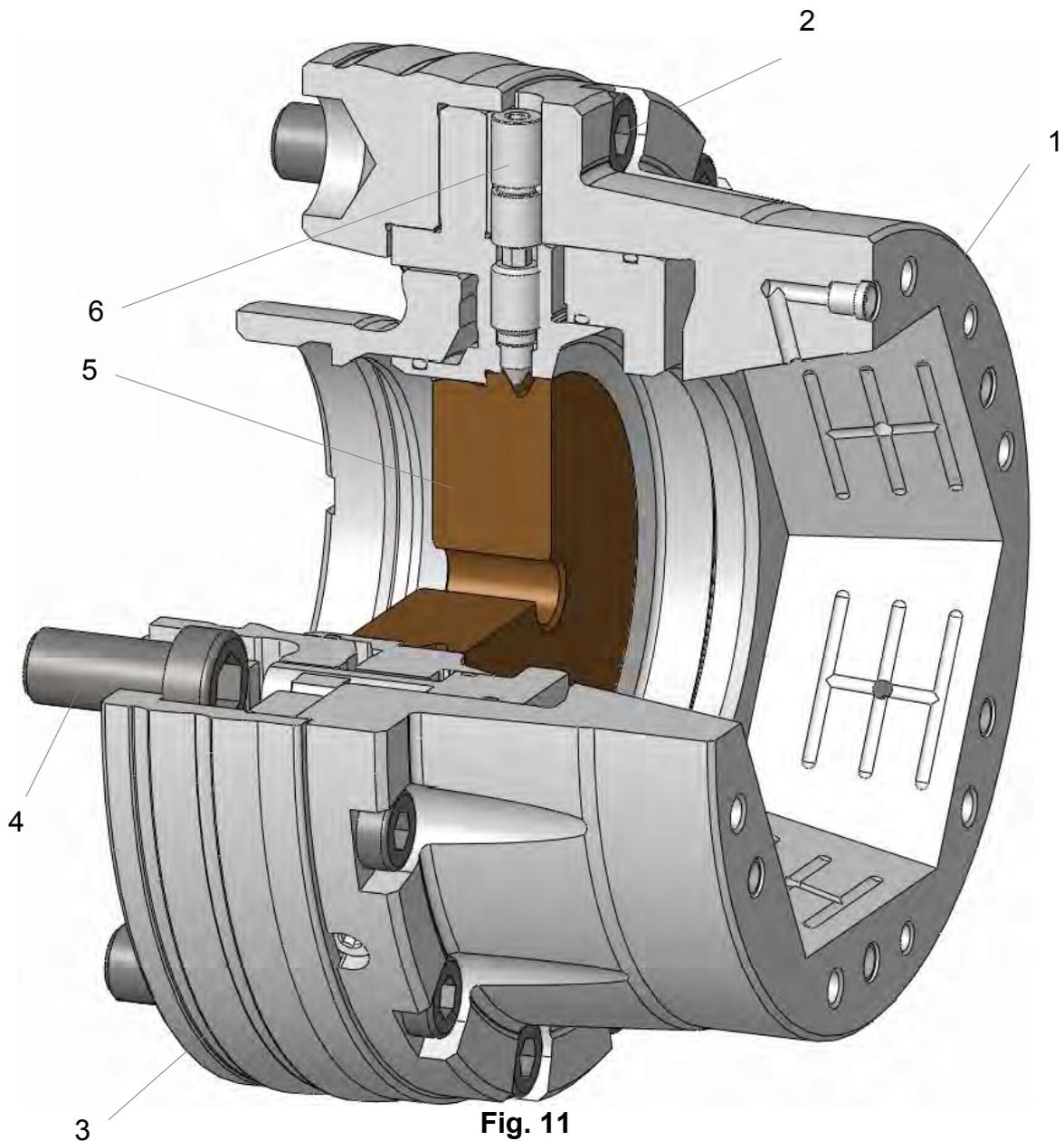


Fig. 11

- | | |
|---------------------------------------|--|
| 1. Clamping unit | 4. Cylindrical screws – spindle flange |
| 2. Cylindrical screws – clamping unit | 5. Base end-stop |
| 3. Spindle flange | 6. Clamping screws – base end-stop |

Brief description

The TOPlus mini pull-back is a through-bore chuck for bar work and it can also be used as an end-stop chuck. When used as an end-stop chuck the base end-stop included in the scope of delivery is screwed into the chuck.

Due to the axial drawtube force that is produced by the draw tube component the workpiece is pulled firmly onto the fixed end-stop. The rigidity of the entire clamping device thus achieved makes it possible to also provide stable clamping for workpieces with an extremely short clamping length.

The spindle flange of the clamping device is mounted on the machine spindle. Then the clamping unit with the draw tube adapter, including threaded adapter [optional], is screwed onto the drawtube. After checking concentricity and face run the clamping head is inserted.

The workpieces that will be machined are now clamped into the clamping head.

4.2 Overview and brief description of the TOPlus mini deadlength

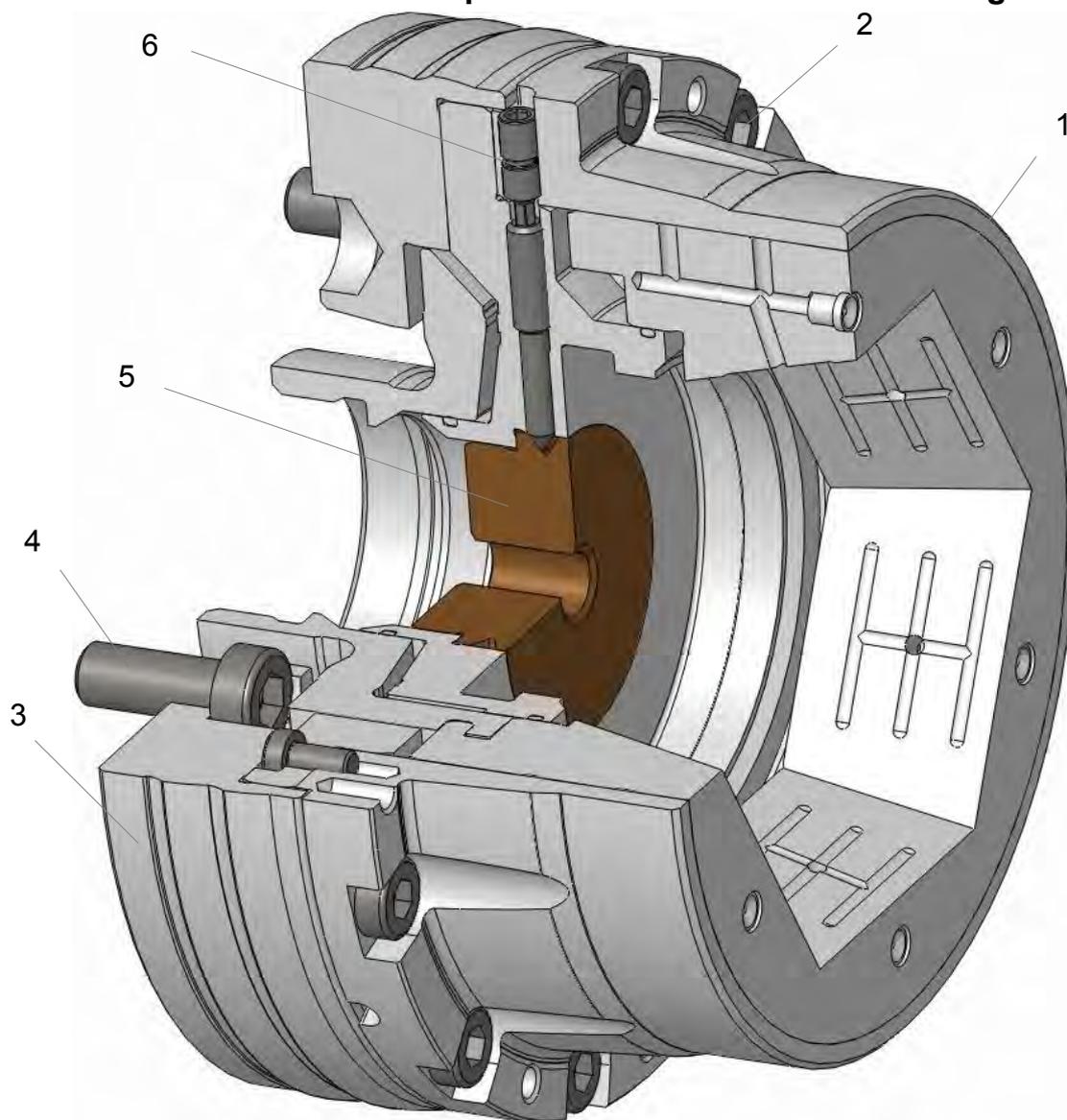


Fig. 12

- | | |
|--------------------------------------|---|
| 1. Clamping unit | 4. Cylindrical screw – spindle flange |
| 2. Cylindrical screw – clamping unit | 5. Base end-stop |
| 3. Spindle flange | 6. Clamping screws for base end-stop
[3 pc.] |

Brief description

The TOPlus mini deadlength is a through-bore chuck for bar work and it can also be used as an end-stop chuck. When used as an end-stop chuck the base end-stop included in the scope of delivery is screwed into the chuck.

Due to the axial fixed clamping head, shoulders that are short to clamp can be machined, and so can long workpieces that must be machined in sections and moved forward several times.

With the TOPlus mini deadlength clamping device you can grip without axial stress on the workpiece.

The spindle flange of the clamping device is mounted on the machine spindle. Then the clamping unit with the drawtube adapter, including threaded adapter [optional], is screwed onto the drawtube. After checking concentricity and face run the clamping head is inserted.

The workpieces that will be machined are now clamped into the clamping head.

4.3 Optional Accessories

The accessories described here are not included in the scope of delivery.

Specially developed segmented clamping bushings match to the respective maximum RPM are available for each clamping device. Trouble-free and precise function of HAINBUCH clamping devices is only ensured when using original HAINBUCH segmented clamping bushings.

Lubricating grease and grease gun are required for cleaning and preservation of the clamping device. The lubricating grease is also specially matched for protection of the vulcanized segments of the segmented clamping bushings and increase their service life and elasticity by a significant factor.

4.3.1 Standard end-stop



Fig. 13

vario part [for precise, rigid clamping]

It functions like a gauge block set and can be adjusted with plates in steps of 1 mm. With a face run of < 0.02 mm at the workpiece touching part the vario part is perfect for machining of finished material.



Fig. 14

vario quick [for precise, rigid clamping]

This variant works with a precise trapezoidal thread, with that the clamping depth can be adjusted quickly. A half turn corresponds to 1 mm adjustment travel.

4.3.2 Changing fixture



Fig. 15

Manual changing fixture

The pins of the changing fixture are inserted in the matching holes in the clamping head. The changing fixture is tensioned via hand force. The clamping head is firmly clamped in the changing fixture and can be inserted into the mounted clamping device with the aid of the changing fixture.



Fig. 16

Pneumatic changing fixture

The pins of the changing fixture are inserted in the matching holes in the clamping head. The changing fixture is tensioned via compressed air. The clamping head is firmly clamped in the changing fixture and can be inserted into the mounted clamping device with the aid of the changing fixture.

4.3.3 Clamping head

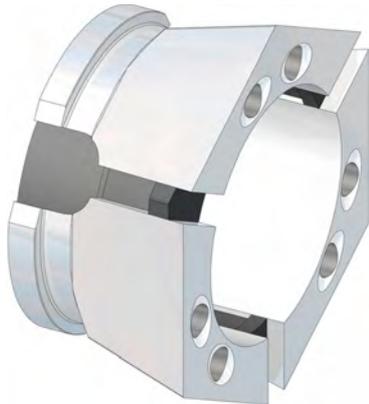


Fig. 17

The clamping heads are used to accommodate the work piece that will be machined. They consist of hard steel and rubber segments that are connected via a vulcanizing process.

Depending on the requirements of the work piece there are clamping heads in different sizes and with different profiles and bores.

4.3.4 Workpiece end-stop

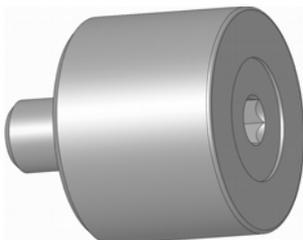


Fig. 18

The workpiece end-stop is manufactured with an end-stop dimension according to the customer's request. In combination with the clamping head and the chuck it provides a functional unit.

4.3.5 Threaded adapter

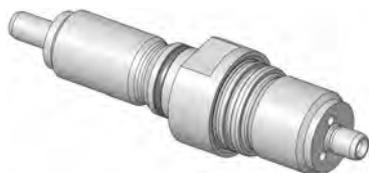


Fig. 19

The threaded adapter acts as a connector between the drawtube of the machine and the drawtube adapter of the clamping device and, depending on the machine type, can be designed in various forms.

4.3.6 Drawtube adapter



Fig. 20

The drawtube adapter acts as connector between the drawtube of the machine and the drawtube adapter of the clamping device and, depending on the machine type, can be designed in various forms.

4.3.7 MANDO Adapt T211 SE

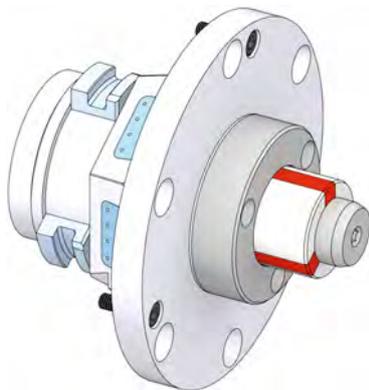


Abb. 21

- Adaption clamping device MANDO Adapt T211
 - The CENTREX quick change-over interface allows a μ -accurate adaption of the adaptation clamping device without adjusting the chuck.
 - Clamping range \varnothing 20 - 80 mm possible by several sizes of mandrel
 - Vibration damping by vulcanized segmented clamping bushings
 - Workpiece stabilization by axial traction to the workpiece end-stop
 - wide bridging area by vulcanized clamping elements

The MANDO Adapt can be ordered at HAINBUCH.

4.3.8 Jaw module

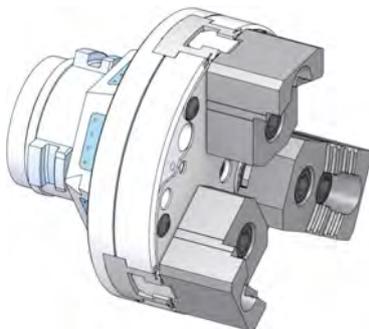


Fig. 22

The jaw module is an adaptation clamping element for using clamping jaws.

It can be used to extend the clamping range of the base clamping device. As a base clamping device for adapting the jaw module is used – depending on the version [RD / SE] – the SPANNTOP [RD] or TOPlus [SE] chuck.

Key advantages

- Minimal interference contour
- Dead-length clamping
- Rotating and stationary use
- Only external clamping possible
- Can be used as a pick-up chuck on sub spindles
- Milling between the jaws possible

4.3.9 Magnet module



Fig. 23

The magnet module is an adaptation clamping device for the use of ferromagnetic materials for grinding or turning. As a base clamping device for adapting the magnet module is used the TOPlus chuck.

Key advantages:

- Only for ferromagnetic materials
- Very good runout characteristics
- Deadlength clamping
- Rotating and stationary use
- Manually operated
- Very short chang-over time

4.3.10 Grease



Fig. 24

The universal grease for chuck and mandrel lubrication is supplied in a 1000g can. The order number for the universal grease is 2085/0003; it can be ordered from HAINBUCH.

4.3.11 Grease gun



Fig. 25

The grease gun is filled with universal grease, which is pressed into the clamping device. The grease gun has a pointed mouthpiece. The order number for the grease gun is 2086/0004; it can be ordered from HAINBUCH.

5 Transporting, packaging and storing

5.1 Safety instructions for transporting

Unbalanced package



WARNING!

Danger of falling due to an unbalanced package

Packed goods can have an unbalanced package. If attached incorrectly the package can tip and cause life-threatening injuries.

- Note the markings on the packages.
- Attach the crane hook in such a manner that it is located above the center of gravity.
- Carefully lift and see if the load tilts. If necessary change the attachment.



Transport!

- For transport always use a suitable clamping means / crane.
- Make sure that a rolling / falling of the clamping device is not possible.

5.2 Symbols on the packaging



Fragile

Identifies packages with fragile or sensitive contents. Handle the packed goods with care; do not allow them to fall, and do not subject them to impact.



Protect from moisture

Keep packed goods dry and protected against moisture.

5.3 Transport inspection

Check delivery immediately upon receipt to ensure that delivery is complete and to identify any transport damage.

Proceed as follows if there is apparent external damage:

- Do not accept the delivery, or only accept it with reservation.
- Note the extent of transport damage on the transport documents or on the transport company's delivery ticket.
- Submit a complaint.



Report any defect as soon as it is detected. Claims for damage compensation can only be enforced during the applicable periods for giving notice of lack of conformity.

5.4 Unpacking and inner-company transportation



From about weight 15 kg there are threaded holes in the circumference of the clamping device. Lifting eye bolts can be screwed into these threaded holes.

For transporting with transport trolley the clamping device must be positioned in standing condition. Make sure that a non-slip pad has been laid.

To safely lift the clamping device out of the package it must be hooked into a crane depending on the weight.

All tools and accessories which are not in scope of delivery are marked as optional in the operating instructions.

- Two people are required for this task.
- Special tools required:
 - Crane from weight more than 15 kg
 - Lifting eye bolts



Fig. 26

1. Screw lifting eye bolt into the radial thread in the circumference of the clamping device.
2. Hook the load-handling equipment into the lifting eye bolt.
3. Use a crane to carefully lift the clamping device out of the transport packaging and put it down on a stable, level substrate.

5.5 Packaging

About the packaging

Individual packages are packed according to the expected transport conditions. Environmentally-friendly materials have been used exclusively for the packaging.

Packaging should protect the specific components from transport damage, corrosion, and other damage until installation. Therefore do not destroy the packaging, remove it just before installation.



The packed goods are sealed in foil airtight and packed in cartons. See the »Technical Data« section for the specific weight of the respective sizes.

Handling packaging materials

Dispose of packaging materials in accordance with the respectively valid statutory regulations and local guidelines.



NOTE!

Improper disposal causes environmental damage!

Packaging materials are valuable raw materials and in many cases they can be reused, or they can be effectively treated and recycled.

- Dispose of packaging materials in an environmentally responsible manner.
- Comply with locally applicable disposal guidelines. If necessary commission a specialized company to dispose of packaging.

5.6 Storing



Under certain circumstances instructions for storage and subsequent storage are affixed to the packages that extend beyond the requirements cited here.

Comply with these instructions accordingly.

Storage of packages Only store packages under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free location
- Do not expose to aggressive media
- Protect from direct sunlight
- Avoid mechanical vibration
- Storage temperature: 15 bis 35 °C
- Relative humidity: max. 60 %
- For storage periods longer than 3 months:
 - Check the general condition of all parts and the packaging at regular intervals.
 - Touch up or re-apply anti-corrosion agents as needed

Subsequent storage of the clamping device

Only re-store the clamping device under the following conditions:

- Thoroughly clean the clamping device prior to subsequent storage [see section »Cleaning«]
- Thoroughly oil and grease the clamping device. [see section »Cleaning«]
- Store the clamping device in airtight foil
- The clamping device must be stored securely in position. If this is not guaranteed, use a suitable container for the clamping device or equip the shelf with a circumferential securing edge.

6 Assembly



WARNING!

During the initial installation of the clamping device severe injuries may occur.

- The initial installation must be done only by qualified personnel.
- All screws remaining in the clamping must be tightened firmly.
- All tools and keys must be removed after installation.
- Always wear personal protective equipment!

6.1 Pre-consideration

- Screws are tightened according to the size of the screw and the general torque.
To avoid axis-parallel warpage under load and to get stiffness turn in the screws evenly.
- To avoid precision error clean the screw joint surfaces and also the mating surfaces, see »Maintenance«.
The ex works wetting of the plate surfaces and the clamping element is only corrosion protection. It's not functionally lubricated.
- The insertion of lubricant is provided only on the mechanical surfaces. Pay attention to the instructions for lubricants in the chapter »Maintenance«.
- Avoid too much lubricant on the bearing surface, as this can cause face runout.
- Seal rings [e.g. o-ring, quad-ring seal] and sealing surfaces must be lubricated.
Note the information in the chapter »Maintenance«.
- Note that the function surfaces [plate surface, mating surface, cone surface and seal surface] may not be damaged.



CAUTION!

Wear safety shoes during the assembly and maintenance work.

Make sure that the starting of the spindle is impossible.

6.2 Preparations

The total weight of the clamping device, consisting of spindle flange and clamping unit, depends on the size and can be as much as 40 kg.

The individual weight of the spindle flange can be as much as 20 kg, and the clamping unit can weigh up to 23 kg [see section »Technical data«].

Depending on the weight, to safely lift the clamping device out of the package and position it in the machine it must be hooked into a crane.



WARNING!

Danger of injury due to falling components!

When mounting components can fall and cause severe injury and material damage.

- Two people are always required for this task.
- Use a crane.
- For assembly on a vertically suspended spindle always use a suitable mounting aid.



WARNING!

Risk of injury when screwing in the threaded adapter!

When screwing in the threaded adapter by hand cuts may occur.

- Wearing of PSA is required!

Special tools required:

- Allen wrench
- Oil stone
- Crane and eye bolts from weight 15 kg



Fig. 27

1. Loosen all allen screws in the clamping device element reception with an allen wrench and remove them completely.



Fig. 28

2. Lift the clamping element reception off of the spindle flange.
3. Wipe off the mating surfaces on the spindle flange and clamping unit with a soft, lint-free cloth and remove all oil and grease residues.
- 4.hone the mating surfaces on the spindle flange with an oil stone.

6.3 Installation



WARNING!

Danger of injury due to unintentional start-up of a machine spindle!

Unexpected start up of a machine spindle can cause severe injury.

- Only run the machine in set-up mode or jog mode.
- Set the axial clamping force of the machine tool on the lowest setting.
- Always remove immediately all the tools and wrenches from the clamping device after use.
- Unscrew all eye bolts from the clamping device and remove them from the interior of the machine.
- Prior to switching on automatic mode close all protective doors or hoods that are present on the machine tool.



WARNING!

Risk of injury!

By operating the clamping device without changing parts [clamping head, workpiece end-stop] there is an increased risk of crushing injuries by the stroke of the moving components of the clamping device.

By uncontrolled discharge of the clamping process [e.g. by incorrect installation of the energy supply or faulty programming] there is an increased danger.



WARNING!

Risk of injury!

Bending in the working area of the machine can cause severe head injuries!



CAUTION!

Risk of injury!

Unexpected start up of the tool spindle can cause severe injury.

- Make sure that the system is pressure-free and that a restart of the machine can be excluded!



Risk of injury!

Contamination of the mechanism can influence/reduce the stroke, thus the clamping force is reduced and thus, the workpiece is not properly tightened and can be thrown out.

- Clean the product regularly [see chapter »Maintenance and service«].



Risk of injury!

If the axial clamping force is too low clamped workpiece may be thrown out.

If the axial clamping force is too high severe damages of the components of the clamping device may occur the throwing out of the workpiece.

- Before operation set the operation pressure back to operation level.
- The axial clamping force should be checked and adjusted regularly!
- The dimension of the workpieces should be checked regularly [clamping- \emptyset]!



Transport!

- For transport always use a suitable clamping means / crane.
- Make sure that a rolling / falling of the clamping device is not possible.



WARNING!

Danger of injury due to vertical suspended spindle!

Bending into the machine work area when assembling overhead can cause severe head injuries.

- Secure components prior to overhead assembly.
- For assembly on a vertically suspended spindle always use a suitable mounting aid.

6.3.1 Assembling the flange [optional]



NOTE!

Material damage due to wrong tightening torque of the cylindrical screws in the spindle flange!

The tightening torque of the cylindrical screws is prescribed by the spindle or machine manufacturer. Incorrect tightening torque of the cylindrical screws in the flange can cause significant material damage on the clamping device and on the machine.

- Only tighten the cylindrical screws of the spindle with the torque prescribed by the spindle or machine manufacturer.



Fig. 29

1. Put the machine in set up mode.
2. Wipe off the mating surfaces of the machine spindle with a soft, lint-free cloth and remove all oil and grease residues.
3. Lift the flange into the machine by hand or with the aid of a crane and place it on the machine spindle. Position the flange on the machine spindle with the aid of the bores.
4. Screw all cylindrical screws into the flange with an allen wrench and hand tighten in a cross pattern.
5. Now adjust the clamping device, see »Adjusting the concentricity of the spindle flange«.



NOTE!

Material damage is possible if the eye bolts are left in the spindle flange!

Eye bolts that are left in the clamping device can significantly damage or even destroy lathe, clamping device and workpiece.

- Always remove eye bolts immediately after mounting the clamping device in the lathe.

6.3.2 Adjusting the concentricity of the spindle flange



NOTE!

Material damage due to insufficient face run and concentricity!

Due to insufficient face run and concentricity workpieces can be damaged during processing.

- After each mounting check, and if necessary readjust, the face run and concentricity of the clamping device.

Auxiliary material required:

- Dial indicator
- Rubber mallet
- Torque wrench

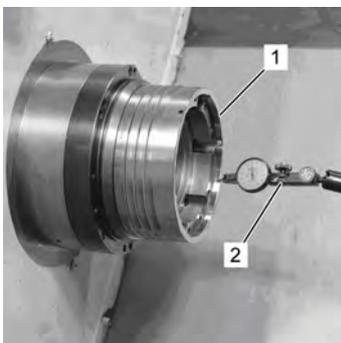


Fig. 30

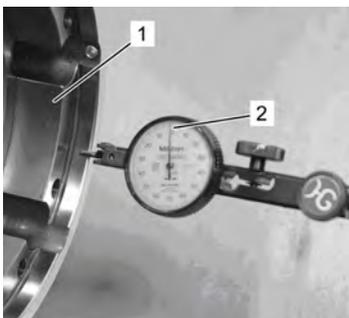


Fig. 31

1. Wipe off the mating surfaces of the spindle flange with a soft, lint-free cloth and remove all oil and grease residues.
2. Place the magnetic base of the dial indicator on the inside of the machine.
3. Place the dial indicator for concentricity on the fit of the spindle flange.
4. Adjust the spindle flange in such a manner that the dial indicator shows the value »0« [$\leq 0,005$ mm].



Fig. 32

5. Tighten all cylindrical screws with a torque wrench in a cross pattern [see section »Screw tightening torque«].



For exact adjustment, if necessary loosen the cylindrical screws a little, repeat the adjusting and retighten the cylindrical screws in a cross pattern.

6.3.3 Checking face run and concentricity

1. Place the magnetic base of the dial indicator on the inside of the machine.
2. Place the dial indicator for concentricity on the inside edge of the spindle flange and check the concentricity [$\leq 0,005$ mm].

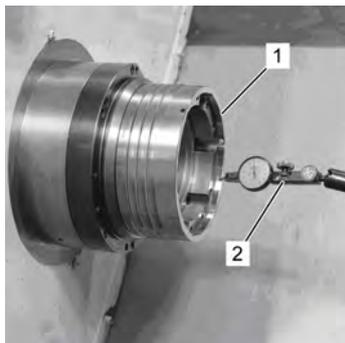


Fig. 33

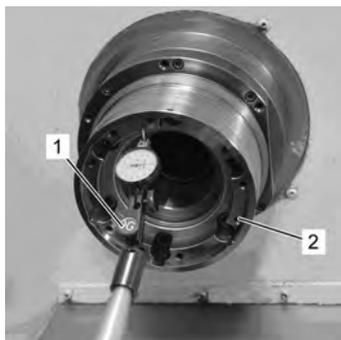


Fig. 34

3. Place the dial indicator for face run on the outer edge of the mating surface, check the face run [$\leq 0,005$ mm].

4. If face run and/or concentricity are larger than the maximum permissible value:
 - Disassemble the flange.
 - Clean all mating surfaces of spindle and spindle flange.
 - Re-assemble the flange.
 - Repeat the adjusting.

6.3.4 Assembly of the clamping device to an interface

The clamping device can be provided with an interface:

1. centroteX / centroteX-V
2. capteX B / capteX D

The assembly of the clamping unit to one of the named interfaces is described in the corresponding manual of the interface.

6.3.5 Assembly of the TOPlus mini clamping unit

Two people are required for this task.

Special tools required:

- Allen wrench
- Crane and eye bolts from weight 15 kg



Fig. 35

1. Remove all tools from the interior of the machine.
2. Move the drawtube of the machine tool into the front stop position.



NOTE!

Mounting sequence drawtube adapter!

If at the TOPlus mini deadlength the outer dimension of the drawtube adapter is larger than the passage of the flange:

- Don't assemble the drawtube adapter into the clamping unit but into the machine spindle!
- Tighten the drawtube adapter firmly.

3. In normal cases: Screw in the drawtube adapter into the clamping unit.
4. Lift the clamping unit with drawtube adapter by hand, or with the aid of a crane, into the machine and place it on the drawtube of the machine.
5. Screw the drawtube adapter with clamping unit [1] onto the drawtube of the machine tool to the end. In this process ensure that the drawtube adapter does not tilt.

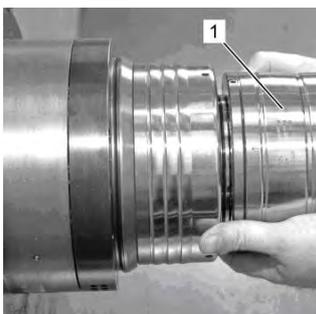


Fig. 36



Do not tighten the drawtube adapter with clamping unit.

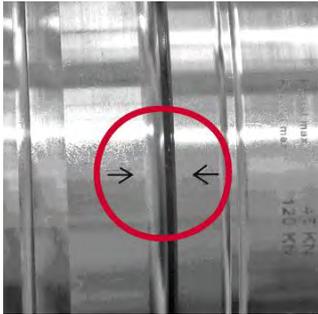


Fig. 37



Fig. 38

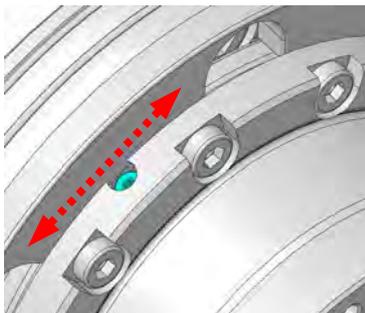


Fig. 39

6. Turn back the clamping unit until the arrows of the balance marks are aligned.



NOTE!

Property damage caused by thrown clamping screws!

By incorrect installation, the clamping screws of the base end-stop may be thrown off. The threaded holes for the clamping screws must not be located next to the screws securing the spindle flange!

- If necessary turn the clamping unit a little back to the next match of the bolt hole circle.



The through-bore of the clamping element reception and the threaded bores of the spindle flange should now be aligned as well.



WARNING!

Crushing danger due to machine movement!

It may not always be avoided that in the assembly of the clamping unit there is a gap between spindle flange and clamping unit.

Therefore the reasons are the position of the drawtube as well as the request to maximum usable work space.

Through this gap there is a higher risk of crushing that can lead to severe injuries.

- Never reach into the gap between spindle flange and clamping unit!

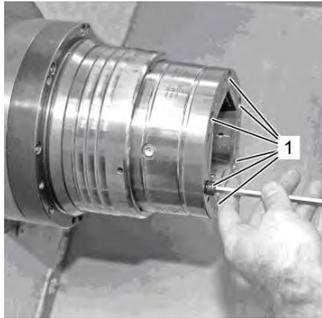


Fig. 40

7. Carefully move the drawtube of the machine tool back in jog mode, until the clamping unit is completely inserted in the spindle flange.
8. Screw all cylindrical screws [1] into the clamping unit with an allen wrench and hand tighten in a cross pattern.

6.3.6 Checking and adjusting face run and concentricity



NOTE!

Material damage due to insufficient face run and concentricity!

Due to insufficient face run and concentricity workpieces can be damaged during processing.

- After each mounting check, and if necessary readjust, the face run and concentricity of the clamping device.

Special tools required:

- Dial indicator
- Rubber mallet
- Torque wrench

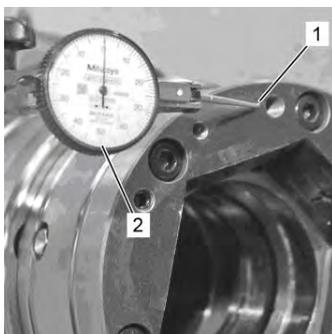


Fig. 41

Checking face run

1. Place the magnetic base of the dial indicator on the inside of the machine.
2. Place the dial indicator for face run on the front face of the spindle flange, check the face run [$\leq 0,005$ mm].



If the measured value is > 0.01 mm:

- Disassemble the clamping unit and clean it.
- Re-assembly of the clamping unit.

3. Clean the TOPlus reception of the clamping unit with a soft, lint-free cloth and remove all oil and grease residues.

Checking and adjusting concentricity

1. Place the magnetic base of the dial indicator on the inside of the machine.
2. Place the dial indicator for concentricity on the outer fit.
3. Adjust the clamping unit in such a manner that the dial indicator shows the value »0« [$\leq 0,005$ mm].



For exact adjustment, if necessary loosen the cylindrical screws only a little and retighten in a cross pattern.

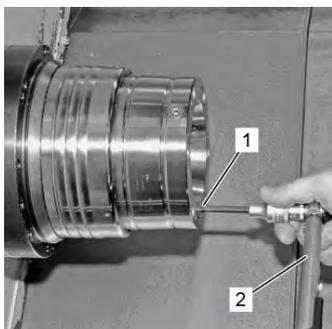


Fig. 42

4. Tighten the cylindrical screws] crosswise with the required tightening torque, see »Maintenance«.



For exact adjustment, if necessary loosen the cylindrical screws several turns and retighten in a cross pattern.

5. Clean the TOPlus reception of the clamping unit with a soft, lint-free cloth and remove all oil and grease residues.

6.3.7 Installing the base end-stop



If the clamping devices will be used as end-stop chuck the base end-stop must be mounted.

Auxiliary material required:

- Allen wrench
- Mounting bolt or suitable cylindrical screw



Fig. 43

1. Take the clamping head out of the taper.
2. Unscrew the clamping screws [see section »Disassembling the base end-stop«].
3. Screw the mounting bolt [1] clockwise into the threaded bore [2] in the center of the base end-stop [3].



Screw the mounting bolt into the base end-stop so that the polished side of the base end-stop is pointing up.



Fig. 44



Fig. 45

4. Use the mounting bolt to insert the base end-stop into the clamping device in such a manner that the lateral fixing pin [1] of the base end-stop is aligned flush with the fixing groove [1] in the centering disk.



NOTE!

Material damage is possible if the clamping screws are tightened too forcefully!

Tightening the clamping screws too forcefully can damage or destroy them. The base end-stop can no longer be clamped in.

- Tighten the clamping screws by hand.
- Do not screw in beyond the resistance.

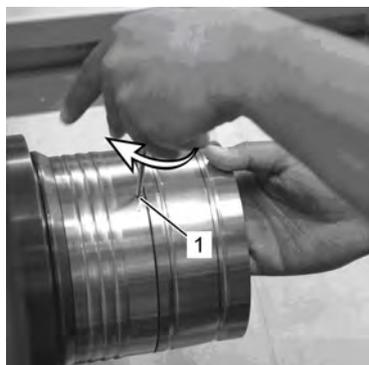


Fig. 46

5. Tighten all clamping screws [1] of the base end-stop in the spindle flange clockwise with an allen wrench with **max. 8 Nm**. The base end-stop is now secured.

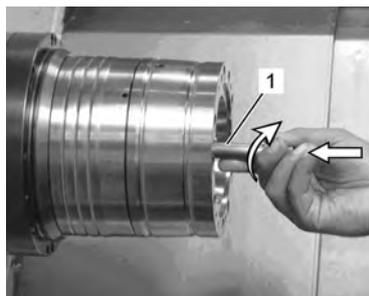


Fig. 47

6. Unscrew the mounting bolt [1] counterclockwise.

6.3.8 Assemble the clamping head



For changing in the clamping head move the coupling of the clamping device to front end position.

Depending on the model of the clamping head the handling of the changing fixture is easier or more difficult.

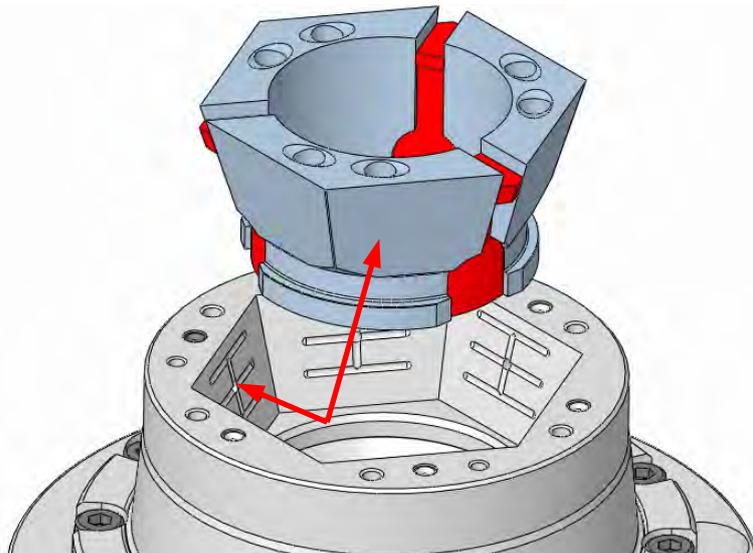


Fig. 48



WARNING!

Danger of violent pressure to hands and fingers!

- Before working at the installed clamping device make sure that starting of the machine is impossible.
- Only run the machine in set-up mode or jog mode.
- During operation never reach into the coupling or slot area of the clamping head nor in the changing fixture.

6.3.9 Assembly of the workpiece end-stop

Special tools required:

- Allen wrench



Fig. 49

1. Put the workpiece end-stop through the assembled clamping head into the clamping device.



NOTE!

Material damage is possible if the mounting screws are tightened too forcefully!

Tightening the mounting screws too forcefully can damage or destroy them.

- Tighten the mounting screws by hand.
- Do not screw in beyond the resistance.

2. Screw in and firmly tighten mounting screws.



WARNING!

Risk of injury!

Tools and gages that are thrown out of the machine can cause injury.

- Remove all tools and gages from the working area of the machine before the machine is started up.



CAUTION

Damage of the clamping device!

If the axial clamping force is too low the clamped workpieces may be thrown out.

- Before operation set the axial clamping force back to operation level.
- The operating axial clamping force should be checked and adjusted regularly!



WARNING!

Slipping danger due to escaping hydraulic fluid!

Escaping [sprayed out] hydraulic oil from adjacent machine components can cause serious personal injuries.

- Make sure that all o-rings/seals for the hydraulic / pneumatic interfaces are available and in undamaged condition.
- Make sure that the clamping device is empty and leakage of hydraulic fluid is avoided.

6.4 Workpiece



WARNING!

Risk of injury due to thrown out parts!

During clamping of the workpiece and the processing parts can be thrown and cause severe injuries and property damage.

- Check the clamping diameter of the workpiece.
- Only clamp workpieces that meet the dimensional requirements.
- For clamping very long workpieces use in addition a tailstock / a steady rest for support.
- Do not exceed the maximum permissible axial clamping force.
- Make sure that the applied axial clamping force is set correctly [neither too high nor too low].



NOTE!

Material damage due to inappropriate workpieces!

- Only clamp workpieces that meet the dimensional requirements.
- For the dimensional requirements see chapter 3 »Technical data«.



CAUTION

Risk of injury!

When placing the workpiece:

- Make sure that the hands / fingers may not be clamped when inserting the workpiece!

6.5 Inspections



NOTE!

Material damage due to damaged clamping devices!

A damaged, incomplete, or unbalanced clamping device can significantly damage or even destroy the machine tool and the workpiece.

- Only install undamaged, complete, and precisely balanced clamping devices.
- If in doubt contact the manufacturer.

Ensure the following points prior to each installation and start-up of the clamping device:

- All cylindrical screws of the clamping device must be present and tightened with the proper tightening torque.
- The balance screws [if provided] of the clamping device must all be present and undamaged.
- All rubber segments must be intact; this means that they are neither torn, nor are they porous at any point.
- All edges and bearing surfaces are intact; this means that they are neither broken nor do they show any signs of wear.
- The set speed of the machine tool should not exceed the maximum permissible speed of the clamping device.
- The maximum drawtube force specified on the perimeter of the clamping device must not be exceeded.
- The axial clamping force of the machine must be sufficiently high.
- All mounting tools must be removed from the interior of the machine.
- Clamping device and workpiece must be compatible – check the clamping diameter regularly.
- The workpiece must be clamped into the clamping

device with sufficient workpiece tension.

- Do a a measurement of clamping force.

6.6 Control of the stroke position



WARNING!

Crushing danger from moving parts!

Crushing danger from moving parts during controlling the stroke position!

Gaps, caused while controlling the stroke position, can cause severe injury.

- Only do the controlling of the stroke position with assembled changing parts.
- Only run the machine in set-up mode or jog mode.
- Do not reach into moving parts or handle moving parts during operation.
- Note the gap dimensions of moving parts.
- Wearing of gloves / [PSA] is required!

6.7 Activities after production is concluded

1. Move the clamping device into unclamped position.
2. Switch off the machine tool and safeguard it from being switched on again.
3. Open the protective door or hood.
4. Clean the clamping device and a possibly mounted add on clamping device and adapter of chips and production residues using a soft, lint-free cloth and oil them lightly.
5. Close the protective door or hood.

7 Disassembly

If there is break in production that lasts longer than 3 days, the clamping device must be disassembled and properly stored in accordance with the manufacturer's specifications [see section »Transport, packaging, storage«].

Prior to disassembling:

- Put the machine in set up mode.
- Remove fuels and auxiliary materials, as well as residual processing materials and dispose of these items in an environmentally-responsible manner.

7.1 Safety

Safeguarding against restart



DANGER!

Life-threatening danger if restarted without authorization

When disassembling there is danger of the energy supply being switched on inadvertently. This poses a life-threatening hazard for persons in the danger zone.

- Prior to starting the tasks switch off all energy supplies and safeguard them from being switched on again.



WARNING!

Danger of injury due to falling components!

When mounting components can fall and cause severe injury and material damage.

- Two people are always required for this task.
- Use a crane.
- For assembly on a vertically suspended spindle always use a suitable mounting aid.



WARNING!

Danger of injury due to vertical suspended spindle!

Bending into the machine work area when assembling overhead can cause severe head injuries.

- Secure components prior to overhead assembly.
- For assembly on a vertically suspended spindle always use a suitable mounting aid.



Transport!

- For transport always use a suitable clamping means / crane.
- Make sure that a rolling / falling of the clamping device is not possible.

7.2 Disassembly of the workpiece end-stop

Special tools required:

- Allen wrench



Fig. 50

1. Loosen and remove the mounting screws.
2. Remove the workpiece end-stop out of the clamping device through the assembled clamping head

7.3 Disassemble the clamping head



For changing in the clamping head move the coupling of the clamping device to front end position.

Depending on the model of the clamping head the handling of the changing fixture is easier or more difficult.

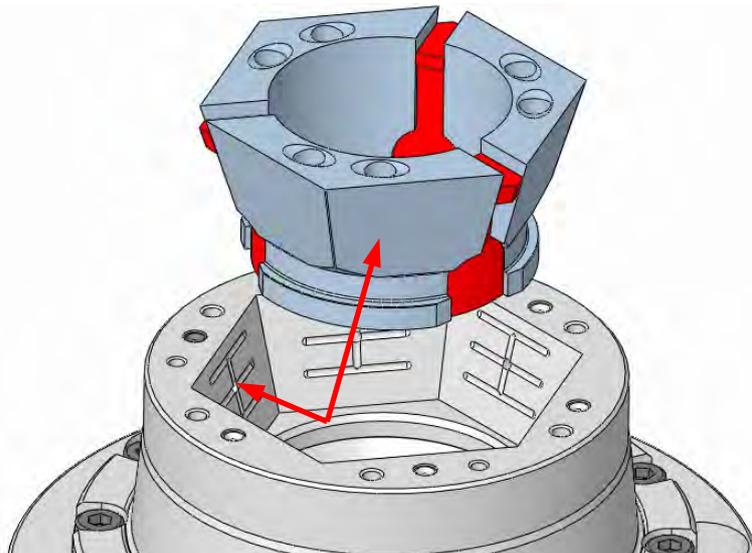


Fig. 51



WARNING!

Danger of violent pressure to hands and fingers!

- Before working at the installed clamping device make sure that starting of the machine is impossible.
- Only run the machine in set-up mode or jog mode.
- During operation never reach into the coupling or slot area of the clamping head nor in the changing fixture.

7.4 Disassembling the base end-stop



If the clamping device will be used as through-bore chuck the base end-stop must be disassembled.

Special tools required:

- Allen wrench
- Mounting bolt or suitable cylindrical screw

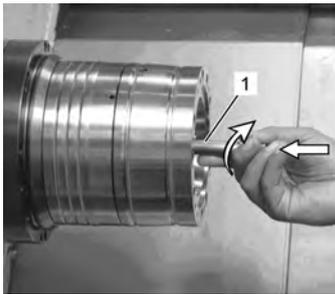


Fig. 52

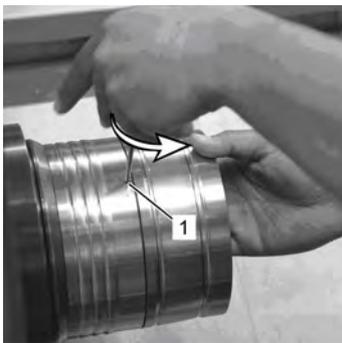


Fig. 53



NOTE!

Material damage if the clamping screws are loosened incorrectly!

Tightening the clamping screws too forcefully can damage or destroy them. The base end-stop can no longer be clamped in.

- Loosen the clamping screws by hand.
- Do not unscrew beyond the resistance.

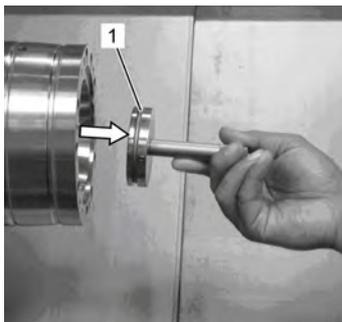


Fig. 54

1. Take the clamping head out of the taper of the clamping element reception.
2. Insert the mounting bolt and screw it clockwise into the threaded bore in the center of the base end-stop.

3. Carefully loosen all clamping screws with an allen wrench counterclockwise until resistance is tangible.
The base end-stop is now loosened.
4. Carefully pull out the base end-stop straight from the front.

7.5 Disassembling the clamping unit TOPlus mini

From weight 15 kg the task requires two people, or use a crane.

Special tools required:

- Use load-handling equipment from weight 15 kg
- Allen wrench

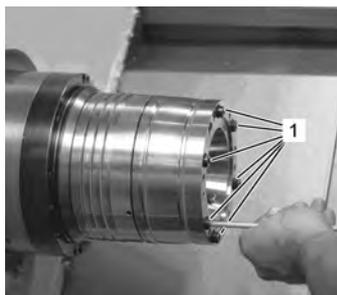


Fig. 55

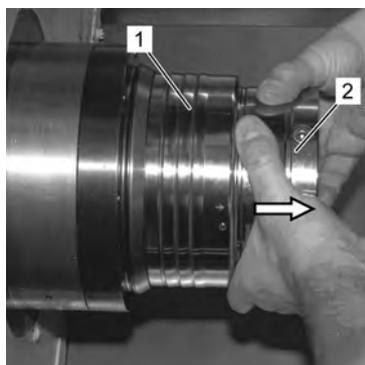


Fig. 56

1. Move the drawtube of the machine into rear end position.
2. Put the machine tool in set up mode.
3. Disassemble the base end-stop [see section »Disassembling the base end-stop«].
4. From weight 15 kg mount the lifting eye bolts [see section »Unpacking and inner-company transport«].
5. Loosen all cylindrical screws [1] with an allen wrench and unscrew them from the clamping unit.
6. Move the drawtube of the machine into front end position.
7. Unscrew and remove the clamping unit from the draw tube of the machine and lift it out of the machine.

The clamping unit is disassembled from the machine.

7.6 Disassembling the spindle flange

- From weight 15 kg the task requires two people, or use a crane.
- Special tools required:
 - Torque wrench
 - Allen wrench
 - Crane and lifting eye bolts from weight 15 kg



Fig. 57

1. Put the machine tool in set up mode.
2. If necessary mount the eye bolts [see section »Unpacking and inner-company transport«].
3. Loosen all cylindrical screws with a torque wrench in a cross pattern [see section »Screw tightening torque«].
4. Remove all cylindrical screws from the spindle flange.

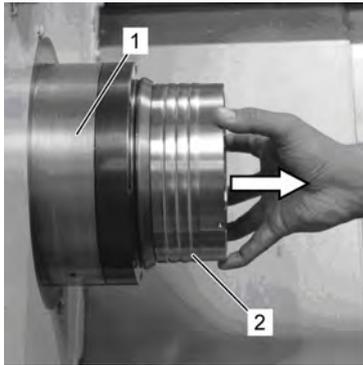


Fig. 58

5. Take the spindle flange from the machine spindle by hand or with the aid of load-handling equipment and lift it out of the machine tool.
6. Wipe off the mating surfaces of the machine spindle with a soft, lint-free cloth and remove all oil and grease residues.
7. Remove all tools from the interior of the machine.

7.7 Subsequent storage of the clamping device

The clamping device must be cleaned and treated with corrosion protection for subsequent storage [see section »Cleaning«].



NOTE!

The storage conditions are specified in the section »Transport, packaging and storage«.

7.8 Disposal

If a return or disposal agreement has not been concluded, then recycle disassembled components.



NOTE!

Improper disposal causes environmental damage!

Lubricants and other auxiliary materials are subject to treatment as special waste, and should only be disposed of by approved specialist companies!

Local municipal authorities or specialized disposal companies provide information on environmentally-responsible disposal.

8 Maintenance

Environmental protection

Comply with the following instructions for environmental protection when performing maintenance work:

- At all lubricating points where lubricant is applied by hand, remove escaping, used, or excess grease, and dispose of it in accordance with applicable local regulations.
- Collect used oil in suitable containers and dispose of it in accordance with applicable local regulations.

8.1 General

Cleanliness of the appropriate end-stop as well as the guidance diameters are conditions for reaching the concentricity and perpendicularity tolerances. Clean these surfaces with an appropriate cleaner.



WARNING!

Risk of injury!

Always comply with the safety data sheets and guidelines provided by the manufacturer.



CAUTION

Danger of injury due to loss of clamping force!

Fouling of the clamping device can cause the clamping device to lose considerable clamping force.

- Always comply with the maintenance and cleaning intervals specified in this manual.
- In conjunction with the maintenance intervals, regularly check the maintenance status of the clamping device through clamping force measurements.



Risk of injury!

Slipping while the lubricating with a grease gun can lead to severe cuts!

8.2 Cleaning



NOTE!

Material damage if cleaned with compressed air!

Cleaning the clamping device with compressed air can force metal chips into thread and grooves. This can damage or even destroy the clamping device.

- Never clean the clamping device with compressed air!

- Auxiliary material required:
 - Ester-free, non-polar cleaning agent
 - Soft, lint-free cloth

1. Disassemble the clamping unit [see section »Disassembling the clamping unit«].

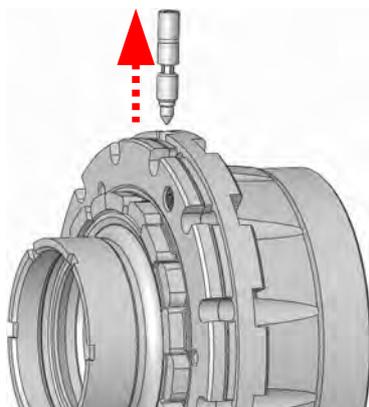


Fig. 59

For cleaning the clamping element reception the centering disc has to be disassembled:

2. Unscrew the 3 clamping screws from the circumference of the clamping unit.

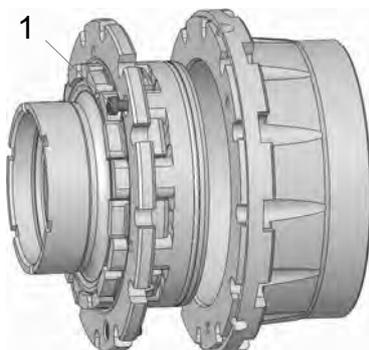


Fig. 60

3. Loosen and remove the 3 mounting screws from the centering disc.
4. Remove the centering disc together with the adapter and the coupling out of the clamping element reception.
5. Clean all the components of the clamping unit listed below with cleaning agent and a cloth; remove all oil and grease residues:

- Spindle flange
- Clamping unit
- Taper reception and coupling area
- Drawtube adapter, threaded adapter
- Cylindrical screws



NOTE!

Material damage by missing or damaged o-rings or seals!

Due to missing / fallen out o-rings and seals compressed air or hydraulic fluids may expel!

- Make sure that all O-rings / seals are available and undamaged!
- If necessary lubricate them before assembly and/or during service.
- Replace missing or damaged o-rings / seals.

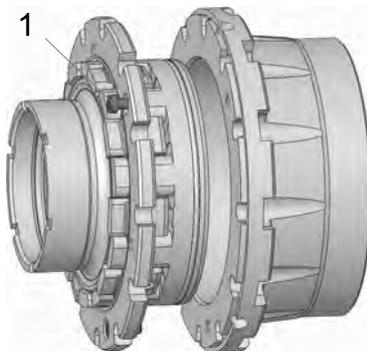


Fig. 61

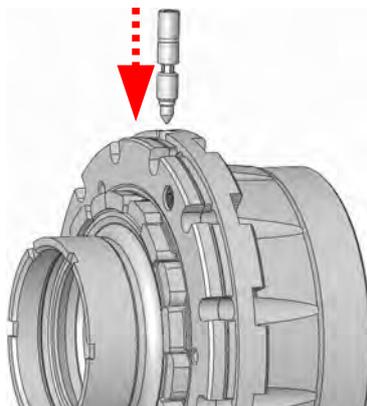


Fig. 62

To reassemble the clamping unit follow these steps:

1. Put the centering disc together with the adapter and the coupling from the rear side into the clamping element reception.
2. Screw the 3 mounting screws into the centering disc and tighten them firmly.
3. Screw the 3 clamping screws completely into the circumference of the clamping unit.

8.3 Preservation

- Special tools required:
 - Universal grease 2085/0003
 - Grease gun
 - Oil stone
 - Soft, lint-free cloth
- 1. Disassembling the clamping unit [see section » Disassembling the clamping unit«].
- 2. Hone all the bearing surfaces of the clamping device with an oil stone.
- 3. Lightly grease all cylindrical screws. Remove excess grease with a cloth.

4. Remount the clamping devices. Re-insert the clamping unit in the spindle flange.
5. Screw all cylindrical screws into the clamping device again and tighten them hand tight.



For subsequent storage tightening the cylindrical screws hand tight suffices. This facilitates re-commissioning and protects the cylindrical screws.



Fig. 63

6. Lightly grease all interior and outer surfaces of the clamping device. Remove excess grease with a cloth.
7. Pack the clamping device airtight in foil. Place it on a level, impact-free storage location and safeguard it from falling.

8.4 Use of lubricant

With the usage of lubricant you may only use grease that corresponds to the requirements concerning bond, pressure-stability and solubility in lubricating coolant. In addition no dirt particles may be in the grease; they cause run errors if they come in in-between two mating surfaces.

We recommend for this the following lubricant:

HAINBUCH grease

See optional Accessories

Alternatives:

Lubricant	Manufacturer	Product
Universal grease	OKS	OKS 265
	MicroGleit	GP 355
	Klüber	QNB 50
	Zeller & Gmelin	DIVINOL SD24440
	Bremer & Leguill	RIVOLTA W.A.P.
Special grease	Klüber	MICROLUBE GL 261

8.5 Maintenance schedule

Maintenance tasks are described in the sections above that are required for optimal and trouble-free operation.

If increased wear is detected during regular inspections, then reduce the required maintenance intervals according to the actual indications of wear.

Contact the manufacturer, [see the service address on the back] if you have questions concerning maintenance tasks and intervals.

Interval	Maintenance task
Daily	Visual inspection and complete cleaning in case of heavy contamination [see section »Cleaning«]
	Check the end position sensing of the machine regularly.
Weekly	Clean the clamping unit [see section »Cleaning«]
	Clean the taper reception and coupling area [see section »Cleaning«]
	Grease the clamping unit [see section »Preservation«]
	Clamping force measurement with a suitable measuring tool.
Every 6 months	Completely disassemble and clean the clamping unit [see section »Cleaning«]



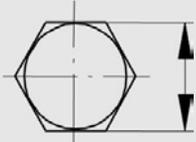
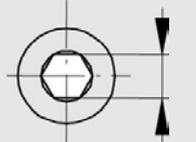
For proper operation of the coolant feed a pre-filtering with duplex filter [mesh size 100 µm, PI 3754] is necessary. The duplex filter is mounted on the coolant cleaning system.

8.6 Bolt torque

Metric ISO thread

The guide values for bolt tightening torque for achieving the highest permissible pre-tension for metric ISO thread are specified in Nm in the table.

- Total friction coefficient $\mu_{\text{tot}} = 0,12$

Diameter	 [mm]	 [mm]	Torque for screw quality 10.9 [Nm]
M 4	7	3	4
M 5	8	4	7
M 6	10	5	12
M 8	13	6	25
M 10	17	8	50
M 12	19	10	100
M 16	24	14	220
M 20	30	17	400
M 24	36	19	600

The table shows the prescribed values.

Knowledge of the applicable guidelines and configuration criteria are the prerequisites.



Consider any different screw tightening torques [e.g. with aluminum components].

- If necessary, different screw tightening torques are given in in Chapter 1.

9 Trouble shooting

Possible fault causes and the tasks to correct these faults are described in the following section.

If faults occur more frequently, the maintenance intervals must be shortened to correspond to the actual system load.

Contact the manufacturer if there are faults that cannot be corrected by following the instructions below; see the service address on the back of this operating instruction.

9.1 Safety

Trouble shooting

The following always applies:

1. For faults that pose a direct danger for personnel and or property immediately execute the emergency-stop function of the machine.
2. Determine the cause of the fault.
3. If correction of the fault requires work in the danger zone, put the machine in set-up mode.
4. Immediately inform the responsible parties at the installation site of the fault.
5. Depending on the type of fault, either have authorized specialized personnel correct the fault, or correct it yourself.



The trouble shooting table provided below lists personnel who are authorized to correct the fault.

6. If there is a fault that was not caused by the clamping device the cause of the fault may be in the machine area. See the operating manual for the machine in this regard.

9.2 Trouble shooting table

Fault	Possible cause	Fault correction	Corrected by
Clamping head cannot be replaced	The change gap between the clamping head coupling and workpiece end-stop is insufficient.	Rework the workpiece end-stop	Specialist
Clamping device does not open or the release stroke is insufficient.	Fouling between the draw mechanism and the clamping unit	Remove the clamping head, move the draw tube back and clean the coupling area [see section »Disassembling the clamping head«].	Specialist
	Dimensional deviation of the draw tube adapter	Check the dimensions of the draw tube adapter and correct them if necessary.	Specialist
Clamping force is too low	Workpiece is under-dimensioned	Replace with a suitable clamping head	Specialist
	Insufficient hydraulic pressure on the clamping cylinder	Check the machine-side hydraulic aggregate	Hydraulic specialist
	Defective clamping cylinder or blocked draw tube	Contact the machine manufacturer	Machine manufacturer
	Compression springs fatigued [at permanent tension]	Replace compression springs	Specialist
Eccentric dimensional deviation on the workpiece	Concentricity error of the clamping unit	Check the concentricity on the clamping taper and correct it if necessary [see section »Checking and adjusting the face run and concentricity of the clamping unit«].	Specialist
Dimensional deviation on the workpiece	Contaminated coupling area	Clean the coupling area of the clamping unit [see section »Cleaning«].	Specialist

Fault	Possible cause	Fault correction	Corrected by
	Contaminated clamping taper	Remove the clamping head and clean the clamping taper [see section »Cleaning«].	Specialist
Formal defect on the workpiece	Elastic deformation of feedstock that is subject to formal defects. After machining, the workpiece returns to its original form.	Use feedstock with fewer formal defects. Use a clamping head with several sharp teeth in the clamping surface.	Specialist
Marks on the clamping surface	Point or linear workpiece clamping	Replace with a clamping head that has a smoother clamping surface	Specialist
	Wrong clamping head type	Replace the clamping head	Specialist
	Excessive dimensional difference between the workpiece diameter and the clamping bore	Replace with a clamping head that has a suitable clamping bore	Specialist

9.3 Start-up after corrected fault

After correcting the fault execute the following steps to start up again:

1. Reset the emergency-stop device
2. Acknowledge the fault on the machine tool controller
3. Ensure that no one is in the danger zone
4. Start the machine tool

10 Appendix

10.1 Service Hotline

Order Hotline

Quickly ordered and delivered. A call is all it takes:
+49 7144. 907-333

Schedule Hotline

Current status of your order? Just call:
+49 7144. 907-222

24h emergency call

Has there been a crash or other technical emergency?

Our experts are at your service around the clock:
+49 7144. 907-444

10.2 Representatives

The sales partners and service employees listed below are available for further consultation or support.

10.2.1 Europe

Austria

HAINBUCH in Austria GmbH SPANNENDE TECHNIK

Pillweinstr. 16
5020 Salzburg
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EC Declaration of conformity

EG-Konformitätserklärung im Sinne der EG-Richtlinie 2006/42/EG über Maschinen [Anhang II A] /

EC Declaration of conformity according to EC directive 2006/42/EC on machinery [Annex II A]

Original-Konformitätserklärung / Translation of original declaration of conformity

Hersteller / manufacturer: HAINBUCH GmbH Spannende Technik
Erdmannhäuser Straße 57
71672 Marbach
Deutschland

Diese Erklärung bezieht sich nur auf die Maschine in dem Zustand, in dem sie in Verkehr gebracht wurde; vom Endnutzer nachträglich angebrachte Teile und/oder nachträglich vorgenommene Eingriffe bleiben unberücksichtigt. Die Erklärung verliert ihre Gültigkeit, wenn das Produkt ohne Zustimmung umgebaut oder verändert wird.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user. The declaration is no more valid, if the product is modified without agreement.

Hiermit erklären wir, dass die nachstehend beschriebene Maschine
Herewith we declare, that the machinery described below

Produktbezeichnung / **TOPlus mini**
product denomination:

allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG entspricht.
is complying with all essential requirements of the Machinery Directive 2006/42/EC.

Angewandte harmonisierte Normen / Harmonised Standards used:

- EN ISO 12100:2011-03 Sicherheit von Maschinen – Allgemeine Gestaltungsgrundsätze
Safety of Machinery – Basic concepts
- DIN EN 1550:1997 Sicherheitsanforderungen für die Gestaltung und Konstruktion von Spannfuttern für die Werkstückaufnahme /
Safety requirements for the design and construction of work holding chucks

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen /
The person authorized to compile the relevant technical documentation:
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Konstruktionsleitung
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71672 Marbach
Deutschland

EC Declaration of incorporation

Einbauerklärung im Sinne der Maschinenrichtlinie 2006/42/EG [Anhang II 1B] /
Declaration of incorporation according to EC directive 2006/42/EC on machinery
[Annex II B]

Hersteller / manufacturer: HAINBUCH GmbH Spannende Technik
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Deutschland

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / The person authorized to compile the relevant technical documentation: HAINBUCH GmbH Spannende Technik
Konstruktionsleitung
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71672 Marbach
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Produktbezeichnung / product denomination: **TOPlus mini**

Der Hersteller erklärt, dass das oben genannte Produkt eine unvollständige Maschine im Sinne der Maschinenrichtlinie ist. Das Produkt ist ausschließlich zum Einbau in eine Maschine oder unvollständige Maschine vorgesehen und entspricht daher noch nicht allen Anforderungen der Maschinenrichtlinie. /

The manufacturer declares that the product cited above is an incomplete machine according to machinery directive. The product is provided exclusively for installation into a machine or an incomplete machine and therefor equates not yet to all requirements of the machinery directive.

Folgende Punkte der MRL wurde berücksichtigt / The following points of the machinery directive were considered:

1.3.2, 1.3.3, 1.3.6, 1.3.7, 1.5, 1.5.4, 1.5.5, 1.5.6, 1.5.8, 1.6, 1.6.1, 1.6.5, 1.7, 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2

Die speziellen technischen Unterlagen [gemäß Anhang VII Teil B] wurden erstellt. Der Bevollmächtigte für das Zusammenstellen der technischen Unterlagen verpflichtet sich, die Unterlagen auf begründetes Verlangen an die einzelstaatlichen Stellen zu übermitteln. Die Übermittlung erfolgt postalisch in Papierform oder auf elektronischem Datenträger.

The relevant technical documentation [as in Annex VII, Part B] were created. The authorized representative for compiling the technical documents is committed to provide the documents to a reasoned request to the national authorities. It shall be sent by mail in paper form or in electronic form.

Die Inbetriebnahme des Produkts ist so lange untersagt, bis festgestellt wurde, dass die Maschine, in die das oben genannte Produkt eingebaut wird, allen grundlegenden Anforderungen der Maschinenrichtlinie entspricht. /

The commissioning of the product is prohibited until it has been determined that the machine, into which the above-mentioned product is installed, complies with all the basic requirements of the Machinery Directive.

Das oben genannte Produkt erfüllt die Anforderungen der folgenden einschlägigen Richtlinien / The above mentioned product complies with the following directives:

- EN ISO 12100:2011-03 Sicherheit von Maschinen – Allgemeine Gestaltungsgrundsätze
Safety of Machinery – Basic concepts
- DIN EN 1550:2008-07 Sicherheitsanforderungen für die Gestaltung und Konstruktion von Spannfuttern für die Werkstückaufnahme /
Safety requirements for the design and construction of work holding chucks



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