



# Installation manual **EN**

**HYDROK**

**HYDROK 40 SE**

**HYDROK 32 RD**

**Hydraulic stationary chuck SPANNTOP**

**force operated**

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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 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 that 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.

## 1.3 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

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.



## 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!

## 1.4 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!

## 1.5 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.

## 1.6 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 HYDROK

Optionally the scope of delivery of the clamping device HYDROK includes:

- 2 Koenig expander
- Clamping head
- Multiple clamping pallet [only for size 65]

Optionally the scope of delivery of the clamping device HYDROK 32 includes:

- Clamping head
- Tandem cylinder
- Hydraulic base plate

## 1.7 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.

## 1.8 Warranty terms

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

## 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 personnel. 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!**

Some clamping devices 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.
- Note the gap dimensions 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 work piece



### **WARNING!**

#### **Danger of injury due to incorrect clamping of the work piece!**

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

Under dimensioned [tolerance] parts can lead to incorrect clamping!

- Check the unmachined work pieces at random on dimensional accuracy.

Too low supply pressure can lead to the reduction of clamping force!

Too high supply pressure can lead to damage of the components of the clamping device!

- Check and adjust, if necessary, the supply pressure regularly.
- Do random checks of the unmachined work pieces on dimensional accuracy.

## Missing changing parts



### **WARNING!**

#### **Danger of injury due to missing changing parts!**

When operating the clamping device without changing parts [segmented clamping bushing, 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 segmented clamping bushing 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.



## **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!**

#### **Missing o-rings or seals may cause severe injuries!**

Due to missing / fallen out O-rings and seals compressed air or hydraulic fluids which are under high pressure may expel!

- Make sure that all O-rings / seals for the hydraulic / pneumatic connections are available and undamaged!
- If necessary lubricate them before assembly and/or during service.



### **Risk of injury!**

Leaking [sprayed out] hydraulic oil can cause serious injury.

- 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 standing 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.

- 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.

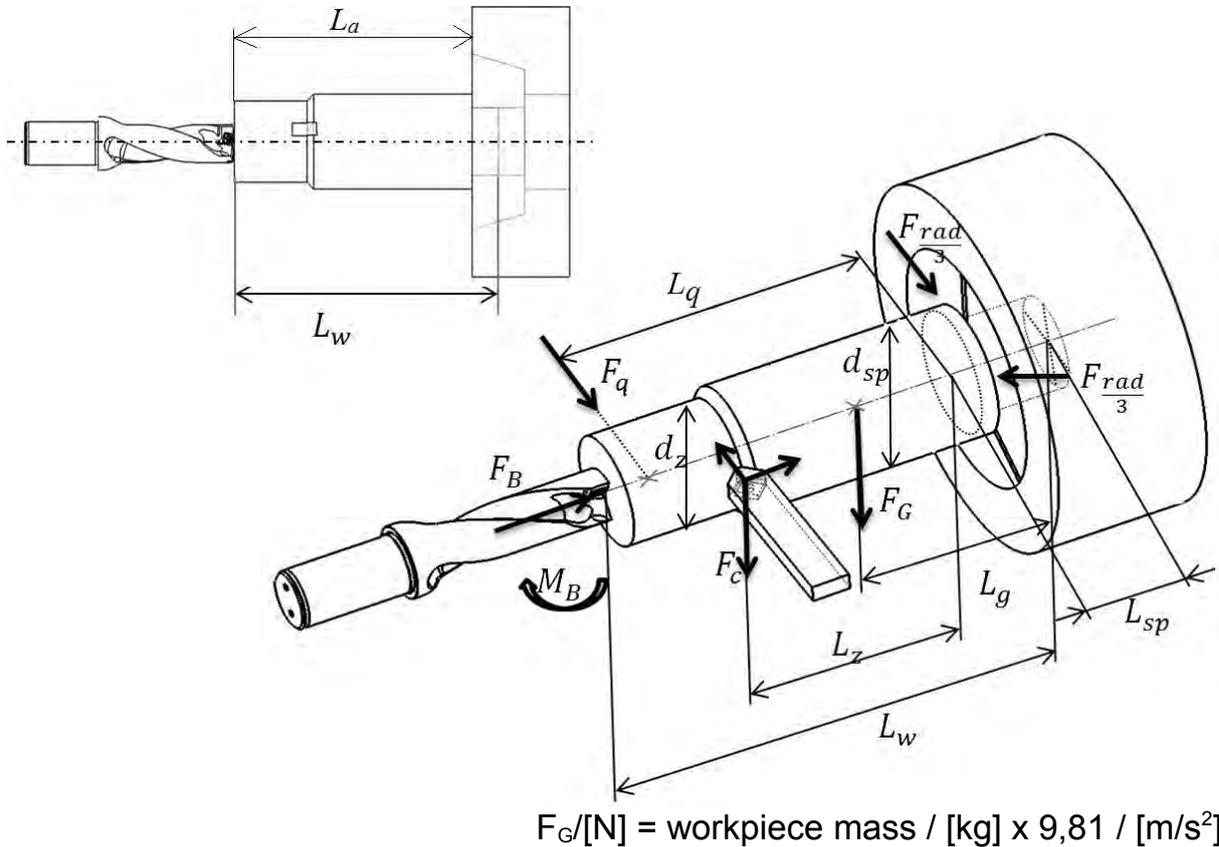
Specifically, prior to using the chucks, four limits that are independent of each other must be checked.

### 2.10.1 Nomenclature

Short 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 <sup>2</sup>	Specific cutting force
$L_a$	mm	Unclamping length
$L_g$	mm	Distance, center of gravity - workpiece - clamping position

Short description	Unit	Explanation
$L_q$	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. moment due to transverse force relative to the chuck axis
$n$	1/min	Speed
$p$	-	Machining code
$r_s$	mm	Distance center of mass SK segment relative to the axis of rotation of the chuck
$S$	-	Clamping force spread factor
$\mu_a$	-	Coefficient of friction in the axial direction
$\mu_t$	-	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. 1**

**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
32	12	18
42	20	30
52	28	40
65	40	60
80	50	75
100	65	100
125	80	120
140	100	150
160	120	180

Table 1: Maximum 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:

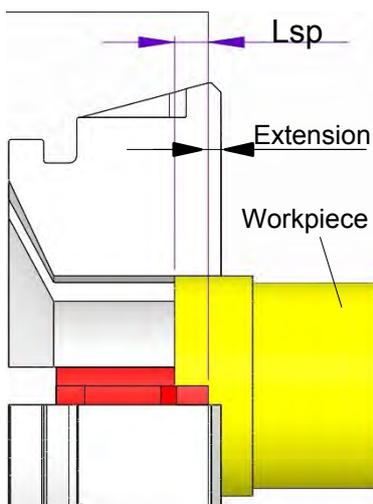


Fig. 2

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

[Use of clamping heads with smooth clamping bore]

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

[Use of clamping heads with longitudinal and radial grooves]<sup>1</sup>

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

[Use of clamping heads with Z-serration]

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

[Use of clamping heads with F-serration]

<sup>1</sup> 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.

## 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.

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 machining<sup>2</sup>, the following must apply at all times:

**1st principle**  $F_{rad} \geq F_{raderf}$

**AND**

**2nd principle**  $F_t \leq F_{t_{max}}$

**AND**

**3rd principle**  $F_c \leq F_{c_{max}}$

[relevant for turning jobs or axial drilling operation]

**AND**

**4th principle**  $F_q \leq F_{q_{max}}$   
[relevant for radial drill operation]

**AND**

**5th principle**  $M_q \leq M_{q_{max}}$   
[relevant for radial drill operation]

<sup>2</sup> 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.

## 2.10.5.1 For principle 1: $F_{\text{rad}} \geq F_{\text{rad erf}}$

### Determination of the required clamping force

Determination of the required clamping force  $F_{\text{rad erf}}$  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  $F_{\text{rad erf}}$ , primarily verification of the introduced transverse force  $F_q$  and the resulting moment  $M_q$  also play a central role.

## Spread of the clamping force

Chuck size SPANNTOP	Radial clamping reserve in diameter [mm]	Clamping force spread factor S <sup>3</sup>	Clamping force spread factor S »verified« <sup>4</sup>
32	1,0	2,8 <sup>5</sup>	1,3
42	1,0	2,0 <sup>5</sup>	1,3
52	1,0	2,0 <sup>5</sup>	1,3
65	1,0	1,6 <sup>5</sup>	1,3
80	1,0	1,6 <sup>5</sup>	1,3
100	1,5	1,45	1,3
125	2,5	1,45	1,3
140	1,5	1,45	1,3
160	1,5	1,45	1,3

Table 2: Spread of the clamping force

## Forms of contact

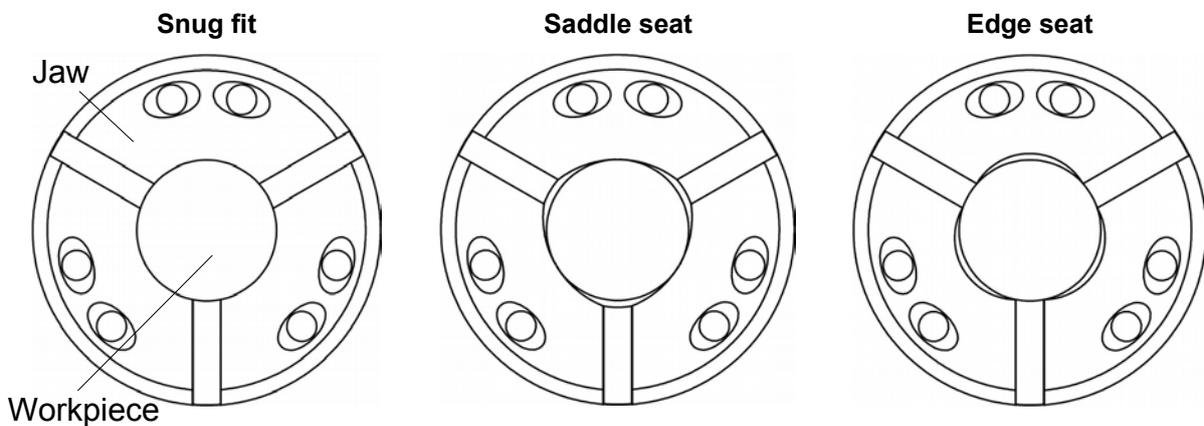


Fig. 3: Forms of contact between smooth top jaws and workpiece

## 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.

- 3 These values are based on a regularly maintained and lubricated operating status as specified in the operating manual.
- 4 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.
- 5 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:

Contact factor c	Machining conditions	Snug fit and saddle seat	Edge seat
Smooth clamping head	Dry	1,1	1,0
	Wet or MMS <sup>6</sup>	1,3	1,2
Clamping head with longitudinal or transverse serration	Dry	1,1	1,0
	Wet or MMS <sup>6</sup>	1,3	1,2
Clamping head with Z-serration or F-serration	Dry	1,0	1,0
	Wet or MMS <sup>6</sup>	1,2	1,1

*Table 3: Contact factor*

### Specific cutting forces $k_c$ [N/mm<sup>2</sup>]

Corresponding to the relatively imprecise classification of the materials, these are guide values. Thus, in some cases 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.

<sup>6</sup> Wet machining MMS [MQL]:

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

Workpiece materials		Specific cutting forces $k_c$ [N/mm <sup>2</sup> ] at $f=0,1\text{mm}$ <sup>7,8,9</sup>	Specific cutting forces $k_c$ [N/mm <sup>2</sup> ] at $f=0,5\text{mm}$ <sup>10,11</sup>	Specific cutting forces $k_c$ [N/mm <sup>2</sup> ] at $f=1,0\text{mm}$ <sup>12,13</sup>
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]	For example: 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/mm<sup>2</sup>]

- 7 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.
- 8 For drilling operations with double-edged tools  $f=f_n/2$  applies
- 9 For feeds, between 0.05 and 0.1 mm the value at  $f=0.1$  with 20% contingency must be used.
- 10 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.
- 11 For drilling operations with double-edged tools  $f=f_n/2$  applies
- 12 For feeds, between 0.5 and 1.0 mm you must interpolate.
- 13 For drilling operations with double-edged tools  $f=f_n/2$  applies

## Coefficients of friction

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

For hardened steel as the material, the values of the smooth jaws 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 smooth clamping heads!

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

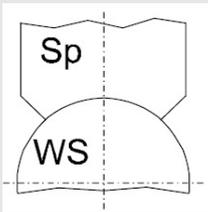
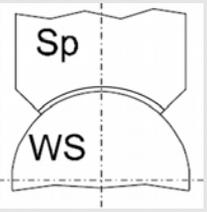
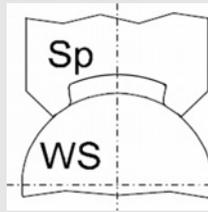
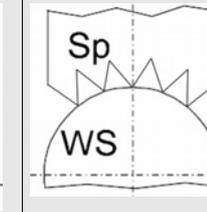
Workpiece surface	Jaw clamping surface			
				
	Smooth clamping head	Clamping head with longitudinal and transverse serration	Clamping head with Z-serration	Clamping head with F-serration
Finely finished, ground	$\mu_t = 0,06$ $\mu_a = 0,08$	$\mu_t = 0,07$ $\mu_a = 0,09$	$\mu_t = 0,15$ $\mu_a = 0,20$	$\mu_t = 0,17$ $\mu_a = 0,22$
Finished 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]
32	0,015	0,51
42	0,021	1,00
52	0,022	1,02
65	0,027	2,05
80	0,032	2,50
100	0,045	3,85
125	0,061	8,60
140	0,062	8,70
160	0,072	11,8

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
$\mu_a, \mu_t$	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 occurring force transmission 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]

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

Drilling

[full drilling, two-edged tool in the 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 in 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:

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

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: $F_t \leq F_{tmax}$ <sup>14</sup>

### 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	$F_{tmax}$ / [kN]
32	4
42	6
52	6
65	8
80	8
100	8
125	8
140	8
160	8

Table 7: Maximum permissible tailstock force

<sup>14</sup> 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 : $F_c \leq F_{cmax}$

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	$F_{cmax}$ / [N]
32	2.700
42	3.600
52	3.600
65	5.000
80	6.000
100	8.000
125	12.000
140	12.500
160	14.000

Table 8: Maximum permissible cutting force

## 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 occurs 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  $90^\circ$  transverse to the chuck axis]

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



kc

From table 4

Chuck size	Fqmax / [N]
32	3.200
42	4.200
52	4.200
65	6.000
80	7.200
100	9.000
125	13.000
140	13.800
160	15.000

Table 9: Maximum permissible transverse force

## 2.10.5.5 For principle 5: $M_q \leq M_{qmax}$

For drilling tasks radial to the workpiece axis, the transverse force verified under principle 4 generates an additional torque  $M_q$  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  $M_q$  through introduction of the transverse force  $F_q$

$$M_q = F_q * L_q$$

Chuck size	Mqmax [Nm]
32	160
42	210
52	210
65	300
80	360
100	450
125	650
140	690
160	750

Table 10: Maximum permissible moment  $M_q$  due to transverse force  $F_q$

## 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  $d_{sp} = 60$  mm
- Workpiece length  
 $L_w = 150$  mm [151,5 mm unmachined]
- Machining diameter – turning operation  
 $d_z = 57,0$  mm
- Workpiece mass  $m_w = 3,3$  kg  
→  $F_G = m_w * 9,81 \text{ m/s}^2$   
→  $F_G = 33$  N

### Process data

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

### Chuck

- SPANNTOP 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  $0.08 * d_{sp} = 0.08 * 60 \text{ mm} = 4.8 \text{ mm}$ , 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]
$\mu_a, \mu_t$	From table 5
m, $r_s$	From table 6

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

From table 2: S=1,6

From table 3: c=1,3

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

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

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

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

Turning:

$$F_c = 1,3 * 1,5 mm * 0,25 mm * 2515 \frac{N}{mm^2}$$

$$F_c = 1226N$$

Drilling:

Here not relevant, because drilling is not intended. Consequently

$$M_B = 0 Nmm$$

$$F_B = 0 N$$

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

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

$$F_{sk} = \frac{207.838 Nmm}{14,11 mm} = 14.727 N$$

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

$L_g = 75mm$ , 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:  $m = 2,05 \text{ kg}$   
 $rs = 0,027 \text{ m}$

$$F_{fz} = (2,05 \text{ kg} * 0,027 \text{ m}) * \left(\frac{\pi * 800 \frac{1}{\text{min}}}{30}\right)^2 = 390\text{N}$$

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

$$F_{raderf} = 1,6 * 1,3 * (1,6 * (14.703 + 14.727) + 390) = 98.745\text{N}$$

$$F_{raderf} = 99\text{kN}$$

Because the size 65 chuck can apply a maximum radial clamping force  $F_{rad} \text{ max.} = 105 \text{ kN}$ , 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  $4500 \text{ N}$ .

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  $105 \text{ kN}$  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 »Clamping force diagram « shown for RPM.

## 2.11 Selection of aggregate

Interpretation of the clamping and release time and volume. The clamping and release time depends on the current level.

### Example:

- HYDROK size 40
- Axial force 22,5 kN
- Max. pressure 85 bar
- Volume flow of the pump 4 l/min

### Calculation of the clamping and release time:

$$\frac{0,01 \text{ l}}{4 \text{ l}/60\text{s}} = 0,15 \text{ s} \text{ [Stroke 4 mm]}$$

### Calculation of the volume:

$$p = \frac{F}{A}$$

$$A = \frac{F}{p} = \frac{22.500 \text{ N}}{85\text{bar} * 10 \frac{\text{N}}{\text{cm}^2}} = 26,47 \text{ cm}^2$$

→ Piston surface A = 26,47 cm<sup>2</sup>

$$26,47 \text{ cm}^2 * 4\text{mm} (\text{clamping reserve} + \text{release stroke}) = 105\text{cm}^3$$

$$105\text{cm}^3 \rightarrow 0,105 \text{ dm}^3 = 0,105 \text{ liter}$$

### 2.11.1 Clamping and release flow at HYDROK

[in liters]

	size 32	size 40 SE	size 42	size 52	size 65	size 80	size 100
Clamping volume / 1 Clamping device	0,013	0,01	0,022	0,022	0,028	0,031	0,080
Release volume / 1 Clamping device	0,013	0,01	0,022	0,022	0,028	0,031	0,080

### 2.11.2 Clamping and release times at 2-liter hydraulic aggregate

[In seconds]

	size 32	size 40 SE	size 42	size 52	size 65	size 80	size 100
1 Clamping device	0,39	0,60	0,65	0,65	0,83	0,93	2,4
2 Clamping device	0,78	0,60	1,30	1,30	1,66	1,86	4,81
4 Clamping device	1,56	1,20	2,60	2,60	3,32	3,72	9,61

### 2.11.3 Clamping and release times at 4-liter hydraulic aggregate

[In seconds]

	size 32	size 40 SE	size 42	size 52	size 65	size 80	size 100
1 Clamping device	0,195	0,15	0,32	0,32	0,42	0,47	1,2
2 Clamping device	0,39	0,30	0,65	0,65	0,83	0,93	2,40
4 Clamping device	0,78	0,60	1,30	1,30	1,66	1,86	4,81

## 2.11.4 Clamping and release times at 8-liter hydraulic aggregate

[In seconds]

	size 32	size 40 SE	size 42	size 52	size 65	size 80	size 100
1 Clamping device	0,097	0,075	0,16	0,08	0,05	0,04	0,03
2 Clamping device	0,195	0,150	0,32	0,16	0,11	0,08	0,06
4 Clamping device	0,390	0,300	0,65	0,32	0,22	0,16	0,13



All specified values are without consideration of the feeding and draining piping systems and fittings.

## 2.12 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 HYDROK

Variant	Size	Weight [kg]	Dimension [L x w x h in mm]	Clamping force $F_{rad}$ max. [kN]	Actuating pressure max. [bar]
RD	32	2,7	79,8 x 79,8 x 95	70	100
	42	12,3	154 x 154 x 120	80	40
	52	12	154 x 154 x 120	94	46
	65	16,4	174 x 174 x 130	105	40
	80	17,5	186 x 186 x 130	115	40
	100	30,9	229 x 229 x 140	150	40
RD Alu	100	13,5	229 x 229 x 130	143	40
SE	40	2,7	79,8 x 79,8 x 95	75 [63]	110
	52	11,8	154 x 154 x 120	108 [94]	46
	65	16,3	174 x 174 x 130	120 [105]	40
	100	30,4	229 x 229 x 140	172 [150]	40
SE Alu	100	13,5	229 x 229 x 130	164 [143]	40

$F_{rad}$  max. can only be reached in lubricated condition.  
In unlubricated condition  $F_{rad}$  max. is much lower.

## 3.2 General information stationary chuck

Variant	Size	Weight [kg]	Dimension [Ø x h in mm] [L x w x h in mm]	Connection [Ø h4 x height in mm]	Clamping force F <sub>rad.</sub> max. [kN]	Actuating pressure max. [bar]
Stationary chuck SPANNTOP RD	32	12,3	Ø 152 x 118	Ø 148 x 8	70	40
	42	12,3	Ø 175 x 120	Ø 170 x 8	80	40
	65	16,4	Ø 200 x 140	Ø 196 x 8	105	40
	80	17,5	Ø 215 x 140	Ø 210 x 8	115	40
	100	30,9	Ø 232 x 138	Ø 228 x 8	150	40
Stationary chuck SPANNTOP SE	32	12,3	134 x 134 x 118	Ø 148 x 8	70	40
	42	12,3	154 x 154 x 120	Ø 170 x 8	80	40
	65	16,4	174 x 174 x 140	Ø 196 x 8	105	40
	80	17,5	186 x 186 x 140	Ø 210 x 8	115	40
	100	30,9	210 x 210 x 138	Ø 228 x 8	150	40

F<sub>rad.</sub> max. can only be reached in lubricated condition.  
In unlubricated condition F<sub>rad.</sub> max. is much 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!

## 3.3 Clamping forces HYDROK and hydraulic stationary chuck SPANNTOP

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.

### Metering example HYDROK size 4242

Under a pressure of 25 bar the radial clamping force is, depending on the maintenance condition of the clamping device, in the range between 19 kN and 57.5 kN, he must neither be less than 19 kN or greater than 57.5 kN.

When using an adaption clamping device, not its axial force.

## Calculation example [HYDROK size 42]

Calculation of the pressure [p] that has to be adjusted, to get a certain max. traction axially.

### Definition:

$p_{\max}$ [HYDROK]	Max. operating pressure of the HYDROK [bar]
$F_{ax-\max}$ [HYDROK]	Max. draw force axially of HYDROK [kN]
$F_{ax}$ [adaptation clamping device]	Draw force axially of adaptation clamping device [kN]

### Given values:

$p_{\max}$ [HYDROK]	40 bar
$F_{ax-\max}$ [HYDROK]	35 kN
$F_{ax}$ [adaptation clamping device]	20 kN [Example]

### Requested value:

$p$  [HYDROK],  
if  $F_{ax}$  [adaptation clamping device] = 20kN

### Calculation:

$$p [HYDROK] = \frac{p_{\max} [HYDROK] * F_{ax} [Adaptionsspannmittel]}{F_{ax\max} [HYDROK]}$$

$$p [HYDROK] = \frac{40\text{bar} * 20\text{kN}}{35\text{kN}} = 23\text{bar}$$

## Comments

The diagram shows the influences of friction and clamping diameter are included.

The maximum drawtube force [ $F_{ax}$ ] of the respective adaptation clamping device must not be exceeded. This value is given on the adaptation clamping device.

## 3.3.1 Clamping force diagram – HYDROK – size 32 RD

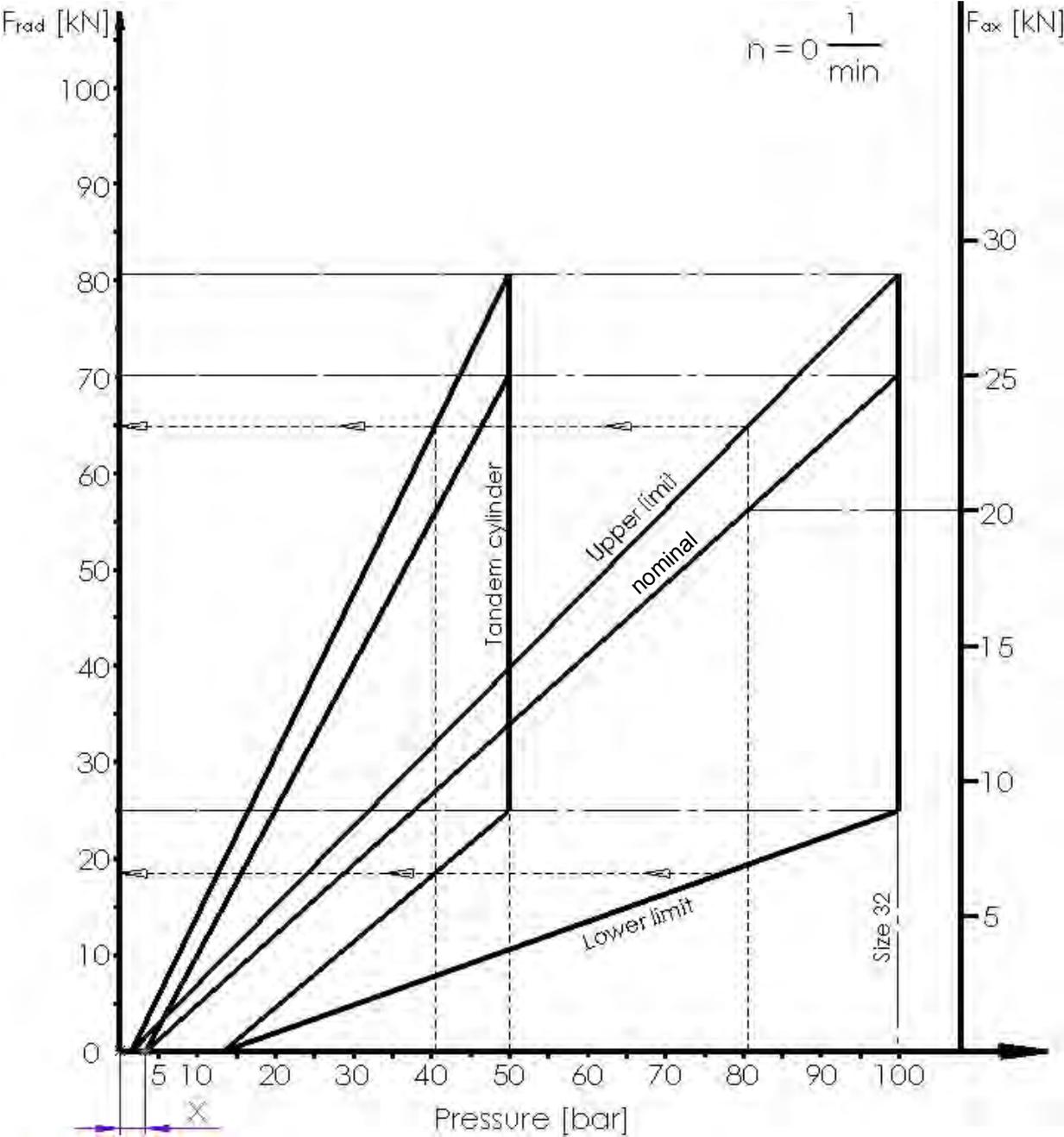


Fig. 4

3.3.2 Clamping force diagram – hydraulic stationary chuck – size. 32 RD

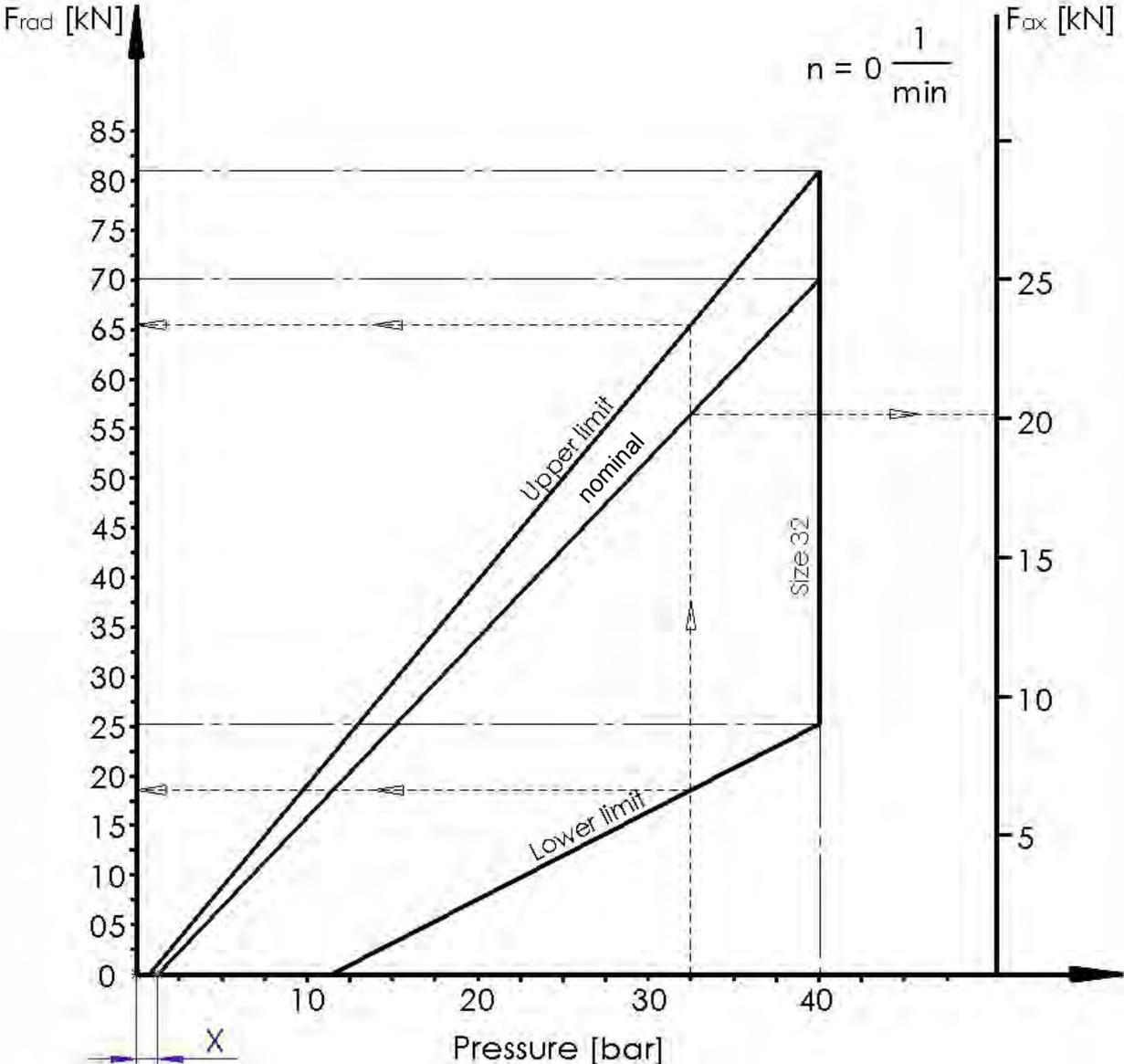


Fig. 5

## 3.3.3 Clamping force diagram – HYDROK – size 40 SE

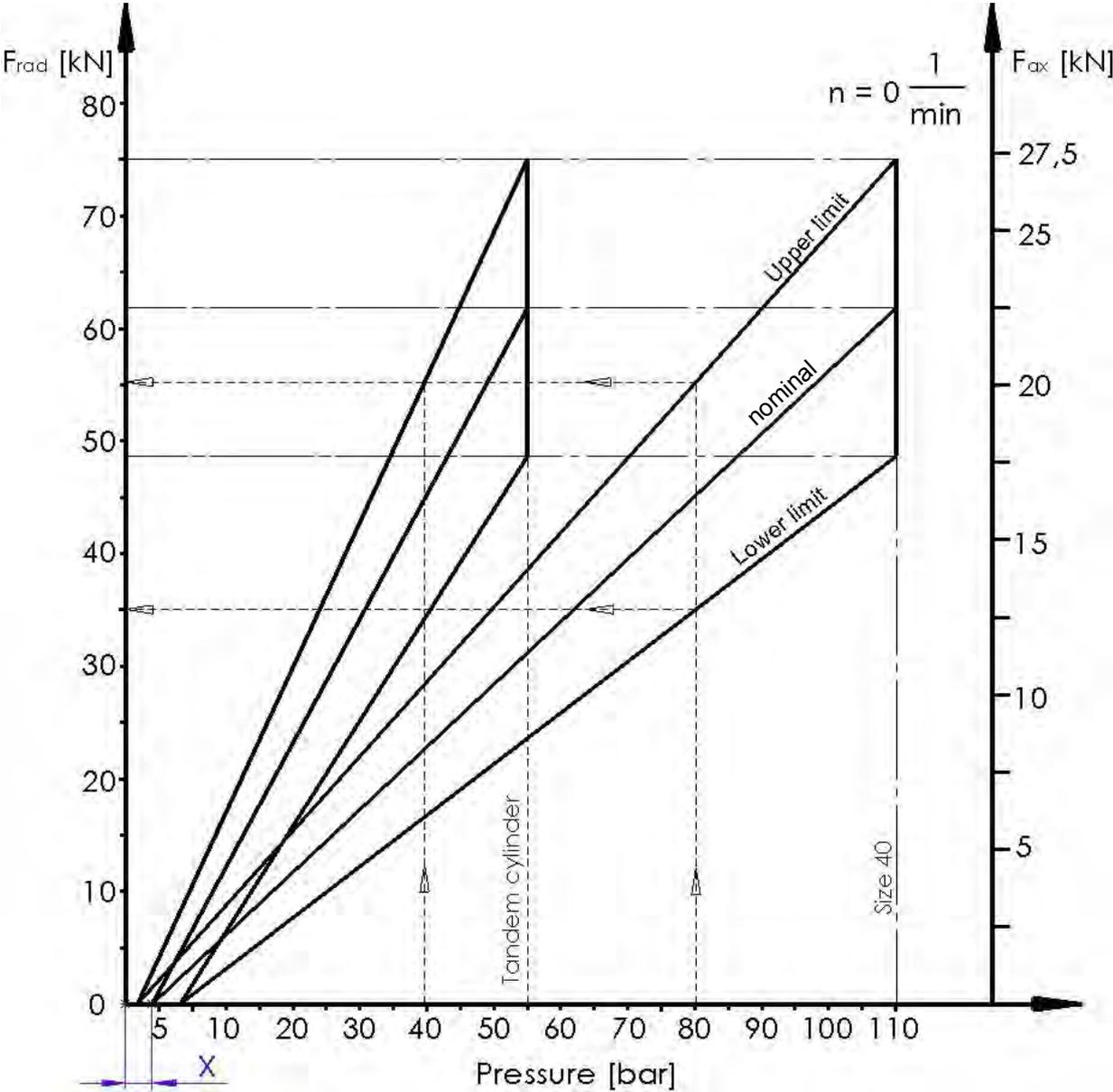


Fig. 6

## 3.3.4 Clamping force diagram – HYDROK and hydraulic stationary chuck – size 42/52 RD/SE

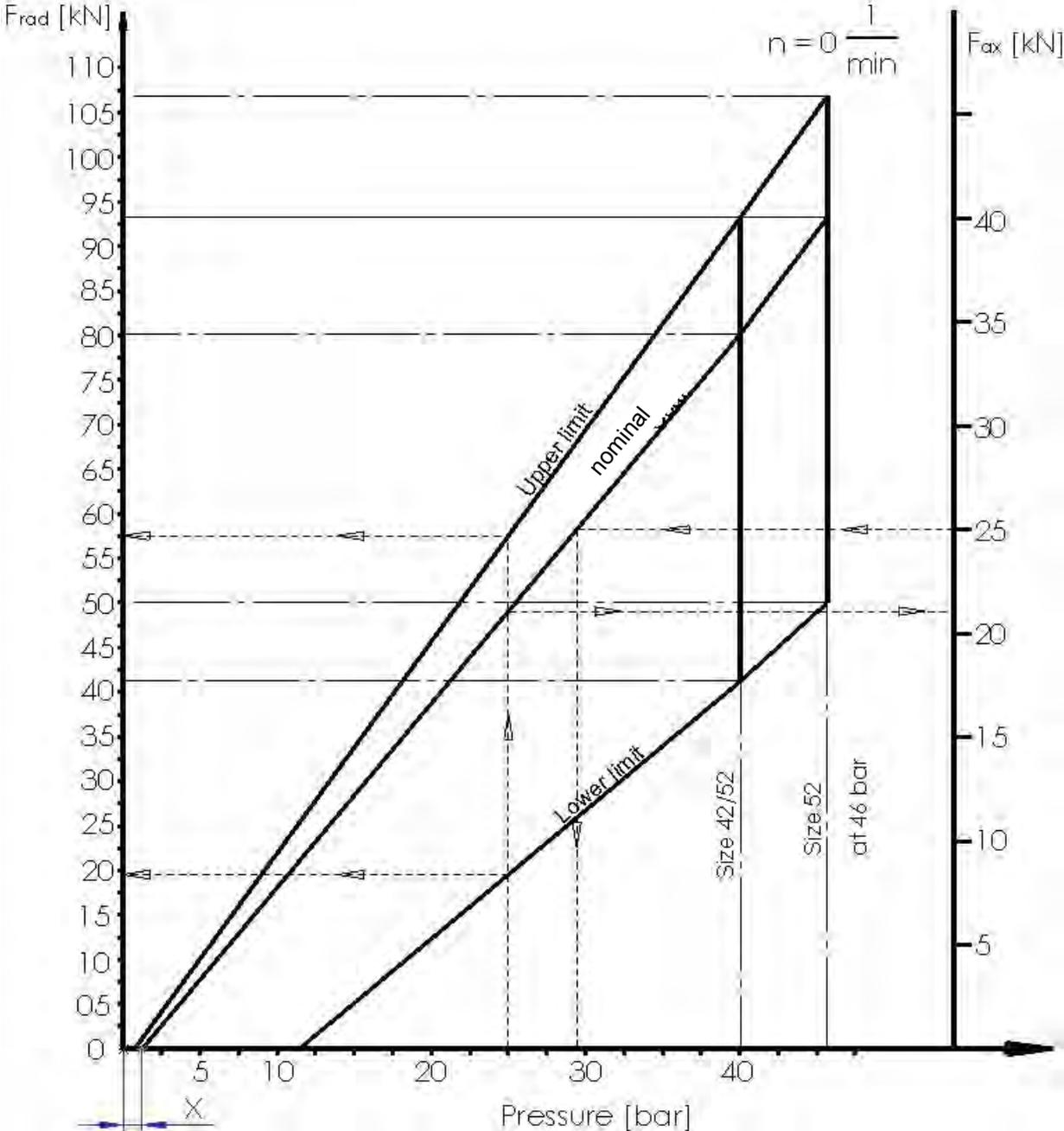


Fig. 7

## 3.3.5 Clamping force diagram – HYDROK and hydraulic stationary chuck – size 65 RD/SE

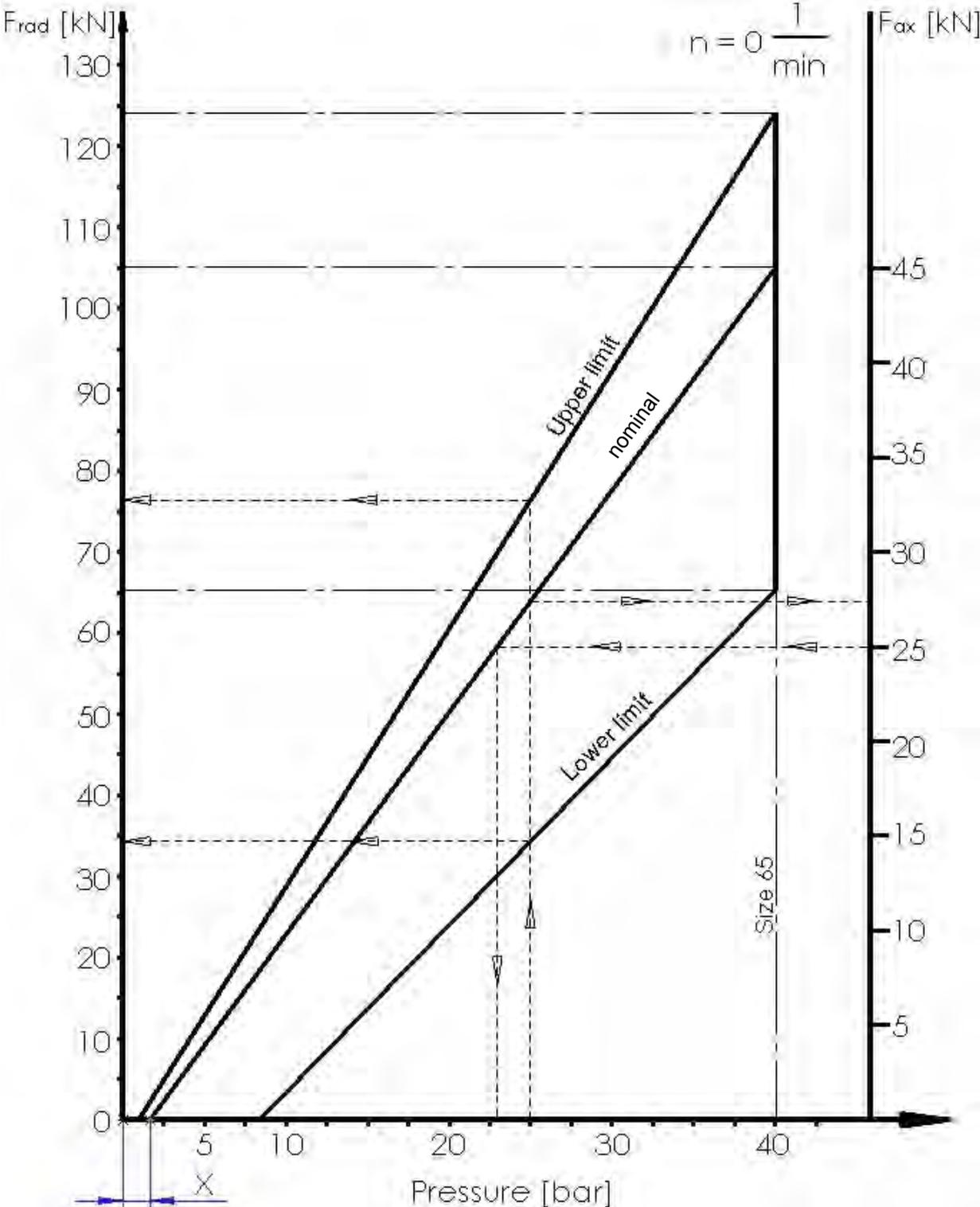


Fig. 8

## 3.3.6 Clamping force diagram – HYDROK and hydraulic stationary chuck – size 80 RD

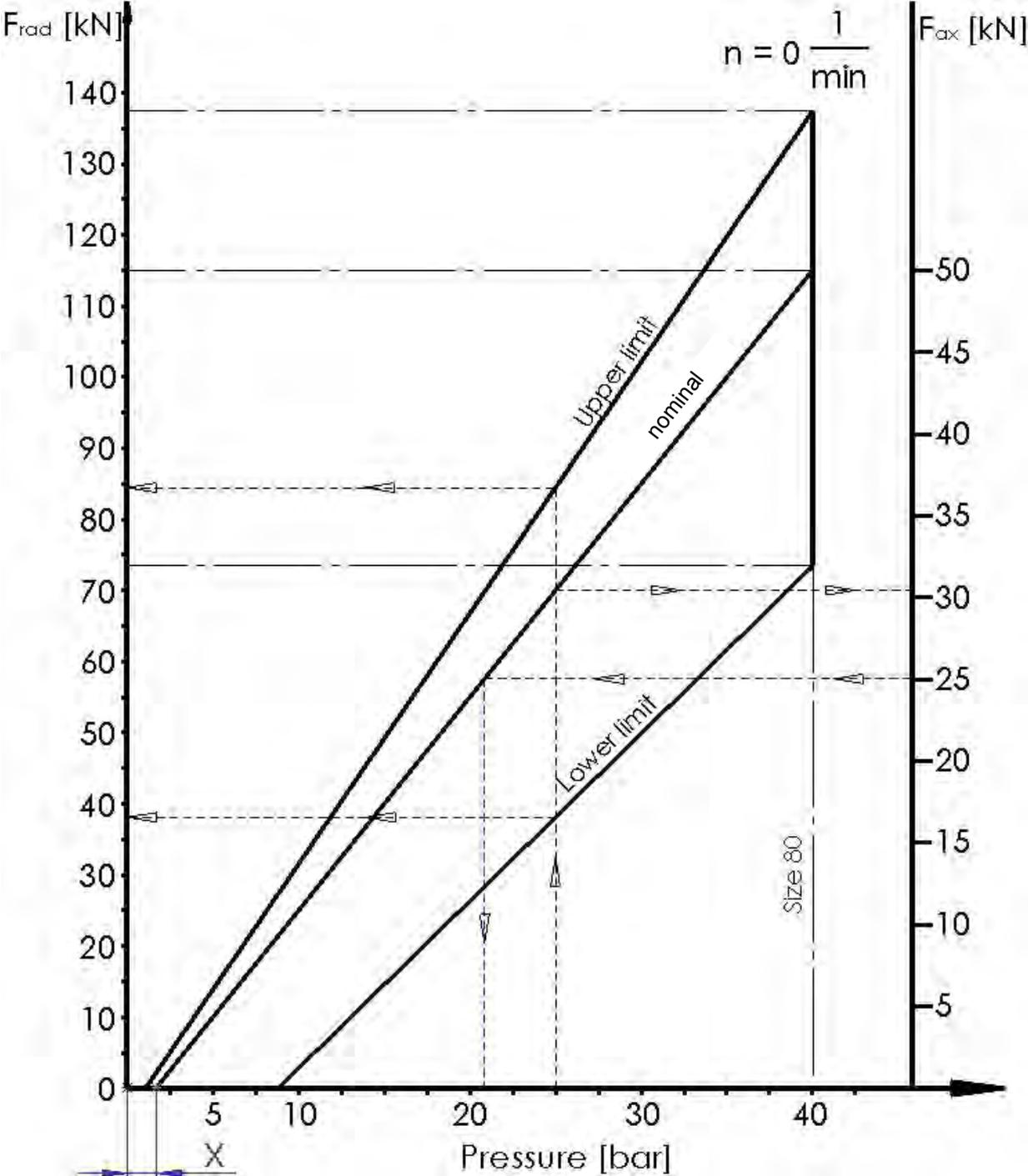


Fig. 9

## 3.3.7 Clamping force diagram – HYDROK and hydraulic stationary chuck – size 100 RD/SE

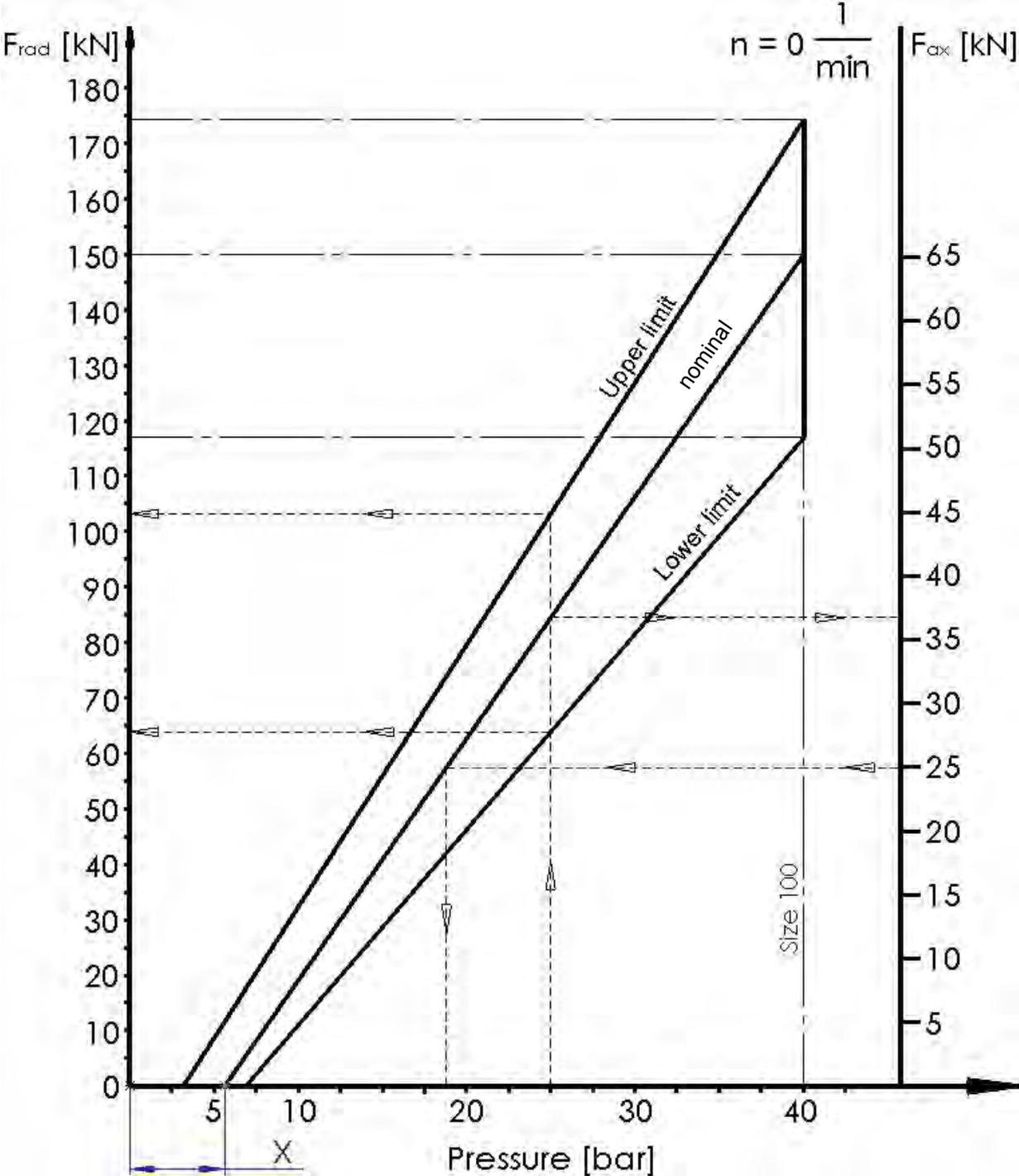


Fig. 10

## 3.4 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!

## 3.5 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.

## 3.6 Type designation



The type designation 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]

Fig. 11

## 4 Structure and function

### 4.1 Overview HYDROK

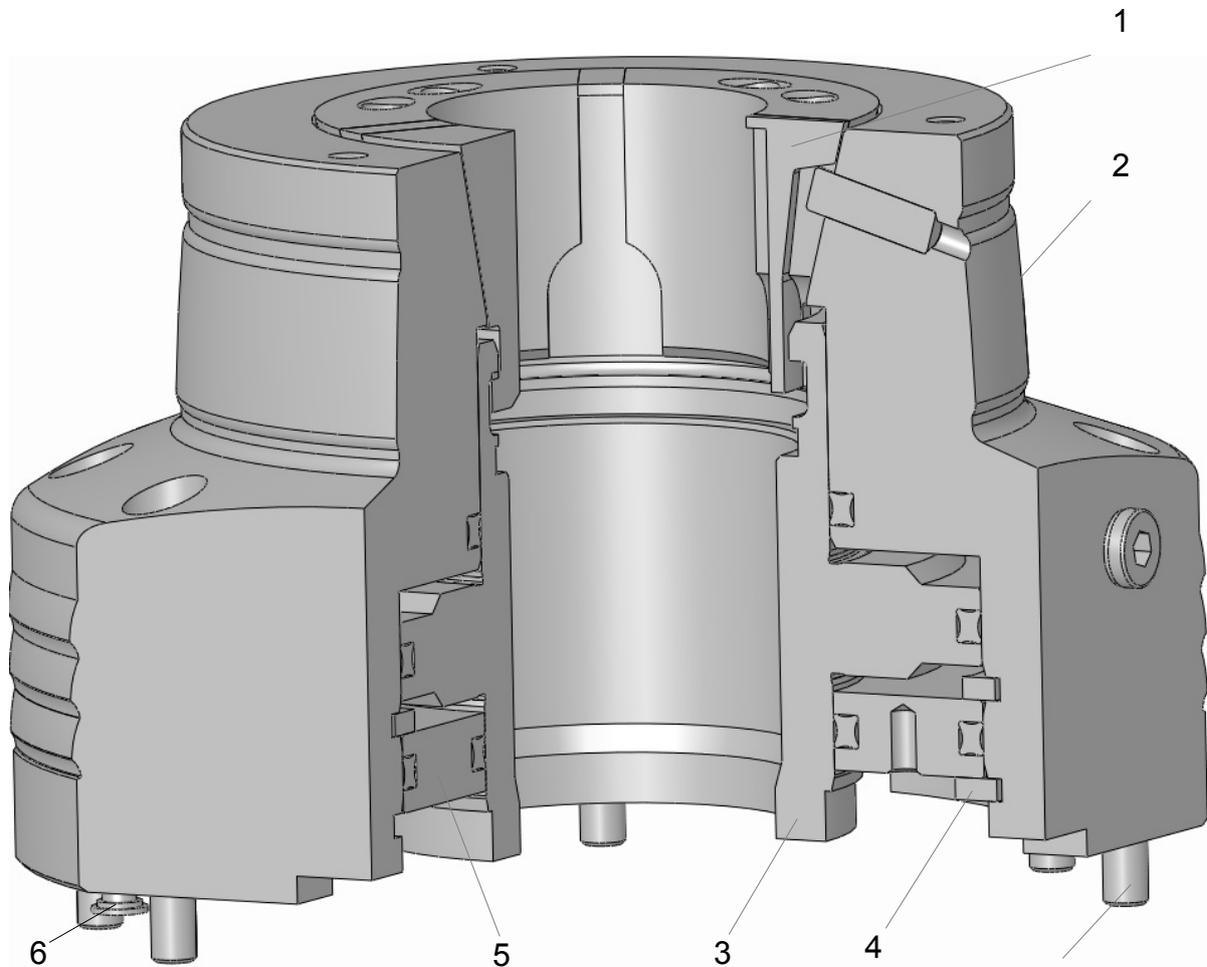
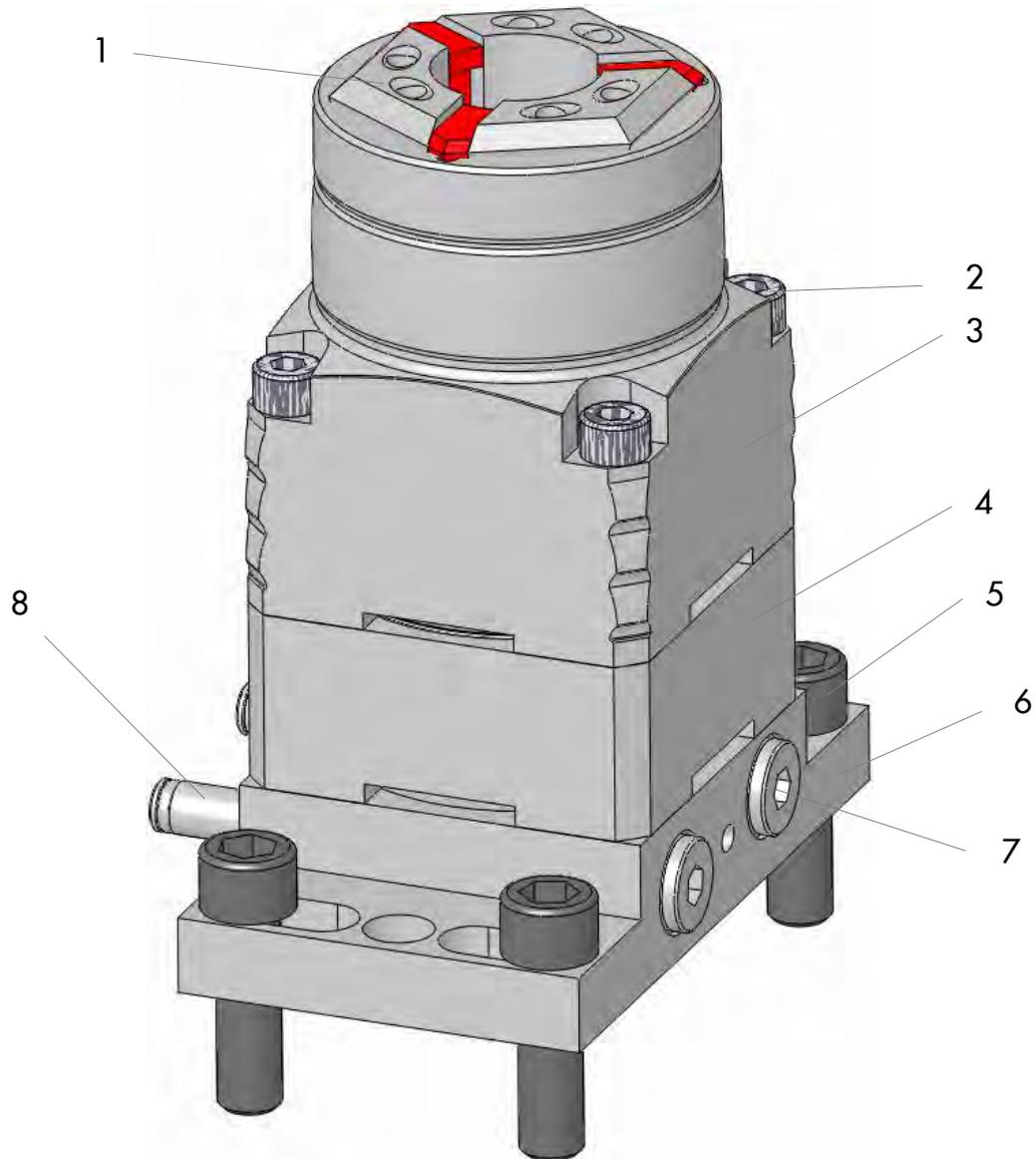


Fig. 12

- |                             |                    |
|-----------------------------|--------------------|
| 1. Clamping head [optional] | 5. Cylinder cover  |
| 2. Housing                  | 6. Fitting         |
| 3. Piston / coupling        | 7. Mounting screws |
| 4. Locking ring             |                    |

## 4.2 Overview HYDROK 32 RD / HYDROK 40 SE



**Fig. 13**

- |                               |  |
|-------------------------------|--|
| 1. Clamping head [optional]   | 6. Hydraulic base plate [optional]   |
| 2. Mounting screws [4x]       | 7. Hydraulic connection  |
| 3. HYDROK 32                  | 8. Hydraulic connection [optional] for the connection of several HYDROK 32 |
| 4. Tandem cylinder [optional] |  |
| 5. Cylindrical screws [4x]    |  |

## 4.3 Brief description HYDROK / HYDROK32

The HYDROK is ideal for stationary use: eg in drilling and machining centers and milling machines.

The clamping heads consist of hardened steel segments which are vulcanized together. They guarantee parallel clamping of the workpieces as well as a fast set-up and high accuracy - during minimum deformation of the workpieces.

Due to the axial pulling components while clamping, the clamping head is pulled directly into the stationary chuck. This makes the clamping of the workpieces very stable. Additionally the entire clamping device gets stiff which affects the service life of the tools favorably.

5-axis machining or rational multiple clamping, with the HYDROK we offer a hydraulically actuated stationary chuck that provides even more implementation possibilities. It can be used with all clamping device adaptations, such as the MANDO Adapt mandrel-in-the-clamping device or with the jaw adapter.

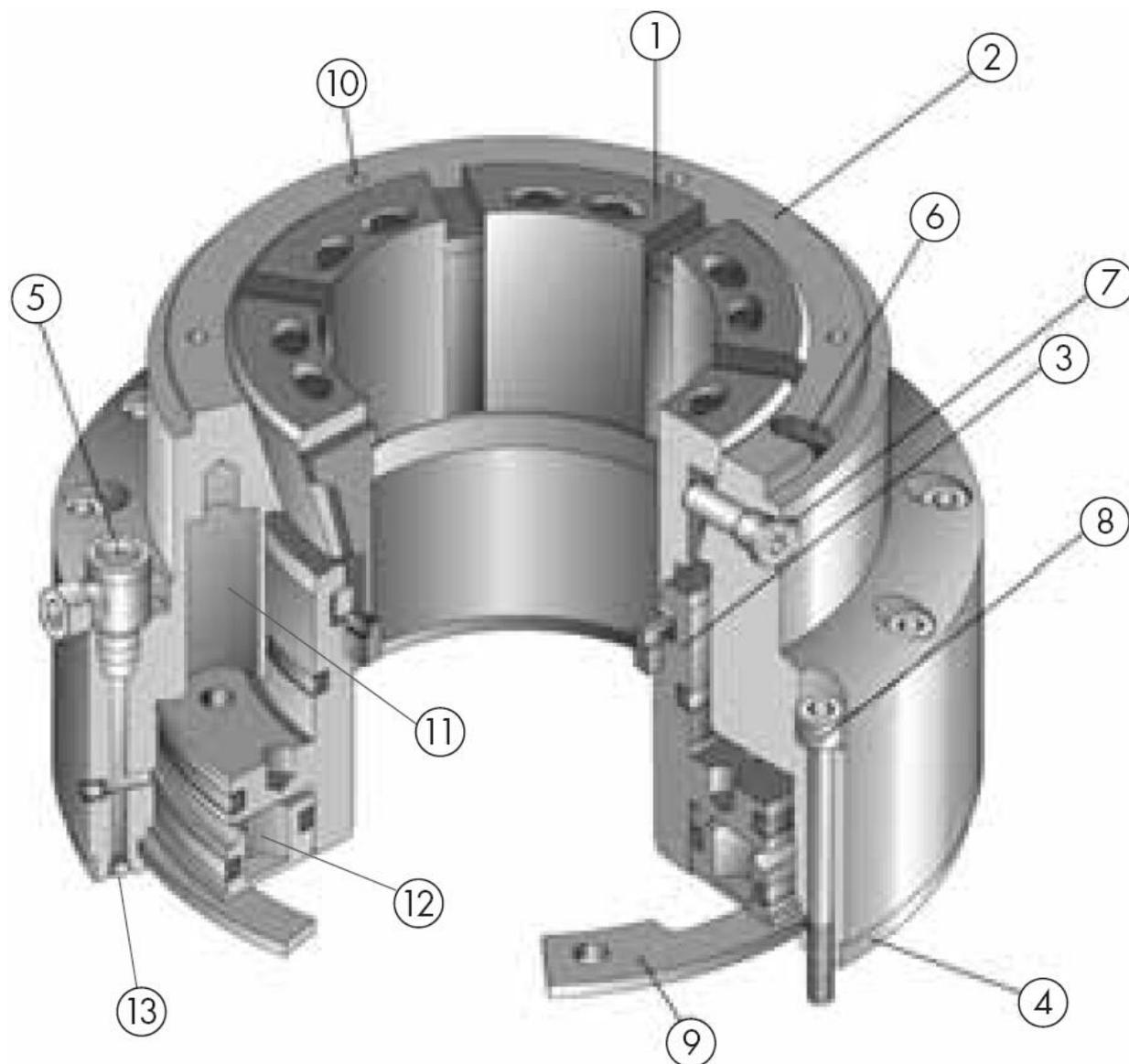
Consequently, allowing for future and complete reliability on the intelligent HAINBUCH modular system, even for stationary clamping devices.

Key advantages:

- Easy set-up
- Repeatability < 0.01 mm possible
- Ideal for automated clamping
- Angular contour allows lower space requirement
- Multiple clamping made possible in the smallest space
- Ideal for 5-side machining
- Typical HAINBUCH features, such as user friendly set-up, full passage, parallel clamping, optimal power conversion, extreme rigidity and superior holding power, as well as minimal wear and tear
- Prepared for work piece end-stop and front end-stop

With the HYDROK 32 you may adjust the required pressure by the tandem cylinder.

## 4.4 Overview and brief description



**Fig. 14**

- |   |  |
|---|--|
| 1. Clamping head                                      | 8. Mounting screws                       |
| 2. Housing  | 9. Safety ring                           |
| 3. Piston   | 10. Mounting thread for frond connection |
| 4. Connection to base plate or table                  | 11. Disc springs [only type 2000]        |
| 5. Media supply [from side or through the base plate] | 12. Disc springs [only type 3000]        |
| 6. Positioning for front end-stop                     | 13. O-rings                              |
| 7. Radial positioning                                 |  |

## 4.5 Brief description hydraulic stationary chuck SPANNTOP

The HYDROK is ideal for stationary use: e.g. in drilling and machining centers and milling machines.

The clamping heads consist of hardened steel segments which are vulcanized together. They guarantee parallel clamping of the workpieces as well as a fast set-up and high accuracy - during minimum deformation of the workpieces.

Due to the axial pulling components while clamping, the clamping head is pulled directly into the stationary chuck. This makes the clamping of the workpieces very stable. Additionally the entire clamping device gets stiff which affects the service life of the tools favorably.

5-axis machining or rational multiple clamping, with the HYDROK we offer a hydraulically actuated stationary chuck that provides even more implementation possibilities. It can be used with all clamping device adaptations, such as the MANDO Adapt mandrel-in-the-clamping device or with the jaw adapter.

Consequently, allowing for future and complete reliability on the intelligent HAINBUCH modular system, even for stationary clamping devices.

Key advantages:

- Repeatability < 0.01 mm possible
- Ideal for automated clamping
- Angular contour allows lower space requirement
- Ideal for 5-side machining
- Typical HAINBUCH features, such as user friendly set-up, full passage, parallel clamping, optimal power conversion, extreme rigidity and superior holding power, as well as minimal wear and tear
- Prepared for work piece end-stop and front end-stop
- Clamping possibly by spring assemblies.

## 4.6 Designs hydraulic stationary chuck SPANNTOP

### 4.6.1 Type 100x

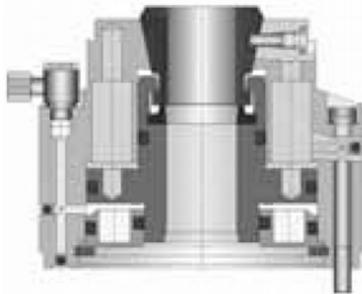


Fig. 15

**Clamping** By spring assemblies

**Loosening** Hydraulic

Hydraulic connection through the base plate.

The spring force of the disc springs is getting lower if the stationary chuck moves into reserve stroke.

### 4.6.2 Type 200x

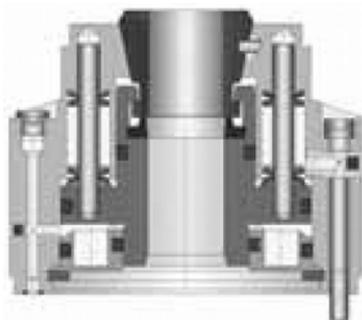


Fig. 16

**Clamping** By spring assemblies

**Loosening** Hydraulic

## 4.7 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.

## 4.7.1 Changing fixture



Fig. 17

### 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. 18

### 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.

## 4.7.2 Clamping head



Fig. 19

The clamping heads are used to accommodate the workpiece 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 workpiece there are clamping heads in different sizes and with different profiles and bores.

## 4.7.3 Clamping head

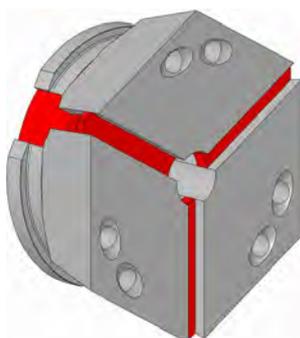


Fig. 20

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.

## 4.7.4 Grease



Fig. 21

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.

## 4.7.5 Grease gun



Fig. 22

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.

## 4.7.6 Tandem cylinder

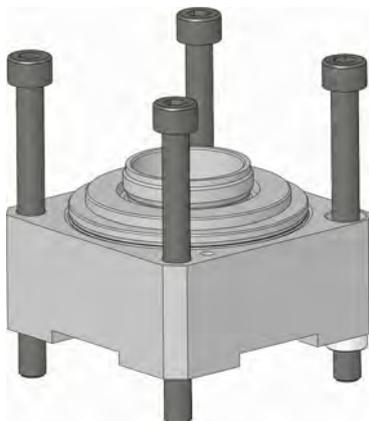


Fig. 23

By adapting the tandem cylinder to the HYDROK 32 RD you can reach a clamping pressure of 70 kN by only 50 bar.

By adapting the tandem cylinder to the HYDROK 40 SE you can reach a clamping pressure of 75 kN by only 55 bar.

The tandem cylinder has the order number 10510/0001 and can be ordered from HAINBUCH.

## 4.7.7 Hydraulic base plate

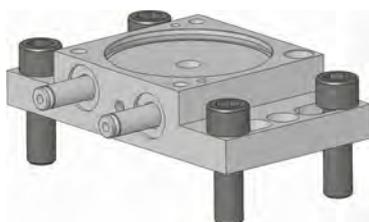


Fig. 24

For size 32 RD a special hydraulic base plate has been developed.

- The hydraulic base plate is pressure checked at 11MPa [110bar].
- Connecting material is in scope of delivery
- Mounting of the hydraulic base plate by clamping edge.

The hydraulic base plate can be ordered separately:

# HYDROK – Structure and function

	Dimensions [L x W x H]	Order number
Hydraulic base plate <ul style="list-style-type: none"> <li>■ HYDROK size 32 RD</li> <li>■ HYDROK size 40 SE</li> </ul>	140 x 79,8 x 30	1205/0006



## WARNING!

### Risk of injury due to uncontrolled movement of the hydraulic connection!

When connecting the hydraulic with a HAINBUCH base plate or a self-constructed base plate and the use of rapid action coupling an automatic movement may occur. This can result in serious injury.

- Connect the rapid action coupling only with extreme vigilance.

## 4.7.8 Multiple clamping pallet



Fig. 25

For size 65 a special multiple clamping pallet has been developed.

- Connecting material is in scope of delivery
- Mounting of the hydraulic base plate by clamping edge.

The multiple clamping pallet is available in several models and can be ordered separately:

Multiple clamping pallet for HYDROK size 65	Dimensions [L x W x H]	Order number
2 times	360 x 180 x 35	1205/0001
4 times - serie	720 x 180 x 35	1205/0002
4 times - square	360 x 360 x 35	1205/0003

## 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



The clamping device is packed vertically and has threaded bores in the end face.

From about weight 15 kg there are also 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
- 1. Screw lifting eye bolt into the thread in the end face 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.

### 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 30-40 kg.

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.



### **WARNING**

#### **Risk of injury due to stored energy!**

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!
- Always wear personal protective equipment!

## 6.3 Installation



### **WARNING!**

#### **Danger of injury due to unintentional start-up of the tool spindle!**

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

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



### **WARNING!**

#### **Risk of injury!**

By operating the clamping device without changing parts [clamping head, segmented clamping bushing, workpiece end-stops ...] 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!



## **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 clamping pressure is too low clamped workpiece may be thrown out.

If the clamping pressure 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 operating pressure 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.

## 6.3.1 Installation of the HYDROK and the hydraulic stationary chuck SPANNTOP

Two people are required for this task.

Special tools required:

- Allen wrench
- Tool for expander
- Crane and eye bolts from weight 15 kg

Depending on the model of the stationary chuck the hydraulic connection is

- usually by the base plate or
- alternatively at the side of the stationary chuck

The stationary chuck can be centered by the outer fit or the inner fit.

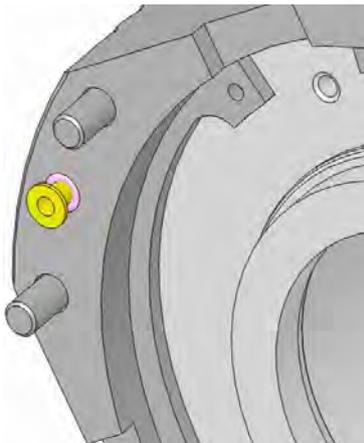


Fig. 26



### Caution!

#### Property damage due to missing seal rings

By removing the seal rings the clamping device may become leaky.

- When remove the plug the seal ring must remain in the stationary chuck.

1. Remove the plug from the rear side of the clamping device.



### Property danger due to not fitting hydraulic connections!

With not fitting of the hydraulic connections of base plate and stationary chuck the O-rings can be destroyed!

- When connecting the hydraulic by the base plate, make sure that the connectors for the hydraulic at clamping device and pipe fit.
- Please use preferably the HAINBUCH base plate [see optional accessories].

2. Connect the hydraulic preferable at the hydraulic connection at the rear side, alternatively at the hydraulic connection at the side.
3. When using the hydraulic connection at the side, insert an expander into the free lower hydraulic connection.



Clean the fitting areas at stationary chuck and machine table before each installation!

4. Put the stationary chuck on the machine table.
5. Screw in the mounting screws through the stationary chuck into the machine table and tighten them only finger tight.

Check the face run:

6. Adjust the dial indicator at the front side of the clamping element reception and/or housing and check the face run. Find the 0-position
7. Tighten the mounting screws according to the manufacturers order.

## 6.3.2 Installation of the HYDROK 32 RD and the HYDROK 40 SE

Two people are required for this task.

Special tools required:

- Allen wrench
- Tool for expander

The hydraulic supply of the stationary chuck is carried out via the base plate.

The stationary chuck can be centered either on an outer diameter or on an inner diameter.

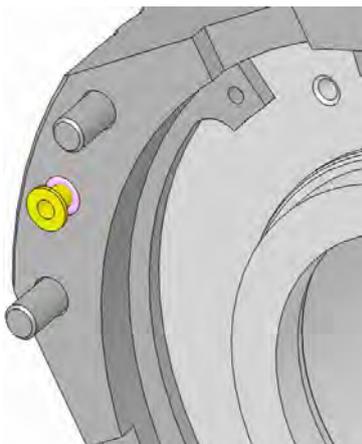


Fig. 27



### Caution!

#### Property damage due to missing seal rings

By removing the seal rings the clamping device may become leaky.

- When remove the plug the seal ring must remain in the stationary chuck.

1. Remove the plug from the rear side of the clamping device.



### Property danger due to not fitting hydraulic connections!

With not fitting of the hydraulic connections of base plate and stationary chuck the O-rings can be destroyed!

- When connecting the hydraulic by the base plate, make sure that the connectors for the hydraulic at clamping device and pipe fit.
- Please use preferably the HAINBUCH base plate [see optional accessories].

2. Connect the hydraulic preferable at the lower hydraulic connection at base plate.



When using several base plates they can be connected directly by pins!



Clean the fitting areas at stationary chuck and machine table before each installation!

3. Move the coupling of the HYDROK 32 RD / HYDROK 40 SE into clamping reserve [downwards].

4. Move the tandem cylinder in front end position.



Make sure that all o-rings are in good condition and inserted.

5. Put the tandem cylinder from the rear side on the HYDROK 32 RD / HYDROK 40 SE till end stop.



Use the „Index“ holes for positioning!

6. Turn back the tandem cylinder till the “Index” holes fit.

7. Put the ring in the base plate.

8. Put the tandem cylinder together with the assembled HYDROK 32 RD / HYDROK 40 SE on the ring on the base plate.

9. Screw in the mounting screws through the HYDROK 32 RD / HYDROK 40 SE into the base plate and tighten them only finger-tight.

Check the face run:

10. Adjust the dial indicator at the front side of the clamping element reception and/or housing and check the face run. Find the 0-position

11. Tighten the mounting screws according to the manufacturers order.



## Risk of injury!

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

If the clamping pressure 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 operating pressure should be checked and adjusted regularly!



## WARNING!

### Slipping danger due to escaping hydraulic fluid!

Escaping [sprayed out] hydraulic oil can cause serious 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.

### 6.3.3 Installation of the clamping head

The changing of the clamping head is only possible in release position of the stationary chuck.

Special tool required:

#### ■ Changing fixture

1. Clean the clamping cone in the clamping element reception as well as the housing.



## Risk of crushing!

While operating the changing fixture there is crushing danger.

- Do not seize into moving parts!

2. Put the changing fixture on the clamping head: Put the pins of the changing fixture completely into the front holes in the clamping head. By operating the changing fixture the clamping head is squeezed at the coupling area.
3. Put the clamping head into the clamping element reception and/or the housing.

4. Loosen the changing fixture by light pressure in axial direction and pull it out of the clamping head.

## 6.4 Workpiece

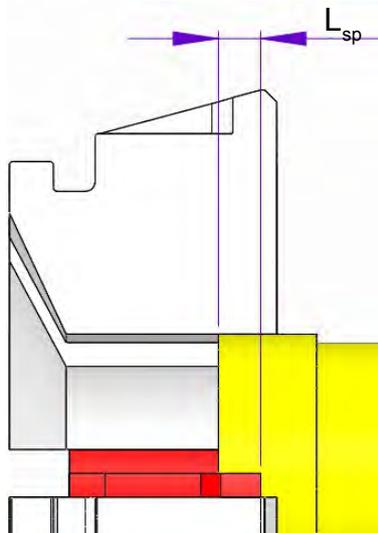


Fig. 28

### 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.
- Tighten only workpieces that meet the dimensional requirements, in this regard pay attention to the maximum utilization of the clamping reserve/reserve stroke, see chapter 2.5 »Faulty workpiece clamping«.
- Only clamp workpieces with a minimum clamping depth » $L_{sp}$ «, **see chapter »Implementation limits«**. As in this case only the area of the taper without front nose extension applies.
- To clamp extremely long workpieces, in addition use a tailstock/steady rest for support.



### CAUTION

#### Risk of injury!

When placing the workpiece:

- Make sure that the hands / fingers may not be clamped between the flange and 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 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 clamping pressure 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 pressure loss test and 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**

### **Risk of injury due to stored energy!**

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!
- Always wear personal protective equipment!



## **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 Disassembling the clamping device

### 7.2.1 Disassembly of the clamping head

The changing of the clamping head is only possible in release position of the stationary chuck.

Special tool required:

- Changing fixture



#### **Risk of crushing!**

While operating the changing fixture there is crushing danger.

- Do not seize into moving parts!

1. Put the changing fixture on the clamping head: Put the pins of the changing fixture completely into the front holes in the clamping head. By operating the changing fixture the clamping head is squeezed at the coupling area.
2. Remove the clamping head out of the clamping element reception and/or the housing.
3. Loosen the changing fixture by light pressure in axial direction and pull it out of the clamping head.
4. Clean the clamping cone in the clamping element reception and/or housing.

### 7.2.2 Disassembly of the HYDROK

Two people are required.

Special tools required:

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

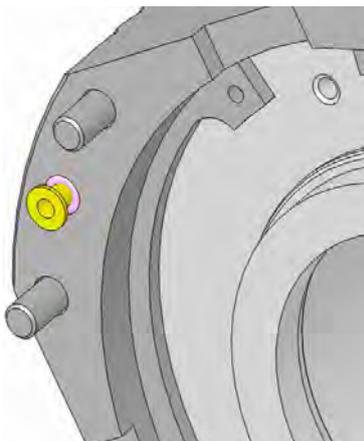


Fig. 29

1. Loosen and remove the mounting screws.
2. Disconnect the hydraulic connection at the stationary chuck.
3. Remove the stationary chuck from the machine table.



Clean the mounting surfaces of the stationary chuck and the machine table after each disassembly!

## 7.2.3 Disassembly of the HYDROK 32 RD / HYDROK 40 SE

Two people are required.

Special tools required:

- Allen wrench

1. Loosen and remove the mounting screws of the HYDROK 32 RD / HYDROK 40 SE.
2. Disconnect the hydraulic connection at the HYDROK 32 RD / HYDROK 40 SE.
3. Remove the HYDROK 32 RD / HYDROK 40 SE together with the tandem cylinder [optional] from the base plate.



Clean the mounting surfaces of the HYDROK 32 RD / HYDROK 40 SE, the base plate, the tandem cylinder [optional] and the machine table after each disassembly!

4. Remove the ring from the base plate and clean it.
5. Move the tandem cylinder into front end position.
6. Move the coupling of the H HYDROK 32 RD / HYDROK 40 SE into reserve stroke [downwards].
7. Unscrew the tandem cylinder downwards out of the HYDROK 32 RD / HYDROK 40 SE.



The o-rings may not be damaged!



Clean the mounting surfaces of HYDROK 32 RD / HYDROK 40 SE and the machine after each disassembly!



### CAUTION!

#### Material damage due to missing o-rings!

By removing the o-rings the clamping device may become leaky.

- When inserting the protection cap the o-ring must remain in the HYDROK 32 RD / HYDROK 40 SE.

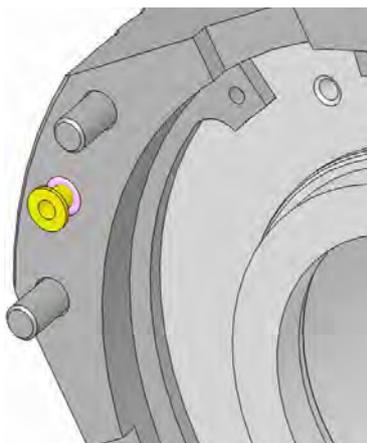


Fig. 30

8. Put the protection cap in the lower side of the clamping device.

## 7.2.4 Disassembly of the hydraulic stationary chuck SPANNTOP

Two people are required.

Special tools required:

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



### **WARNING!**

#### **Risk of injury due to leaking hydraulic oil!**

The stationary chuck may contain spring assemblies.

- Move the clamping device into reserve stroke!

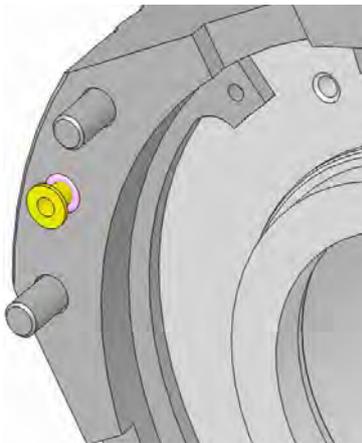


Fig. 31

1. Loosen and remove the mounting screws.
2. Disconnect the hydraulic connection at the stationary chuck.
3. Remove the stationary chuck from the machine table.



Clean the mounting surfaces of the stationary chuck and the machine table after each disassembly!

## 7.3 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«.

## 7.4 Disposal

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



### **CAUTION!**

#### **Risk of injury due to leaking fluids!**

Hydraulically or pneumatically operated clamping devices may contain residues of liquids. Uncontrolled leakage of fluids can lead to severe injuries.

- Open the pressure relief screw and drain remaining liquid.
- Discard the liquid.



### **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!



### **NOTE!**

#### **Composite materials!**

For disposal clamping devices which include composite materials [mineral cast, CFK] must be returned at HAINBUCH!

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.



#### **CAUTION**

#### **Danger of injury due to improper handling of cleaners!**

Improper handling of cleaners can cause health impairments.

- Always comply with the safety data sheets and guidelines provided by the manufacturer of the cleaning agent for handling/using the cleaners.



#### **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.



## **WARNING**

### **Risk of injury due to stored energy!**

The clamping device can be designed with disc springs. These disc springs are under permanent tension! The release of the stored energy can cause injuries!

- By loosening the corresponding screws they have to be operated continuously alternately to reduce the clamping pressure to a minimum!
- Particularly cautious approach is required!
- For cleaning and maintenance disassemble the clamping device from the machine!
- Always wear personal protective equipment!



### **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



### CAUTION!

#### Damage of the seal rings when partial disassembly!

When partly disassembling of the stationary chuck for cleaning / service, the seal rings will be damaged!

**Keep a new set of seal rings ready for re-assembling.**

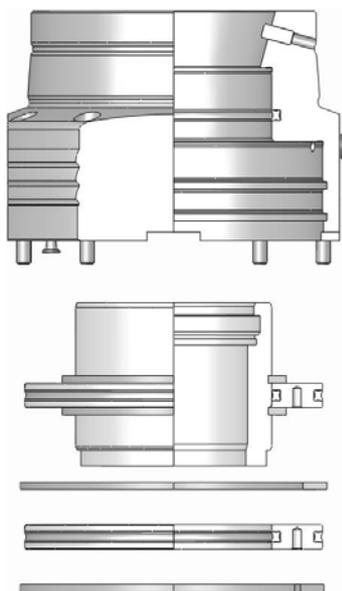


Fig. 32

1. Disassembled the clamping device [see chapter »Disassembling the clamping device«].



### CAUTION!

#### Risk of injury due to spring tension!

While disassembling the stationary chuck for cleaning / preservation, the clamping device may cause severe injuries.

- The partly disassembly may only be done by HAINBUCH service personnel.

2. Clean all the components listed below with cleaning agent and a cloth; remove all oil and grease residues:
  - Taper reception
  - coupling area

## 8.2.1 Cleaning HYDROK 32 RD and HYDROK 40 SE



### 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. Disassembly of the HYDROK 32 RD / HYDROK 40 SE from the machine table [see chapter »Disassembly of the HYDROK 32 RD / HYDROK 40 SE«].



### CAUTION!

#### Risk of injury by not allowed partly disassembly of the HYDROK 32 RD / HYDROK 40 SE!

When partly disassembling of the HYDROK 32 RD / HYDROK 40 SE for cleaning / service, the clamping device may be damaged or even destroyed.

- The partly disassembly may only be done by HAINBUCH service personnel.

- 2. Clean all the components listed below with cleaning agents and a cloth; remove all oil and grease residues:
  - Base plate
  - Tandem cylinder [optional]
  - Taper reception and coupling area of the HYDROK 32 RD / HYDROK 40 SE.

## 8.3 Preservation

- Special tools required:
  - Universal grease 2085/0003
  - Grease gun
  - Oil stone
  - Soft, lint-free cloth
- 1. Hone all the bearing surfaces of the clamping device with an oil stone
- 2. Lightly grease all cylindrical screws. Remove excess grease with a cloth.
- 3. Lightly grease all interior and outer surfaces of the clamping device. Remove excess grease with a cloth.
- 4. 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«]
Weekly	Clean the taper reception and coupling area [see section »Cleaning«]
Every 6 months	Completely disassemble and clean the clamping unit [see section »Cleaning«]



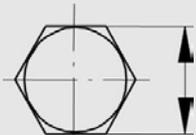
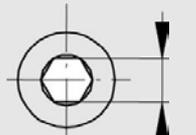
For proper operation of the coolant feed a pre-filtering with duplex filter [mesh size 100 µm, PI 3754] is necessary. The duplex filter is mounted on the coolant cleaning system.

## 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.

## 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. Determine the cause of the fault.
2. 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.

3. 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 device does not open or the release stroke is insufficient.	Fouling of the draw mechanism	Remove the clamping head and clean the coupling area [see section »Disassembling the clamping head«].	Specialist
Clamping force is too low	Work piece 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
	Compression springs fatigued [at permanent tension]	Replace compression springs	Specialist
Dimensional deviation on the work piece	Contaminated coupling area	Clean the coupling area of the clamping unit [see section »Cleaning«].	Specialist
	Contaminated clamping taper	Remove the clamping head and clean the clamping taper [see section »Cleaning«].	Specialist
Formal defect on the work piece	Elastic deformation of feedstock that is subject to formal defects. After machining, the work piece returns to its original form.	Use feedstock with fewer formal defects. Use a clamping head with several sharp teeth in the clamping surface.	Specialist
	Clamping force is too high	Reduce the clamping force to the valid level for the clamping device and the workpiece	Specialist
Marks on the clamping surface	Point or linear work piece 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 work piece 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  
Phone +43 662 825309  
Fax +43 662 62500720  
E-mail: [verkauf@hainbuch.at](mailto:verkauf@hainbuch.at)  
Internet: [www.hainbuch.at](http://www.hainbuch.at)

##### Bulgaria

Aton MI Ltd  
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office No. 92  
1574 Sofia  
Phone +359 879050951  
E-mail: [sales@smartcnc.eu](mailto:sales@smartcnc.eu)  
Internet: [www.smartcnc.eu](http://www.smartcnc.eu)

##### Denmark

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Fax +45 46170001  
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Internet: [www.jbh-tools.dk](http://www.jbh-tools.dk)

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Internet: [www.bistechnics.com](http://www.bistechnics.com)

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60200 Brno  
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Fax +420 548217219  
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Internet: [www.tmccr.cz](http://www.tmccr.cz)

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Internet: [www.bisspecials.com](http://www.bisspecials.com)

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## Italy

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Fax +39 031611570  
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Fax +47 35532375  
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Internet: [www.onstadmaskin.no](http://www.onstadmaskin.no)

## Poland

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Internet: www.bim-polska.pl

## Romania

Banatech srl. – connecting technologies  
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Fax +40 355814125  
Mobile +40 749220553  
E-mail: office@banatech.ro  
Internet: www.banatech.ro

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## 10.2.2 North america

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### Mexico

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## 10.2.3 South america

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### Australia

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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 / product denomination:** **HYDROK**

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 /  
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