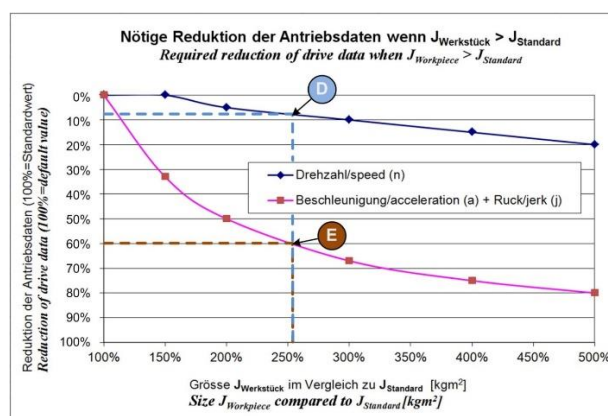
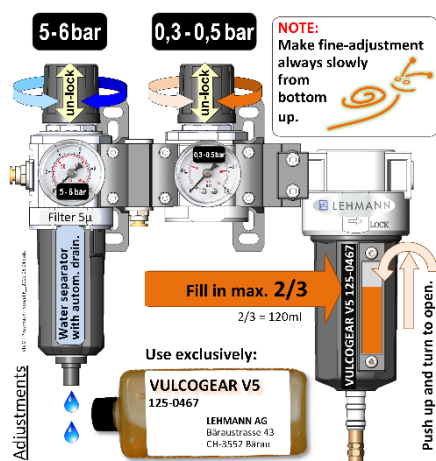
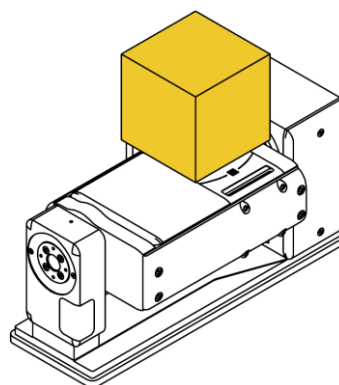
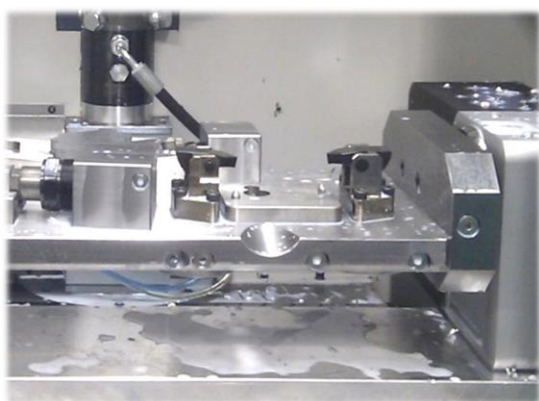


# Operating manual STANDARD

- ☑ Operation
- ☑ Maintenance
- ☑ Accessories

## for pl LEHMANN product line 500 CNC rotary tables

With PGD gear unit technology



Manufacturer:  
Peter Lehmann AG  
Bäraustrasse 43  
CH-3552 Bärau  
[www.lehmann-rotary-tables.com](http://www.lehmann-rotary-tables.com)

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# 1 General Information

Dear Customer,

We wish you every success with your pL LEHMANN CNC rotary table.

pL LEHMANN CNC rotary tables are quality products from Switzerland.

These fast, accurate and compact devices are ideal for efficient production.

The range of sizes, models, options and freely selectable accessories provide for a broad range of applications.

The combiFlex® system for Tx models provides unprecedented flexibility of modifying the system to current production needs.

Let the illustrations in our BR500 product catalog inspire you.

pL LEHMANN CNC rotary tables can be used on all machine tools. Our standard interfaces are ideal for retrofitting your machine quickly.

Read this operating manual to understand the contents regarding safety, warranty and liability and to make optimum use of your system.

## 1.1 Document History

lx(1)	Edition (2)	Page	What	of
06	2015-11-17	div	# Various items corrected, updated, revised in text section (without diagrams).	Frö
06	2016-02-04	60	# Bei Steuerbox SPZ.Awk Bild von innen eingefügt.	Hub
		70	# Bei GLA Warnungen erweitert, Massbild korrigiert.	As
		72	# Bei GLA.HYD-fix Ø18 eingefügt.	As
		73	# Bei GLA.HYD-vario Ø18 und Schlauchlänge eingefügt.	as





■ Change index and date are entered in each footer. ...\_\_DOK-xxxx-xx.00<sup>(1)</sup>\_\_...\_YYYY-MM-DD<sup>(2)</sup>.docx

## 1.2 Meaning of signal words and symbols used

pL LEHMANN rotary tables are used as a rotary axis in the enclosed machining compartment of machine tools. Despite having been manufactured in compliance with the generally accepted rules of design and manufacture, a rotary axis can pose hazards.

The following symbols, signal words and the text that follows draw attention to potential hazards to life and limb. These safety instructions are important and must be observed.

However, it is also important to us to prevent possible property damage and also make suggestions for optimal use with the signal words WARNING and NOTICE.

Markings	Meaning of Symbol and Signal Word
 <b>WARNING</b>	Indicates a potentially dangerous situation that could result in death or serious injury.
 <b>CAUTION</b>	Indicates a potentially dangerous situation that can result in minor injury.
 <b>ATTENTION</b>	Indicates a potentially dangerous situation that can result in damage to property.
 <b>NOTE</b>	Highlights useful tips, recommendations and information for efficient and trouble-free operation.

## 1.3 Signs and Labels

There are no permanently attached signs or labels on pL LEHMANN rotary tables regarding the safety of individuals and material.

Nevertheless, this label with safety instructions is attached to one of the eyebolts on each piece of equipment prior to shipment:





## 1.4 Product Documentation 500 - Validity of this Document

This document is an integral part of the «BR 500 Product Documentation» as listed in the following.

### 1.4.1 «Package insert 500\_\_DOK-0001»

Fixed to the rotary table, packed in a plastic bag, on a ring bolt . Contains information for identifying the rotary table and must therefore be retained.

*Table of contents of the packaging document «Package insert DOK-0001»:*

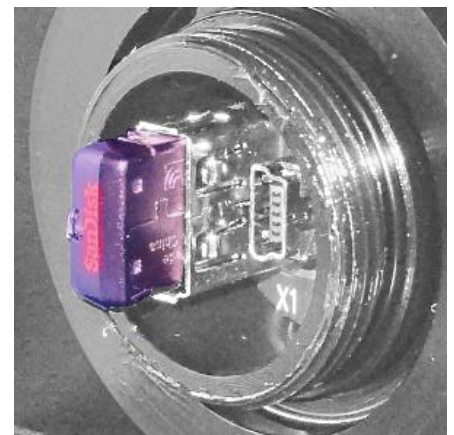
1. **Instructions for «smart doc» USB stick**
2. (Instructions for download if USB stick is missing)
3. **Product registration**
4. **EC Installation instructions for incomplete machines** (MRL 2006/42/EC, Appendix II, sub. B). The **system number** (Serial No.) is visible here
5. **Assembly instructions** (MRL 2006/42/EC, Art.13 (1) and Annex VI)



### 1.4.2 Detailed «smart doc» system documentation for commissioning, operation, maintenance, ...

Saved on the USB stick and attached (protected from water and dirt) to the motor cover on the system. The data storage medium contains the following documents at a minimum:

- «**ADAT - DRIVE SET-UP DATA**» Techn. data for this system
- «**PARA-...**» Parameter list for the CNC control system supplied
- «**Operating manual STANDARD, DOK-0003**»
- «**Commissioning manual STANDARD, DOK-0004**»
- «**Commissioning manual, specific**», e.g. SEP brother
- **Indexing accuracy report** to VDI/DGQ 3441. On T-systems, 1 report each for divider and swiveller / tilter
- «**Geometry test report**». Acceptance data after final assembly
- «**PROFI Catalog CNC Rotary Tables**» overview. One each in German and English
- **Special drawings** from customer if available
- **Operating manuals** for accessories such as hydraulic unit, CNC-FANUC, etc.



### 1.4.3 Website [www.lehmann-rotary-tables.com](http://www.lehmann-rotary-tables.com)

All documents and information that are not provided are available on the website.

A few examples:

- **PROFI Catalog – Overview 500**

[www.lehmann-rotary-tables.com/en/Download/Catalogs-serie-500](http://www.lehmann-rotary-tables.com/en/Download/Catalogs-serie-500)

Also available in print version.

- **MAIN Catalog – All information 500**

[www.lehmann-rotary-tables.com/en/Download/Catalogs-serie-500](http://www.lehmann-rotary-tables.com/en/Download/Catalogs-serie-500)

Also available in print version.

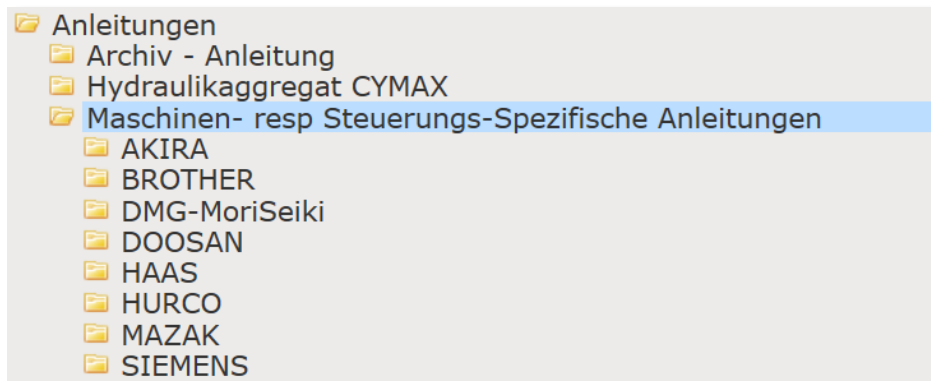
- **Detailed Product Description**

Decision-making aids, practical examples, video clips, ...

Application catalogs ALMAC, BROTHER, DMG-MORI, DOOSAN, FANUC, HURCO, etc.

Facts, flyers, overviews, supplements to main catalog, ...

- **Machine/control system-specific manuals**



This document describes frequent add-ons to a machine with «servoPACK», but also less complex specialties for individual machine tools.

## 1.5 Name plate

Mounted to the rear of the module. The data on the name plate is listed on the «Package insert».

- **Weight**

Total weight of the system. Without accessories.

- **Product**

System type and version. Legend, see main catalog.

- **OEM No.**

Only on customer request.

- **Serial No.**

System number. Have this at hand when contacting our customer technical support.



### System number for T-systems

On T-systems, the system number (Serial No.) is attached to all modules. The system type (Product) and the weight (Weight), however, only to the swiveller / tilter.

<div> <div>Weight</div> <div>Product</div> <div>OEM No.</div> <div>Serial No. <b>A10286</b></div> </div>	<div> <div>Weight <b>85kg</b></div> <div>Product <b>T1-507510.LL fixX-F1</b></div> <div>OEM No.</div> <div>Serial No. <b>A10286</b></div> </div>	
Divider	Tilter	Housing number below cover. Internal use only.

## 1.6 What are pL LEHMANN rotary tables

pL CNC rotary tables are quality CNC rotary axes for machine tools with precise, robust worm drive and integrated pneumatic-hydraulic spindle clamping.

Drive motor, control unit and cabling are accommodated compact and waterproof to IP67 in the motor housing.

Robust, flexible tubing leads all connections from the rotary table to the machine tool. It is swivel-mounted to the rotary table.

## 1.7 All rotary table models are an «incomplete machines»

Based on Article 2, para. g) of MRL 2006/42/EC, all rotary tables from the pL LEHMANN range, with or without control unit, are INCOMPLETE MACHINES.

The documents required by MRL 2006/42/EC «Declaration of Incorporation» and «Assembly Instructions» are included with the system when shipped.

pL LEHMANN does not affix a CE symbol in accordance with 2006/42 / EC Art. 5 f). The responsibility for «fundamental safety and health requirements», MRL instructions, numeral 18, always rests with the manufacturer of the «complete machine» resp. the retrofitters.

## 1.8 Destination

See documentation for the higher-order «complete machine».

## 1.9 Intended use

pL LEHMANN CNC rotary tables are CNC rotary axes and intended to be incorporated into incomplete or complete machines as defined in 2006/42/EC for the purpose of holding workpieces through use of suitable clamping means and rotating them around their own axis between or during machining operations.

Instead of workpieces, tools or incomplete machines can also be mounted on the spindle of the rotary table under the same conditions.

pL LEHMANN CNC rotary tables are not suitable for moving safety devices or guards, people or purposes other than the intended use.

## 1.10 Initial installation and commissioning

See document «Commissioning manual and diagrams STANDARD», DOK-0004.

The system must be incorporated into the EMERGENCY STOP circuit of the machine on which it is mounted.

The system must be behind the protective doors of the «machine».

## 1.11 Product registration / Activating the warranty

Your pL LEHMANN CNC rotary table was manufactured with great care and to international standards. The warranty for this product becomes effective upon commissioning at the end customer. The warranty period is limited, however, as far as the machine supplier is concerned. Consult them in case questions arise.

### 1.11.1 Registration requirement

The product must be registered within one week after commissioning. pL LEHMANN reserves the right to reject warranty claims on products that are NOT registered, registered LATE or INCORRECTLY registered.

The product can be registered either by submitting the form «Activation of the warranty» in the package insert or at <http://www.lehmann-rotary-tables.com> «Product registration».

## 1.12 Modification, changes

Modifications and changes to pL LEHMANN rotary table systems are prohibited without our written approval.

## 1.13 Safety Information

The following safety information applies to pL LEHMANN systems independently of the ultimately binding overall documentation for the complete machine.



### WARNING

**Electric shock from high motor voltage.**

*Danger of serious injury!*

- Switch off the system if flexible tubing or cables are damaged.
- Always consult the regulations of the relevant technical personnel for installation and repairs.

## CAUTION

**Suspended systems can fall.**

*Risk of injury!*

- Never stand under suspended rotary table systems during transport.
- Always use proper lifting equipment.
- Put the load down when leaving the workplace.

## CAUTION

**Scissor effect when moving the indexing or tilting axis.**

*Risk of entanglement!*

- Always close safety door when working!
- Non-round parts on the rotary table spindle can behave like tongs.
- When formless loads are moved on the tilting axis, varying spaces are created.
- Remove tools, measuring and test equipment, etc. out of the system's range of movement.

## ATTENTION

**Excessive tangential forces.**

*The gear unit can be damaged!*

- Always activate the spindle clamping when it is at a standstill. LED lit green, «CLAMPED».
- Avoid impact when loading / unloading.
- The spindle clamping can be unclamped without compressed air and/or without actuation.

## ATTENTION

**Continuous turning leads to malfunctions.**

*The motor becomes too hot and the system must be shut down!*

- Maintain a duty cycle of 20%.
- Read the relevant instructions.

## NOTE

### Personnel qualifications.

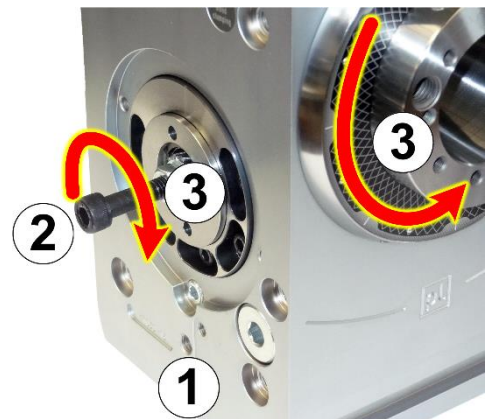
*Only trained persons can operate the system safely and efficiently!*

- Training is the responsibility of the manufacturer of the «complete machine».

### 1.13.1 Procedures in case of accidents and malfunctions

#### Check list

1.	Switch off the machine immediately at the Emergency Stop. For more information on immediate stopping and preventing unintentional restart, see the documentation for the higher-order «complete machine».										
2.	Check immediately whether persons have been entangled or injured.										
3.	Enlist the help of other people if necessary.										
4.	Inform supervisors.										
5.	Call your First Aid specialist if necessary.										
6.	<p><b>Procedure for moving spindle manually (worm drive is self-locking):</b></p> <p>a) Unbolt the cover. ①</p> <p>b) Insert screw / bolt ②, lock with nut.</p> <p>c) <b>NOTE:</b> Direction of rotation ③ is reversed on the opposite side.</p> <p>d) Thread size in worm gear</p> <table><tr><td>Module</td><td>507</td><td>510</td><td>520</td><td>530</td></tr><tr><td>Thread</td><td>M5</td><td>M8</td><td>M8</td><td>M8</td></tr></table>	Module	507	510	520	530	Thread	M5	M8	M8	M8
Module	507	510	520	530							
Thread	M5	M8	M8	M8							



The instructions in the documentation for the higher-order, «complete machine» is binding for conduct in case of accidents and malfunctions and conduct AFTER eliminating malfunctions.



### 1.14 Implementation of machinery directive 2006/42/EC

The 2006/42/EC is valid only for new systems with a delivery date from January 1, 2010.

### 1.15 Documentation in accordance with MRL 2006/42/EC

We deliver the following documents, in accordance with MRL 2006/42/EC:

Document	Delivery	Safe-keeping	Lan-guages
Declaration of incorporation, DOK-0001	Included in German and English. For additional languages, see <a href="http://www.lehmann-rotary-tables.com">www.lehmann-rotary-tables.com</a>	Original 10 years	DE, EN
Assembly instructions, DOK-0001	Included in German and English. For additional languages, see <a href="http://www.lehmann-rotary-tables.com">www.lehmann-rotary-tables.com</a>	None	DE, EN
STANDARD commissioning manual, DOK-0004	See <a href="http://www.lehmann-rotary-tables.com">www.lehmann-rotary-tables.com</a>	None	DE, EN
STANDARD operating manual, DOK-0003	See <a href="http://www.lehmann-rotary-tables.com">www.lehmann-rotary-tables.com</a>	None	DE, EN
Special technical documents	Only on reasonable request from a national EC authority	10 years	DE

#### 1.15.1 Safekeeping

Keep this operating manual in a safe location at the machine.

It must be readily available to the operator of the pL LEHMANN rotary table at all times.

#### NOTE

**Follow the instructions in the OPERATING MANUAL of the «MACHINE».**

*This document is a lower-order part of the overall documentation!*

- The entire contents of this operating manual are binding.
- Because pL LEHMANN rotary tables always represent additional CNC axes incorporated into a machine tool, they are considered to be an «incomplete machine».
- It is the responsibility of the manufacturer of the «complete machine» to prepare an OPERATING MANUAL in compliance with MRL 2006/42/EC. This operating manual is provided as a service.
- When an auxiliary CNC control system is used, consult the instructions for this auxiliary control system.



### 1.15.2 Original instructions/translations

All documentation will be written in the official EU language of German and marked as «Original instructions».

For additional languages, see [www.lehmann-rotary-tables.com](http://www.lehmann-rotary-tables.com)

The machine manufacturer and/or purchaser are responsible for additional translations. All translations must be marked with «Translation of original instructions».

## 1.16 Technical data

### 1.16.1 Ambient conditions

#### *Temperature*

Transport and storage: Sudden temperature changes are prohibited.

Operation: +20 ...+35°C

#### *Thermal expansion*

On high-precision versions, the cooling action of lubricants, high temperatures in the machining compartment, exposure to sunlight etc. can rapidly lead to disturbing material expansion.

Knowledge about the influence of these and similar factors are part of the user's know-how.

Also see «Physical limits for mechanical precision» page 39.

#### *Fluids*

The use of inappropriate fluids such as purified water, alkaline, acidic or other aggressive liquids can damage the system as the result of corrosion or make it unusable.

#### *Rust*

Water-laden air or large temperature differences lead to condensation inside of assemblies, which can cause damage due to rust.

#### *Compressed air*

The compressed air must be clean and dry, non-condensing.

Pressure min. 5.5 bar. For more information, see «Commissioning manual STANDARD» DOK-0004.

# A. Operation

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## 2 Clamping

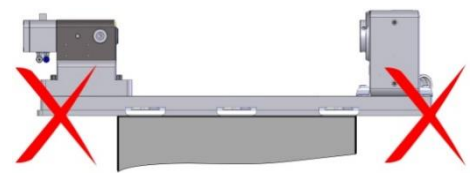
Proper positioning and fastening is key to the geometric accuracy and stability of the rotary table system. For this reason, be sure to observe the following.

### NOTE

**System overhang is not permitted.**

*The accuracy may be poor and irregular!*

- The system must rest on the entire base.



### NOTE

**Contact surfaces must be flat.**

*Otherwise the high precision will be lost!*

- Dress and clean the machine table with an oil stone PRIOR TO MOUNTING the system.
- The rotary table system base plate has been treated with an adhesive rust inhibitor. Clean and inspect the footprint. It must be free of contamination.




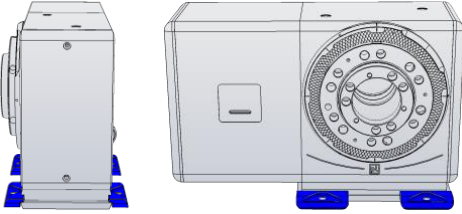
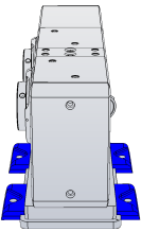
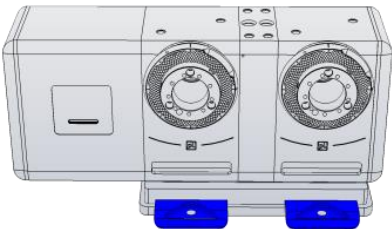
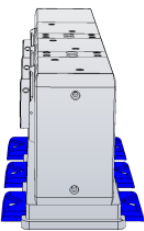
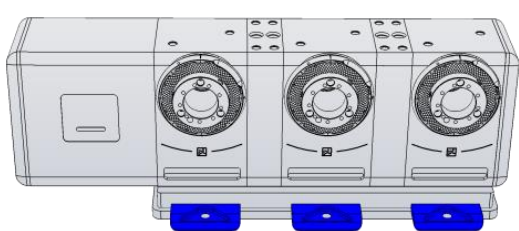
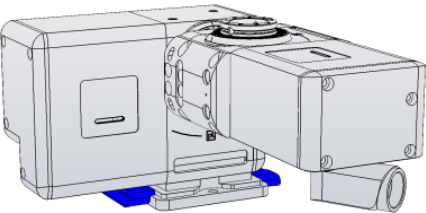
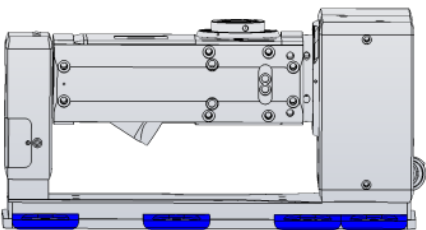
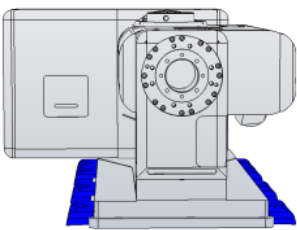
## 2.1 Arrangement of the clamping shoes

The number and distribution of the clamping shoes as shown in the following images is important and binding.

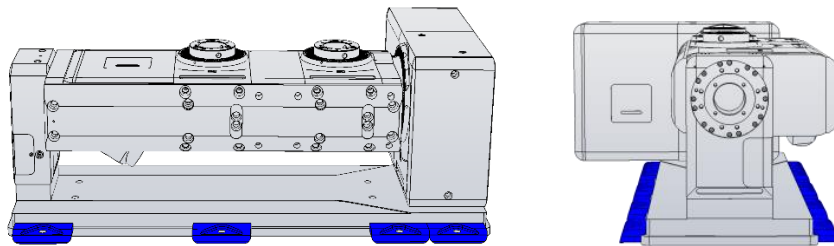
The same applies to the tightening torques shown in following table.

Be sure to adhere to these specifications.

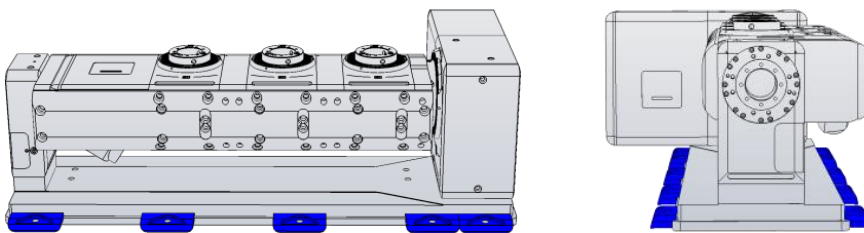
The system was also assembled and aligned under these conditions.

	
<b>EA-507...520 2 pcs</b>	<b>EA-530 – 4 pcs</b>
	
	<b>M2-... – 4 pcs</b>
	
	<b>M3-... – 6 pcs</b>
	
<b>TF-... – 2 pcs</b>	
	

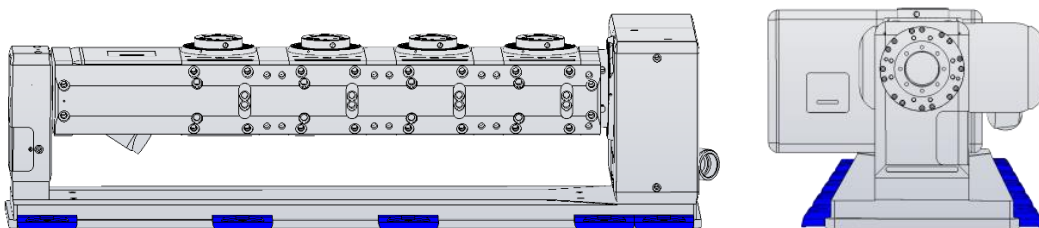
**T1-... – 8 pcs**



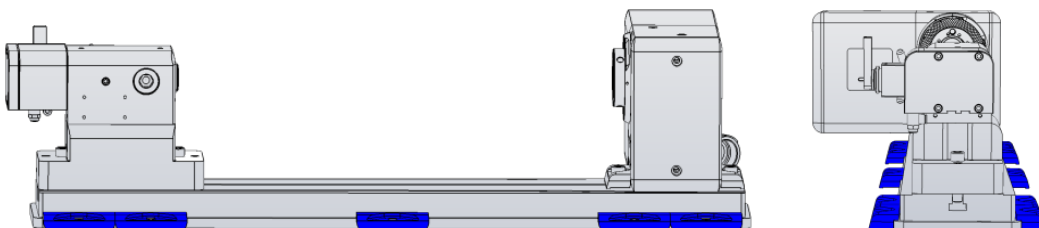
**T2-... – 8 pcs**



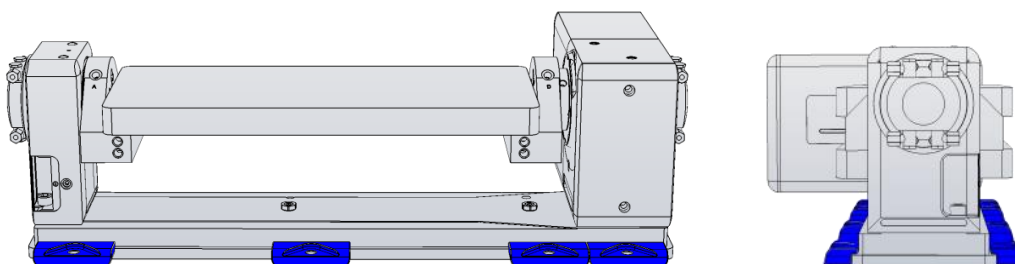
**T3-... – 10 pcs**



**T4-... – 10 pcs**

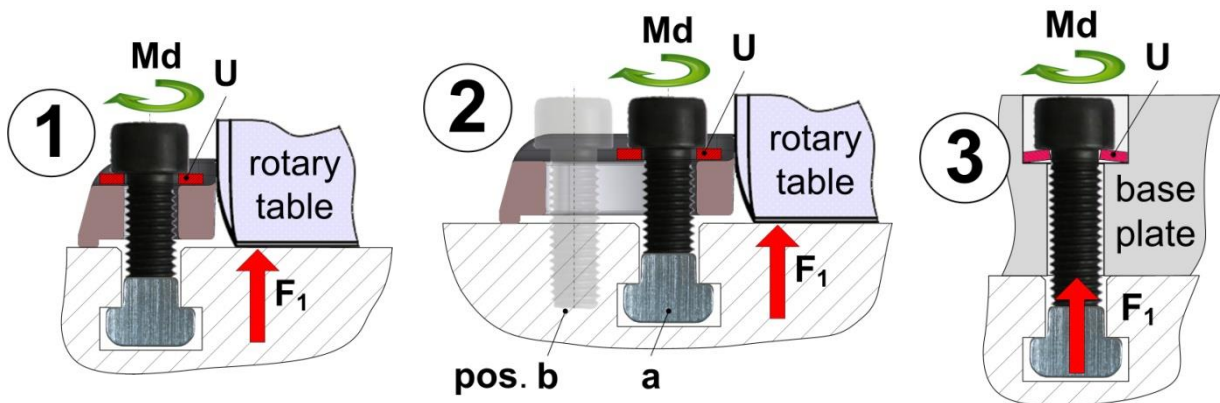


**LFX.5xx – 10Stk**



**RFX.... – 8 pcs**

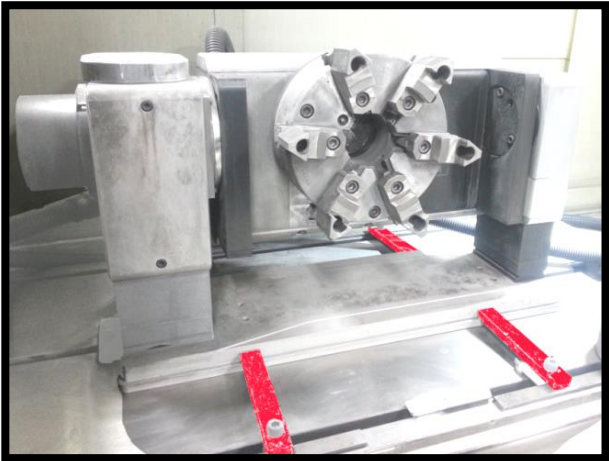
2.2 Torque values for clamping shoe screws



Screw	No.	Posit. (pos.)	U-washer (U)	Tightening torque (Md) [Nm]	Hold-down force approx. (F <sub>1</sub> ) [N], based on μ0.1
<b>M10</b> Quality 12.9	①		2.5 mm	<b>70</b>	20 000
	②	a		45	
	③		Clamping disc	42	30 000
<b>M12</b> Quality 12.9	①		2.5 mm	<b>75</b>	20 000
	②	a		50	
		b		95	
	③		Clamping disc	50	30 000



NOT LIKE THIS!

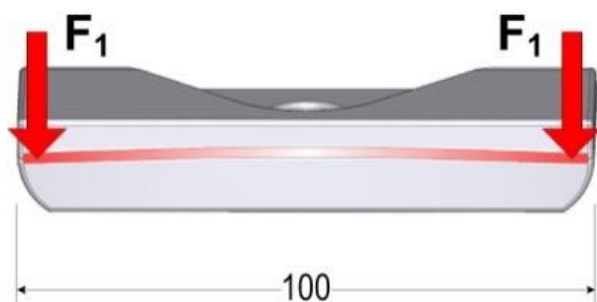




## 2.3 Clamping shoe dimensions

Item no.: <b>510-0007</b>	Item no.: <b>510-0007c</b>	Item no.: <b>507-0007</b>

On all clamping shoes, the clamping bar is concave so that the clamping force  $F_1$  is transmitted to the corners.



### NOTE

#### Screw tightening torques.

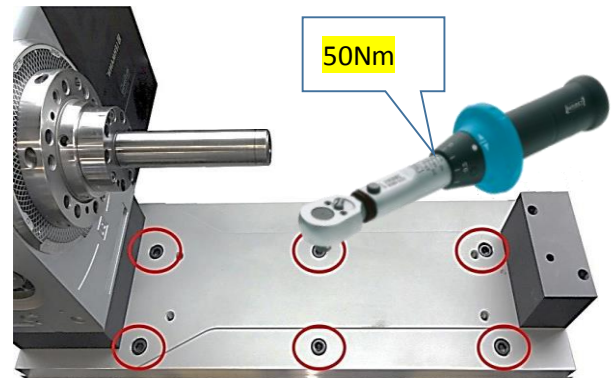
*The system can become warped and inaccurate!*

- Always use a torque wrench and the specified torques.
- The system was also assembled and measured under these conditions.



## 2.4 Example for mounting special base plate SPEZ.GPL-g

Screw size M12



## 2.5 Close threaded holes at the top

Seal the threaded holes with the provided plugs **2** after the eyebolts have been removed **1**.



## 2.6 Different T-slots spacings

Our base plates are designed for T-slot spacings of 50, 100 and 150 mm and standard clamping shoes. For T-slot spacings of 63 and 125 mm, the clamping shoes 510-0007c with an oblong hole are suitable.

	Text	Image
STANDARD clamping shoe. Included in accessories.	<p>Base plate width 168 mm Slot spacing 50 mm, 100 mm Clamping shoe 510-0007</p> <p><b>Suitable for:</b></p> <ul style="list-style-type: none"> <li>■ Mx-507 / Mx-510</li> <li>■ Tx-xxx510</li> <li>■ rotoFIX / longFLEX 507</li> <li>■ rotoFIX / longFLEX 510</li> </ul>	
	<p>Base plate width 268 mm Slot spacing 50 mm, 100 mm Clamping shoe 510-0007</p> <p><b>Suitable for:</b></p> <ul style="list-style-type: none"> <li>■ Mx-520</li> <li>■ Tx-xxx520</li> <li>■ rotoFIX / longFLEX 520</li> </ul>	
Special clamping shoe. Order separately.	<p>Base plate width 168 mm Slot spacing 63 mm, 125 mm Clamping shoe 510-0007c</p> <p><b>Suitable for:</b></p> <ul style="list-style-type: none"> <li>■ Mx-507 / Mx-510</li> <li>■ Tx-xxx510</li> <li>■ rotoFIX / longFLEX 510</li> <li>■ Mx-507</li> <li>■ rotoFIX / longFLEX 507</li> </ul>	
	<p>Base plate width 268 mm Slot spacing 63 mm Clamping shoe 510-0007c</p> <p><b>Suitable for:</b></p> <ul style="list-style-type: none"> <li>■ Mx-520</li> <li>■ Tx-xxx520</li> <li>■ rotoFIX / longFLEX 520</li> </ul>	

### 3 Aligning the system

Here, only a simple mechanical alignment is shown.



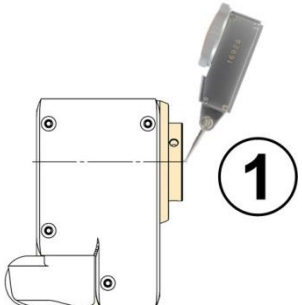
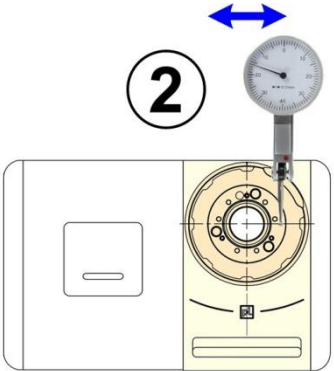
#### NOTE

**Aligning and attaching the system securely is critically important.**

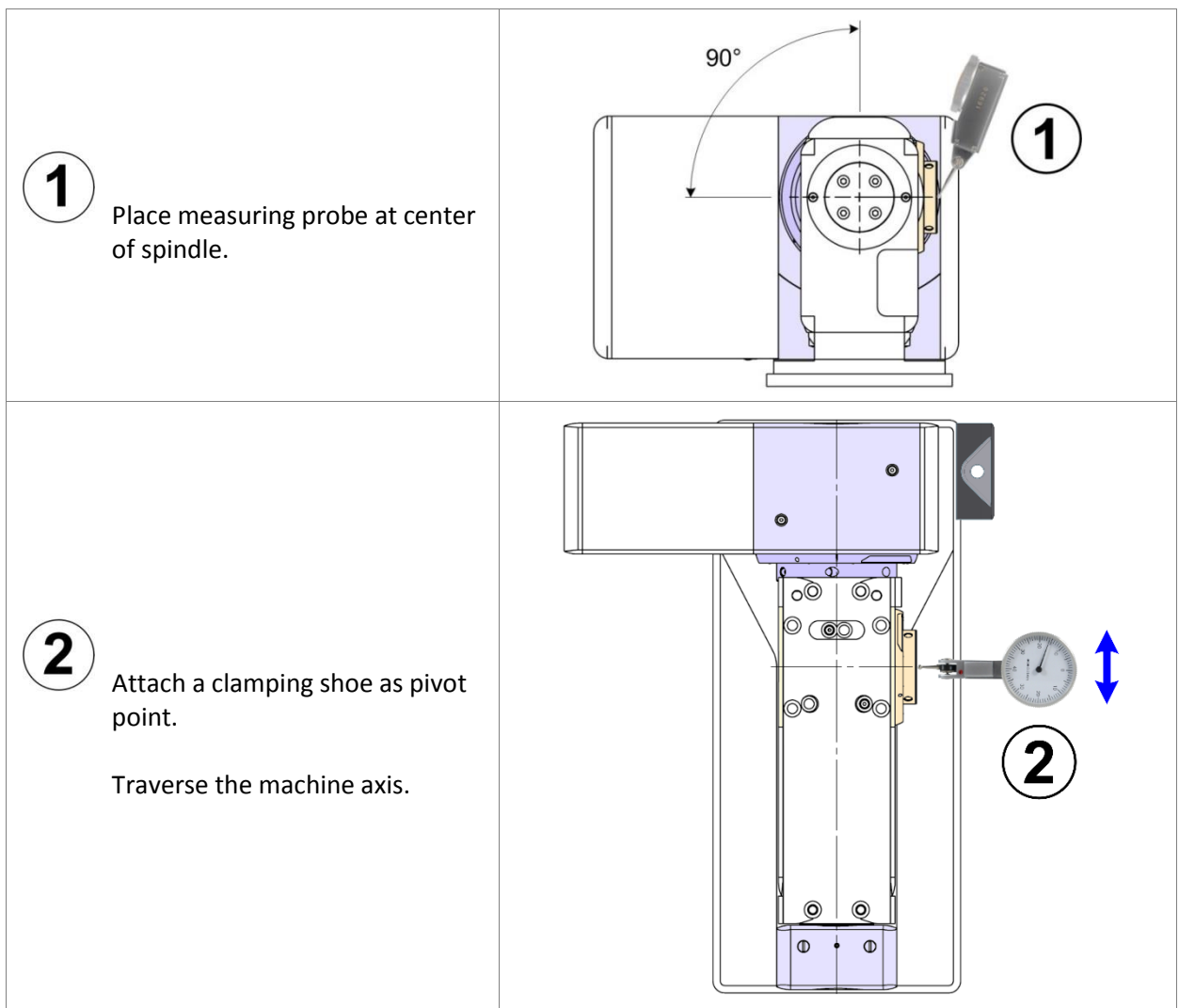
*The total of all geometry errors from the axes involved can cause considerable inaccuracies on the workpiece.*

- How to achieve the best accuracy is described in detail in the operating manual STANDARD DOK-0004.
- Measuring instruments must have the required sensitivity in the  $\mu$  range.

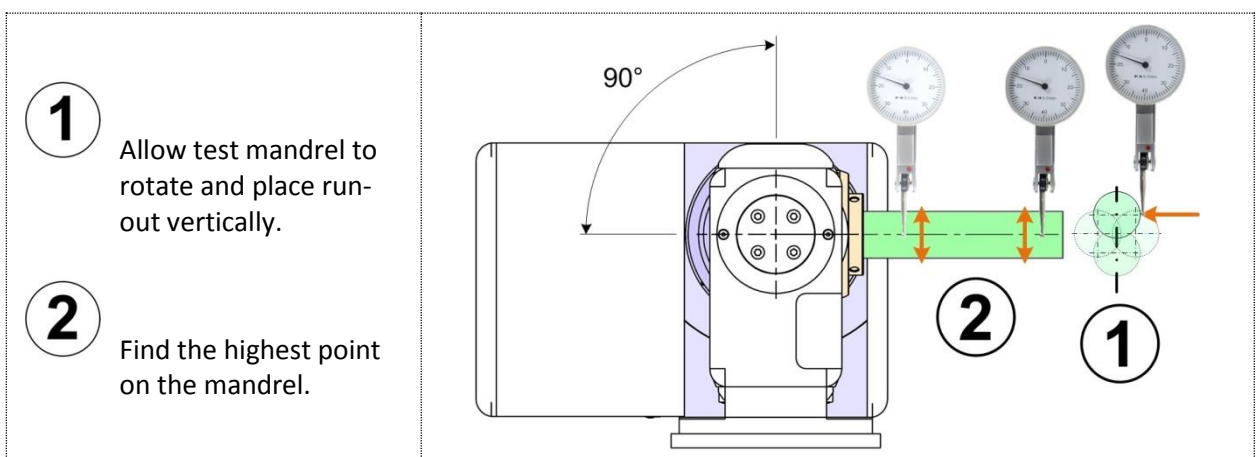
#### 3.1 Aligning single-axis EA-5xx – on spindle

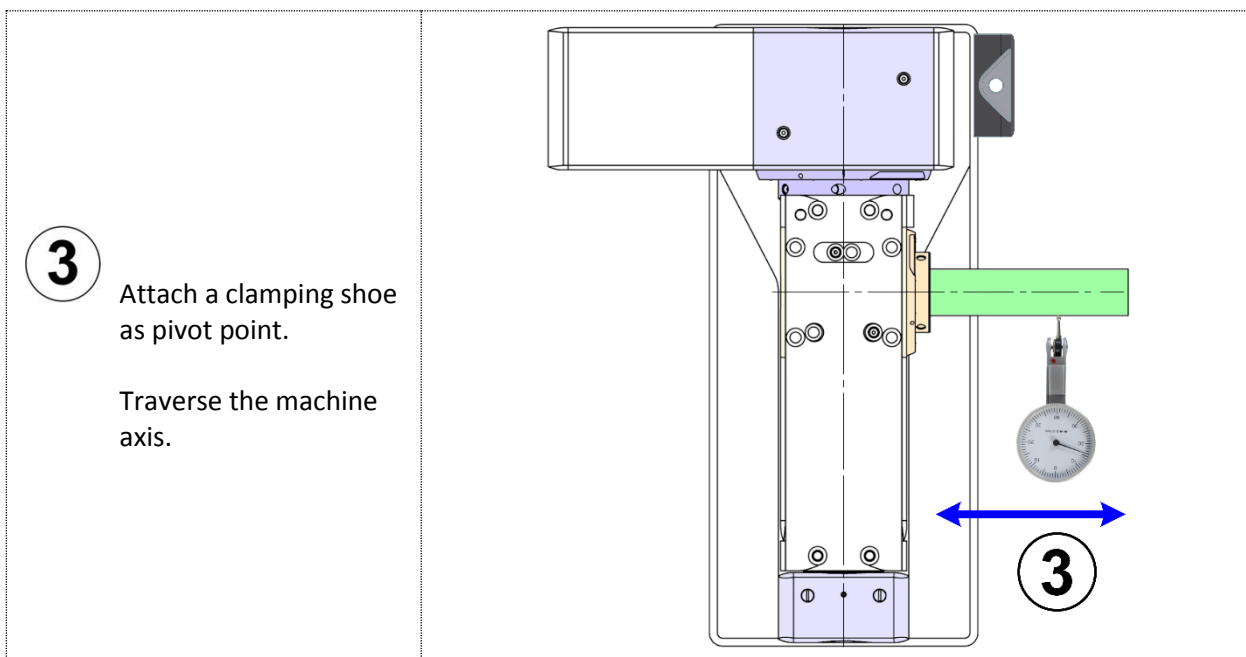
<p><b>1</b></p> <p>Place measuring probe at center of spindle</p>	
<p><b>2</b></p> <p>Traverse the machine axis.</p>	

### 3.2 Aligning two-axis system Tx-5xx5xx – a) on spindle

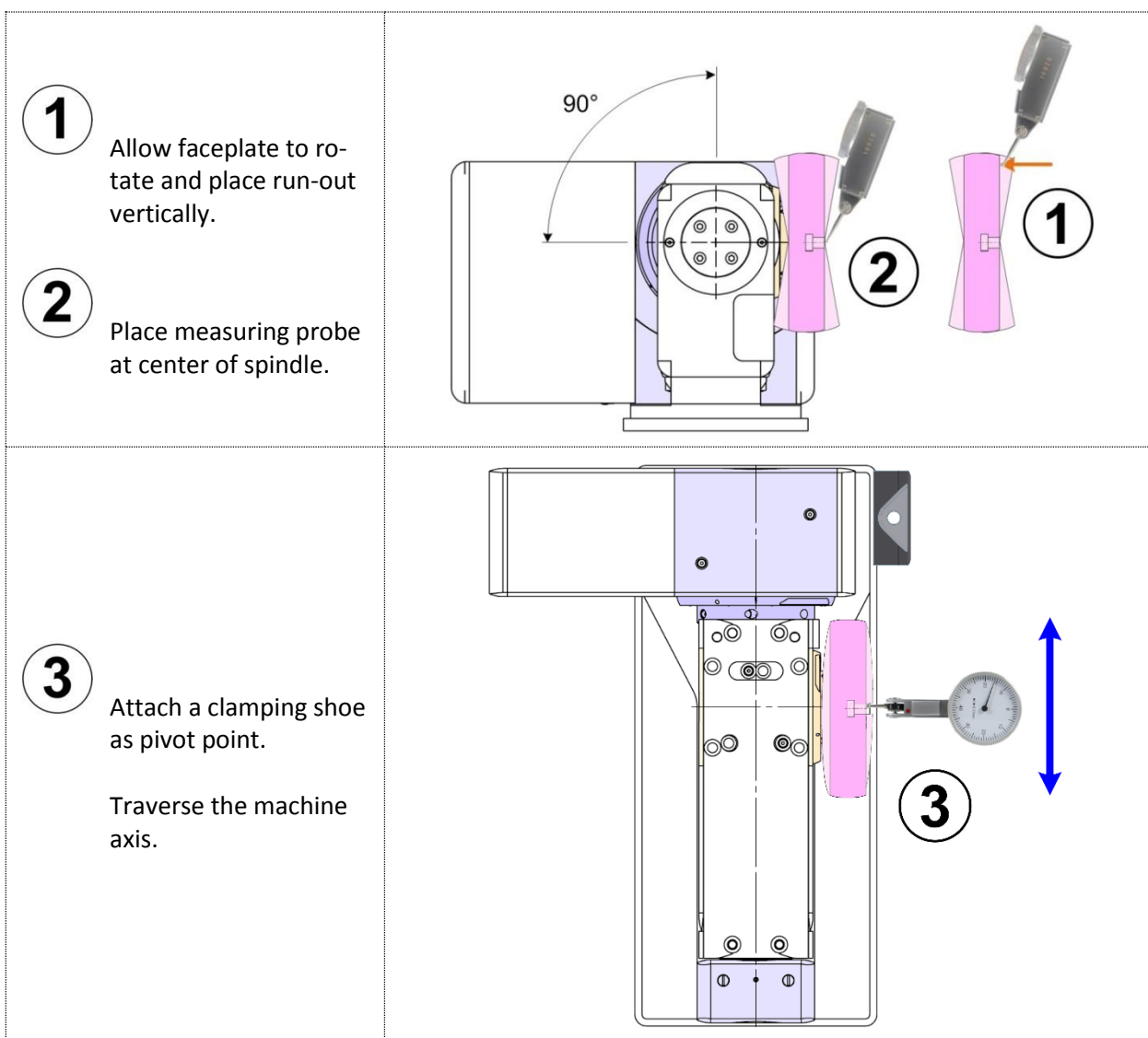


### 3.3 Aligning two-axis system Tx-5xx5xx – b) on a test mandrel

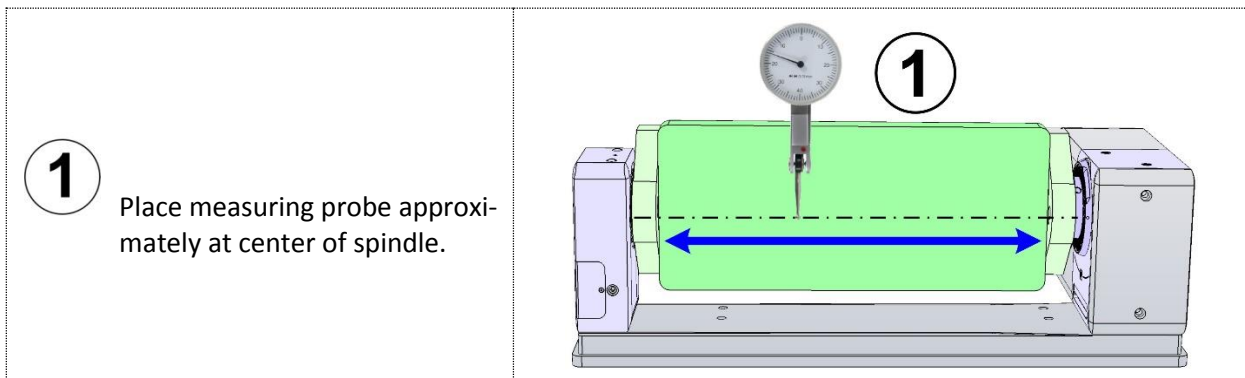




### 3.4 Aligning two-axis system Tx-5xx5xx – c) on a face plate



### 3.5 Aligning EA-5xx with rotoFIX AND clamping plate – on clamping plate





### 3.6 EA-5xx with rotoFIX, with base plate, but supplied WITHOUT clamping plate

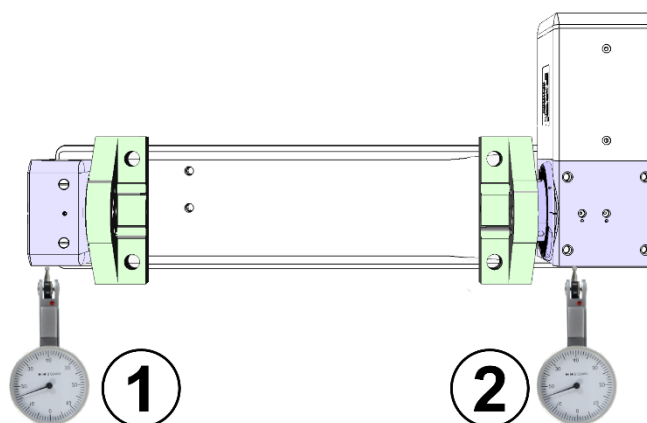
Remove side plate from rotary table.



The **offset value** between the measur-

ing point **1** and **2** is shown on the provided measurement record.

**1** Place dial indicator approximately at center height and then zero.

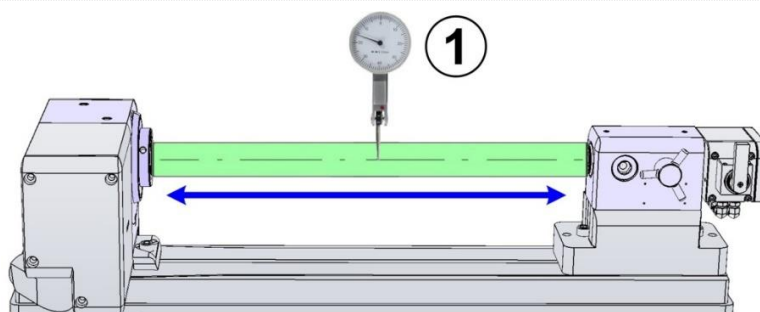
**2** Traverse machine, measure on side of module and GLA, and set above **offset value**.



PL LEHMANN® Test report geometry							
Rotary table	mot.pos. rot.ax.pos. WMS DDF SPZ enh. accur.						
--	-- -- -- -- --						
System no.: <b>A</b>	Test date: Visa:						
<b>General provisions:</b> 1. The clamping/fixing on the measuring table must comply with the requirements of the commissioning instructions. 2. The testing must be carried out on a calibrated granite slab. 3. The rotary table must not be exposed to any foreign thermal influences (sun, fans, radiators...). 4. Prior to the measuring, the rotary table as well as the measuring and test equipment must be in the same environment for at least 24h. 5. <b>X position = A axis</b> rotary axis is parallel to X (direction of the machine table), <b>Y position = B axis</b> rotary axis is parallel to Y (longitudinal on the machine table). 6. All measured values must be determined for an unloaded rotary table, all offset values measured in the clamped state. Note: a: measurements shown with test mandrel are valid also with test cube (same effect)							
<b>G1</b>	<b>Radial concentricity of the spindle bore</b> Test equipment: - Measuring stand with m-dial gauge digita Test instructions: Apply the dial gauge into the spindle bore - Carry out a complete rotation of the rotary indexing axis - Read max. errors Repeat this process for each spindle 						
	<table border="1"> <thead> <tr> <th>permitted</th> <th>measured</th> </tr> </thead> <tbody> <tr> <td>standard 0.005 mm</td> <td>0.005 mm</td> </tr> <tr> <td>enhanced 0.003 mm</td> <td>0.003 mm</td> </tr> </tbody> </table>	permitted	measured	standard 0.005 mm	0.005 mm	enhanced 0.003 mm	0.003 mm
permitted	measured						
standard 0.005 mm	0.005 mm						
enhanced 0.003 mm	0.003 mm						
<b>G2</b>	<b>Runout rotary spindle noses / center height tilting axis</b> Test equipment: - Measuring stand with m-dial gauge digita - Alignment TESA Misauro-tilt 						
	<table border="1"> <thead> <tr> <th>permitted</th> <th>measured</th> </tr> </thead> <tbody> <tr> <td>standard 0.005 mm</td> <td>0.005 mm</td> </tr> <tr> <td>enhanced 0.003 mm</td> <td>0.003 mm</td> </tr> </tbody> </table>	permitted	measured	standard 0.005 mm	0.005 mm	enhanced 0.003 mm	0.003 mm
permitted	measured						
standard 0.005 mm	0.005 mm						
enhanced 0.003 mm	0.003 mm						

### 3.7 Aligning EA-5xx with longFLEX – on shaft

**1** Clamp the shaft. Set measuring probe approximately at spindle center and traverse.



### 3.8 Additional aligning elements

We can supply the following items at short notice.

#### 3.8.1 zentriX alignment set

**zentriX** can be used to conveniently align the system. Thanks to the locknuts, the position of the system can be saved for the next time.

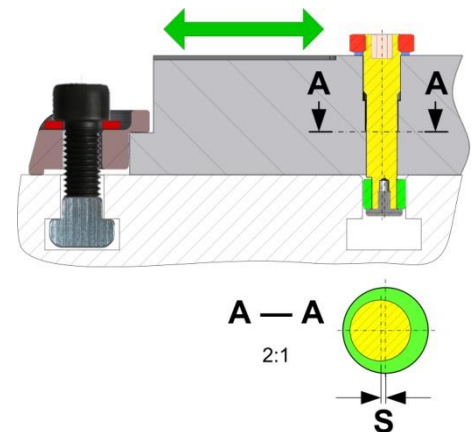
Our base plates are all prepared for **zentriX**. They have two widely-spaced holes for the **zentriX** screws.

#### Use

1. Remove steel plug ① from base plate.
2. Thread **zentriX** screw ② into the base plate from above with the aid of an s=6 Allen wrench ③ until the small cylinder appears at the very bottom.
3. Position appropriate roller ④ with long edge facing down and secure with U-washer ⑤ and bolt ⑥. An s=2.5 Allen wrench ⑦ is needed.
4. Now carefully lower system onto machine table and guide the alignment rollers into the desired alignment slot.
5. Align the system by rotating the **zentriX** eccentric screw with the wrench ③.
6. Lock **zentriX** screw with serrated washer ⑧ and **shallow** nut ⑨. Open-end wrench s=19.

Item no.	Assembly designation	Roller Ø
AUR.zX-12	<b>zentriX</b> alignment set, 1 pair	12g6
AUR.zX-14	<b>zentriX</b> alignment set, 1 pair	14g6
AUR.zX-16	<b>zentriX</b> alignment set, 1 pair	16g6
AUR.zX-18	<b>zentriX</b> alignment set, 1 pair	18g6

The M12x1.5 screw and the shaft Ø always remain the same. The eccentric rollers can be replaced.

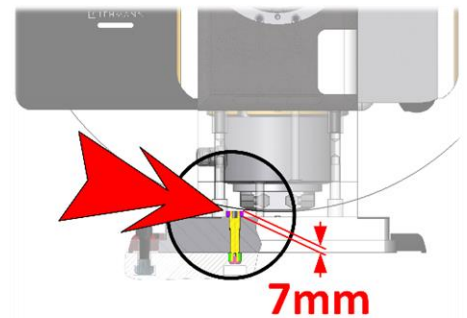


## ! ATTENTION

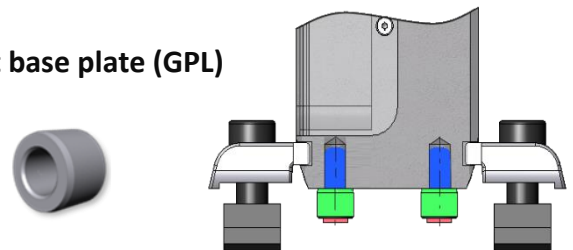
### Collision with **zentriX**.

*The tilter gear unit can be destroyed!*

- Screws and nuts may protrude only **7 mm**.
- Check the distance when aligning **zentriX**.



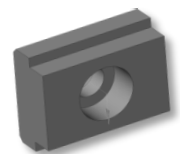
### 3.8.2 Alignment roller for counter bearing (GLA) without base plate (GPL)



*Assembly with cyl. pin and extraction thread, roller and screw.*

Item no.	Name1	Name2	Rollers- $\varnothing$ (mm)
AUR.Bu-12	Alignment pins	Sleeve, 1 pair	12
AUR.Bu-14	Alignment pins	Sleeve, 1 pair	14
AUR.Bu-16	Alignment pins	Sleeve, 1 pair	16
AUR.Bu-18	Alignment pins	Sleeve, 1 pair	18

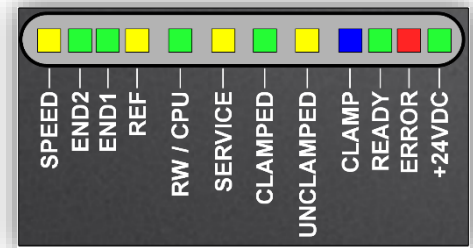
### 3.8.3 Alignment slot nut for EA-DT without GPL, TF-DT without GPL and GLA with GPL



Item no.	Name1	Groove width (mm)
AUR.St-10	Alignment pin, 1 pair	10
AUR.St-12	Alignment pin, 1 pair	12
AUR.St-14	Alignment pin, 1 pair	14
AUR.St-16	Alignment pin, 1 pair	16
AUR.St-18	Alignment pin, 1 pair	18
AUR.St-20	Alignment pin, 1 pair	20

## 4 Displays and operating elements

LEDs on the motor cover indicate the operating status.



### 4.1 Meaning of the LEDs

LED	Color	Function	Comment
SPEED	yellow	Worm speed	Flashes 1x per worm revolution
END2	green	Limit switch 2 (-) UZ	Extinguishes when end position «-» is reached (only for tilting axes with connected limit switches.)
END1	green	Limit switch 1 (+) GUZ	Extinguishes when end position «+» is reached (only for tilting axes with connected limit switches.)
REF	yellow	Ref. Spindle	Illuminates/extinguishes on the edge of the cam / slot
RW/CPU	green	EPROM / USB stick	<ul style="list-style-type: none"> <li>Flashes in idle state at 2 second intervals if OK.</li> <li>Flickers during read in/out on USB stick or EPROM.</li> <li>Illuminates permanently/does not illuminate if system is not ready</li> </ul>
SERVICE	yellow	Service	Flashing sequence. For code key, see «Commissioning manual STANDARD DOK-0004».
CLAMPED	green	Spindle clamping «clamped»	Illuminates when spindle clamping is clamped
UNCLAMPED	yellow	Spindle clamping «un-clamped»	Illuminates when spindle clamp is unclamped
CLAMP	blue	«clamp» spindle clamping	Illuminates when signal for clamping is present
READY	green	System OK.	Illuminated continuously when system is ready for operation. <b>NOTE:</b> If error messages are displayed and the LED «READY» is nevertheless illuminated, only warnings are involved.
ERROR	red	Error	Flashing sequence. For code key, see «Commissioning manual STANDARD DOK-0004».
+24VDC	green	Power System OK.	Illuminated continuously when the power supply is OK.

For more information, see the document «Commissioning manual STANDARD DOK-0004».

There are no operating elements on the rotary table modules.

See later in this document for use of accessories.

## 5 Workpiece spindle admissible load and precision, operating mode

### 5.1 STANDARD spindle load

The effect of forces on the spindle and gear unit vary.

Loads on the gear unit are caused by:

- Excentric load
- Moment of inertia when accelerating
- Machining forces

Here we distinguish between operating conditions:

- Resting condition = Axis «clamped»
- Acceleration and machining workpiece.

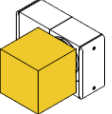

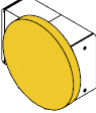

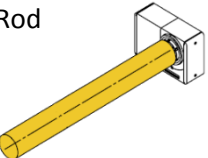

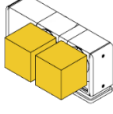

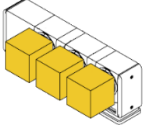

The following table «**Definition of STANDARD spindle load («Catalog»)**» is an excerpt from the «**Main catalog CNC-rotary tables 500**» (Edition Sep. 13, pages 76-77). Fictitious STANDARD workpieces, which are used to create our parameter lists.

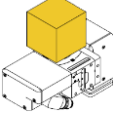

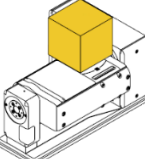

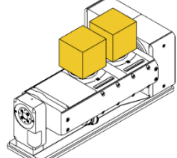

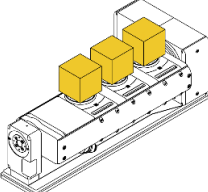

PLEASE NOTE: The parameter lists contain values for 3 different magnitudes of load.

For more information, see [www.lehmann-rotary-tables.com / Service / Downloads / Commissioning / Parameter lists](http://www.lehmann-rotary-tables.com/Service/Downloads/Commissioning/Parameter%20lists).

The practical calculation aid «Parameter set selection aid.xlsx» can be found there.

### 5.2 Definition of the STANDARD spindle load Type «Catalog»

EA		507	510	511	520	530
 Cubic	 [mm]	130	173	139	228	273
	m [kg]	17	42	21	90	161
	J [kgm <sup>2</sup> ]	0.05	0.2	0.07	0.8	2
 Flange-shaped	 [mm] (steel)	200	285	220	400	500
	Thickness [mm]	40	40	40	40	40
	m [kg]	10	40	12	62	62
	J [kgm <sup>2</sup> ]	0.05	0.2	0.07	0.8	2
 Rod shaped	 [mm] (steel)	80	113	89	145	175
	Length[mm]	1400	1600	1500	2200	3000
	m [kg]	55	125	73	250	600
	J [kgm <sup>2</sup> ]	0.05	0.2	0.07	0.8	2
M2		507	510		520	530
 Cubic	 [mm]	114	151	per spindle.		
	m [kg]	12	27			
	J [kgm <sup>2</sup> ]	0.025	0.10			
M3		507	510			
 Cubic	 [mm]	105	139	per spindle.		
	m [kg]	9	21			
	J [kgm <sup>2</sup> ]	0.017	0.067			

TF		507510	510510	510520	520520
 Cubic	 [mm]	130	137	173	204
	m [kg]	17	20	42	67
	J [kgm <sup>2</sup> ]	0.05	0.06	0.20	0.46
T1		507510	510520	520520	
 Cubic	 [mm]	130	173	204	
	m [kg]	17	42	67	
	J [kgm <sup>2</sup> ]	0.05	0.2	0.46	
T2		507510	510520		
 Cubic	 [mm]	114	140	per spindle.	
	m [kg]	12	21		
	J [kgm <sup>2</sup> ]	0.025	0.1		
T3		507510	510520		
 Cubic	 [mm]	105	121	per spindle.	
	m [kg]	9	14		
	J [kgm <sup>2</sup> ]	0.017	0.07		



## ATTENTION

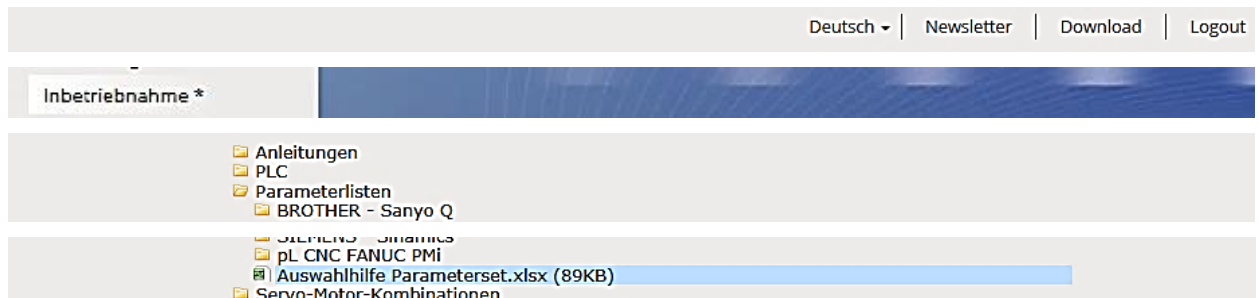
**Do not exceed standard spindle load.**

*This will shorten the gear unit service life!*

- If the load is too great, the drive data **MUST** be reduced.
- The CNC control circuit cannot work optimally when overloaded.
- For more information, see «Physical limits to mechanical accuracy»

### 5.2.1 Decision aids for estimating spindle load

Go to [www.lehmann-rotary-table.com](http://www.lehmann-rotary-table.com) / Download / Commissioning / Parameter lists, «Parameter set selection aid.xlsx».



Directly open and use the file «Parameter set selection aid.xlsx».

Or download it and then open. This requires that you have Microsoft EXCEL on your computer.

The following screen content is visible.

Entscheidungshilfe Auswahl Lasttyp P.Lehmann Rotary Tables					
Typ: <b>EA-520</b> <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">1</span>		<span style="border: 1px solid green; border-radius: 50%; padding: 2px;">2</span>		<span style="border: 1px solid green; border-radius: 50%; padding: 2px;">3</span>	
Lasttyp	Massenträgheitsmoment	Kriterien (wenn Massenträgheitsmoment nicht bekannt)	Last UND Dimension		
			$J$	$\approx$	
<b>Catalog (Max.Speed)</b> 	$< 0.8 \text{ kgm}^2$	$\approx$	$< 90 \text{ kg}$	$< 230 \text{ mm}$	<span style="border: 1px solid green; border-radius: 50%; padding: 2px;">4</span> Wenn Massenträgheitsmoment oder Last UND Dimension innerhalb der Grenzwerte → Wähle 'Catalog'-Werte in Parameterliste
<b>Usual</b> 	$< 1.2 \text{ kgm}^2$	$\approx$	$< 120 \text{ kg}$	$< 320 \text{ mm}$	<span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">5</span> Wenn Massenträgheitsmoment oder Last UND Dimension innerhalb der Grenzwerte → Wähle 'USUAL'-Werte in Parameterliste
<b>Max.Load</b> 	$< 8 \text{ kgm}^2$	$\approx$	$< 800 \text{ kg}$	$< 450 \text{ mm}$	<span style="border: 1px solid pink; border-radius: 50%; padding: 2px;">6</span> Wenn Massenträgheitsmoment oder Last UND Dimension innerhalb der Grenzwerte → Wähle 'Max.Load'-Werte in Parameterliste
Parameterlisten unter:		<a href="http://www.lehmann-rotary-tables.com">www.lehmann-rotary-tables.com</a>		→ Download → Inbetriebnahme	
<div style="border: 1px solid yellow; padding: 10px;"> <p style="text-align: center;"><b>ACHTUNG:</b>                          Die dargestellten Grenzwerte sind nur Richtwerte.                          Da Last, Dimension und Massenträgheitsmoment in direktem Zusammenhang stehen, können leichte Werkstücke mit größerem Durchmesser bewegt werden, als oben angegeben.                          Das Massenträgheitsmoment als komplexes Produkt von Last und Dimension darf allerdings nicht überschritten werden.</p> <p style="text-align: center;">Fragen Sie uns im Bedarfsfall an.</p> </div> <span style="border: 1px solid green; border-radius: 50%; padding: 2px; float: right;">7</span>					



**Legend:**

- 1 Select module size/type
- 2 If the moment of inertia is known, it is already possible to read whether the load is appropriate for the line «Max.Speed (Catalog)», «Usual» or «Max.Load»
- 3 If it does not, the same decision can be reached from the weight and rotation diameter in this column.
- 4 In the parameter list, select the values for «**Catalog**».
- 5 In the parameter list, select the values for «**USUAL**».
- 6 In the parameter list, select the values for «**Max.Load**».

Now enter the parameter list with this qualification **Catalog**, **USUAL** or **Max.Load**. Appropriate input values for the CNC can be found under these terms in the columns and lines.

## 5.3 Parameter list (example)

The list contains the values for the different loads «Catalog», «USUAL» and «Max.Load»

Proposal without guarantee

Selected for: Type-Modul.Execution/s:

EA-510.L/R/OL/OR

### Background

Element	Subject
CNC control on test bench LEHMANN	FANUC 21i, PMiD
Servo amplifier on test bench LEHMANN	FANUC αiSVxx, BISVxx
position control unit on test bench LEHMANN	FANUC HRV2

### Note:

This document contains most of the necessary parameters and machine data for the commissioning of the Lehmann rotary table. PLC data are not included, they must be prepared by the machine manufacturer. With these parameters, the rotary table works on our test bench with FANUC 21i well. For any damages arising from use of the parameters outlined below assumes no liability to company LEHMANN.

### Achtung:

Dieses Dokument enthält die meisten notwendigen Maschinendaten für die Inbetriebnahme des Lehmann-Drehstisches. PLC-Daten sind keine enthalten, dies muss durch den Maschinenhersteller vorbereitet werden. Mit diesen Parameter funktionierte die Achse auf unserem FANUC 21i-Prüfstand. Für allfällige Schäden, welche durch die Benutzung der unten aufgeführten Parameter entstehen, übernimmt die Firma LEHMANN keine Haftung.

### Parameters

#### Note:

**Bold** = Important Parameters or Parameters that need to be adjusted.

#### HINWEISE

Fett = Wichtige Parameter oder Werte welche angepasst werden müssen

#### Activation parameters:

Depending on which parameter is changed, the change will only become active when the corresponding action is performed according to 'Fanuc-Parameter-Note':

Je nach dem welcher Parameter verändert wird, wird die Änderung erst aktiv wenn die entsprechende Handlung gemäss Fanuc-Parameter-Hinweis ausgeführt wird:

- PowerOn, PowerOn

- If parameter P2020 MotorID is changed, then the parameters P2000 # 1 (DGPR) of 1 are set to 0, so that the motor parameters are taken.

Wenn Parameter MotorID P2020 verändert wird, muss anschliessend der Parameter P2000#1(DGPR) von 1 auf 0 gesetzt werden, damit die Motorparameter übernommen werden.

#### Steps of the parameterization:

1. Press EMERGENCY-STOP
2. Switch to EDIT Mode
3. Set Parameter WriteEnable to 1
4. First set P2020 MotorID and activate P2000 # 1 = 0
5. Then set the other parameters.
6. Test Axis
7. Set ParameterWriteEnable to 0

#### Ablauf Parameterierung

1. NOTAUS betätigen
2. in EDIT-MODE wechseln
3. Parameter Schreibfreigabe auf 1 setzen
4. Zuerst P2020 MotorID setzen und mit P2000#1 = 0 aktivieren
5. Anschliessend die weiteren Parameter eingeben
6. Achse testen
7. Parameter Schreibfreigabe auf 0 zurücksetzen

#### Parameters valid on controls:

FANUC 16i, 18i, 21i, 32i-B, 31i-B, 30i-B, 35i-B, 0iD, 0i Mate-D, PowerMate i

#### Limit datas, given by mechanic:

	510.L/R	Catalog	Usual	Mxload	Calculation tool: V3.0
Valid by duty cycle (ED) <= 20%		0.2	0.3	7	
J< [kgm <sup>2</sup> ]		0	25	90	Catalog = max. possible/permitted speed
excentric load < [Nm]		55	45	15	Usual = easy to regulate (EA, rotoFIX Alu)
n Spindle [min <sup>-1</sup> ]		10	5	0.2	Max.load = max. mass inertia and exc. load (EA, rotoFIX Steel)
acc. [k°/s <sup>2</sup> ]		303	92.8	3	Usual = Standardwerte, Catalog = Max - Beschleunigung/Drehzahl
Jerk [k°/s <sup>3</sup> ]					Max.load = MaximaleMassenträgheitsmoment, Maximalast

#### Limit datas, given by mechanic:

	510.OL/OR	Catalog	Usual	Mxload	Calculation tool: V3.0
Valid by duty cycle (ED) <= 20%		0.2	0.3	3.5	
J< [kgm <sup>2</sup> ]		0	25	45	Catalog = max. possible/permitted speed
excentric load < [Nm]		55	33.3	10	Usual = easy to regulate
n Spindle [min <sup>-1</sup> ]		5	1.7	0.25	Max.load = max. mass inertia and max excentric load
acc. [k°/s <sup>2</sup> ]		75.7	25.5	3.7	Usual = Standardwerte, Catalog = Max - Beschleunigung/Drehzahl
Jerk [k°/s <sup>3</sup> ]					Max.load = MaximaleMassenträgheitsmoment, Maximalast

#### Axis type

#### Rotary-table Model

#### Motor brand

#### Motor type

#### Motor encoder brand

#### Motor encoder type

#### Direct angle encoder brand

#### Direct angle encoder type

rotary axis	rotary axis
510.L/R	510.OL/OR
FANUC	FANUC
a2/5000is	b1/8000is
Fanuc	Fanuc
a1000A	b64A
HEIDENHAIN	HEIDENHAIN
RCN x2F	RCN x2F

Parameter	Fanuc-term	Unit	value	value	value	value	NOTE
1420	Rapid traverse rate	deg/min	Catalog: 19800 Usual: 16200 Max. load: 5400	Catalog: 19800 Usual: 11980 Max. load: 3600			
1421	F0: Lower Feed Speed at rapid traverse rate override	deg/min	0 or 360	0 or 360			Feed at override value F0
1423	Jogging feed rate	deg/min	360	360			
1424	Manual rapid traverse rate for each axis	deg/min	5400	3600			
1425	FL: Lower feed speed at reference point return	deg/min	720	720			
1428	Ref.Point Return Speed	deg/min	1800	360			
1430	Max Cutting Speed	deg/min	Catalog: 9900 Usual: 8100 Max. load: 2700	Catalog: 9900 Usual: 6000 Max. load: 1800			Maximum cutting feedrate for each axis
1432	Max Cutting Speed look-ahead mode	deg/min	Catalog: 7500 Usual: 6100 Max. load: 2100	Catalog: 7500 Usual: 4500 Max. load: 1400			Maximum cutting feedrate for each axis in look-ahead mode
1602#6	LS2 Acc./dec. after interpolation is of a linear type	bits	x1xxxxxx	x1xxxxxx			0=exponential / 1=linear
1610#0	CTL Linear acceleration/deceleration after ITP	bits	xxxxxx1	xxxxxx1			0=off / 1=on
1620	Linear type rapid traverse acc./dec. time constant	ms	Catalog: 33 Usual: 54 Max. load: 450	Catalog: 66 Usual: 118 Max. load: 240			Time constant (without jerk time)
1621	Time constant of acc./dec. in rapid traverse - bell-shaped part	ms	Catalog: 33 Usual: 54 Max. load: 450	Catalog: 66 Usual: 67 Max. load: 68			Jerk time (proportional to acceleration time)
			Catalog: 80				

You will find helpful calculation formulae in the main catalog. The main catalog is also on the web.

## 5.4 Operating mode S3 ED20%-1min with STANDARD spindle load

If the spindle is moved frequently, the duty cycle «DC» also plays an important role.

The motor on our rotary tables is based on the operating mode S3 to DIN EN 60034-1 (VDE 0530-1) with the parameters: ED20%<sup>-1min</sup> with STANDARD spindle load.

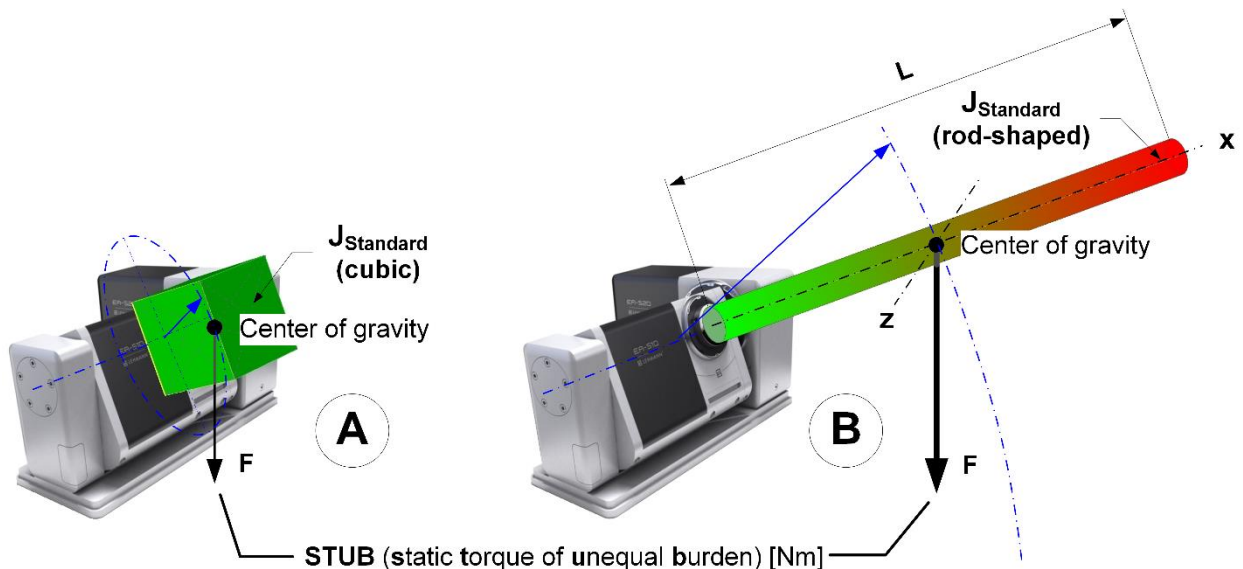
## 5.5 Torque load on T-systems

The basis for calculating the swivelling / tilting axis drive remains the STANDARD spindle load with  $J_{\text{Standard}}$  in the cubic shape.

The resulting preload [Nm] on the swivelling / tilting gear unit is also called the «STUB» (static torque of unequal burden).

The graph shows the differences in load with the same weight [kg].

The length of projection plays an important role both statically and dynamically.



Despite the same workpiece weight in kg (and the same J in terms of the x-axis), the torque load is obviously not the same for **A** and **B**.



### NOTE

**Do not overload gear unit.**

*If the mechanism is overburdened, the result cannot be optimal!*

- Always make a rough calculation to determine which parameters are optimal.
- pL LEHMANN offers optimal adaptation of the parameters. Tailored to your workpiece range. Ask for application service.

**Now check the torque load on the swivelling / tilting gear unit.**

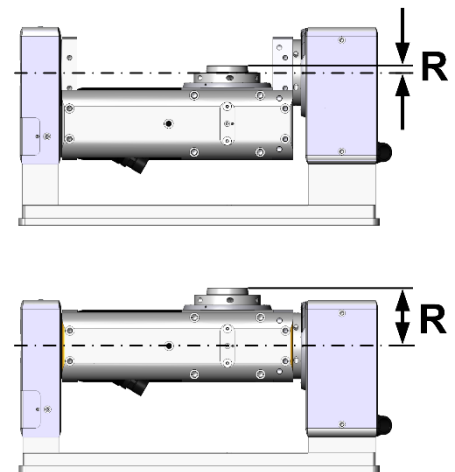
## 5.6 Static torque on the swivelling / tilting gear unit

### 5.6.1 Step 1: Calculate workpiece and clamping tool.

WITHOUT intrinsic moment of the indexing axis. In tilting direction.

Table: **Distance R** on various system types.

	R [mm]	
Rotary table	fix(X)	vario(X)(1)
TF...T1-507510	65	0
TF-51x510	68.5	3.5
TF...T1-51x520	86.5	0
TF...T1-520520	114	0



Formula for calculating M:

$$R_s = R + L/2$$

$$M = m \times R_s \times g$$

R = Radius from swivelling / tilting axis to divider spindle nose [m]

L = Workpiece length in the indexer axis [m]

M = Torque from M x g x R<sub>s</sub> [Nm]

R<sub>s</sub> = Center distance [m]

g = Acceleration due to gravity 9.81 [m/s<sup>2</sup>]

Sample calculation for system T1-510520-fix:

Rod-shaped workpiece, length 0.8m, weight 50kg

$$R_s = 0.0865 \text{ [m]} + (0.8/2) \text{ [m]} = 0.4865 \text{ [m]}$$

$$M = 50 \text{ [kg]} \times 0.4865 \text{ [m]} \times 9.81 \text{ [m/s}^2\text{]} = \mathbf{238 \text{ [Nm]}}$$

### 5.6.2 Step 2: Add intrinsic moment of the divider (depending on design)

Formula for calculating M<sub>tot</sub>:

$$M_{\text{tot}} = M + M_e$$

M<sub>tot</sub> = Total load of tilter gear unit.

M = Torque from M x g x R<sub>s</sub> [Nm]

M<sub>e</sub> = intrinsic moment of indexer. See guideline values in the following table, column «2».

Sample calculation for system T1-510520-fix:

M = 238 [Nm]

M<sub>e</sub> = 12 [Nm] From table on next page.

**M<sub>tot</sub> = 238 [Nm] + 12 [Nm] = 250 [Nm]**

**Assess the result using the following table, column «3» and «4».**

### 5.6.3 Step 3: Determine parameter group - and set at the CNC

- If the result for «M<sub>tot</sub>» is SMALLER than the reference value in the table, set column «3» (STANDARD spindle load) = Parameter group «Catalog».
- If the result for «M<sub>tot</sub>» is GREATER than «STANDARD», but smaller than «M<sub>max</sub>», set parameter group «M<sub>max</sub>».
- If the result is greater than «M<sub>max</sub>», the swiveling axis is overloaded and may be damaged.

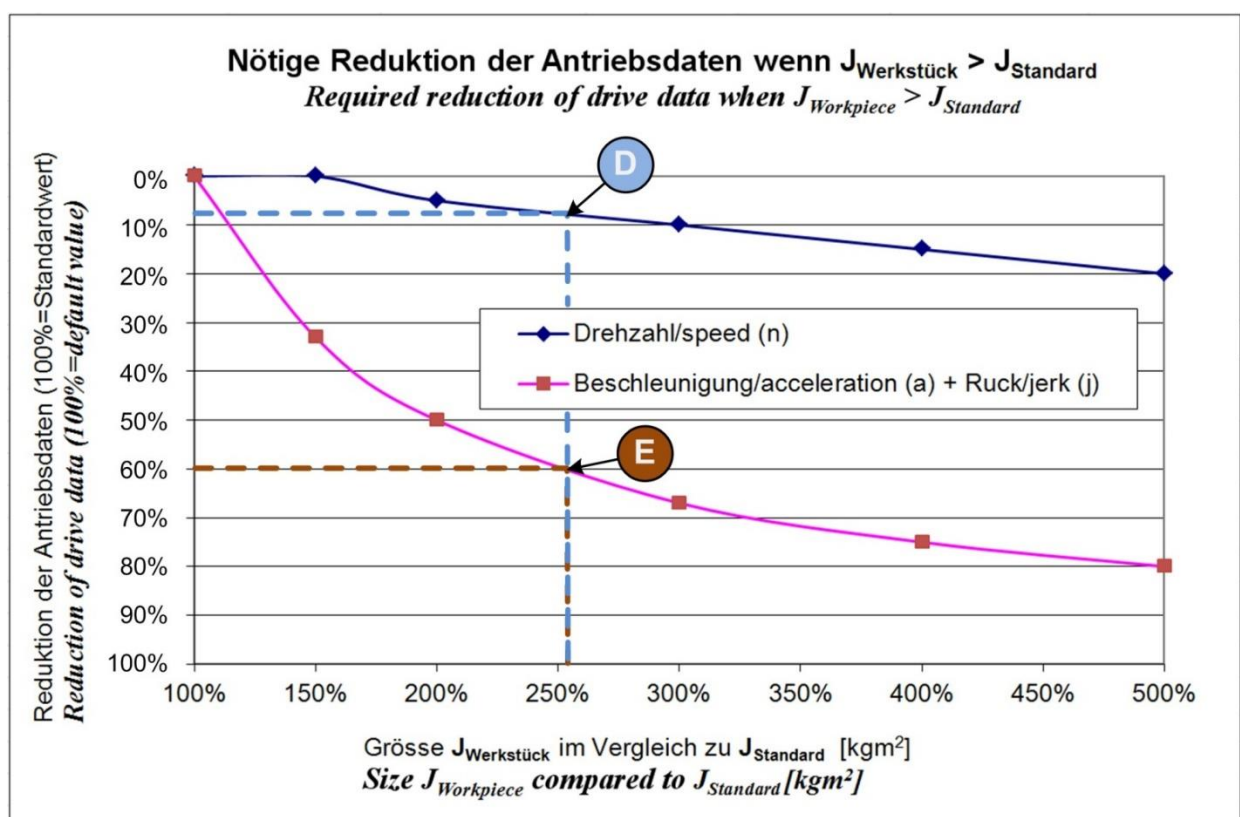
Contact our application service to obtain other parameter settings.

#### *Gear unit load table (maximum load)*

Column	2	3	4
	Without load «M <sub>e</sub> » [Nm]	Standard «Catalog» [Nm]	« M <sub>max</sub> » [Nm]
<b>Systems TF-...fix and TF-...fixX</b>			
507510	6	25	250
510510	12	36	250
510520	12	75	440
520520	25	140	440
<b>Systems TF-...vario and TF-...varioX</b>			
507510	16	6	250
510510	33	12	250
510520	33	12	440
520520	72	25	440
<b>Systems T1-...fix and T1-...fixX</b>			
507510	6	25	250
510520	12	75	440
520520	25	140	440
<b>Systems T1-...vario, T1-...varioX and T1-...varioX1</b>			

507510	16	6	250
510520	33	12	440
520520	72	25	440
Systems T2-...fix			
507510	13	33	250
510520	25	93	440
Systems T3-...fix			
507510	20	39	250
510520	38	108	440

#### 5.6.4 Mass moment of inertia J greater than Standard = reduction of drive data



[Reading example D and E:](#) A load that is 2.5 (250%) times greater than the STANDARD spindle load requires the following measures:

- Reduce rotational speed by 8%. (Example: Speed 18.4 rpm instead of 20 rpm)
- Increase the acceleration time and jerk time by 60%. (Example: 160ms instead of 100ms) or reduction of acceleration (e.g. in  $\text{k}^\circ/\text{s}^2$ ) and jerk time (e.g. in  $\text{k}^\circ/\text{s}^3$ ) by 60%.

## 5.7 Physical limits for mechanical precision

### 5.7.1 Gear backlash

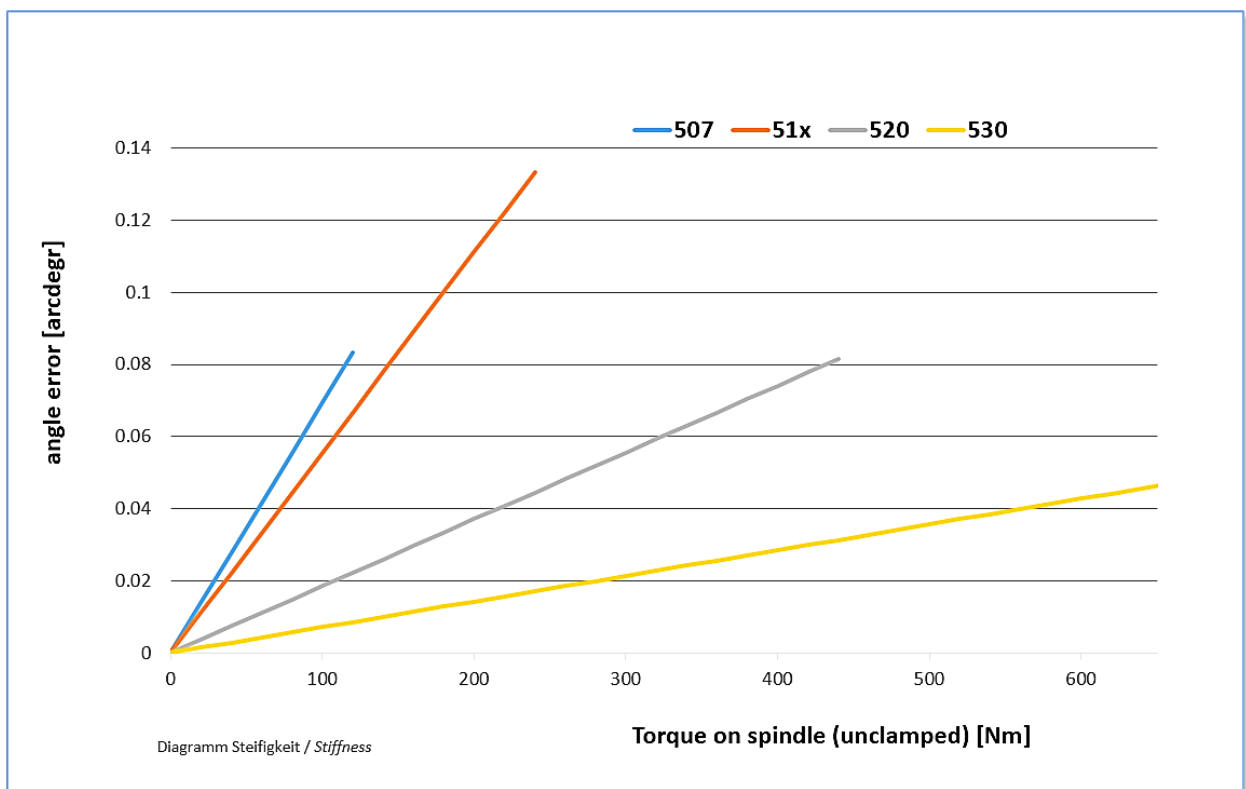
A worm drive normally has minimal gear backlash. pL LEHMANN rotary tables are backlash-free starting with Edition 3.

The pL LEHMANN gear units are even preloaded and designated **PGD – Preloaded Gear Drive**. There is no longer any mechanical clearance in meshing teeth.

### 5.7.2 Rigidity

Every material has a certain elasticity. The consequence is that pL LEHMANN gear units can exhibit a larger or smaller angular error at different tangential loads.

The table shows the stiffness of our rotary tables with an **unclamped** spindle.



#### Conclusion a):

For very high angular accuracy requirements, we recommend the WMS angular position measuring system option. See main catalog. Electronic error curve compensation can also help in some cases.

#### Conclusion b):

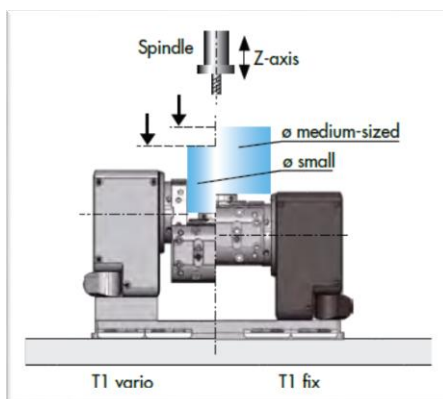
Use the capabilities of our «combiFlex®» system to find the optimal position for the load.

See the following illustrations, which can also be found in the main catalog.



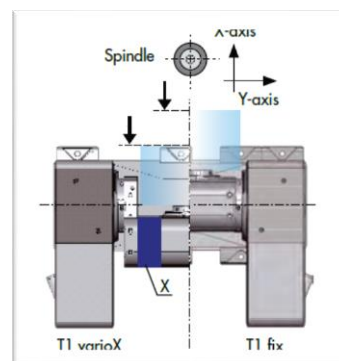
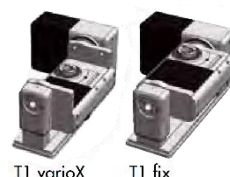
### 5.7.3 «combiFlex®» capabilities and benefits

Some examples with the T1 arrangement (tilter with divider and counter bearing). These advantages can also be applied to other arrangements.



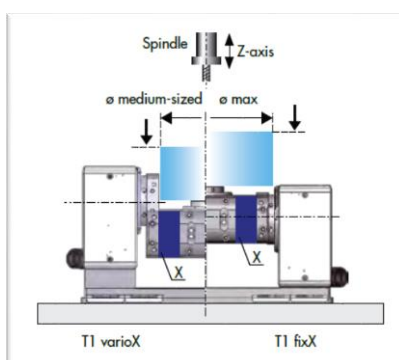
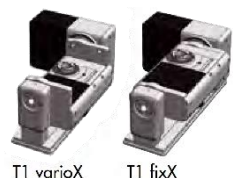
#### (1) Comparison T1 vario with T1 fix

With T1 fix, the maximum workpiece diameter is greater than with T1 vario. The workpiece is higher. On the other hand, with T1 vario the spindle travel path (Z-axis) is greater since the workpiece is lower.



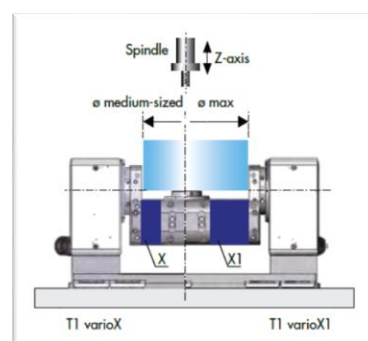
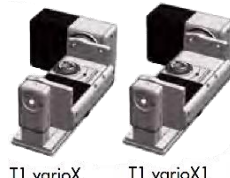
#### (2) Comparison T1 varioX with T1 fix

Top view. Here, thanks to the built-in spacer X, the largest possible workpiece  $\varnothing$  on the T1\_varioX is even greater than for (1). This provides more freedom of motion in the X-axis.



#### (3) Comparison T1 varioX with T1 fixX

With this configuration, the largest possible workpiece  $\varnothing$  for both solutions is even greater than that of the comparison (1) due to the built-in spacer X



#### (4) Comparison T1 varioX with T1 varioX1

With the configuration T1 vario X1, the largest possible workpiece  $\varnothing$  is even greater than at T1 varioX, since the X1 spacer is wider than X.





## NOTE

**Always clamp the spindle.**

*Knocks can damage the precision gear unit!*

- During loading / unloading, the clamping must be «clamped».

## 5.8 Synchronize drive control circuit

The swivelling / tilting axis is usually loaded asymmetrical by the divider, the workpiece holder and the workpiece.

Good control circuit parameter synchronization can therefore be crucial.

We provide parameter lists for most machinery and equipment on our website.

Take advantage of this offer. If anything is unclear, contact your VAR.

## 6 Recommended warm-up prior to production

### ***First cycle:***

*Indexing axes:* Feed 20% of max. speed: 10x (+360° / pause 5 sec. / -360° / pause 5 sec.)

*Tilting axes:* Feed 20% of max. speed: 20x (limit plus° / pause 5 sec. / limit minus° / pause 5 sec.)

### ***Second cycle:***

*Dividing / indexing axes:* Feed 50% of max. speed: 20x (+90° / pause 2 sec. / -90° / pause 2 sec.)

*Swivelling / tilting axes:* Feed 50% of max. speed: 10x (limit plus° / pause 5 sec. / limit minus° / pause 5 sec.)

## 6.1 Recommended cycle for stress test (ED 20%)

Only permitted after warm-up.

Maximum spindle load per «Standard spindle load» in the pL LEHMANN main catalog.

### CLAMP SPINDLE CLAMPING AFTER EACH POSITIONING.

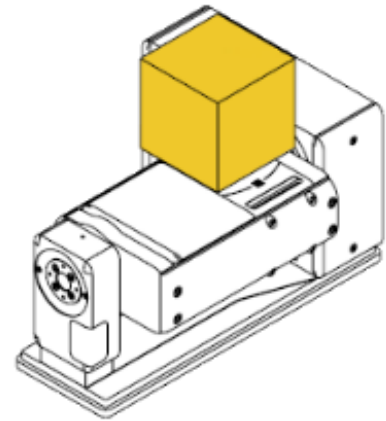
Cycle for rotary axis:

Feed 100%: 10x (+180° / pause 4x the time for run 180° (see main catalog), then repeat at -180°).

Cycle for tilting axis:

Feed 100%: 20x (0° / pause 4x the time for run 180° (see catalog pL), then -90°).

The rotary table electronics blackBOX checks the duty cycle and enters «Error 022» in the logbook if the time is exceeded.



### NOTE

**With >DC20%, measures are required.**

*The gear unit and motor can be permanently damaged possible!*

- Reduce the rpm and acceleration.

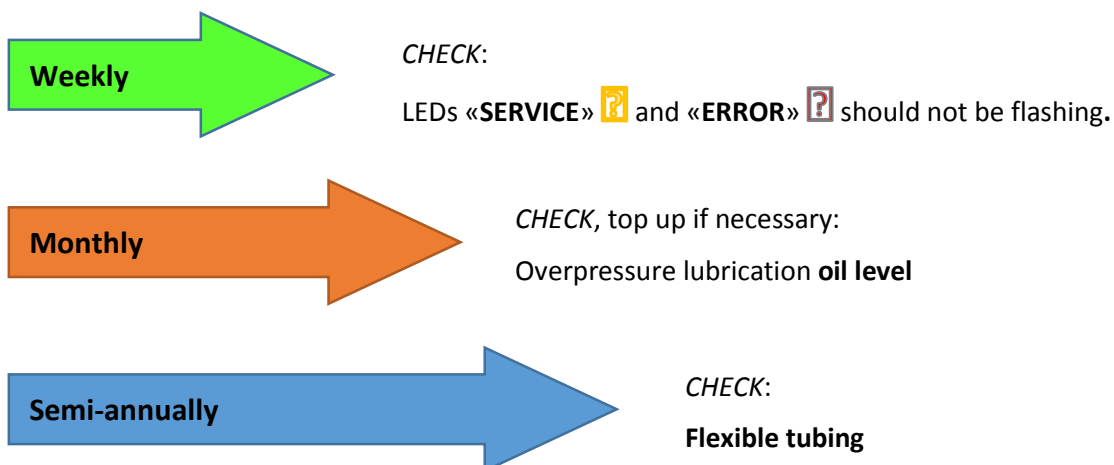
## B. Maintenance

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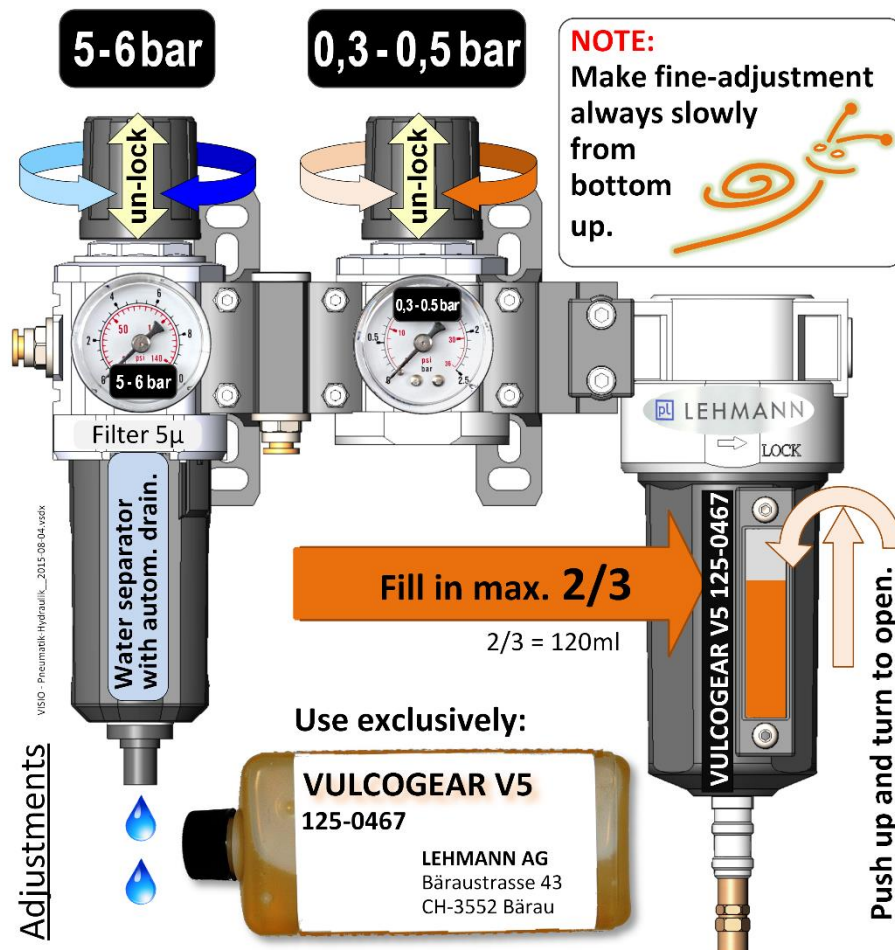
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## 7 Maintenance

Maintenance involves the following activities:



## 7.1 Topping up the air maintenance unit



### ! ATTENTION

Only use pL LEHMANN oil, VULCOGEAR V5.

*Otherwise, the warranty will be invalidated immediately!*

- VULCOGEAR V5 was developed specifically for the very demanding requirements of pL LEHMANN gear units.
- It must not be mixed with other products.
- Ensure that your maintenance service receives this information.

**NOTE**

**Air bubbles in oil hose.**

*The clamping does not function with air bubbles in the oil!*

- Check the white oil hose for bubbles.

## 7.2 Safety data sheet for VULCOGEAR oil

For retail sales, a recognized safety data sheet is needed for the pL LEHMANN gear oil.

It is available at [www.lehmann-rotary-tables.com](http://www.lehmann-rotary-tables.com) under «Operation».

- Archiv - Bedienung
- Hydraulikaggregat CYMAX
- Spezial-Anleitungen
- alte Baureihen
- Anleitung für Zubehör ALLGEMEIN\_DOK-0164-DE-05\_ZUBE\_2013-10-15.pdf (2514KB)
- Bedien.\_u.\_Service-Anl.\_CNC-FANUC 35iB\_DOK-0253-DE.01\_2014-07-21.pdf (12487KB)
- Bedienungsanleitung STANDARD\_DOK-0003-DE-03\_BEDI\_2013-06-18.pdf (4311KB)
- Sicherheitsdatenblatt für Öl Vulcogear Synt EP V5 PL ISO 220\_DOK-0067-DE-02\_2013-0

DOK-0067-DE-2: «Safety data sheet 1907/2006/EC, article 31 version number 2 for products with the brand name: - Vulcogear Synt EP V5 PL ISO 220 - article number: 31173» from STRUB.

**ATTENTION**

**Shut down the machine and secure it before performing any maintenance activities.**

*Otherwise there is a risk of injury from moving parts!*

- Lock the main switch.
- Remove all equipment that can pose a risk of injury from the work place.

**NOTE**

**Poor care and maintenance.**

*The repair of damage caused by poor maintenance will be invoiced within the warranty period!*

- pL LEHMANN CNC rotary table systems are usually located in the midst of metal chips and coolant. To prevent damage, appropriate care by the user is required.

## 8 Information on troubleshooting



### NOTE

**Dismantling of the system is not permitted.**

*Dismantling or repair of pL LEHMANN rotary tables is permitted only by pL LEHMANN technicians and contractual partners.*

- The exceptions are the maintenance steps described here.
- For more information on bleeding and troubleshooting, see «Commissioning manual STANDARD DOK-0004», chapter 3.

# C. Accessories

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## 9 Introduction to the Accessories chapter

Accessories can be purchased and supplied at any time.

This includes workpiece clamping systems, rotary unions, counter bearings, tailstocks etc.

Some accessories required assembly, measuring, aligning etc.

### 9.1 Qualification of specialists

We assume the relevant expertise for the following descriptions.

### 9.2 Tightening torques for socket head screws

Always use the following tightening torques if not noted otherwise.

- Quality of the screws / bolts: 12.9
- Material for threaded elements: Steel

Screw size	Tightening torque [Nm]
M 5	9.7
M 6	14.5
M 8	35
M 10	70
M 12	120

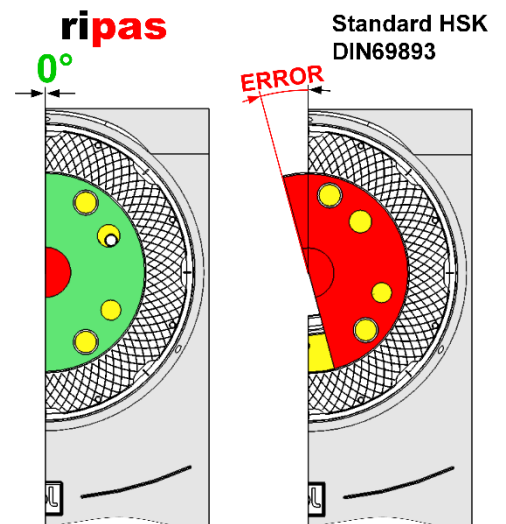
## 10 HSK-ripas clamping system

### HSK clamping system ripas = 0°

Very accurate angular position of the pallet.

### HSK clamping system DIN 69893 = ERROR

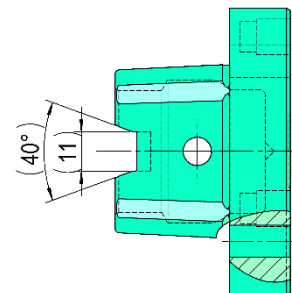
No accurate angular position of the palette.



### *ripas works with a very precise pairing of cam / slot*

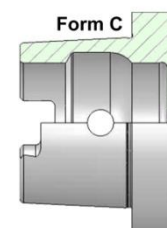
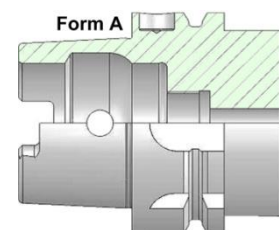
On the special HSK-**ripas** pallets, the slots are ground precisely to fit the somewhat narrower cams.

Rough positioning is achieved with the aid of a pin on the face of the spindle. This is also the 180° orientation, because the two cams are shaped differently.



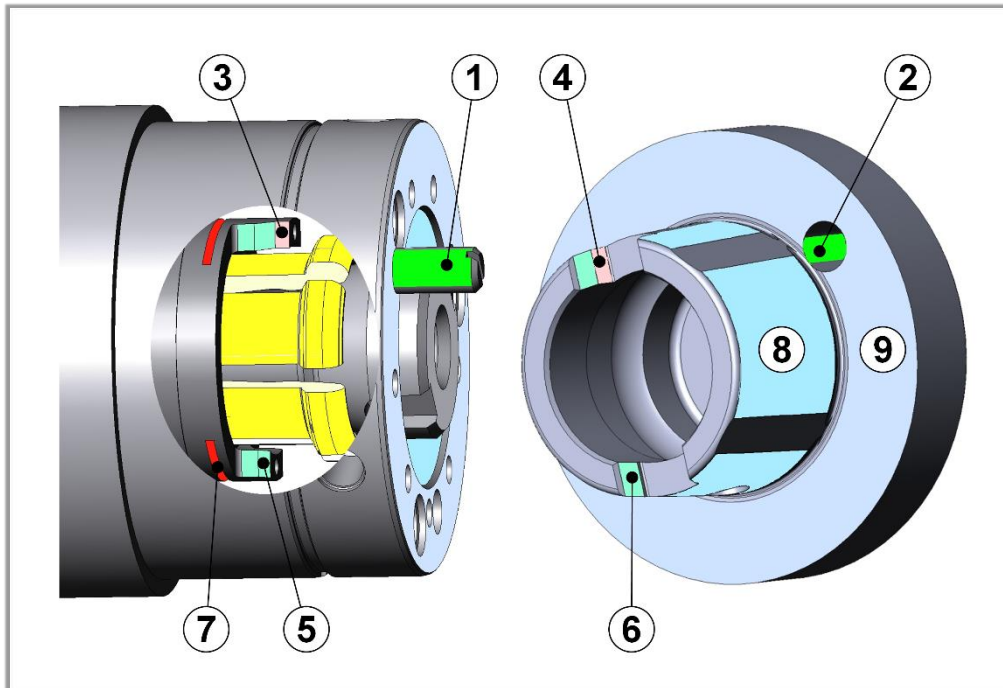
### *Common HSK inserts may still be used*

However, they must be type A or C, since only these have the cam slots and the transverse hole for manual tensioning.



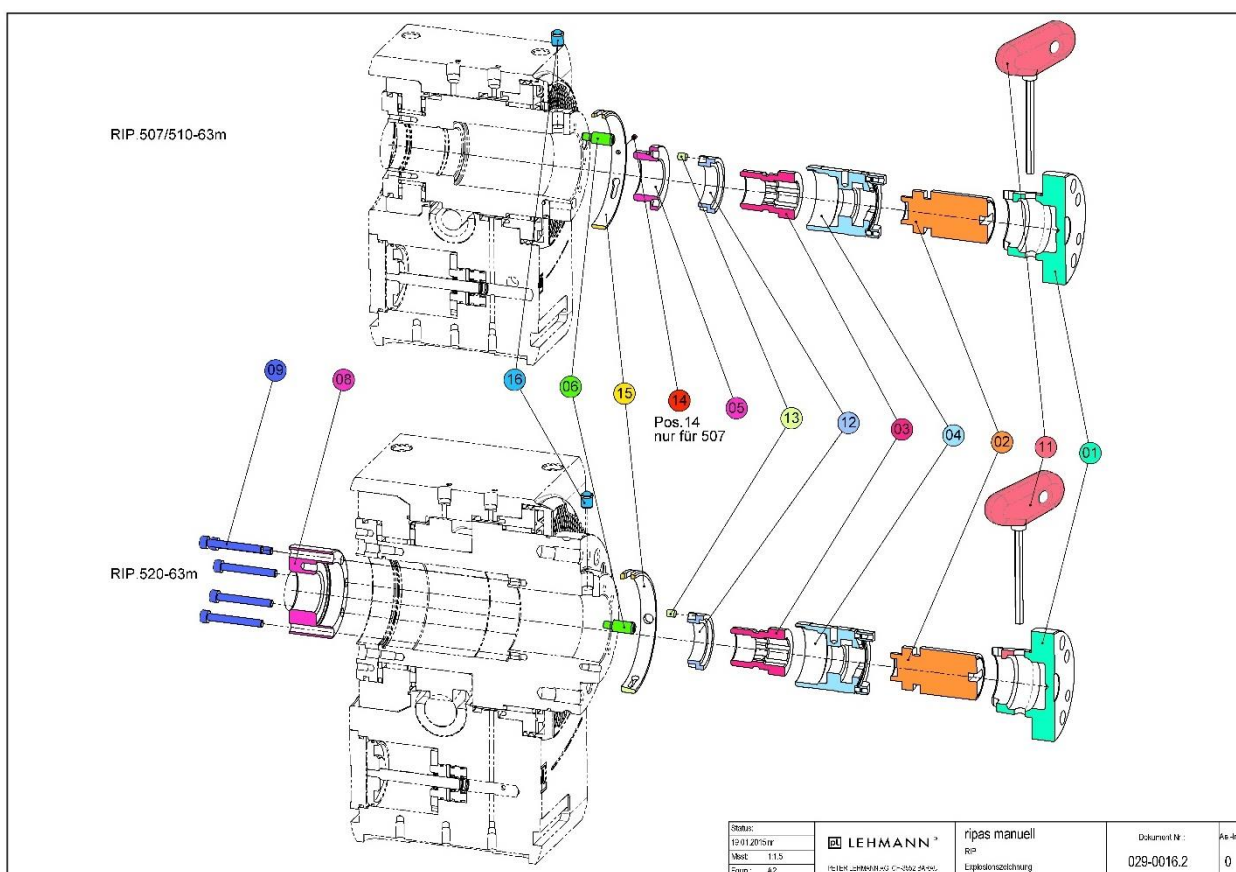
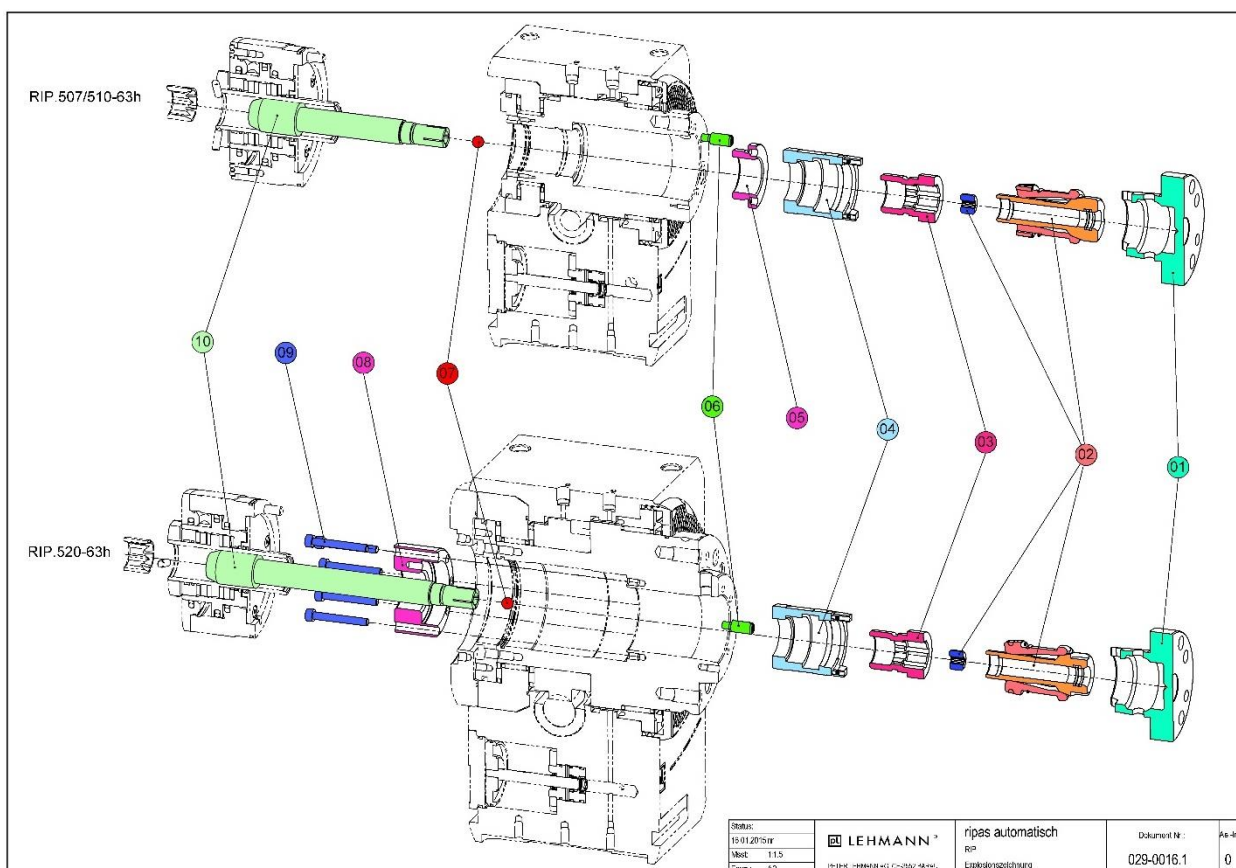
## 10.1 Description of functions

A video is available at [www.lehmann-rotary-tables.com](http://www.lehmann-rotary-tables.com) under Download/Operation.



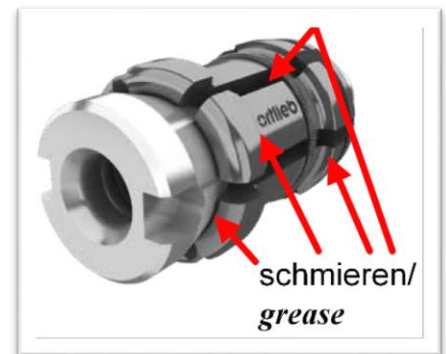
- The pin ① that slides into the hole ② provides rough positioning.
- The alignment cam ③ has a parallel-ground nose that fits the slot ④ in the ripas pallet and already ensures rough positioning.
- Before the HSK taper ⑧ closes, the two conically ground cams ⑤ engage the precisely fitting slots in the pallet ⑥ and align it accurately.
- In addition, under the cams ⑤ there are machined slits ⑦ that allow the cam to deflect slightly and the HSK pallet closes fully. ⑨

## 10.2 Parts overview

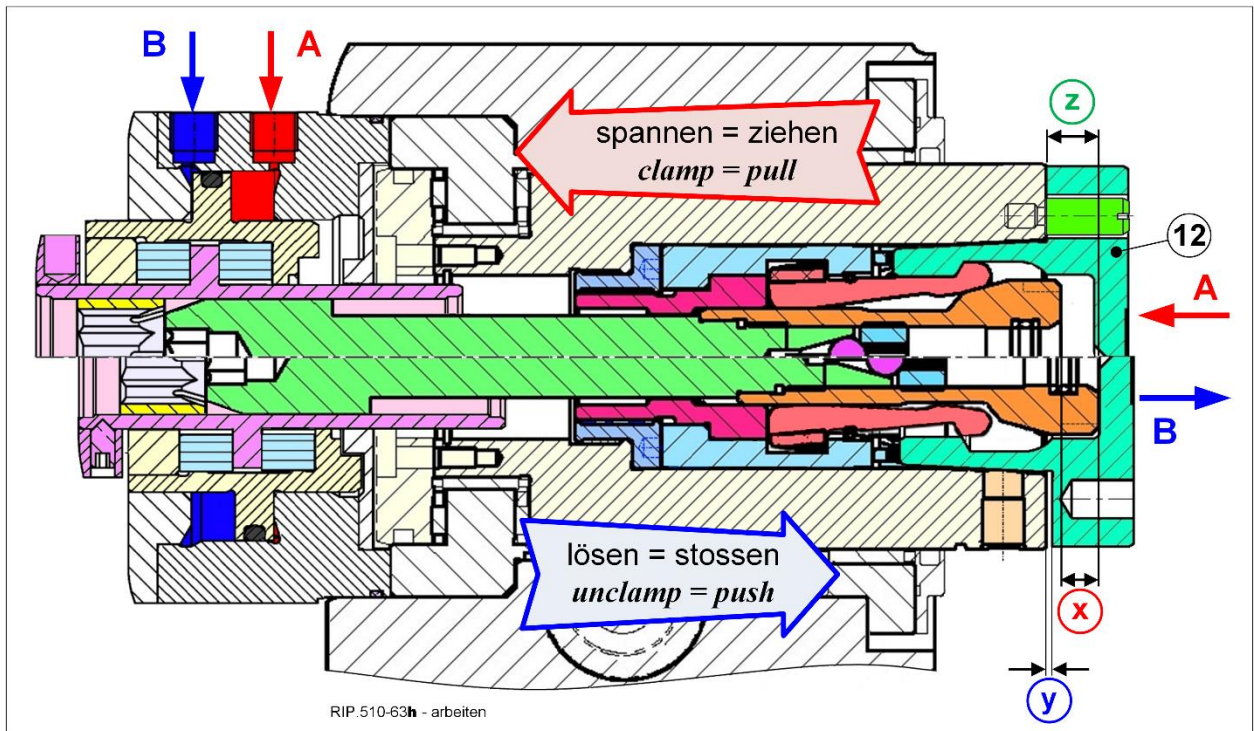


### 10.3 IMPORTANT REMARKS regarding HSK-ripas clamping:

- Keep the HSK taper **dry and clean** - do NOT lubricate it.
- **Lubricate sliding and pressure surfaces** on the drawing system and the **contact surfaces in the inner contour** of the pallets with adherent high-pressure grease.
- Prior to unloading, thoroughly **flush** the **contact surface** between the pallet and rotary table spindle.
- **Manual** loading / unloading in the **horizontal position** to prevent entry of water and dirt.
- **Automatic** loading / unloading in the **vertical position** when a robot is used and the load is >10 kg. **Reason:** Alignment of the HSK-ripas inserts functions better.
- **Torsional and tangential forces** on the pallet during loading **are poor**.
- **Do not continuously** request the **location check**. Only once after clamping.
- **Continuously** monitor the **clamping hydraulics**.  
Need for safety reasons.
- Automatic clamping: Do **not** build up tensile force **abruptly**. Install a choke in the hydraulic line to the clamping cylinders. (A 0.8 mm panel is included in the scope of supply.)
- Manual clamping: Always apply the **same torque**.



## 10.4 Working with HYDRAULIC HSK-ripas clamping



Starting position: Clamping cylinder is set to «unclamp» (B).

### Clamping

- Insert pallet or ripas adapter (12) and hold securely. → A small air gap remains (y).
- Set the clamping cylinder to «clamp» (A). → The clamping cylinder executes its stroke (x) → The pallet is clamped.

### Unclamping

Set the clamping cylinder to «unclamp» (B). → The pallet is ejected a few tenths of a millimeter (y).

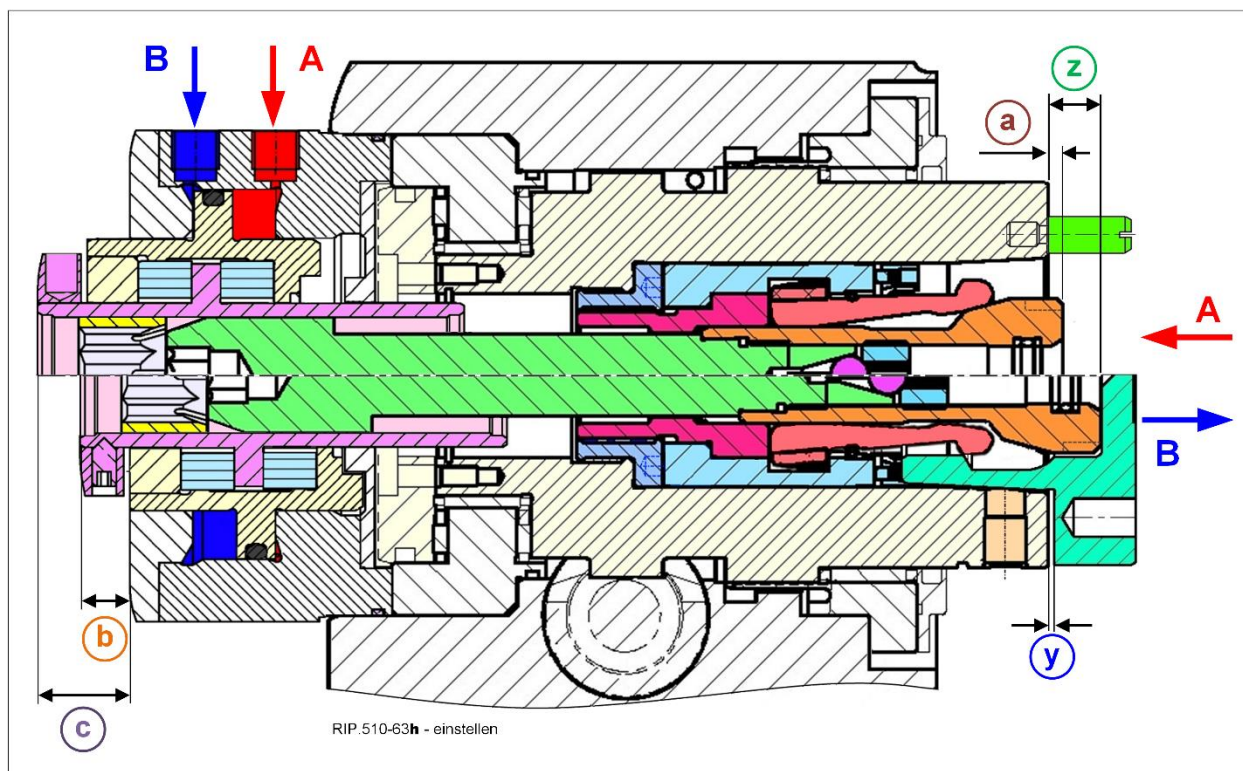
### 10.4.1 Clamping force table

For automatic HSK clamping

Module	507	510	520	530
HSK size	HSK-63	HSK-63	HSK-63	HSK-100
Clamping set	TG 48	TG 48	TG 48	TG 75
Draw-in force [kN]	10	10	10	24
Clamping force, approx. [kN]	30		30	
Max. oil pressure [bar]	45	45	45	90
SPZ clamping cylinder type	SPZ.5xx-9	SPZ.5xx-9	SPZ.520-9	SPZ.530-15
SPZ clamping cylinder stroke [mm]	9	9	9	15



### 10.4.2 Clamping cylinder control stroke



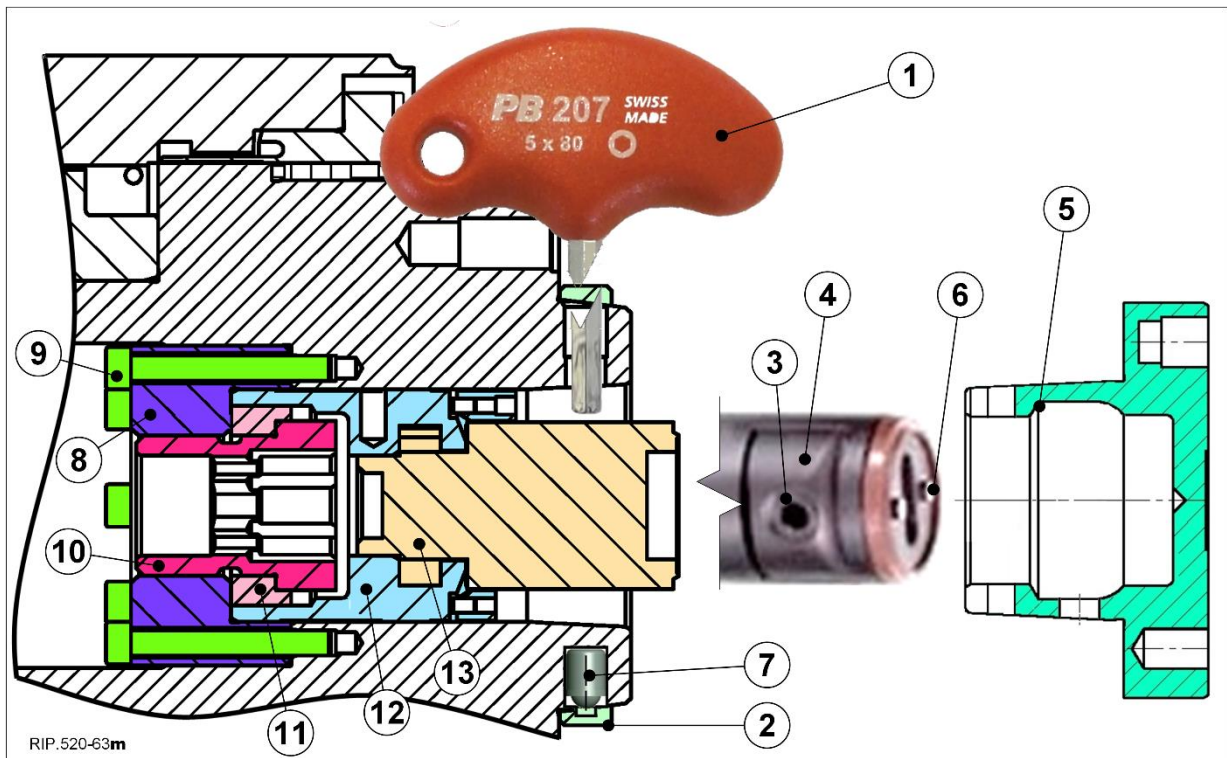
#### Procedure:

1. Set clamping cylinder without pallet or adapter to «clamp» (A).
  2. Compare dimension **a** against table below.
  3. Set clamping cylinder to «unclamp» (B), insert pallet, check air gap **y**.
  4. Measure dimension **c**. Insert pallet or adapter, set clamping cylinder to «clamp», measure dimension **b**.
- ➔ The difference between **c** minus **b** must be considerably less than the possible travel of the clamping cylinder. See table above.

### 10.4.3 Setting dimensions, ORTLIEB clamping set, aut. clamping HSK

Size	<b>z</b> [mm]	<b>a</b> [mm]	<b>y</b> [mm]	<b>c</b> minus <b>b</b> [m]
HSK-63, SPZ.5xx-9	10.15 (+0.05)	<2.5 (ca.1.5)	0.15 (+0.2)	<<9 (approx .5...7)
HSK-100	12.8 (+0.2)	<2.2	0.4 (+0.2)	<<9 (approx.8.5)

## 10.5 Working with MANUAL HSK-ripas clamping



### Clamping

1. Rotate protection ring (2) to open the transverse hole.
2. Insert pallet resp. **ripas** adapter and hold in place.
3. Using wrench (1) (size 5,  $\varnothing$  max. 8.8 mm), turn the screw / bolt (3) clockwise and tighten to the torque listed in the table. In response, the two clamping jaws (4) move in opposite directions into the inside contour (5). At the same time, the two ejector pins (6) retract into the clamping set.
4. Remove the wrench (1), rotate the protection ring (2) to close the hole.

### Unclamping

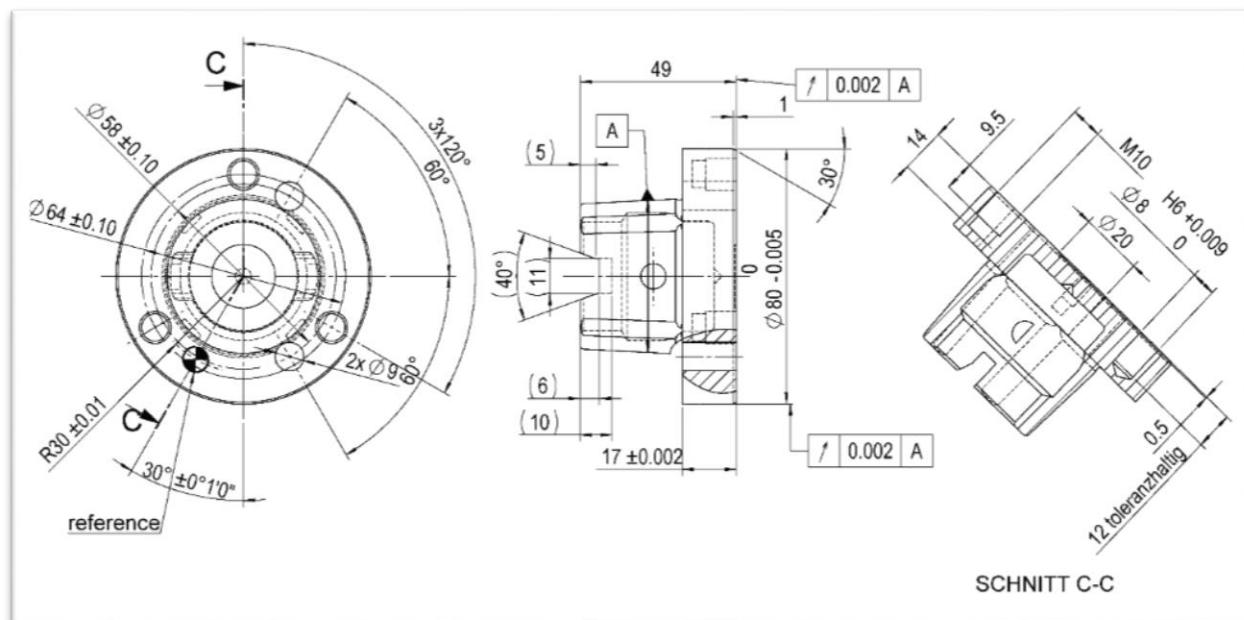
1. Turn the screw / bolt (3) counterclockwise to loosen and continue turning until the adapter is pushed out by the two pins (6).

### 10.5.1 Clamping force table for manual HSK clamping

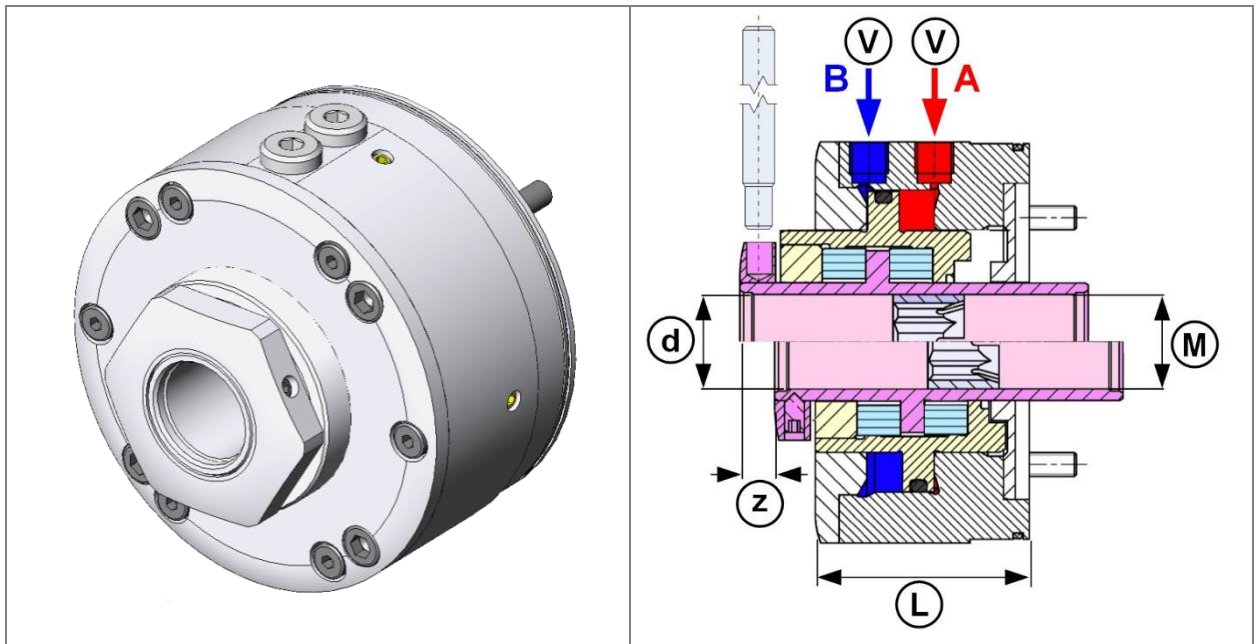
Module	507	510	520	520	530
HSK size	HSK-63	HSK-63	HSK-63	HSK-80	HSK-100
Clamping set	KS 63-08	KS 63-08	KS 63-08	KS 80-09	KS 100-10
Tightening torque [Nm]	20	20	20	30	50
Draw-in force [kN]	30	30	30	40	50
Wrench $\varnothing$ [mm]	8.8	8.8	8.8	8.8	8.8



RIP.63ada is available on short notice.



## 11 SPZ.5xx — clamping cylinder

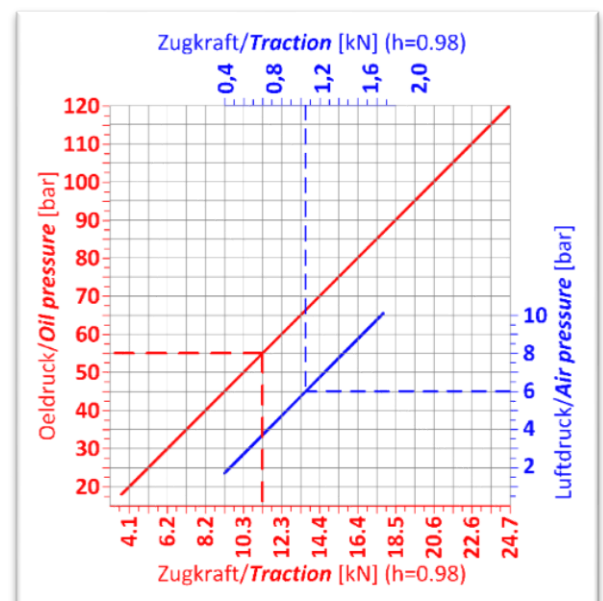


### 11.1 Technical data

All SPZ.5xx clamping pressure max. 120 bar

Type	Effective direction	z [mm]	V [cm <sup>3</sup> ]	L [mm]	d [mm]	M
SPZ.5xx-d2.5	double	2.5	5.2	60	Ø22	M24x1.5
SPZ.5xx-9	double	9	18.8	60	Ø22	M24x1.5
SPZ.5xx-15 (a.A.)	double	15	31.4	72	Ø22	M24x1.5
SPZ.5xx-d2.5d25	double	2.5	5.2	51	Ø25	M30x1.5

### 11.2 Pressure / insertion force diagram



## 12 SPZ.Awk presence detection

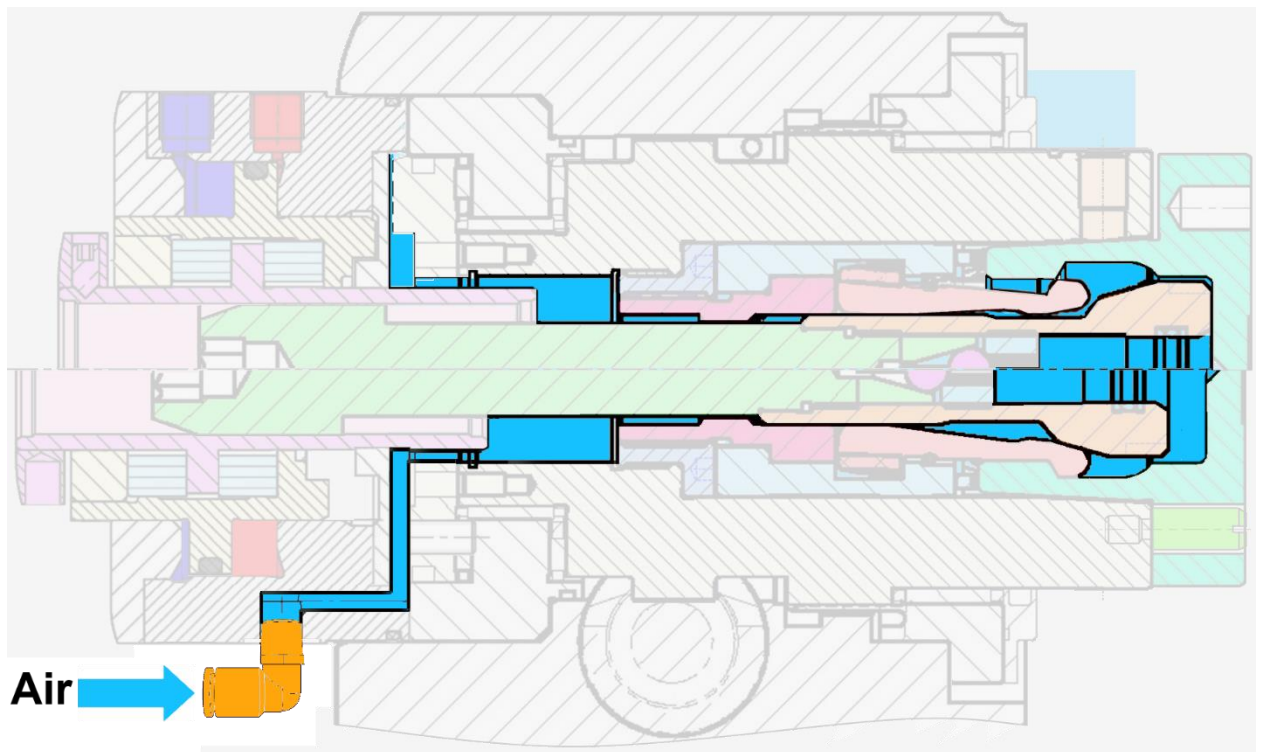
This add-on monitors the clamping and generates corresponding signals.

This can be important with automatic loading.

### 12.1 Function

An air connection in the clamping cylinder leads into the HSK clamping unit.

When an HSK hollow shaft taper is inserted and the clamping is set to «clamp», a back pressure is created that is evaluated by the control box «SPZ.Awk control box for presence detection».



### 12.2 SPZ.Awk control box

The SPZ.Awk control box fulfills two functions:

1. It **cleans** the HSK taper
2. It generates the signal for the **presence** of the pallet with the aid of a compressed-air sensor.

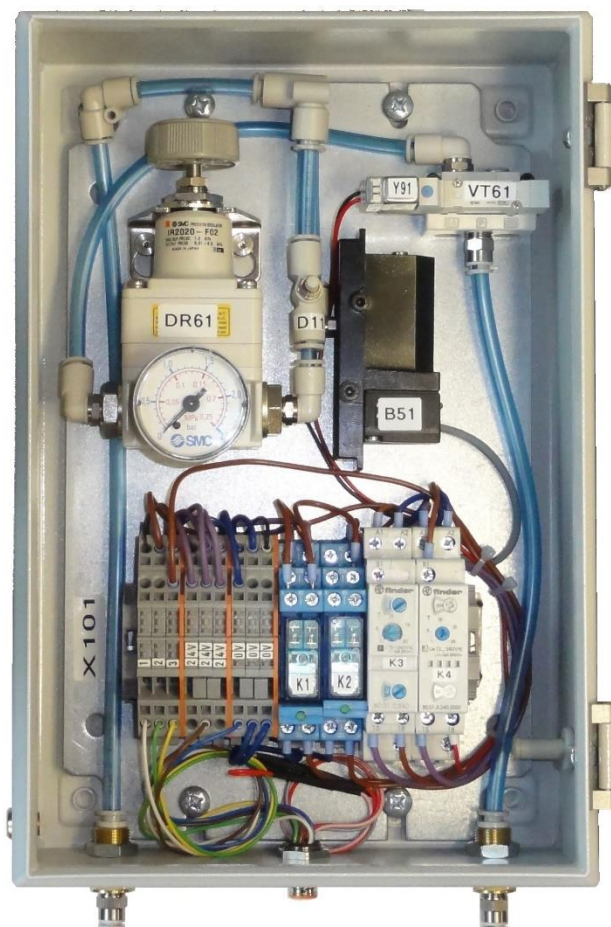


### 12.3 Installing the SPZ.Awk control box

1. Connect shop air at 6 bar to **T1VT61**.  
Ø6 mm hose.
2. Connect the supplied **yellow hose** to outlet **T1PS61** and to the clamping cylinder.  
This is the controlled air.
3. Connect the supplied cable to the electr. coupling **X102**. This is the connection to the machine.
4. Connect the other end of the cable in the control cabinet.



### 12.4 Interior

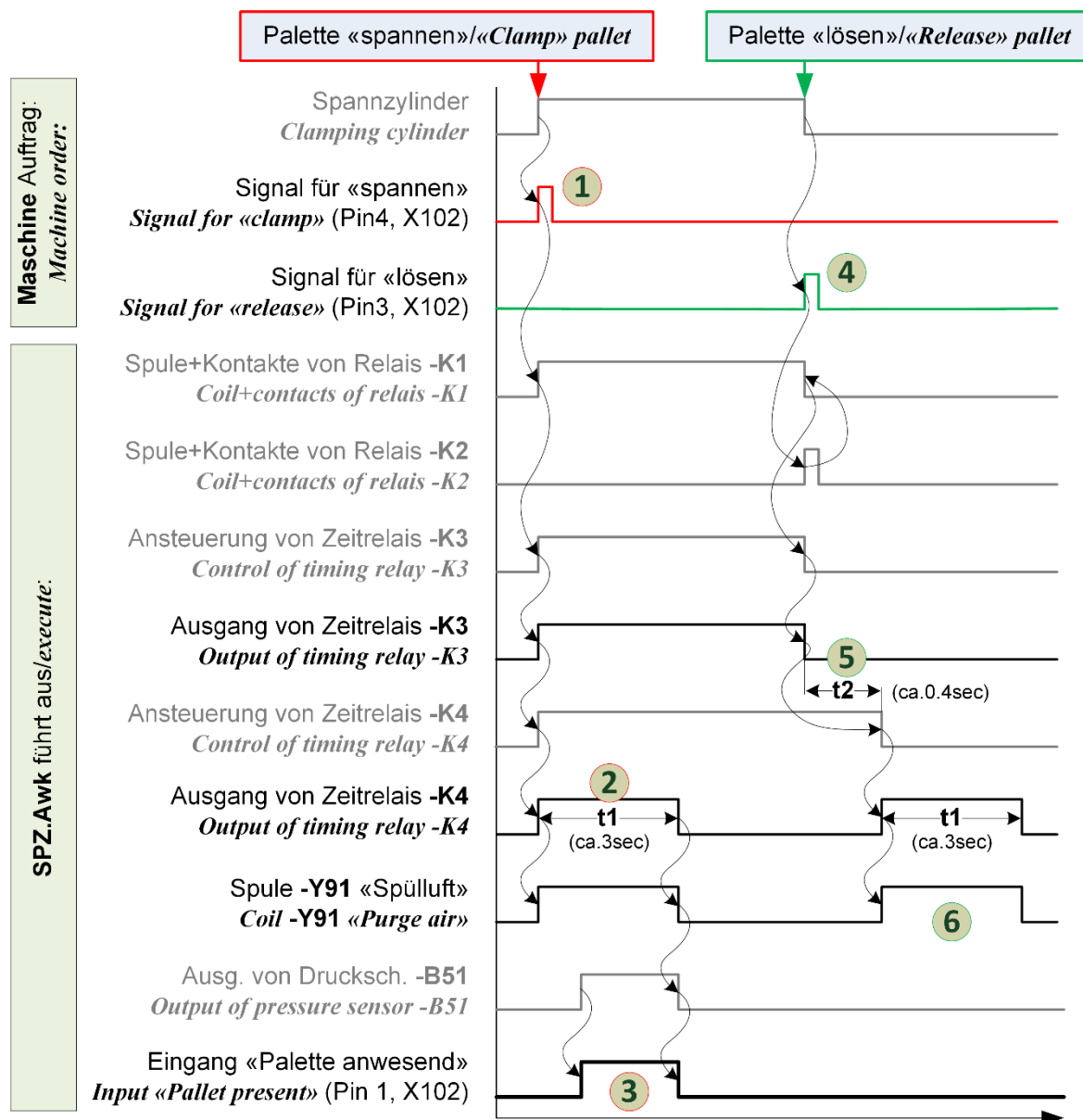






## 12.6 Sequence diagram for SPZ.Awk

The diagram shows the sequence for 1 clamping and 1 unclamping.



### Retract pallet and clamp

- The machine gives the command to «clamp» ① on pin 4 and waits for the acknowledgment signal on pin 1 ③.
- The purge air flows as long as the ON delay in relay -K4 ② is running.
- The pressure sensor signals «pallet present» ③, because the compressed air backs up below the pallet. The clamping process is complete.

### *Unclamp and eject pallet*

- a) The machine gives the signal to «unclamp» ④ and expects compressed air to flow out from under the pallet in order to keep dirt out once the palette is released («clean after short waiting period»).
- b) The time delay relay –K3 ⑤ is programmed to have a short shutoff delay that prevents the immediate flow of purge air, as otherwise a back pressure could arise and forcibly eject the pallet.
- c) During time t1 ⑥, the purge air flows and then switches off. This completes unclamping.



### **NOTE**

**Presence detection reduces the contact force considerably.**

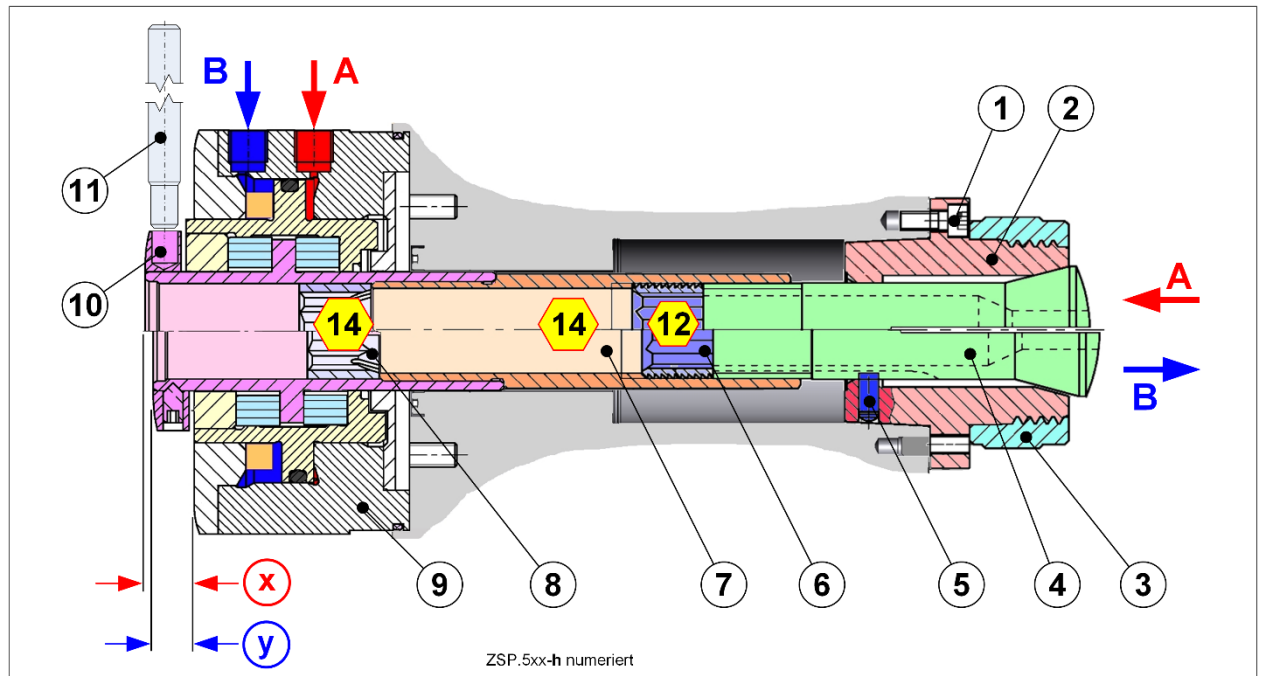
*The compressed air for presence detection must not be supplied continuously!*

- Maximum permissible compressed air: 3 bar.
- The air for the presence check must be switched off BEFORE machining.

## 13 ZSP.5xx — Collet clamping SCHAUBLIN type W

### 13.1 AUTOMATIC clamping

Please note: Use clamping cylinder with 2.5 mm stroke only. If the stroke is too long, the collet can be destroyed.



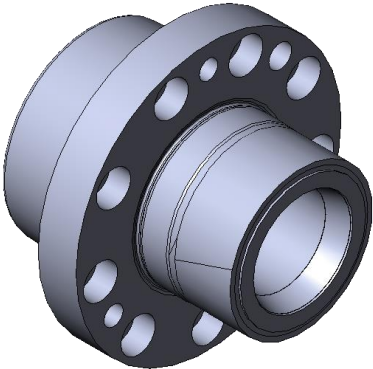
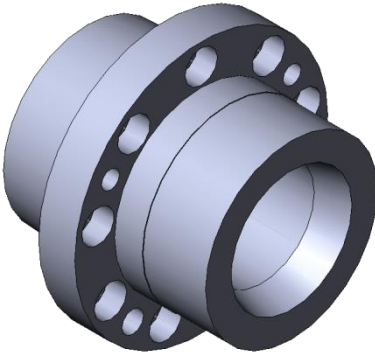
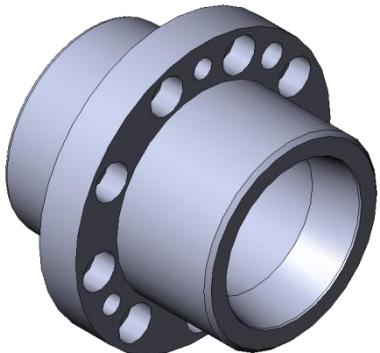
Please proceed as follows:

1. Thread the locking screw **6** sufficiently deep into the draw tube **7** from the front with the aid of a size 12 Allen wrench (135-0109 Allen wrench, size 12, long).
2. Thread the draw tube **7** into the clamping cylinder **9** up to the shoulder and, with the aid of a size 14 Allen wrench (135-0039 Allen wrench, size 14, long) and a pin **11** (160-0178 Ø6.8/12 Ø8/120) with  $\varnothing < 7$  mm to hold tightly, screw in as far as possible.
3. Next, with the size 14 wrench still in place, thread in the locking screw **8** and lock in place with the aid of a second size 14 Allen wrench.
4. Insert collet insert / internal adapter **2** and fasten with screws **1**. The protective nut **3** remains in place for collet work.
5. Move the clamping cylinder to the desired position (completely back **A** or forward **B**).
6. Insert the collet **4**, rotate to locate the collet pin **5**, then slide the collet to the start of the threads and hold in place while applying light pressure.
7. Turn the nut **10** clockwise by hand or with a pin **11** and in this way retract the collet to the desired position.
8. Check the result by means of «clamp» **A** and «unclamp» **B**.
9. Finally, lock the collet from the rear by means of the locking screw **6** with the aid of a size 12 Allen wrench. Hold in position with a pin **11**.



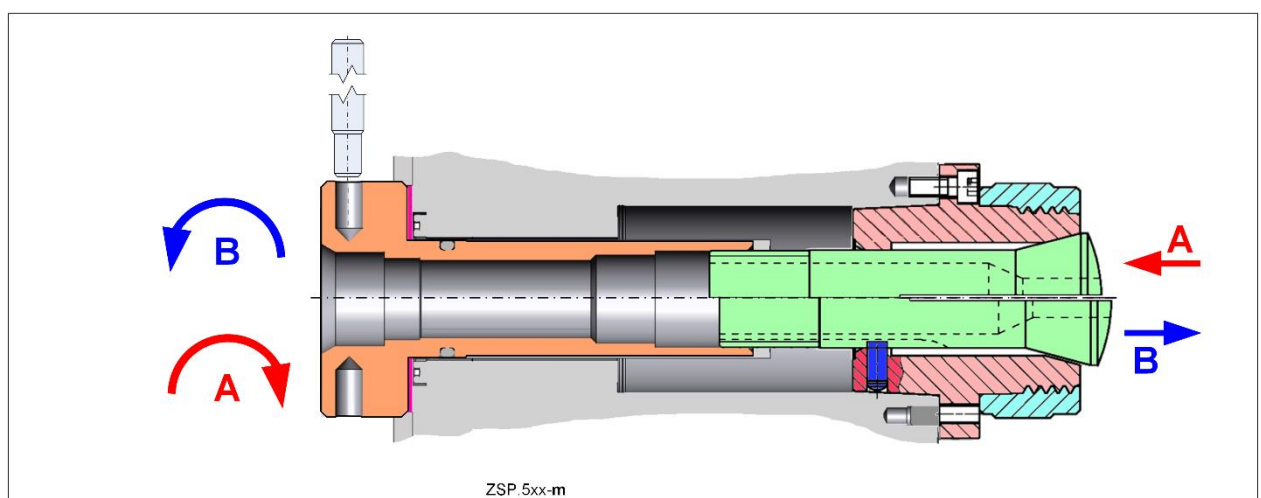
**Note**

- The correct position of the clamping cylinder when the collet is «unclamped» is determined by the application.
- Because of dirt and consequent runout, a collet should be unclamped only to the extent that no gap occurs at the taper.
- The clamping cylinder is suitable for oil and air. When working with compressed air, the usual 6 bar shop air may not be sufficient. For the draw-in force diagram, refer to chapter «SPZ.5xx clamping cylinder». Another possibility is to use a pressure intensifier such as that shown in «Commissioning manual DOK-0004» under «ASSEMBLY».

		
ZSP.5xx-W20x Collet clamping W20	ZSP.5xx-W25x Collet clamping W25	ZSP.5xx-W31x (ND) Collet clamping W31.75
Suitable spindle with HSK-A63		

## 13.2 Manual clamping

Assembly and operation are very easy.



## 14 DDF.5xx and DDG.5xx — Rotary union

### 14.1 Rotary unions for mounting on rotary table - DDF

Only the length of the through changes with the module size and the mounting of a WMS.

**DDF.5xx-04**  
Drehdurchführung 2-fluten:  
Fluten A + B  
Drehdurchführung 4-fluten:  
Fluten A - D  
**Rotary union 2-flows:**  
**Flows A + B**  
**Rotary union 4-flows:**  
**Flows A - D**

DDF Typ	W	X	Y	D	D1
DDF.507-04	9	-	30	100	-
DDF.507-04-2	-	96	117	-	130
DDF.510-04	-	0	21	-	-
DDF.510-04-2	-	98	119	-	130
DDF.510-04-7	-	93	114	-	220
DDF.520-04	13	21	42	160	-
DDF.520-04-2	16	101	121	160	130
DDF.520-04-7	-	96	117	-	220
DDF.530-04	5	13	34	230	-
DDF.530-04-2	4	88	109	230	130
DDF.530-04-7	-	77	98	-	220

**Threaded connections A-F: G1/8"x8 deep**  
**Operating pressure max. 250bar**  
**Gewindeanschlüsse A-D: G1/8"x8 tief**  
**Betriebsdruck: max. 250 bar**

Status:	26.09.2012 nr	<b>LEHMANN®</b> PETER LEHMANN AG, CH-3552 BÄRAU	<b>DDF.5xx-0x</b> 4-flutig Anschlussmasse	<b>Connection dimensions</b> Dokument Nr.: 021-0107a	Ae.-In.: 2
Msst:	1:2.5				
Form.:	A3				

## 14.2 Rotary unions for mounting on counter bearing - DDG

Only the length of the through shaft changes with the size of the rotary table.

**Rotary union 2-flows:**  
Flows A + B

**Rotary union 4-flows:**  
Flows A - D

**DDG.5xx-04**

Drehdurchführung 2-fluten:  
Fluten A + B

Drehdurchführung 4-fluten:  
Fluten A - D

**BEACHTEN SIE BITTE das Mass V-W ±0.2**  
Sonst könnten die Dichtungen zerstört werden.  
**PLEASE NOTE the measure of V-W ±0.2.**  
Otherwise the seals can be damaged.

**Threaded connections A-F: G1/8" x8 deep**  
**Operating pressure max. 250bar**

**Gewindeanschlüsse A-F: G1/8" x8 tief**  
**Betriebsdruck: max. 250 bar**

DDG Typ	V	W	X	Y	D
DDG.507-04	76	70	9	30	100
DDG.510-04	76	70	9	30	116
DDG.520-04	86	80	23	44	166

Status: 26.09.2012 nr

Msst: 1/2

Form.: A3

**LEHMANN®**

PETER LEHMANN AG, CH-3552 BÄRAU

DDG.5xx-0x

4-flutig

Anschlussmasse

Dokument Nr.: 021-0025b

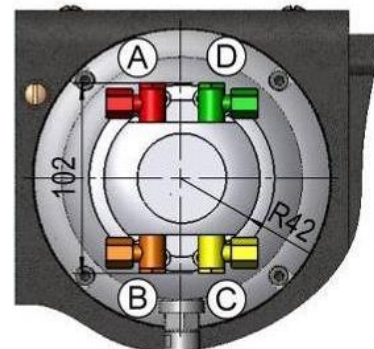
Ae.-In.: 2

## 14.3 Media port designations

The designation (A, B, C, etc.) on the DDF and DDG corresponds to the clamping tool connections from most manufacturers.

NOTE: Outputs A ... D are shown in drawings 021-... above.

Connection	Function
A	Open
B	Clean
C	Clean centering rules
D	Bleeding



## 14.4 Mounting DDF/DDG

<p>1. Remove spindle cover and O-ring.</p>	<p>2. Screw connecting piece to flange. IMPORTANT: Concentric alignment ① &lt;0.02 mm. Tighten screws ② <sup>(1)</sup>.</p>	<p>3. Mount adapter flange, align concentrically, tighten ③ <sup>(1)</sup>.</p>
<p>4. Insert shaft (DDx.32) into connecting flange (DDx.17), tighten ④ <sup>(1)</sup>.</p>	<p>5. Grease shaft with seal rings, carefully insert entire unit. It must be possible to rotate the unit easily by hand. Aligning is not necessary. Tighten ⑤ <sup>(1)</sup>.</p>	

<sup>(1)</sup> = To tightening torque listed in table in chapter 9.

## 15 GLA.5xx — Counter bearing

Counter bearings have their own clamping ring, which is actuated with the rotary table clamping.

On T-systems, the counter bearing is connected to the rotary table clamping by a hydraulic line.

On T-systems, the counter bearing must never be released or removed. It is part of the system and has significant influence on the admissible load, rigidity and geometry.

All counter bearings have clearance-free needle bearings, which are suitable for the bearing pin used.

The bearing pin is sealed.

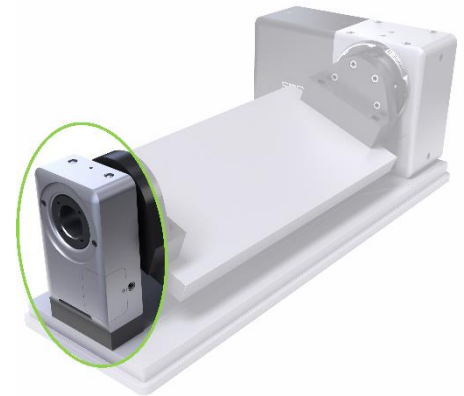


### 15.1 GLA on rotoFIX

The counter bearing is permanently mounted on the base plate and aligned at the factory. When the clamping plate is removed, the bearing pin can be pulled out.

Please ensure cleanness during assembly. The needle bearings have lifetime grease lubrication.

Please also lightly grease bearing pin and clamping ring.



### 15.2 GLA included as separate accessory

We recommend that a common base plate for rotary table and counter bearing always be used. Compare the information in the pL LEHMANN CNC Rotary Tables 500 catalog under the keyword «longFLEX support system».



## ! ATTENTION

1. **Never clamp without bearing pin.**  
*Otherwise, the clamping ring is immediately destroyed!*
2. **Secure the loose bearing pin always against falling out.**  
*He can independently slide out and injure persons!*
3. **Never push the bearing pin all the way into the housing.**  
*Otherwise it creat an uncontrolled braking effect!  
Always keep the distance as shown in drawing.*
4. **No tilting moments (overhanging loads) in unclamped state.**  
*The counter bearing is structurally unsuitable for it.*



### 15.2.1 Important installation instructions for counter bearings

#### Bearing pin position GLA.01

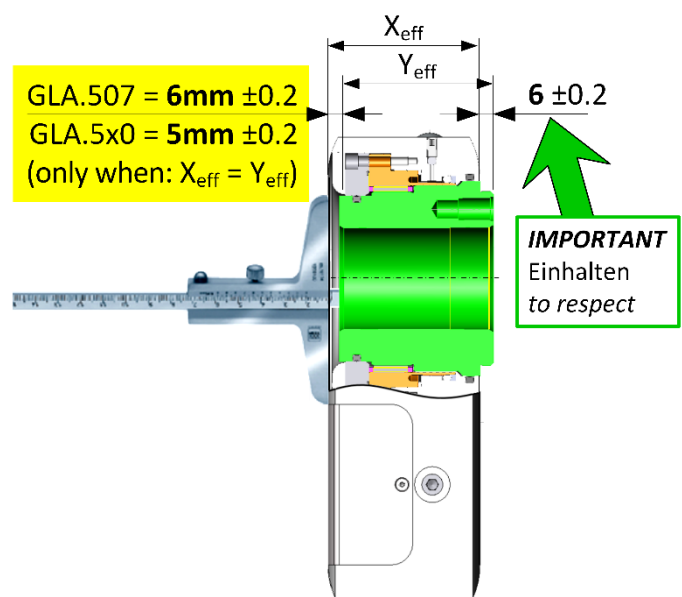
The bearing pin is fitted loose.

Its location is determined by the CFX.07 adapter plate.

The dimension 6 mm  $\pm 0.2$  must be set so that sufficient light remains between counter bearing and adapter plate.

With size GLA.507, the nominal dimension of the opposite side is 6 mm, with other sizes, 5 mm.

Please offset the effective dimensions of housing and pin.

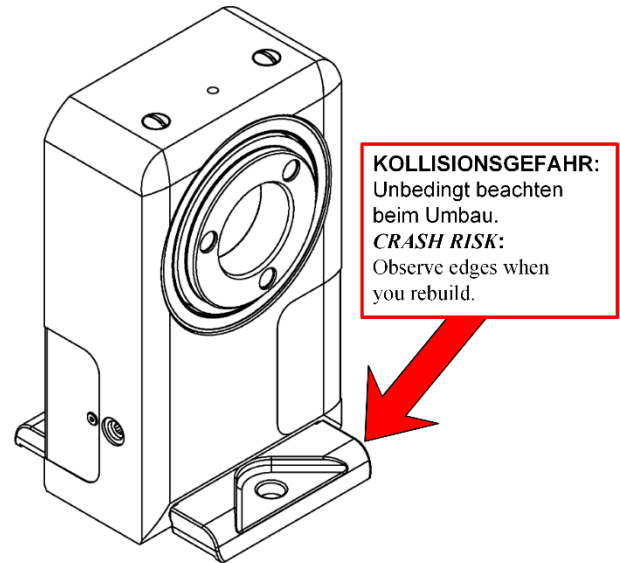


### **Interfering edges on clamping shoe CFX.26**

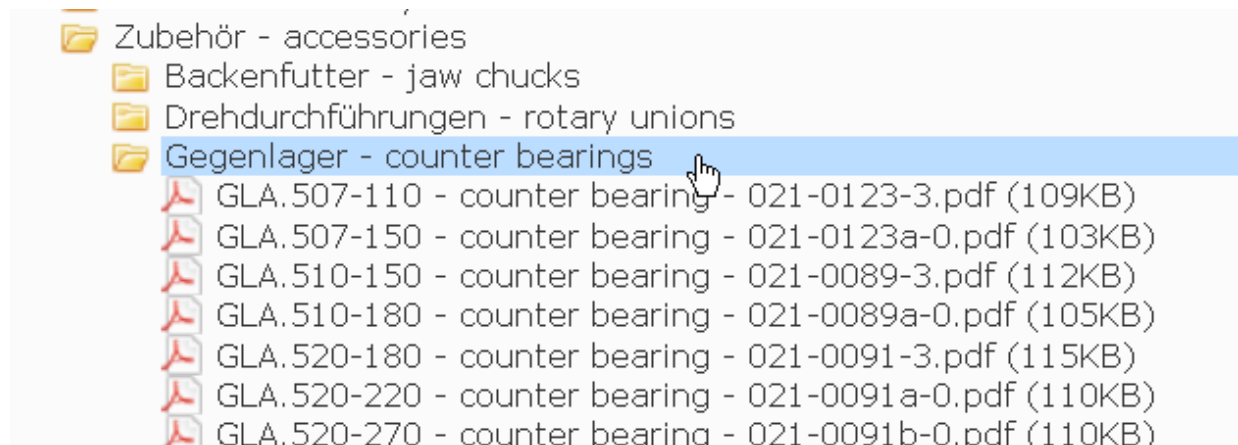
On our system, the counter bearing is screwed onto the base plate from below.

However, it also has slots for the use of clamping shoes.

If you assemble systems and use the clamping shoes at the counter bearings, which is possible thanks to the flexible system, please note the risk of collision.



### **For all dimension sheets for counter bearings see**



### **NOTE**

**Ensuring coaxiality.**

*Errors >0.05 mm can have major impacts!*

- Check the conformity of rotary table axis and counter bearing.
- Experience has shown that the deviation should be <0.05 mm. Align the counter bearing.



## NOTE

**Adapt drive data.**

*If the load is significantly higher than before, the drive system may not regulate optimally!*

- Adapt the parameters. See earlier in this manual.

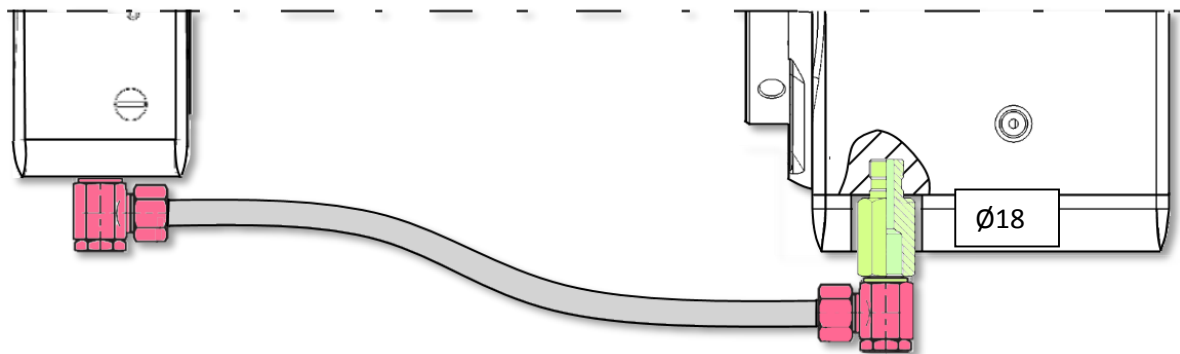
### 15.3 GLA.HYD — Hydraulic connection

The counter bearing can be procured as an accessory for retrofitting to single systems.

The counter bearing clamping system is attached to the rotary table clamping via the following connections. The output volume from the BRAKY pressure intensifier in the rotary table suffices for both clamping systems - as long as the system is fully bled. Pressure = 220 bar.

For more information on bleeding, see Commissioning manual STANDARD DOK-0004 under STEP 10.

#### 15.3.1 GLA.HYD-fix — Pipe to counter bearing



If necessary, drill hole Ø18 in end plate. Suitable pilot holes are provided inside.



## NOTE

**The pipe must not contain air.**

*If the pipe is not bled properly, minor error messages will occur!*

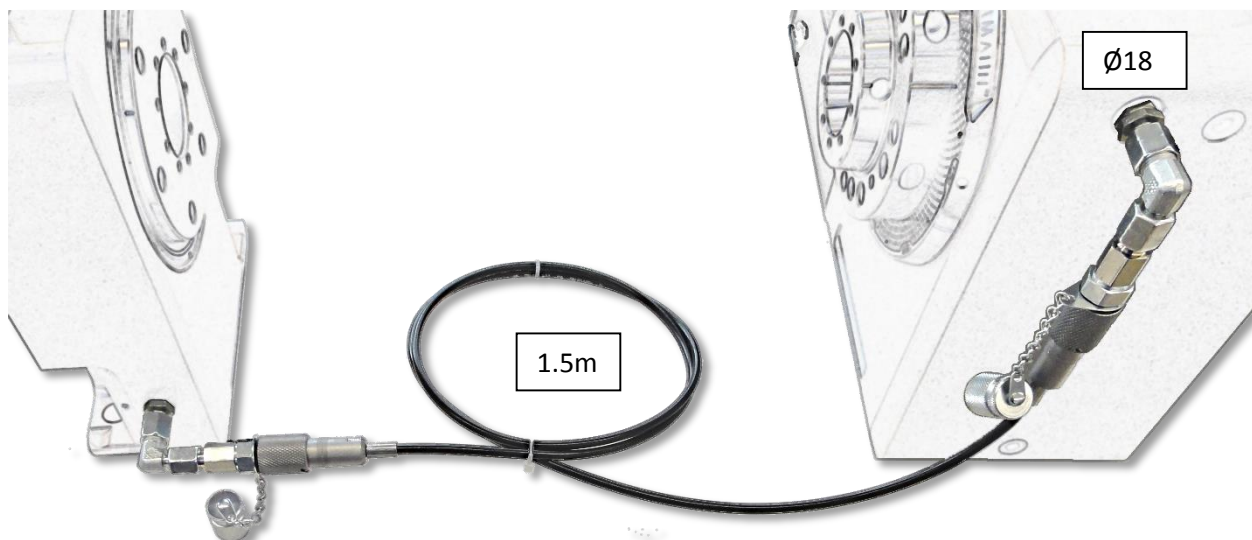
- Carefully bleed the hydraulic connection.
- Then bleed the counterbearing.



### 15.3.2 GLA.HYD-vario — Hose to counter bearing

With new systems, we deliver the assembly fully-mounted.

The hose seals on both sides and is filled by us with bubble free oil.



If necessary, drill hole Ø18 in end plate. Suitable pilot holes are provided inside.

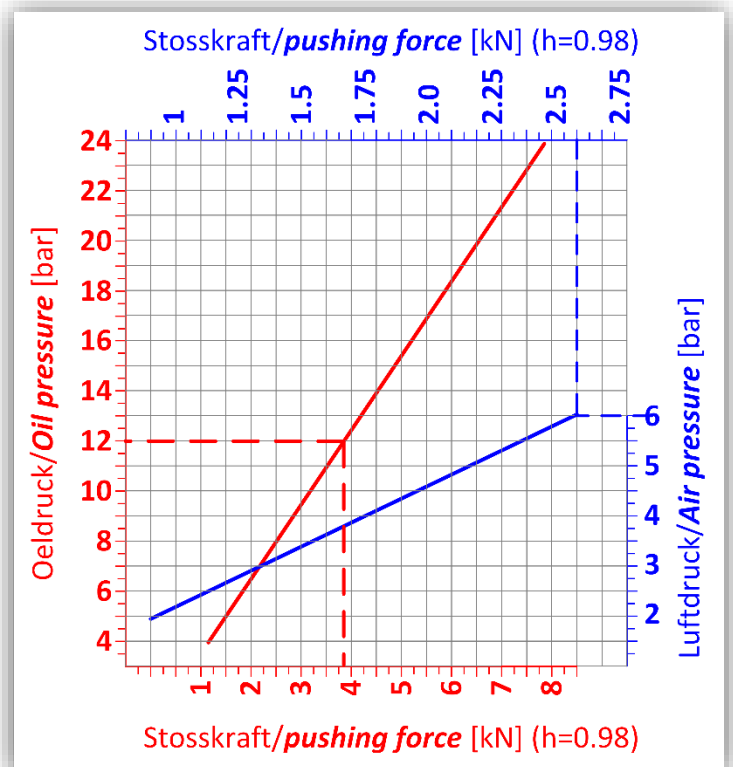
## 16 RST.5xx — Tailstocks






### 16.1 Clamping force table

This table lists the approximate impact force of the quill.

When using compressed air or oil.



## 16.2 Removing tailstock center

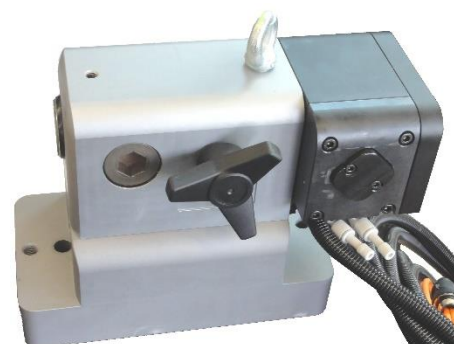
		
<p>1. Threaded plugs on both sides. Use size 17 Allen wrench to remove.</p>	<p>2. Move quill into position so that the taper drift cannot compress the thread.</p>	<p>3. Insert taper drift and strike lightly with hammer to drive in.</p>

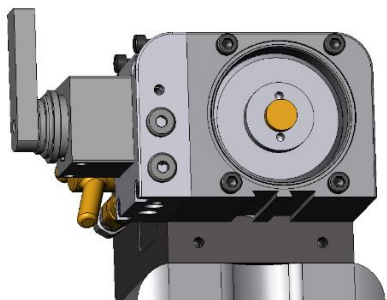
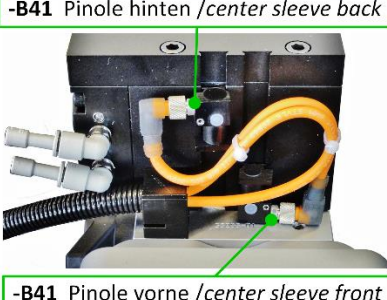
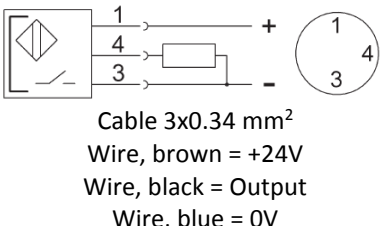

## 16.3 Stroke monitoring – RST.Hub (Option)

Two magnetic field sensors respond digitally to the neodymium magnets at the rear of the quill.

In an automated process, this can be used to ensure that the quill is retracted or extended.

The sensors can be adjusted in the slots, if necessary.

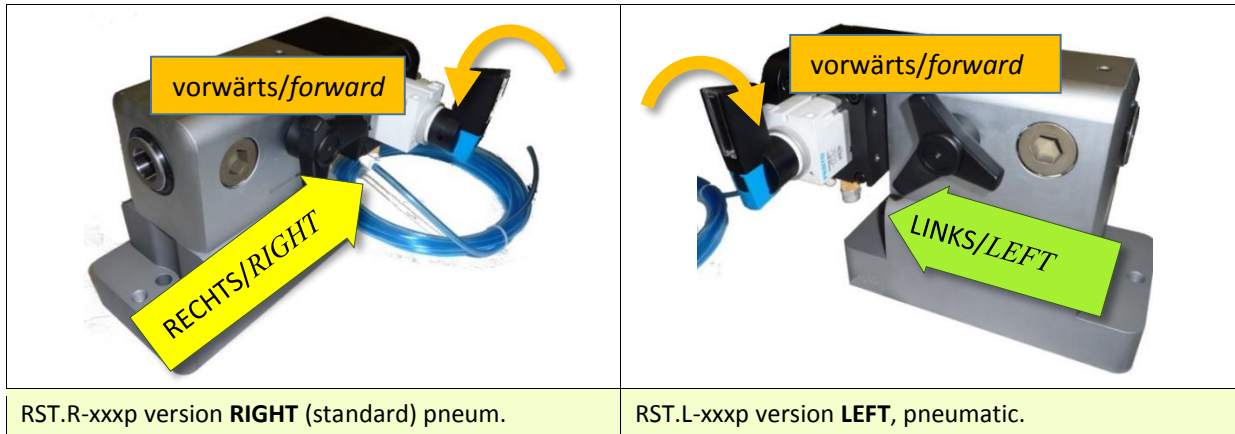


	
<p>1. The magnet is already present. Slide sensors into the slots and secure in place.</p>	<p>2. Connect cable, attach flexible tubing holder.</p>
 <p>Cable 3x0.34 mm<sup>2</sup> Wire, brown = +24V Wire, black = Output Wire, blue = 0V</p>	
<p>3. Sensor data:</p> <p>Voltage: 24VDC Circuit type: PNP normally open contact Protection type: IP678</p>	<p>4. Flexible tubing NW10, L = 4.5m Cable, L = 10m End of flexible tubing = M16x1.5</p>

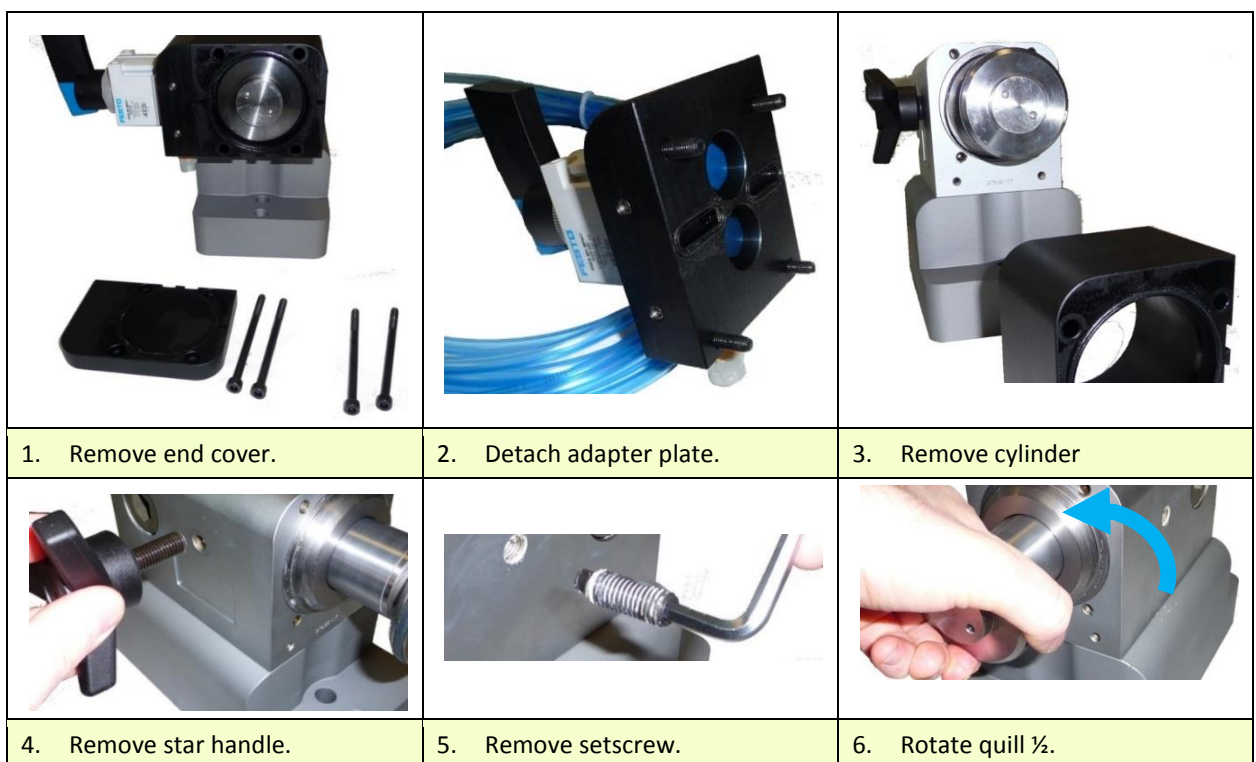
## 16.4 Conversion of «pneumatic operation» from RIGHT to LEFT




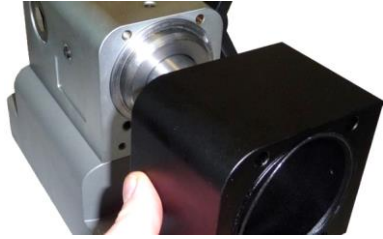
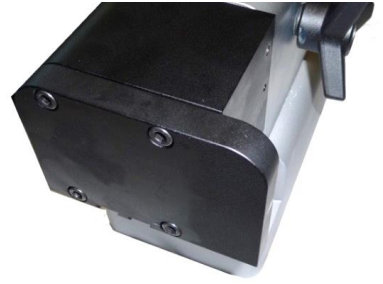

The following images illustrate the conversion of the «pneumatic» execution.

The «manual» execution is converted in the same way. This concerns only the star knob and the grub screw on the opposite side. Steps 4...10.



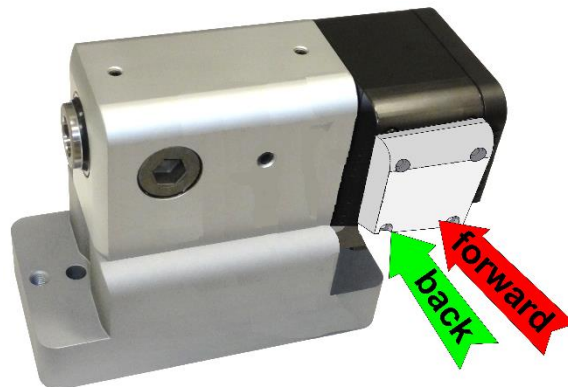
### 16.4.1 Conversion procedure



		
<p>7. Attach star handle on opposite side. Locate the slot.</p>	<p>8. Use setscrew (for screw locking) to locate the slot and screw all the way in.</p>	<p>9. The loosen approx. ¼ turn.</p>
		
<p>10. Reattach cylinder rotated 180°.</p>	<p>11. Reassemble with cover</p>	<p>12. Reinstall adapter plate, check operation.</p>

## 16.5 Connecting plate for external hydraulics

2x G $\frac{1}{8}$ "





## 17 HAG.CY-AGG-x — CYMAX hydraulic unit

See separate manual DOK-0216 at [www.lehmann-rotary-tables.com](http://www.lehmann-rotary-tables.com)

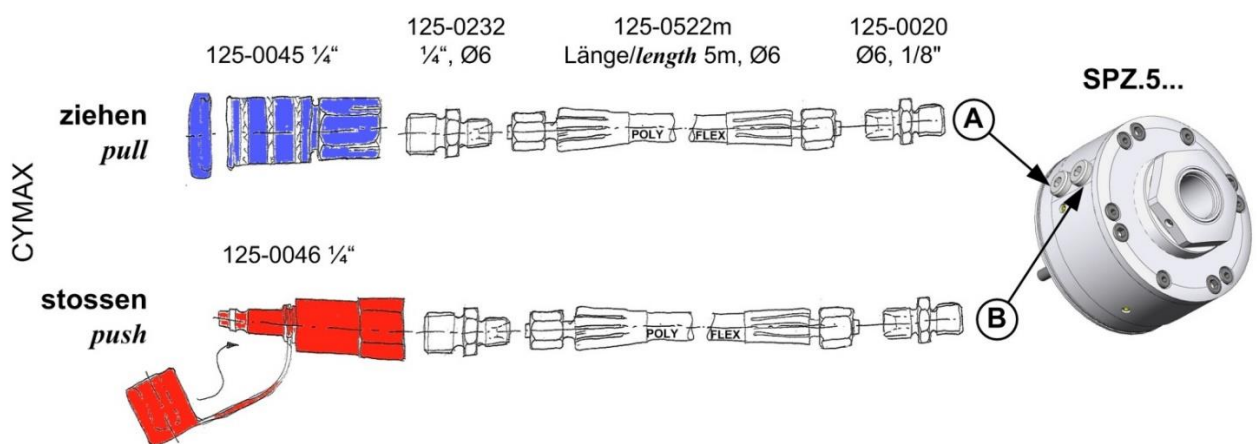
Hydraulikaggregat CYMAX

Betriebsanleitung Hydraulikaggregat CYMAX\_\_DOK-0216-DE-00\_ZUBE\_2013-01-28.pdf (3401KB)



### 17.1 HAG.LEIT-05-2 — Hydraulic hoses with couplers

The delivered set matches the equipment in our above-mentioned hydraulic unit CYMAX.

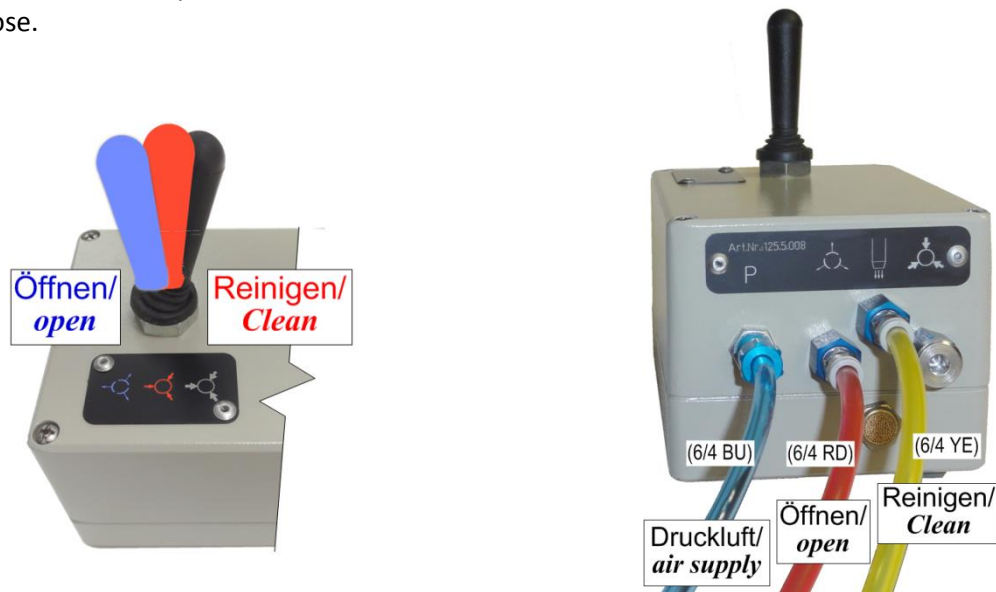


The couplers can be attached only in the absence of pressure.

## 18 ERO.xxx — Control valve for EROWA clamping devices

### 18.1 ERO.HSV — Manual control valve

Manual control valve with pressure switch PEN-M5. The unit is supplied loose.

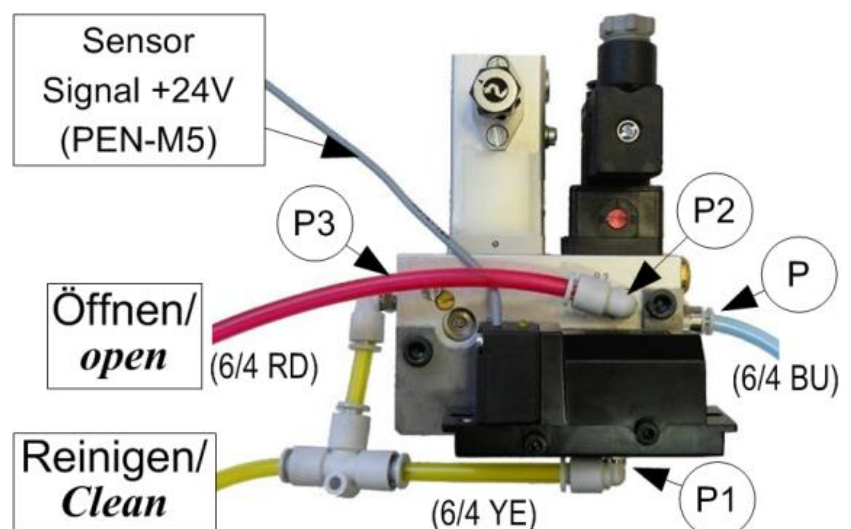


### 18.2 ERO.ASV — Automatic control valve

Control valve with pressure switch PEN-M5, included.

Please download ER-010590 instructions from EROWA.

Carefully adjust control unit.



### 18.2.1 Rotary union required for this purpose

#### Our sales items:

DDF.507-04 Rotary union 4-flute, oil or air

DDF.510-04 Rotary union 4-flute, oil or air

DDF.520-04 Rotary union 4-flute, oil or air

DDF.530-04 Rotary union 4-flute, oil or air

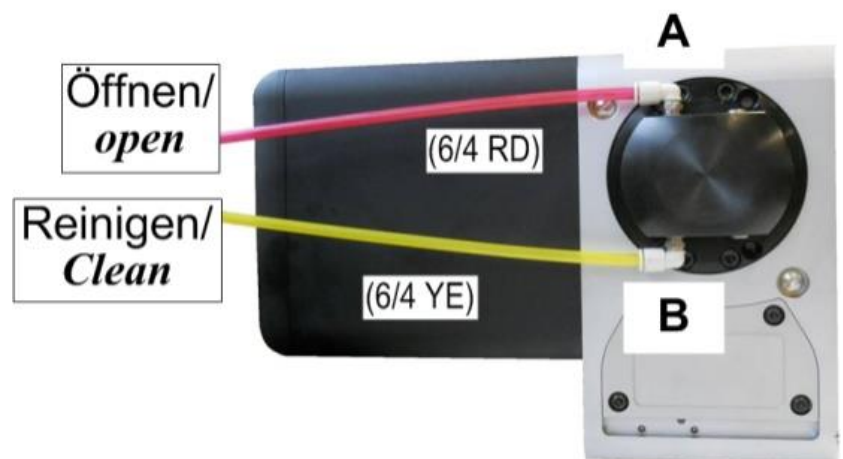
#### Rotary union connections

A = Open

B = Cleaning

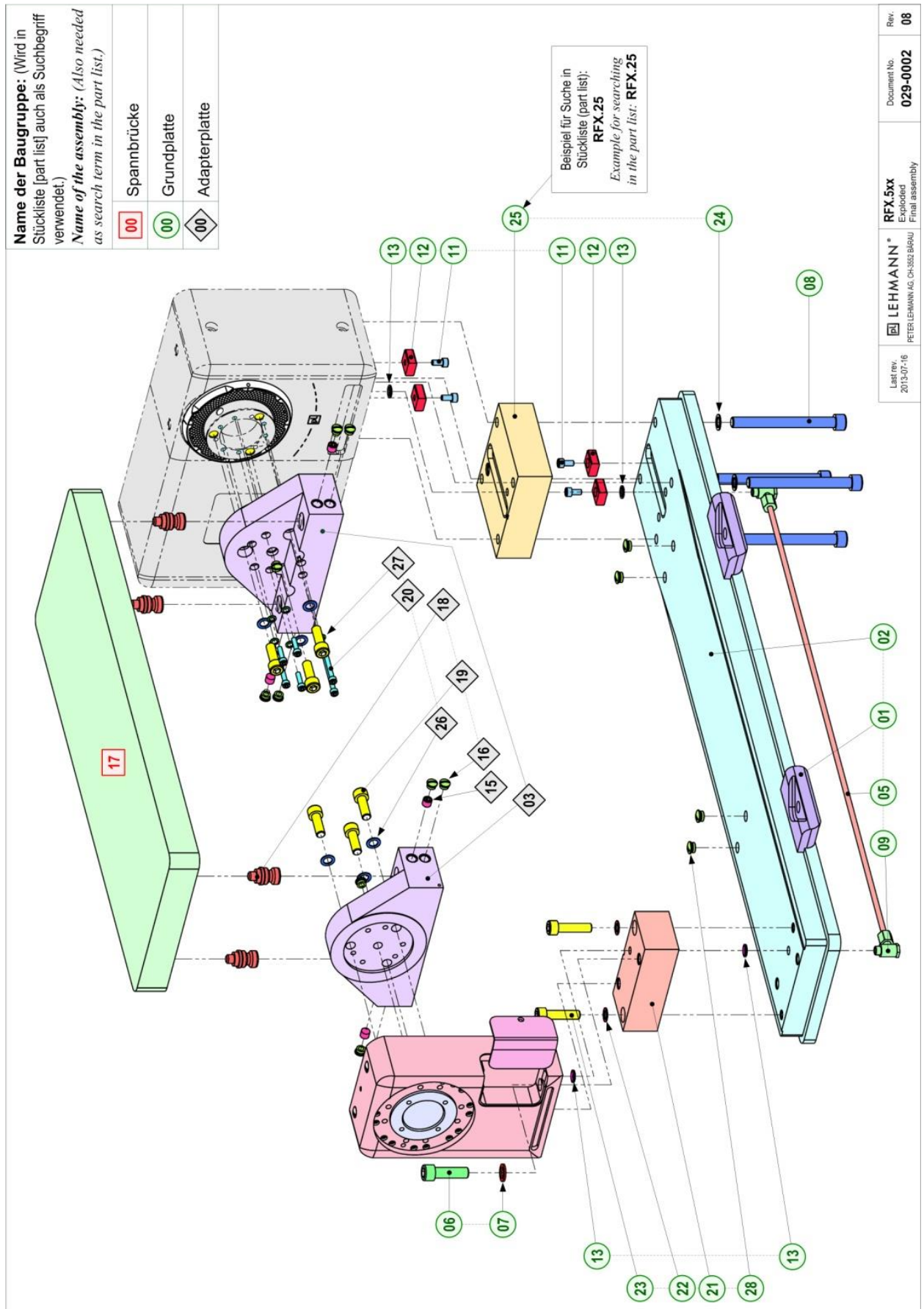
D= Please leave open

For more on rotary union see «DDF. ... and DDG. ... — Rotary unions».





## 19 RFX.5xx — «rotoFIX» clamping bridge system



## 20 LFX.5xx — «longFLEX» support system

longFLEX are systems with long, stable base plate.

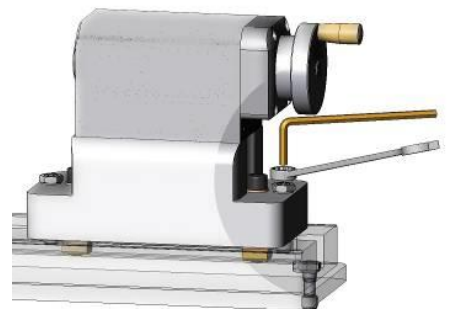
Rotary table and counter bearing/tailstock can be aligned well with each other.

For counter bearing clamping, see GLA.HYD-fix and GLA.HYD-vario



### 20.1 zentriX can be a great help when aligning the tailstock.

For more information, see chapter 3 «Aligning the system»





## NOTE

**Rigidity must be guaranteed.**

*With large distances between centers, the rigidity of the machine table is often underestimated!*

- Even thick base plates are elastic.
- The system must never protrude beyond the machine table.
- The clamping shoes must be arranged exactly as shown farther above.



## NOTE

**Do not distort system.**

*The mounting of heavy equipment requires high precision!*

- Check the coaxiality between the rotary table and counter bearing.
- Check the rigidity of the machining table.

## 21 TPL.5xx — Faceplates

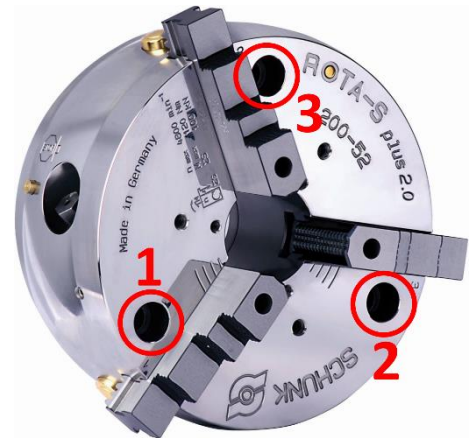
For the tightening torque of screws, see the table «Tightening torques for socket head screws» in chapter 9.2 at the beginning of this main section C.



## 22 BFU.5xx — 3-jaw chucks

For concentric alignment, loosen the 3 screws.

For the tightening torque of screws, see the table  
«Tightening torques for socket head screws» in chapter 9.2  
at the beginning of this main section C.



### ATTENTION

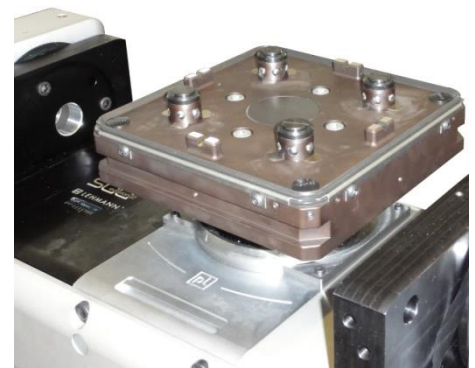
**Excessive tangential forces.**

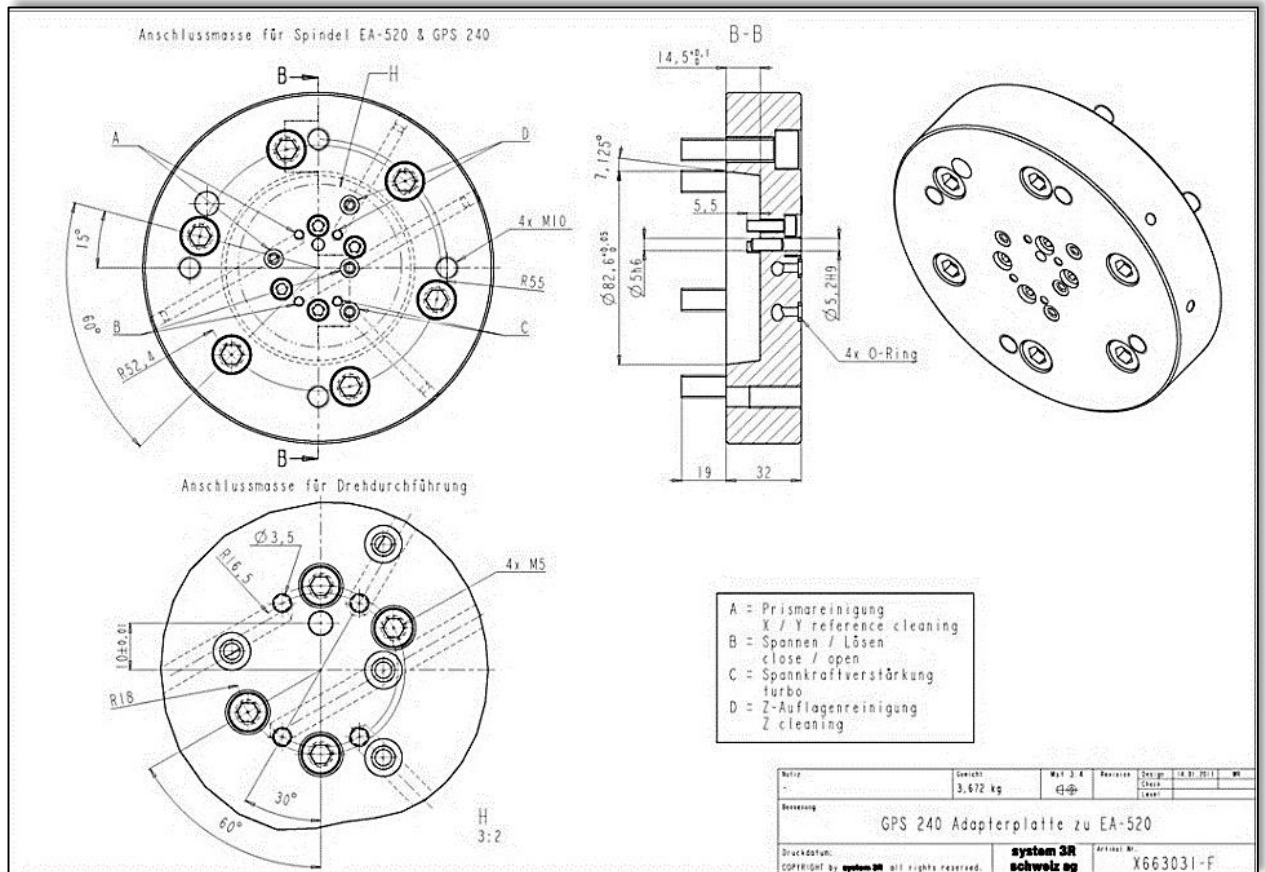
*The gear unit can be damaged!*

- Always activate the spindle clamping when it is at a standstill. LED lit green, «CLAMPED».
- Avoid knocks during mounting/dismounting.
- The spindle clamp can be released without compressed air and/or without actuation.

## 23 S3R.520-G240 - GPS 240 Pallet mount

System 3R GPS 240 Power 240x240 mm. Incl. flange, pneumatic.





The connections to the rotary union on the tilter resp. GLA correspond with the plan.

## 24 S3R.507/510-G70 3R GPS 70 Pallet fixture

Incl. flange, pneumatic.





## 25 Contact

### Manufacturer:

Peter Lehmann AG

Bäraustrasse 43

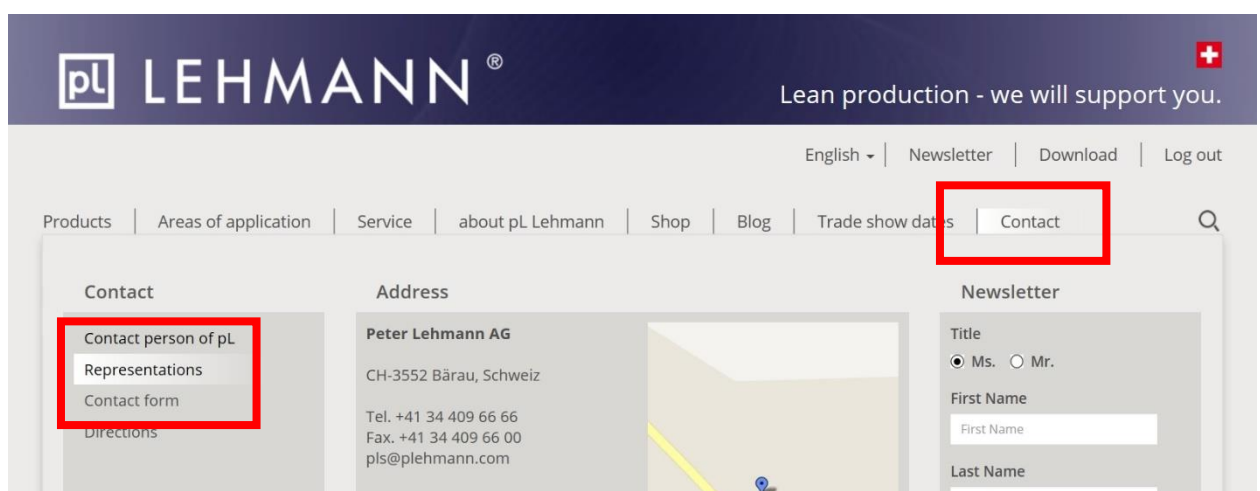
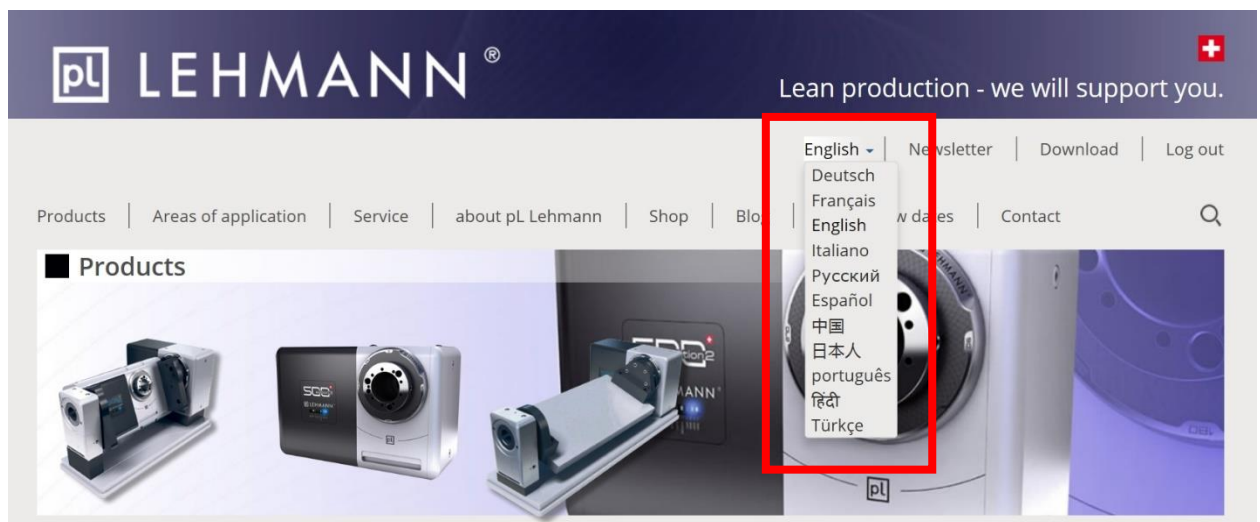
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