



# Power Chuck

## ROTA NCO

### Assembly and operating manual

## Imprint

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**Technical changes:**

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Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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**Please read the operating manual in full and keep it close to the product.**

# Table of Contents

<b>1 General .....</b>	<b>5</b>
1.1 About this manual.....	5
1.1.1 Illustration of warnings .....	5
1.1.2 Applicable documents .....	6
1.2 Warranty .....	6
1.3 Scope of delivery.....	6
<b>2 Basic safety notes.....</b>	<b>7</b>
2.1 Appropriate use .....	7
2.2 Inappropriate use .....	7
2.3 Structural changes.....	8
2.4 Spare parts .....	8
2.5 Ambient conditions and operating conditions .....	8
2.6 Material limitations .....	8
2.7 Chuck Jaws .....	9
2.8 Personnel qualifications .....	9
2.9 Personal protective equipment .....	10
2.10 Transport.....	10
2.11 Protection during handling and assembly .....	10
2.12 Protection during commissioning and operation .....	10
2.13 Notes on safe operation.....	10
2.14 Disposal .....	13
2.15 Fundamental dangers .....	13
2.16 Protection against dangerous movements .....	13
2.17 Notes on particular risks .....	14
<b>3 Technical data .....</b>	<b>17</b>
3.1 Chuck data .....	17
3.2 Clamping force / speed diagrams .....	17
3.3 Calculations for clamping force and speed .....	22
3.3.1 Calculation of the required clamping force in case of a given rpm.....	22
3.3.2 Calculation example: required initial clamping force for a given speed ..	24
3.3.3 Calculation of the permissible speed in case of a given initial clamping force .....	25
3.4 Grades of Accuracy .....	26
3.5 Permissible imbalance DIN ISO 21940-11 .....	26
<b>4 Mounting .....</b>	<b>27</b>
4.1 Torques per screw .....	27
4.2 Mounting in general .....	27

4.2.1	Pre-assembly measures .....	27
4.2.2	Chuck assembly options .....	28
4.3	Mounting of the Power Chuck .....	29
4.3.1	Horizontal attachment .....	30
4.3.2	Vertical attachment .....	30
<b>5</b>	<b>Function .....</b>	<b>31</b>
5.1	Function and handling .....	31
5.2	Change or supplement of jaws .....	31
5.3	Disassembly of chucks for complete cleaning or in case of damage .....	31
5.4	Assembly of various energy inserts .....	33
<b>6</b>	<b>Maintenance .....</b>	<b>35</b>
6.1	Lubrication .....	35
6.2	Maintenance and lubrication plan .....	35
6.3	Central oil lubrication .....	36
6.4	Changing the top jaws .....	36
<b>7</b>	<b>Storage .....</b>	<b>37</b>
<b>8</b>	<b>Disposal .....</b>	<b>38</b>
<b>9</b>	<b>Partlist .....</b>	<b>39</b>
<b>10</b>	<b>Assembly drawings .....</b>	<b>41</b>
<b>11</b>	<b>Manufacturer certificate .....</b>	<b>43</b>



# 1 General

## 1.1 About this manual

This manual contains important information for the safe, correct use of the product.

It is an integral part of the product and must be kept accessible for personnel at all times.

Personnel must have read and understood this manual before beginning any work. The observance of all safety notes in this manual is a prerequisite to ensure safe work processes.

The illustrations are intended to provide a basic understanding and may deviate from the actual version.

Besides this manual, other documents which apply are those listed under ► 1.1.2 [ 6 ]

### 1.1.1 Illustration of warnings

To make risks clear, the following signal words and symbols are used for safety notes.



#### **⚠ DANGER**

Denotes a hazard with a high degree of risk that, if not avoided, will result in death or serious injury.



#### **⚠ WARNING**

Denotes a hazard with a medium degree of risk that, if not avoided, could result in death or serious injury.



#### **⚠ CAUTION**

Denotes a hazard with a low degree of risk that, if not avoided, could result in a minor or moderate injury.

#### **NOTICE**

Information about avoiding material damage.

### 1.1.2 Applicable documents

- General Terms and Conditions \*
- Calculation of the jaw centrifugal forces and jaw guidance load, in the "Technology" chapter of the lathe chuck catalog \* and the "Calculating the clamping force and RPM" chapter
- Brief operating instructions if available
- Approval drawings

The documents labeled with an asterisk (\*) can be downloaded from **schunk.com**.

## 1.2 Warranty

The warranty for standard products is 24 months from the date of delivery from the factory, or 50,000 cycles\* for manually operated clamping devices and 500,000 cycles\* for power operated clamping devices. For special clamping devices, it is 12 months from the date of delivery from the factory, assuming appropriate use in accordance with the following conditions:

- Observe the applicable documents, ▶ 1.1.2 [ 6]
- Observance of the ambient conditions and operating conditions, ▶ 2.5 [ 8]
- Observance of the specified maintenance and lubrication intervals ▶ 6.2 [ 35]

Parts touching the workpiece and wearing parts are not part of the warranty.

\* One cycle comprises one complete clamping procedure ("opening" and "closing")

## 1.3 Scope of delivery

- 1 **Power Chuck incl. fastening screws**  
**base jaws with fine serration incl. T-nuts with screws**  
**base jaws with tenon and slot incl. jaw fixing screws**
- 1 **Eye bolt (DIN 580) from size 260 and up**

## 2 Basic safety notes

Improper handling, assembly and maintenance of this product may result in risk to persons and equipment if this operating manual is not observed.

### 2.1 Appropriate use

- The product is used for clamping metal and plastic workpieces on machine tools.
- The product may only be used within the scope of its technical data.
- The product is intended for industrial and commercial use.
- Appropriate use of the product includes compliance with all instructions in this manual.
- The maximum speed and the necessary clamping force must be determined by the operator for each clamping task in accordance with the valid standards or technical specifications of the manufacturer.  
(See also "Calculation for clamping force and speed of rotation" in the chapter "Technical data").
- Use suitable top jaws with a suitable interface.
- The interference circuit diameter of the workpiece must be smaller or at most equal to the outer diameter of the clamping device.
- The workpiece must not experience plastic deformation under clamping force (clamping pressures are permissible).

### 2.2 Inappropriate use

The product is not being used appropriately if:

- the product is used as a press, a punch, a toolholder, a load-handling device or as lifting equipment.
- the specified technical data for use of the product are exceeded.
- workpieces are not properly clamped, paying particular attention to the specified clamping forces.
- the top jaws are not mounted properly.
- the product is not being operated properly.
- the product is operated in the stroke end positions.
- the guideways are overloaded due to the chuck jaws being too high or the clamping point being selected too high.
- the product has been insufficiently maintained.
- the product is brought into contact with aggressive media, especially acids.
- the product is used in abrasive blasting processes, especially sandblasting.
- the product is operated in a potentially explosive area (EX area (ATEX directive)).

## 2.3 Structural changes

### Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

## 2.4 Spare parts

### Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Only use original spare parts and spares authorized by SCHUNK.

## 2.5 Ambient conditions and operating conditions

### Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction in the service life of the product.

- Make sure that the product is only used within its defined application parameters.
- Ensure that the product is of a sufficient size for the application.
- Ensure that maintenance and lubricating intervals are observed.
- Only use cooling emulsions with anti-corrosive additives when machining.

Depending on the operating conditions, the function and clamping force must be checked after a certain period of operation.

With the smallest possible actuation pressure on the clamping cylinder, the base jaws should move evenly. This method is not a substitute for measuring the clamping force.

If the clamping force has dropped too much or if the base jaws and/or the release mechanism no longer move properly, the clamping device must be disassembled, cleaned, and relubricated.

## 2.6 Material limitations

The product is made of steel alloys, elastomers, aluminum alloys and brass. In addition, Linomax plus grease, Branotect anti-rust oil and Renolit HLT2 are incorporated into the product as auxiliary and operating materials. The safety data sheet for LINOMAX plus can be found at [www.schunk.com](http://www.schunk.com).

## 2.7 Chuck Jaws

### Requirements of the chuck jaws

Rotational or if applicable, accumulated energy, can make the product unsafe and risk the danger of serious injuries and considerable material damage.

- Change chuck jaws at a standstill and without a clamped workpiece.
- Do not use welded jaws.
- Design the chuck jaws to be as light and as low as possible. The clamping point must be as close as possible to the chuck face (clamping points at a greater distance lead to greater surface pressure in the jaw guidance and can significantly reduce the clamping force).
- If the clamping point is at a greater distance from the housing, the operating pressure must be reduced.
- After a collision, the clamping device and the chuck jaws must be subjected to a crack detection test before being used again. Replace damaged parts with original SCHUNK spare parts.
- The chuck jaw mounting screws and if present, the T-nuts, must be replaced if there are signs of wear or damage. Only use screws of quality grade 12.9 in compliance with the specified tightening torques. For clamping devices with fine serration, the jaw mounting screws must be screwed into the holes closest to the clamping point.

## 2.8 Personnel qualifications

### Inadequate qualification of personnel

Any work on the product by inadequately qualified personnel can lead to serious injuries and considerable material damage.

- All work must be performed by appropriately qualified personnel.
- Personnel must have read and understood the complete manual before beginning any work on the product.
- Observe country-specific accident prevention regulations and the general safety notes.

The following personnel qualifications are required for the various activities on the product:

#### Qualified electrician

Qualified electricians have the professional training, knowledge, and experience to work on electrical systems, to recognize and avoid potential dangers, and know the relevant standards and regulations.

#### Specialist personnel

Specialist personnel have the specialized training, knowledge, and experience to perform the tasks entrusted to them, to recognize and avoid potential dangers, and know the relevant standards and regulations.

<b>Instructed person</b>	Instructed persons have been instructed by the operator regarding the tasks entrusted to them and the potential dangers of inappropriate behavior.
<b>Manufacturer's service personnel</b>	The manufacturer's service personnel have the specialized training, knowledge, and experience to perform the work entrusted to them and to recognize and avoid potential dangers.

## 2.9 Personal protective equipment

### Use of personal protective equipment

Personal protective equipment serves to protect staff in the event of a danger that may interfere with their health or safety at work.

## 2.10 Transport

### Handling during transport

Incorrect handling during transport can make the product unsafe and risks the danger of serious injuries and considerable material damage.

- During transport and handling, secure the product to prevent it from falling.
- Use the transport thread on the clamping device.

## 2.11 Protection during handling and assembly

### Incorrect handling and assembly

Incorrect handling and assembly can make the product unsafe and can risk the danger of serious injuries and considerable material damage.

- All work must only be performed by appropriately qualified personnel.
- Secure the system against accidental operation during all work.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

## 2.12 Protection during commissioning and operation

### Falling or violently ejected components

Falling and ejected components can lead to serious injury or death.

- Take suitable protective measures to secure the danger zone.

## 2.13 Notes on safe operation

### Incorrect manner of working by personnel

An incorrect manner of working can make the product unsafe and risks serious injuries and considerable material damage.

- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. Products for special ambient conditions are excluded.
- Rectify malfunctions as soon as they occur.
- Observe the care and maintenance instructions.

- Observe the current safety, accident prevention, and environmental protection regulations for the application field of the product.
- The chuck may only be accelerated to speed or otherwise when a workpiece is correctly clamped. This means that the clamping force has been applied to the workpiece and the clamping has taken place within the permissible operating range.
- Unclamping may only occur once the machine spindle has come to a standstill.

### Functionality check

After installation of the clamping device, its function must be checked prior to commissioning.

#### Two important points are:

- **Clamping force:** At max. actuation force/pressure/torque, the clamping force specified for the clamping device must be reached.
- **Stroke control:** The stroke of the clamping piston must have a margin of safety at the front and back end positions. The machine spindle must not start up until the clamping piston has passed through this safety margin.

With manual clamping devices, stroke control is carried out via the indicator pin. Clamping is only correct if the indicator pin is countersunk and clamping force is applied to the workpiece.

When determining the clamping force required to machine a workpiece, the centrifugal force acting on the chuck jaws must be taken into account (according to VDI 3106).

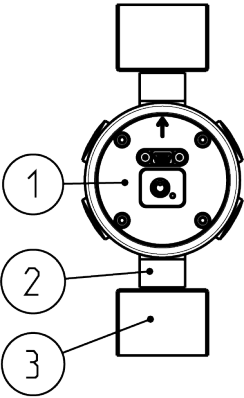
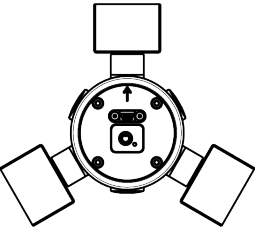
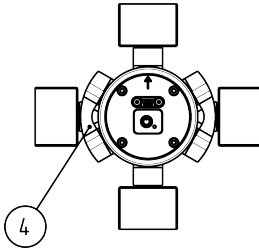
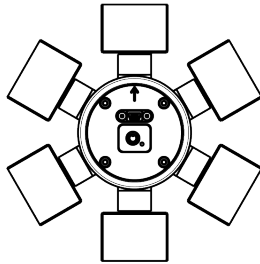
### Maintenance instructions

The clamping device's reliability and safety can only be guaranteed if the operator complies with the manufacturer's maintenance instructions.

- For lubrication, we recommend our tried and tested special grease, LINOMAX plus. Unsuitable lubricants can have a negative impact on the functioning of the clamping device (clamping force, coefficient of friction, wear behavior). (For product information about LINOMAX plus, see the "Accessories" chapter of the SCHUNK lathe chuck catalog or contact SCHUNK.)
- Use a suitable high-pressure grease gun to ensure that you reach all the greasing areas.
- To ensure correct distribution of the grease, move the clamping device to its end positions several times, lubricate again, and then check the clamping force.
- Move the clamping device through to its end position several times after 500 clamping strokes, at the latest. This moves the lubricant back to the surfaces of the force transmission.
- Check the clamping device regularly for clamping force and jaw stroke.

### Clamping force measurement

- Depending on the operating conditions, the function and clamping force must be checked after a certain period of operation. For this purpose, a calibrated clamping force meter (e.g. SCHUNK IFT) must be used. The loading conditions are shown below for the different chuck variants.

	2-jaw	3-jaw	4-jaw (compensating)	6-jaw (compensating)
				
<b>Measuring device</b>	SCHUNK IFT clamping force tester	SCHUNK IFT clamping force tester	SCHUNK IFT clamping force tester	SCHUNK IFT clamping force tester
<b>Accessories</b>	–	–	IFT MA4	–
<b>Measuring points</b>	0°/180°	0°/120°/240°	0° / 180° / 90° / 270° (IFT MA4)	0°/60°/120°/180°/240°/300°
<b>Please note</b>	Operating manual SCHUNK IFT Clamping force tester	Operating manual SCHUNK IFT Clamping force tester	Operating manual SCHUNK IFT Clamping force tester	Operating manual SCHUNK IFT Clamping force tester
			<b>Attention</b> Compensation must be activated, otherwise it may lead to inconsistent results.	<b>Attention</b> Compensation must be activated, otherwise it may lead to inconsistent results.

① Measuring head

② Clamping insert

③ Chuck jaw

④ Bridge element (IFT MA4)

- If the clamping force has dropped too much or if the base jaws and piston no longer move properly, the chuck will have to be disassembled, cleaned and relubricated.
- The clamping force should always be measured with the clamping device in the same condition as it is used in for the current clamping application. If top jaws with clamping steps are used, measuring must be performed in the same step as for the respective clamping task. In the event of high operating speeds, clamping force losses must be accounted for



due to the centrifugal force acting on the chuck jaws. In this case the value of the operating clamping force should be measured dynamically.

- We recommend checking the clamping force using a clamping force tester before starting a new production run and between maintenance intervals. "Optimum safety can only be guaranteed through regular checks".

## 2.14 Disposal

### Handling of disposal

Incorrect handling of disposal can make the product unsafe and lead to risks of environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

## 2.15 Fundamental dangers

### General

- Disconnect power sources before installation, modification or calibration. Ensure that no residual energy remains in the system.
- Do not reach into the open mechanism or movement area of the product during operation.

## 2.16 Protection against dangerous movements

### Unexpected movements

If the system still retains residual energy, serious injuries can be caused while working on the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- Never rely merely on the response of the monitoring function to avert danger. Assume that the drive movement is faulty as long as the installed monitors are not effective, since the effect depends on the control and the current operating state of the drive.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted.

## 2.17 Notes on particular risks



### **DANGER**

**Risk of fatal injury to operating personnel due to the workpiece falling down or being flung out in the event of a power failure**

This poses a risk of death or injury to the operating personnel and can result in serious damage to the machine.



### **DANGER**

**Possible risk of death for the operating personnel in case of insufficient clamping force due to ejection or falling of the workpiece!**

Due to settling behavior, the clamping force may decrease over time.

- Re-clamping of the workpiece with manual or pneumatic clamping devices after 4 hours.
- The energy supply must be constantly applied to power-operated clamping devices during operation.
- Use clamping cylinders with energy conservation.



### **DANGER**

**Possible risk of death for operating personnel if the clamping device's top speed of rotation is exceeded and a workpiece is released or parts fly off.**

If the machine tool or the technical equipment can reach a higher speed than the maximum speed of the clamping device, the speed must be limited for safety purposes!



### **DANGER**

**Possible risk of death for operating personnel if a jaw breaks or if the clamping device fails because the technical data has been exceeded and a workpiece is released or parts fly off!**

- Never exceed the technical data specified by the manufacturer for using the clamping device.



### **⚠ DANGER**

**Possible risk of death for operating personnel from clothing or hair getting caught on the clamping device and being dragged into the machine!**

Loose clothing or long hair may become caught on projecting parts of the clamping device and be drawn into the machine.

- Always wear tight-fitting clothing and a hairnet when working on the machine and the lathe chuck.



### **⚠ WARNING**

**Possible risk of death for the operating personnel due to impact of the rotating clamping device!**

- Keep a safe distance to the rotating clamping device!
- Do not reach into the rotating clamping device!



### **⚠ CAUTION**

**Risk of limbs being crushed when opening and closing the chuck jaws during manual loading or unloading or when exchanging moving parts.**

- Do not reach between the chuck jaws.



### **⚠ CAUTION**

**Hazard from vibration due to imbalanced rotating parts and noise generation.**

Physical and mental strains due to imbalanced workpieces and noise during the machining process on the clamped and rotating workpiece.

- Ensure the clamping device's axial and concentric runout.
- Check options for remedying imbalances on special top jaws and workpieces.
- Reduce the speed.
- Wear hearing protection.



### **⚠ CAUTION**

**There is a risk of limbs being crushed by moving parts during manual loading and unloading and the clamping procedure.**

- Do not reach between the chuck jaws.
- Use loading devices.



### **⚠ CAUTION**

**Allergic reactions or irritation due to skin or eye contact with lubricants on the product.**

- In case of foreseeable contact with lubricants on the product (e.g. when lubricating or cleaning)
- Wear protective equipment (protective gloves, protective goggles)

### **NOTICE**

**Risk of damage due to incorrect choice of clamping position for chuck jaws on workpiece.**

If an incorrect clamping position is chosen for the chuck jaws on the workpiece, the base and top jaws may become damaged.

- Observe maximum positions of base and top jaws.
- The diameter of the workpiece must not be greater than the clamping device diameter.
- For clamping devices with fine serration, do not allow the T-nuts for connecting the top jaws to protrude beyond the base jaws in radial direction.
- The outer diameter of the screwed-on top jaws must not exceed the outer diameter of the clamping device by more than 10%.

### 3 Technical data

#### 3.1 Chuck data

ROTA NCO	165	200	250	315	400	500	630
Max. actuating force [kN]	30	42	62	90	120	140	140
Max. clamping force [kN]	72	95	150	190	270	330	330
Max. speed of rotation [rpm]	6000	5000	4500	3600	2500	2000	1600
Stroke per jaw [mm]	6.4	9.0	10.0	13.0	15.0	15.0	15.0
Piston stroke [mm]	24	27	30	40	45	45	45
Centrifugal torque of base jaw $M_{cGB}$ [kgm] fine serration	0.025	0.043	0.099	0.161	0.431	0.674	1.085
Centrifugal torque of base jaw $M_{cGB}$ [kgm] Tongue and groove	0.030	0.056	0.137	0.241	0.571	-	-
Max. jaw eccentricity of center of gravity in axial direction $a_{max}$ [mm]	30	30	40	32	40	40	40

The specified maximum speed is only valid with maximum clamping force and when using the hard standard stepped jaws type SHB belonging to the chuck.

When using unhardened top jaws or jaws in special design, make sure that their weight is as low as possible.

For soft top jaws or jaws in special design the permissible speed of the respective cutting task has to be calculated in accordance to VDI 3106, whereby the maximum standard value may not be exceeded. The calculated values have to be examined with a dynamic measurement. Control of function (piston movement and actuation pressure) has to be accomplished in accordance with the guidelines of the professional association.

#### 3.2 Clamping force / speed diagrams

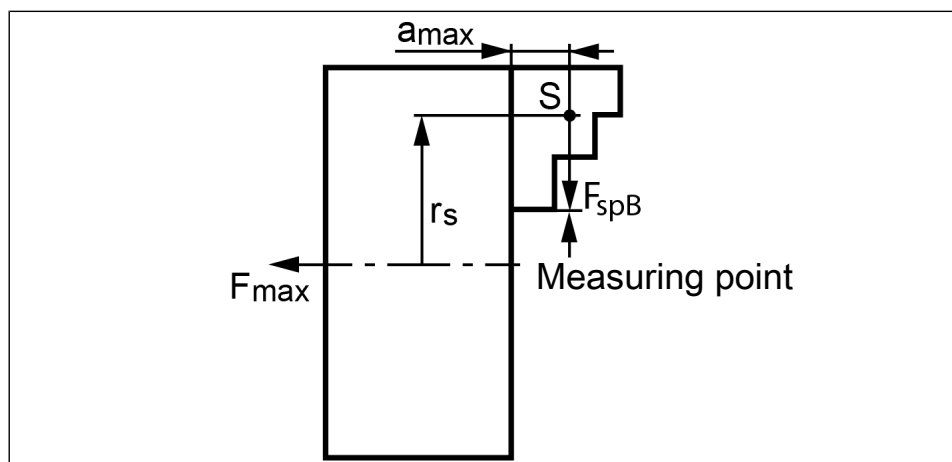
The diagrams refer to a 3-jaw-chuck.

Clamping force/RPM curves have been determined by using hard jaws. In the determination process, the maximum actuating force was applied and the jaws were set flush with the outer diameter of the chuck.

It is also assumed the chuck is in perfect condition and lubricated with SCHUNK LINOMAX plus special grease .

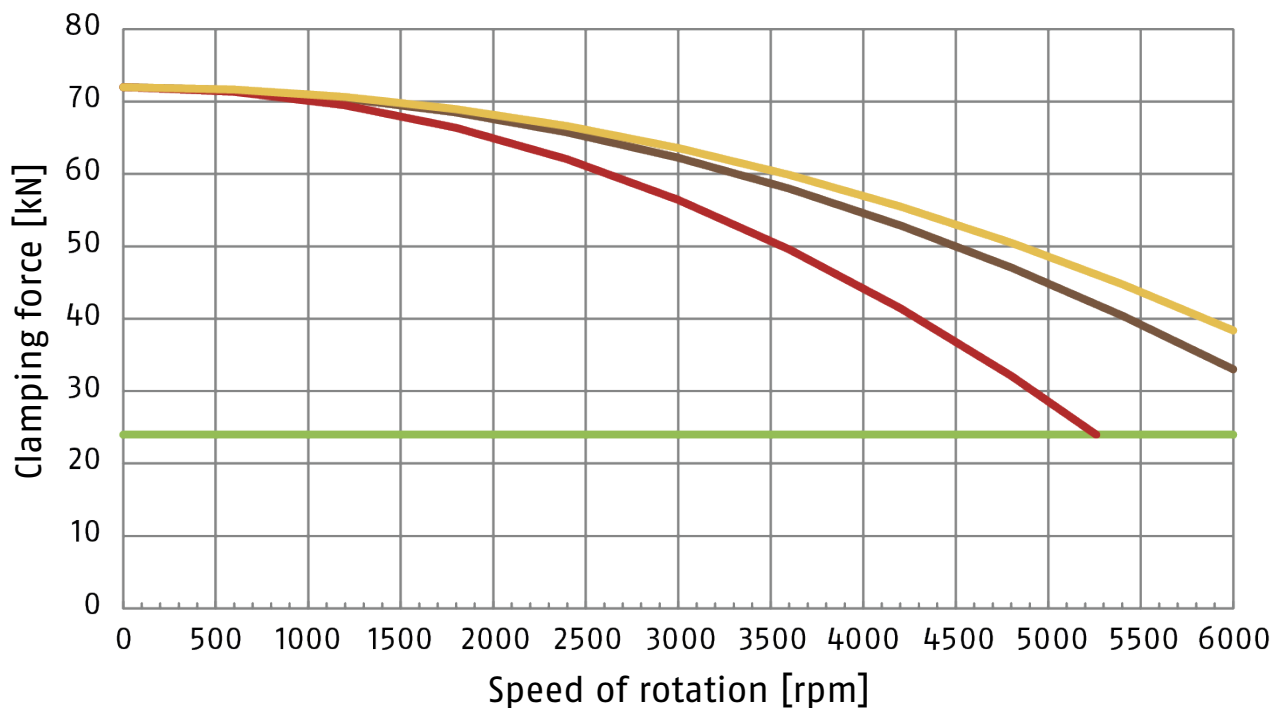
If one or more of these prerequisites is altered, the diagrams will no longer be valid.

### Chuck setup for clamping force/RPM diagram



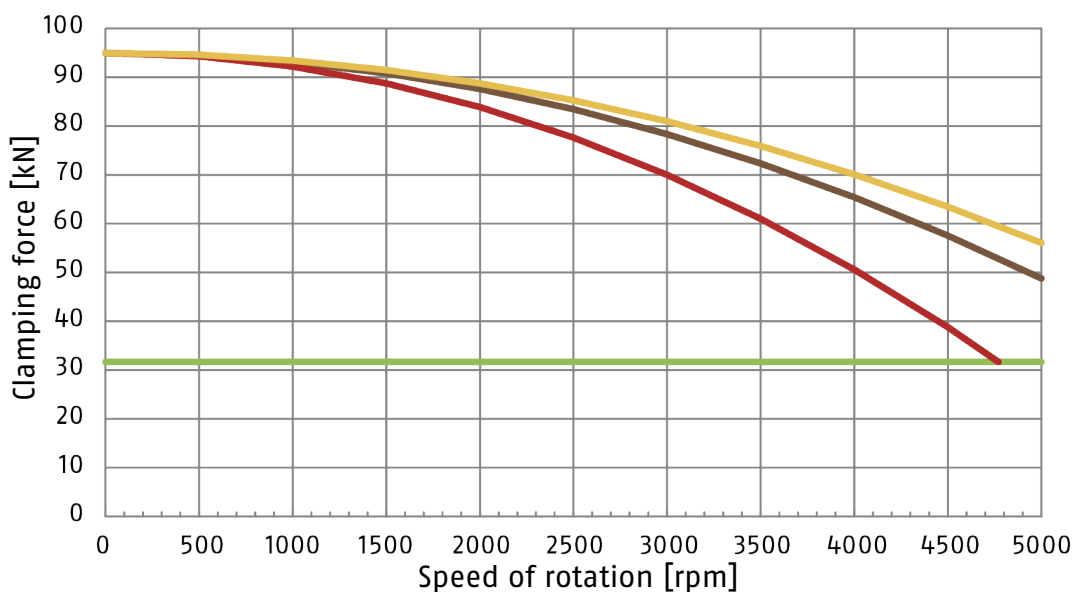
$F_{spB}$	Clamping force per jaw	$S$	Center of gravity
$r_s$	Center of gravity radius	$a_{max}$	Max. jaw center of gravity eccentricity in axial direction
$F_{max}$	Max. actuating force		








### Clamping force / speed diagram ROTA NCO 165



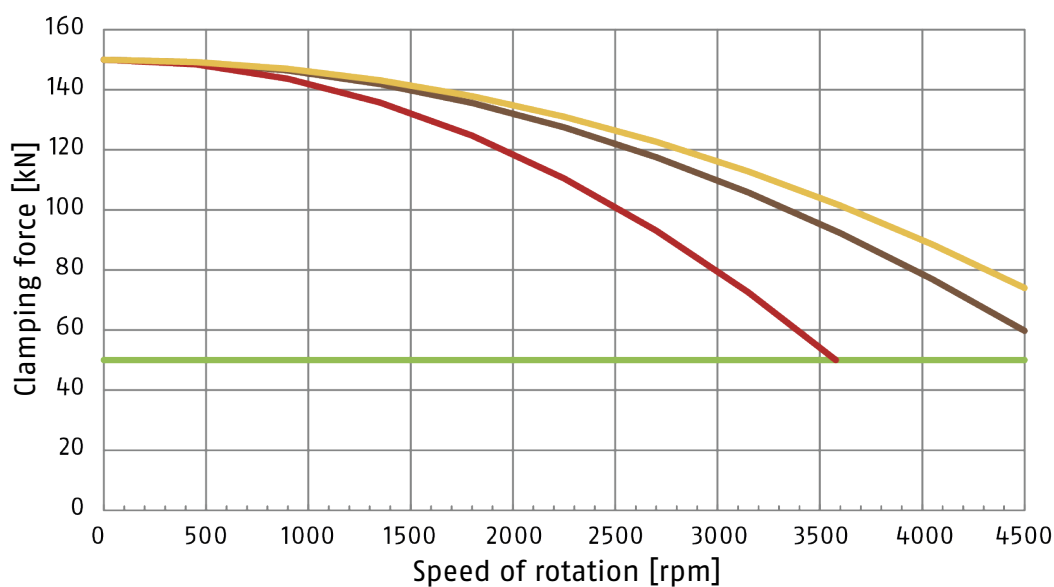
Colour	Jaw ID	Weight [kg]
<span style="color: yellow;">—</span>	SWB-AL 160	1.2
<span style="color: brown;">—</span>	SHB 200	1.3
<span style="color: red;">—</span>	SWB 160	2.5
<span style="color: green;">—</span>	Minimum required clamping force 33%	








**Clamping force / speed diagram ROTA NCO 210**



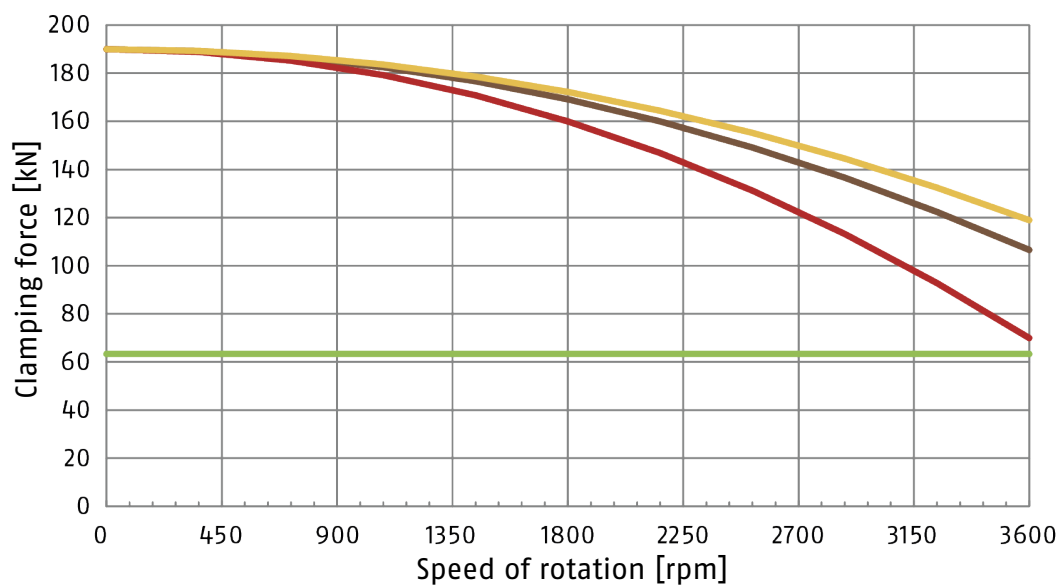
Colour	Jaw ID	Weight [kg]
	 SWB-AL 200	1.5
	 SHB 210	2.0
	 SWB 200	4.1
	Minimum required clamping force 33%	








**Clamping force / speed diagram ROTA NCO 260**



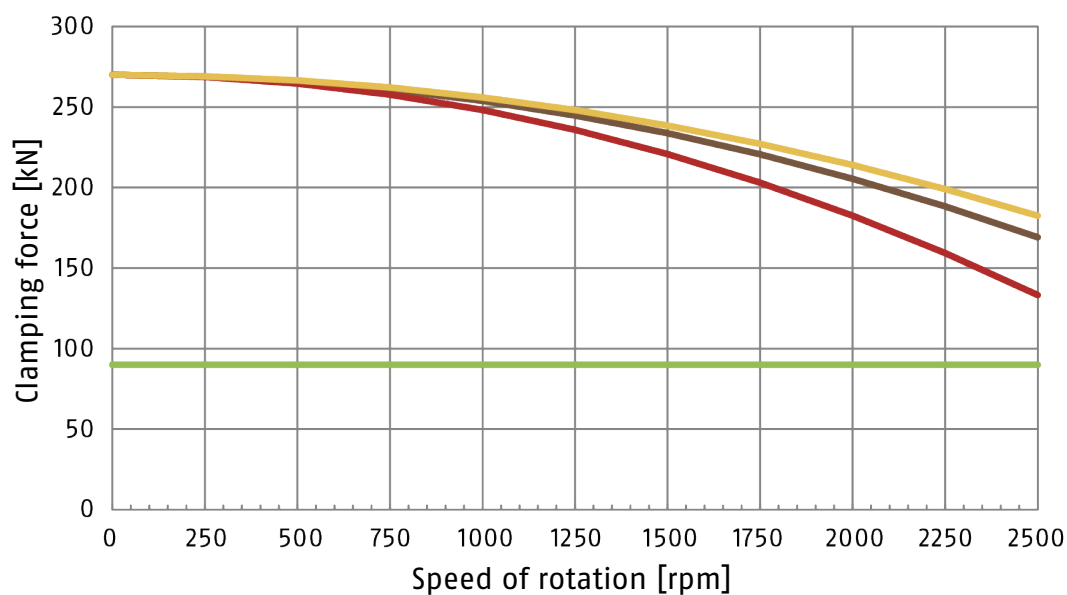
Colour	Jaw ID	Weight [kg]
	 SWB-AL 250	3.0
	 SHB 250	3.5
	 SWB 250	9.4
	Minimum required clamping force 33%	








**Clamping force / speed diagram ROTA NCO 315**



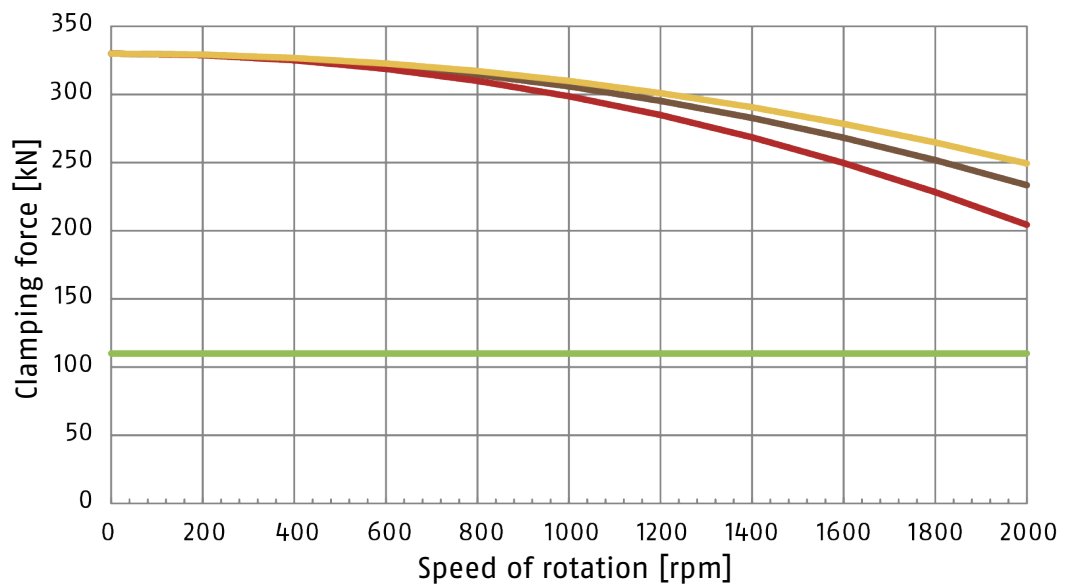
Colour	Jaw ID	Weight [kg]
	 SWB-AL 250	3.0
	 SHB 315	4.6
	 SWB 250	9.4
	Minimum required clamping force 33%	








**Clamping force / speed diagram ROTA NCO 400**

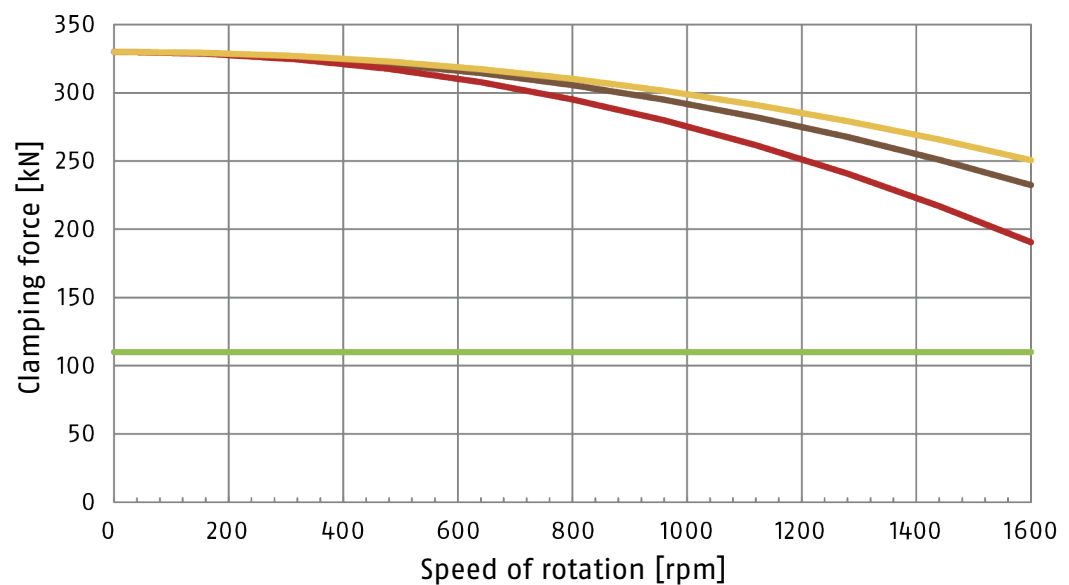









Colour	Jaw ID	Weight [kg]
	 SHB 400	8.0
	 SWB-AL 400	6.4
	 SWB 400	18.3
	Minimum required clamping force 33%	



**Clamping force / speed diagram ROTA NCO 500**


Colour	Jaw ID	Weight [kg]
	 SHB 400	8.0
	 SWB-AL 400	6.4
	 SWB 400	18.3
	Minimum required clamping force 33%	

**Clamping force / speed diagram ROTA NCO 630**


Colour	Jaw ID	Weight [kg]
	 SHB 400	8.0
	 SWB-AL 400	6.4
	 SWB 400	18.3
	Minimum required clamping force 33%	

### 3.3 Calculations for clamping force and speed

Missing information or specifications can be requested from the manufacturer.

#### Legend

$F_c$	Total centrifugal force [N]	$M_{cAB}$	Centrifugal torque of top jaws [Kgm]
$F_{sp}$	Effective clamping force [N]	$M_{cGB}$	Centrifugal torque of base jaws [Kgm]
$F_{spmin}$	minimum required clamping force [N]	$n$	Speed of rotation [RPM]
$F_{sp0}$	Initial clamping force [N]	$r_s$	Center of gravity radius [mm]
$F_{spz}$	Cutting force [N]	$r_{sAB}$	Center of gravity radius of top jaw [mm]
$m_{AB}$	Mass of one top jaw [kg]	$s_{sp}$	Safety factor for clamping force
$m_B$	Mass of chuck jaw set [kg]	$s_z$	Safety factor for machining
$M_c$	Centrifugal torque [kgm]	$\Sigma_s$	Max. clamping force of lathe chuck [N]

#### 3.3.1 Calculation of the required clamping force in case of a given rpm

The **initial clamping force**  $F_{sp0}$  is the total force impacting radially on the workpiece via the jaws due to actuation of the lathe chuck during shutdown. Under the influence of rotation, the jaw mass generates an additional centrifugal force. The centrifugal force reduces or increases the initial clamping force depending on whether gripping is from the outside inwards or from the inside outwards.

The sum of the initial clamping force  $F_{sp0}$  and the **total centrifugal force**  $F_c$  is the **effective clamping force**  $F_{sp}$ .

$$F_{sp} = F_{sp0} \mp F_c \text{ [N]}$$

(-) for gripping from the outside inwards

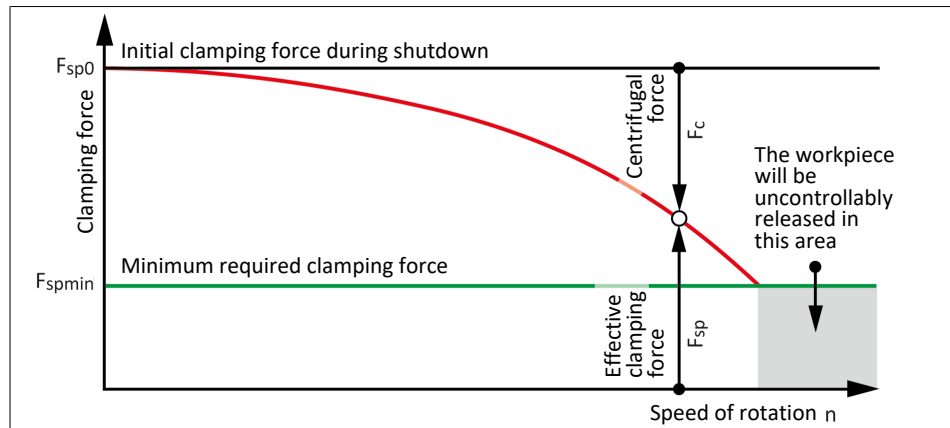
(+) for gripping from the inside outwards



#### **⚠ DANGER**

**Risk to life and limb of the operating personnel and significant property damage when the RPM limit is exceeded! With gripping from the outside inwards, and with increasing RPM, the effective clamping force is reduced by the magnitude of the increasing centrifugal force (the forces are opposed). When the RPM limit is exceeded, the clamping force drops below the required minimum clamping force  $F_{spmin}$ . Consequently, the workpiece is released spontaneously.**

- Do not exceed the calculated RPM.
- Do not fall below the necessary minimum clamping force.



Reduction in effective clamping force by the magnitude of the total centrifugal force, for gripping from the outside inwards.

The required effective clamping force for machining  $F_{sp}$  is calculated from the product of the **machining force**  $F_{spz}$  and the **safety factor**  $S_z$ . This factor takes into account uncertainties in the calculation of the machining force. According to VDI 3106:  $S_z \geq 1.5$ .

$$F_{sp} = F_{spz} \cdot S_z \text{ [N]}$$

From this we can derive the calculation of the initial clamping force during shutdown:

$$F_{sp0} = S_{sp} \cdot (F_{sp} \pm F_c) \text{ [N]}$$

(+) for gripping from the outside inwards

(-) for gripping from the inside outwards

### NOTICE

**This calculated force must not be larger than the maximum clamping force  $\Sigma S$  engraved on the lathe chuck.**

See also "Lathe chuck data" table ► 3.1 [17]

From the above formula it is evident that the sum of the effective clamping force  $F_{sp}$  and the total centrifugal force  $F_c$  is multiplied by the **safety factor for the clamping force**  $S_{sp}$ . According to VDI 3106, the following also applies here:  $S_{sp} \geq 1.5$ .

The **total centrifugal force**  $F_c$  is dependent on both the sum of the masses of all jaws and on the center of gravity radius and the rpm.

### NOTICE

**For safety reasons, in accordance with DIN EN 1550, the centrifugal force may be a maximum of 67% of the initial clamping force.**

The formula for the calculation of the total centrifugal force  $F_c$  is:

$$F_c = \sum (m_B \cdot r_s) \cdot \left(\frac{\pi \cdot n}{30}\right)^2 = \sum M_c \cdot \left(\frac{\pi \cdot n}{30}\right)^2 \text{ [N]}$$

For this, **n is the given speed of rotation** in RPM. The product  $m_B \cdot r_s$  is referred to as the **centrifugal torque  $M_c$** .

$$M_c = m_B \cdot r_s \text{ [kgm]}$$

In case of toolholders with split chuck jaws, i.e., with base jaws and top jaws, for which the base jaws change their radial position only by the stroke amount, the **centrifugal torque of the base jaws  $M_{cGB}$**  and the **centrifugal torque of the top jaws  $M_{cAB}$**  need to be added:

$$M_c = M_{cGB} + M_{cAB} \text{ [kgm]}$$

The centrifugal torque of the base jaws  $M_{cGB}$  can be found in the table "Lathe chuck data" ▶ 3.1 [17]. The centrifugal torque of the top jaws  $M_{cAB}$  is calculated as per:

$$M_{cAB} = m_{AB} \cdot r_{sAB} \text{ [kgm]}$$

### 3.3.2 Calculation example: required initial clamping force for a given speed

**Required initial clamping force  $F_{sp0}$  for a given RPM n**

The following data is known for the machining job:

- Gripping from the outside in (application-specific)
- Machining force  $F_{spz} = 3000 \text{ N}$  (application-specific)
- max. RPM  $n_{max} = 3200 \text{ RPM}$  ("Lathe chuck data" table)
- RPM  $n = 1200 \text{ RPM}$  (application-specific)
- Mass of one (!) top jaw  $m_{AB} = 5.33 \text{ kg}$  (application-specific)
- Center of gravity radius of top jaw  $r_{sAB} = 0.107 \text{ m}$  (application-specific)
- Safety factor  $S_z = 1.5$  (according to VDI 3106)
- Safety factor  $S_{sp} = 1.5$  (according to VDI 3106)

**Note:** Masses of the jaw mounting screws and T-nuts are not taken into account.

First the required effective clamping force  $F_{sp}$  is calculated using the machining force stated:

$$F_{sp} = F_{spz} \cdot S_z = 3000 \cdot 1.5 \Rightarrow \mathbf{F_{sp} = 4500 \text{ N}}$$

Initial clamping force during shutdown:

$$F_{sp0} = S_{sp} \cdot (F_{sp} + F_c)$$

Calculation of total centrifugal force:

$$F_c = \sum M_c \cdot \left(\frac{\pi \cdot n}{30}\right)^2$$

For two-part chuck jaws, the following applies:

$$M_c = M_{cGB} + M_{cAB}$$

Take the centrifugal torque of the base jaw and top jaw specified from the "Lathe chuck data" table:

$$\mathbf{M_{cGB} = 0.319 \text{ kgm}}$$

For the centrifugal torque of the top jaw, the following applies:

$$M_{cAB} = m_{AB} \cdot r_{sAB} = 5.33 \cdot 0.107 \Rightarrow \mathbf{M_{cAB} = 0.57 \text{ kgm}}$$

Centrifugal torque for one jaw:

$$M_c = 0.319 + 0.571 \Rightarrow \mathbf{M_c = 0.89 \text{ kgm}}$$

The chuck has 3 jaws, the total centrifugal torque is:

$$\sum M_c = 3 \cdot M_c = 3 \cdot 0.889 \Rightarrow \mathbf{\sum M_c = 2.667 \text{ kgm}}$$

The total centrifugal force can now be calculated:

$$F_c = \sum M_c \cdot \left(\frac{\pi \cdot n}{30}\right)^2 = 2.668 \cdot \left(\frac{\pi \cdot 1200}{30}\right)^2 \Rightarrow \mathbf{F_c = 42131 \text{ N}}$$

Initial clamping force during shutdown that was sought:

$$F_{sp0} = S_{sp} \cdot (F_{sp} + F_c) = 1.5 \cdot (4500 + 42131) \Rightarrow \mathbf{F_{sp0} = 69947 \text{ N}}$$

### 3.3.3 Calculation of the permissible speed in case of a given initial clamping force

Calculation of the permissible RPM  $n_{perm}$  in case of a given initial clamping force  $F_{sp0}$

The following formula can be used to calculate the permissible RPM for a given initial clamping force during shutdown:

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\frac{F_{sp0} - (F_{spz} \cdot S_z)}{\sum M_c}} \text{ [min}^{-1}\text{]}$$

#### NOTICE

**For safety reasons, the calculated permissible RPM may not exceed the maximum RPM inscribed on the lathe chuck!**

### Example of calculation: Permissible RPM for a given effective clamping force

The following data is known from previous calculations:

- Initial clamping force during shutdown  $F_{sp0} = 17723 \text{ N}$
- Machining force for machining job  $F_{spz} 3000 \text{ N}$  (application-specific)
- Total centrifugal torque of all jaws  $\Sigma M_c = 2,668 \text{ kgm}$
- Safety factor  $S_z = 1.5$  (according to VDI 3106)
- Safety factor  $S_{sp} = 1.5$  (according to VDI 3106)

#### NOTE:

Masses of the jaw mounting screws and T-nuts are not taken into account.

Identifying the permissible RPM:

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\frac{F_{sp0} - (F_{spz} \cdot S_z)}{\Sigma M_c}} = \frac{30}{\pi} \cdot \sqrt{\frac{69947 - (3000 \cdot 1.5)}{2.668}} \Rightarrow n_{zul} = 1495 \text{ min}^{-1}$$

The calculated RPM  $n_{perm} = 1495 \text{ RPM}$  is smaller than the maximum permissible RPM of the lathe chuck  $n_{max} = 3200 \text{ RPM}$  (see "Lathe chuck data" table ▶ 3.1 [17]).

**This calculated RPM may be used.**

## 3.4 Grades of Accuracy

Tolerances for radial and axial run-out accuracy correspond to the Technical Supply Terms for lathe chucks as per DIN ISO 3442-3.

## 3.5 Permissible imbalance DIN ISO 21940-11

The ROTA NCO in ungreased state without T-nuts and top jaws corresponds to the balancing quality class 6.3 (according to DIN ISO 21940-11). Residual imbalance risks may arise due to insufficient rotation compensation being achieved (see DIN EN 1550 6.2 e). This applies particularly to high speeds, asymmetrical workpieces or the use of various top jaws, as well as uneven application of lubricants. In order to prevent damage resulting from these residual risks, the entire rotor is to be dynamically balanced in accordance with DIN ISO 21940-11.

## 4 Mounting

### 4.1 Torques per screw

Tightening torques for mounting screws used to clamp the chuck on lathes or other suitable technical equipment (screw quality 10.9)

Screw size	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
Admissible torque $M_A$ (Nm)	13	28	50	88	120	160	200	290	400	500	1050	1500

Tightening torques for mounting screws used to attach top jaws onto the chuck (screw quality 12.9)

Screw size	M6	M8	M10	M12	M14	M16	M20	M24
Max. admissible torque $M_A$ (Nm)	16	30	50	70	130	150	220	450

Tightening torques for the protection sleeve mounting screws (screw quality 8.8)

Screw size	M3	M4	M5	M6
Tightening torques $M_A$ (Nm)	1.3	3.0	5.5	9.0

### 4.2 Mounting in general

#### 4.2.1 Pre-assembly measures

Carefully lift the product (e.g. using suitable lifting gear) from the packaging.



#### ⚠ WARNING

##### Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.



#### ⚠ CAUTION

##### Danger of injury due to sharp edges and rough or slippery surfaces

- Wear personal protective equipment, particularly protective gloves.

Check the delivery for completeness and for transport damage. In order to achieve high run-out accuracy of the chuck, the machine side must be aligned before mounting the chuck. To do this, check the mounting surfaces for radial and axial run-out using a dial indicator.

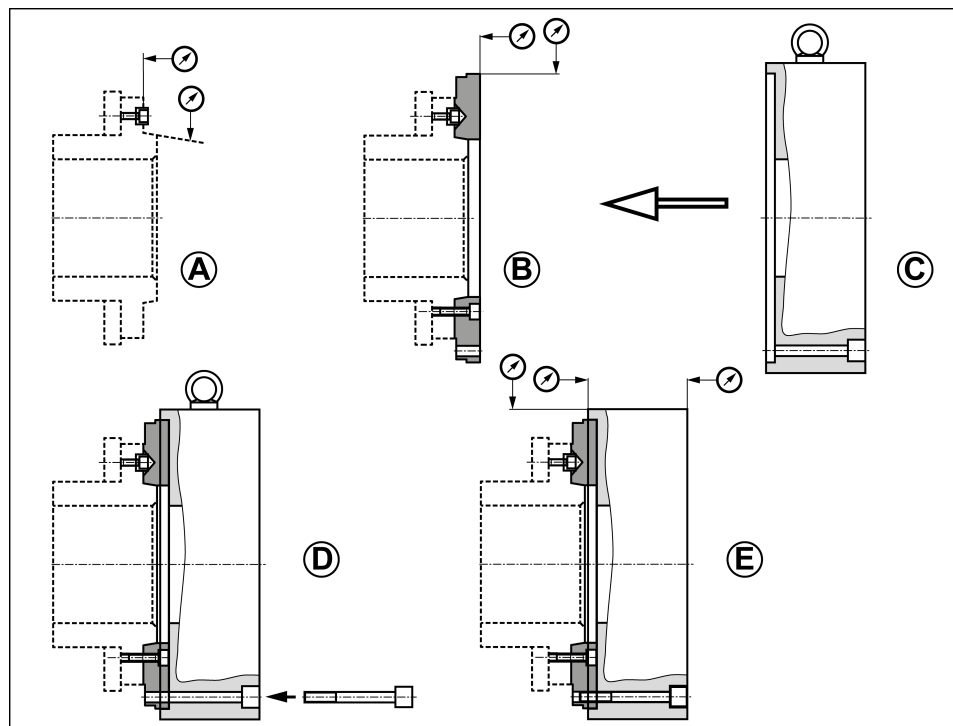
A maximum concentricity error of 0.01 mm should be ensured for the centring of the mount and a maximum axial run-out error of 0.01 mm for the contact surfaces. In addition, the flat surface must be checked for evenness using a straight edge (flat surface deburred and clean at the bore holes).

Radial and axial run-out tolerances of the chuck:

Chuck size [mm]	Max. Radial run-out tolerance [mm]	Max. Axial run-out tolerance [mm]
≤ 315	0.02	0.02
≤ 400	0.03	0.03
≤ 800	0.04	0.04
≤ 1200	0.05	0.05
≤ 1600	0.06	0.06

#### 4.2.2 Chuck assembly options

If the interface of the machine spindle and chuck is identical, assembly is carried out without assembly preparation. If the interface of the machine spindle deviates from the interface of the chuck, a connecting flange must be installed before assembly.



Chuck assembly

- Direct assembly of the chuck to the machine spindle
- Assembly of the chuck with connecting flange
  - Direkt flange (insert ring)
  - Reduction flange
  - Expansion flange



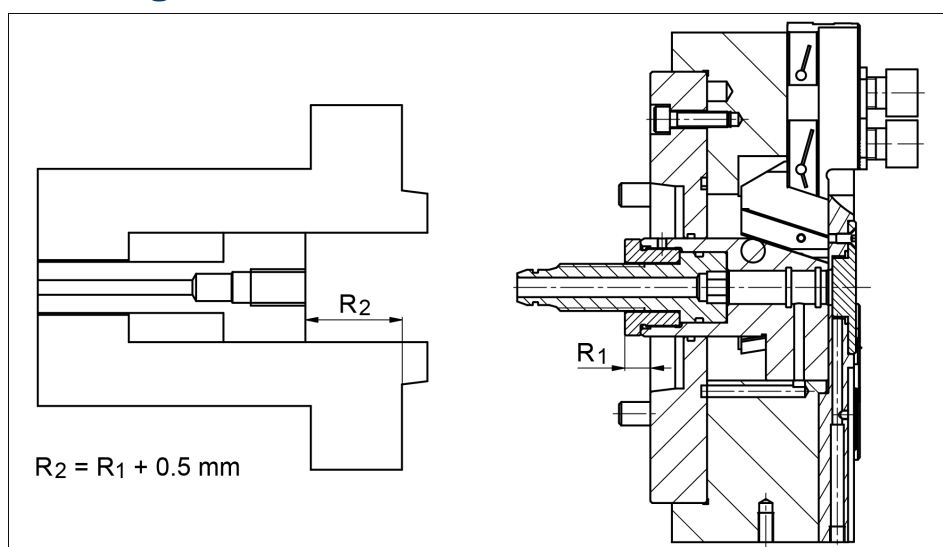
**NOTICE**

When mounting with the connecting flange, never allow the outer rim of the chuck body to make contact. The flange must support on the entire surface.

**NOTICE**

Use a crane to install the chuck. Fasten the chuck to the eye bolt provided for this purpose (see Fig. "Chuck assembly" – C) The eye bolt must be removed prior to commissioning.

### 4.3 Mounting of the Power Chuck



- Remove top jaws with fastening screws and, if present, T-Nuts.
- Move the drawbar to the foremost position by actuating the clamping cylinder.
- Disassemble the central feeding insert.
- Move the chuck piston into the front position.
- Basically the chuck can be attached in two positions (horizontally or vertically), depending on the position of the machine spindle.

Horizontal attachment of the chuck ► [4.3.1](#) [30](#)

Vertical attachment of the chuck ► [4.3.2](#) [30](#)

### 4.3.1 Horizontal attachment

Lift the chuck by means of an assembly belt or with a ring bolt aligned to the spindle centre in front of the spindle nose.

- **ROTA NCO 165:**  
Screw the chuck on to the spindle by turning it on its axis until it stops. Turn the chuck back towards the left until the through bolts are in alignment with the threads or the driving hole is in alignment with the driving keys in the spindle for the first time.
- **ROTA NCO 210 – 630:**  
Screw the central fastening screw with a hexagon wrench into the draw bar or into the draw tube adapter, until it contacts the stop.

### 4.3.2 Vertical attachment

- **ROTA NCO 165:**  
Screw the chuck on to the spindle by turning it on its axis until it stops. Turn the chuck back towards the left until the through bolts are in alignment with the threads or the driving hole is in alignment with the driving keys in the spindle for the first time.
- **ROTA NCO 210 – 630:**  
Put the chuck upside-down onto the assembly device.  
Turn the spindle with the assembly device onto the spindle.  
Afterwards turn the chuck back until the fastening bores and the threads of the spindle flang are aligned.  
Screw in the central fastening screw with a hexagon wrench into the draw bar or into the draw tube adapter.
- Assemble the central feeding insert.
- Insert the fastening screws and **tighten** them **slightly**
- Check the chuck for concentricity and axial runout, and if necessary, align it with light plastic hammer blows on the outer diameter. (See Fig. 'Assembly of the Chuck' – E)
- Then alternately tighten the fastening screws with a torque wrench. Pay attention to the specified maximum tightening torques, ► 4.1 [ 27].
- Check the concentricity and axial runout.
- Check the function and the size of the actuation force.
- Check that the base jaws run smoothly and that the jaw stroke is correct.
- Mount the top jaws firmly on the base jaws with the T-nuts and screws according to the markings 1, 2 and 3.

**Dismounting of the spindle is carried out in reverse order.**

## 5 Function

### 5.1 Function and handling

Wedge hook chuck are actuated by rotating cylinders with or without through holes. The axial draw- or pressure forces are deviated into a radial jaw clamping force via the helical angle of traction between the piston and the base jaws.

The clamp and unclamping stroke of the jaws is determined by the cylinder. Base jaws as well as special jaws for difficult workpiece shapes can be accommodated via the pointed toothing of the base jaws. Moving or changing the base jaws with top jaws bolted to them must be carried out in unclamped position.

### 5.2 Change or supplement of jaws

Jaws for highest repeatability must be bored and ground in the chuck under clamping pressure.

- When boring and grinding it is important that the boring ring or the boring bolts are clamped **by the top jaws** – and not by the base jaws. Keep base and top jaws screwed together for later tasks.
- Keep the base jaws and top jaws screwed in place for recurring work. Tighten the jaw mounting screws to the specified torque ► 4.1 [ 27].

**Tighten the jaw mounting screws with a torque wrench.**

### 5.3 Disassembly of chucks for complete cleaning or in case of damage

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ► 10 [ 41].

**Please consider the tightening torques of all screws at every assembly and disassembly work, ► 4.1 [ 27]!**

For disassembly, please remove the chuck from the machine and then disassemble it. Otherwise it can't be disassembled.

- Remove the top jaws (if existing), T-nuts and fastening screws from the base jaws.
- Screw screws (item 73) out of the chuck and take out media insert (item 24). Set screw (item 28) can be taken out (insert without media lead-through only). O-rings (items 86 and 88) can be removed from the insert.
- Turn chuck on its back. Remove screws (item 78) and take out mounting (item 7). O-ring (item 68) can be taken out.

- For chucks with central oil lubrication, remove gauge cartridges from the chuck.
- Loosen and remove all screws item 75 in the chuck. Carefully turn chuck on its face side.
- **NCO 165 – 400:**  
The lid (item 2) can now be taken out of the chuck. The wiper ledges and the flange head screws (items 66 and 67) can be removed from the chuck lid.
- **NCO 500 – 630:**  
The ledges of the jaw guiding (items 69 and 70) can be taken out of the chuck. The wiper ledges and the flange head screws (items 66 and 67) can be removed from the ledges.
- Individually remove base jaws (item 3) from the remaining chucks. Remove piston (item 4) from the chuck. Loosen set screw (item 89) and remove nut (item 9). Remove screw (item 8) and pressure pieces (item 56) from the remaining pistons. The O-rings (items 87 and 72) can be removed from the components.

**WARNING! In case of base jaw breakage, the bolts and set screws (item 19) must be exchanged.**

**The jaw guidings on the chuck body are numbered from 1 – 3. When mounting the base jaws, it must be ensured that the number of groovings on the base jaws is identical with the numbering of the jaw guidings and that the base jaws are remounted in the same position they were in before their removal. When mounting the piston, it must be ensured that wedge hook 1 is assigned to jaw guiding 1.**

- Remove set screws (items 47, 48 and 59) and lubricating nipples (item 55) from the chuck body (item 1) and remove lid (item 2).
- **NCO 210 – 400:**  
Remove cylindrical pins (item 19) from the chuck body.
- **NCO 500 – 630:**  
Remove set screws (item 19) from the base jaw (item 3).

Degrease and clean all parts and check them for damage or wear. Before installation, lubricate parts well with LINOMAX plus special grease.

**Only use original SCHUNK spare parts when exchanging damaged parts.**



The chuck is assembled in the same way but in the reverse order.

### **⚠ DANGER**

**Danger to life and limb of the user by tearing of the chuck of the spindle when using chuck mounting screws quality 8.8.**

If chuck mounting screws of the quality 8.8 get used it can lead to danger for life and limb of the user and to vastly damage of the unit.

- **Only use screws of the quality 10.9 even if they are flat headed screws.**

Chuck mounting screws of the quality 10.9 can be ordered as spare parts from SCHUNK.

## **5.4 Assembly of various energy inserts**

**(Accessories – have to be ordered separately)**

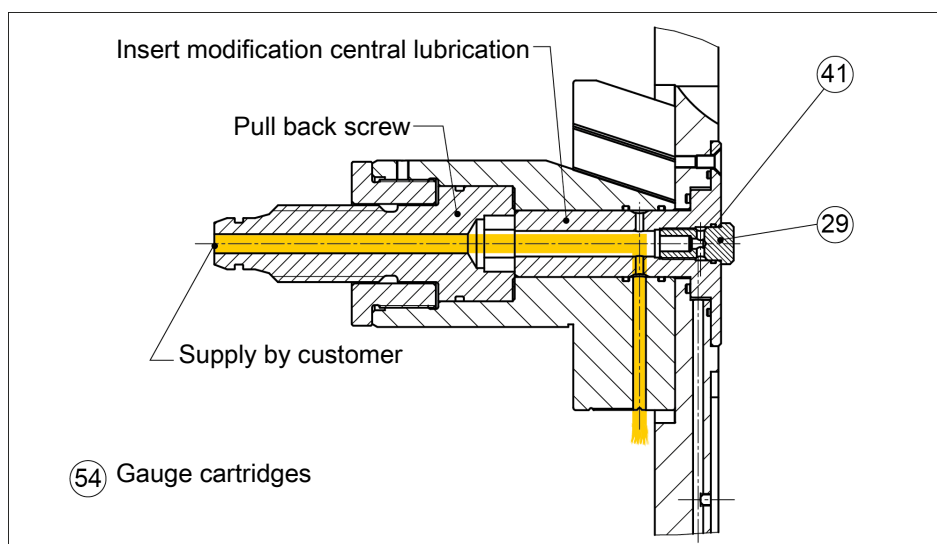
Our standard chucks are equipped with a central energy insert (no energy feed through!).

The chuck can be modified with various energy feed throughs at a later date.

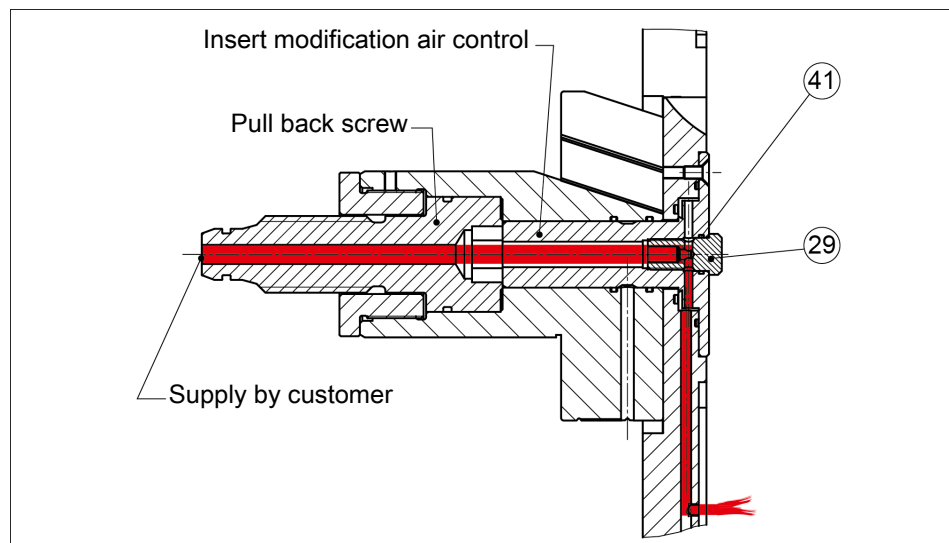
**Please consider the detailed list of necessary components.**

(► 9 [ 39 ]).

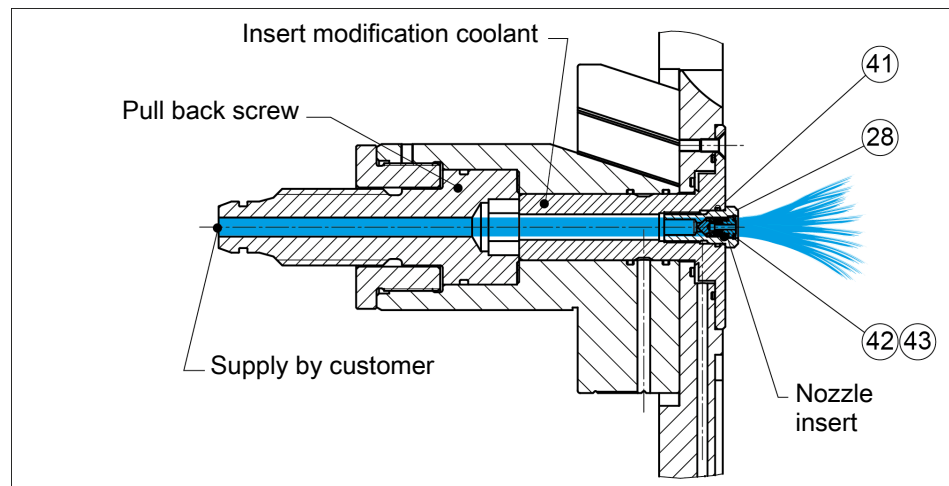
### **Modification – Central lubrication**



## Modification – Air control



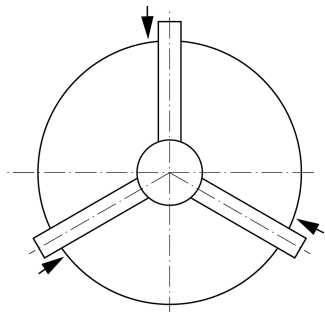
## Modification – Coolant



## 6 Maintenance

### 6.1 Lubrication

In order to maintain the safe operation and high quality of the chuck, it must be regularly lubricated at the three grease nipples (item 55) with LINOMAX plus.



In order to achieve optimal grease distribution, the base jaws need to be moved into the open position for O.D. clamping, the power chuck lubricated, and the base jaws then closed again. Repeat this procedure one more time.

Then the piston has to be moved several times up to its end positions.

#### Operating conditions

Depending on the operating conditions, the function and clamping force need to be checked after a specific period of operation (► 6.2 [35]). Only use a calibrated clamping force tester for measuring in the clamping force test (SCHUNK IFT).

**Lubricate all three segments evenly in order to avoid large imbalances.**

**Technical condition** When the smallest possible actuating pressure is applied (clamping cylinder), the base jaws must move evenly. This method only provides a limited indication and is not a substitute for measuring the clamping force.

If the clamping force has dropped too much or if the base jaws and piston no longer move properly, the chuck has to be disassembled, cleaned, and relubricated.

**Only use genuine SCHUNK spare parts when replacing damaged parts.**

### 6.2 Maintenance and lubrication plan

The specified intervals are guide values and must be adjusted by the operator depending on the ambient and operating conditions and the frequency of use of the clamping device used. In order to determine a suitable lubrication interval for the respective application, it is recommended to carry out a regular clamping force test. If only 80% of the maximum clamping force is reached, the clamping device must be lubricated. In accordance with VDI 3106, it must be ensured that sufficient clamping force is available for the application.

Maintenance task	Strain	Interval
Lubricate	normal / coolant utilization	Daily / every 16 hours*
	high / coolant utilization	1x per shift / every 8 hours*
Check clamping force		To be determined by the operator
Complete cleaning / disassembly	depending on soiling	as required / after 1200 hours

\* Depending on which event occurs earlier.

### 6.3 Central oil lubrication

Applies to the ROTA NCO lathe chuck with modification central oil lubrication.

**ATTENTION:**

**only lubricate in the open position for O.D. clampings (compare with image "Modification central lubrication").**

The chuck must be lubricated at regular intervals, which are dependent on the operating conditions. The lubrication oil VG 220 DIN 51519 is fed into a bore hole in the center of the chuck (► 6.2 [□ 35]). As a rule, an impulse (3 sec.) should be given to the chuck 3 to 6 times an hour at 10 to 30 bar. Three gauge cartridges in the chuck ensure the oil is evenly distributed in the chuck.

Fill quantity of the gauge cartridges:

Size	165	210	260	315	400	500	630
Quantity [cm <sup>3</sup> ]	0.3	0.3	0.3	0.6	0.6	0.6	0.6

### 6.4 Changing the top jaws

When changing the top jaws, the serration has to be cleaned and greased with SCHUNK LINOMAX plus special grease.



## 7 Storage

When storing the product for a longer period of time, observe the following points:

- Clean the product and lubricate it lightly.
- Store the product in a suitable transport container.
- Only store the product in dry rooms.
- Protect the product from major temperature fluctuations.

**NOTE:** Before recommissioning, clean the product and all attachments, check for damage, functionality and leaks.

## 8 Disposal

After decommissioning, place the chuck in a position that enables any liquids in the chuck to drain out.

- Collect the escaping liquids and dispose of them properly in line with the statutory provisions.
- Remove any identifiable plastic or aluminum parts installed in or on the chuck and dispose of them properly in line with the statutory provisions.
- Dispose of the chuck's metal parts as scrap metal.

Alternatively, you can return the chuck to SCHUNK for proper disposal.

## 9 Partlist

When ordering spare parts, it is essential to specify the type, size and, above all, the serial number of the chuck. **Seals, sealing elements, screw connections, springs, bearings, screws and wiper strips as well as parts that come into contact with the workpiece are not covered by the warranty.**

Item	Designation	Quantity	Note
1	Chuck body	1	
2	Cover	1	
3	Base jaws	3	
4	Piston	1	
7	Mount	1	165 / 500 / 630
8	Screw	1	
9	Nut	1	210 / 260 / 315 / 400 / 500 / 630
12	Mount	1	260 / 315
13	Mount	1	210 / 400
16	Screw 12.9	6	KV
	T-nut	3	260 / SV
	T-nut	6	165 / 210 / 315 / 400 / 500 / 630 / SV
18	Sword pin	1	210 / 260 / 315 / 400 / 500 / 630
19	Pin	3	210 / 260 / 315 / 400
	Set screw	6	500
24	Insert 01	1	
27	Set screw	3	500
	Countersunk screw 10.9	3	630
28	Set screw	1	
29	Plug	1	Z
37	Insert 00	1	500 / 630
41	O-ring	1	Z
42	Internal valve components	1	Z
43	Securing ring	1	Z
47	Set screw	1	400 / 630
	Set screw	3	315 / 500
48	Set screw	3	165 / 210 / 260 / 315 / 400
	O-ring	3	500
51	Screw 10.9	3	165 / 210 / 260 / 315
	Screw 10.9	6	400 / 500 / 630
52	Screw 10.9	3	210 / 260 / 315
54	Gauge cartridge	1	Z

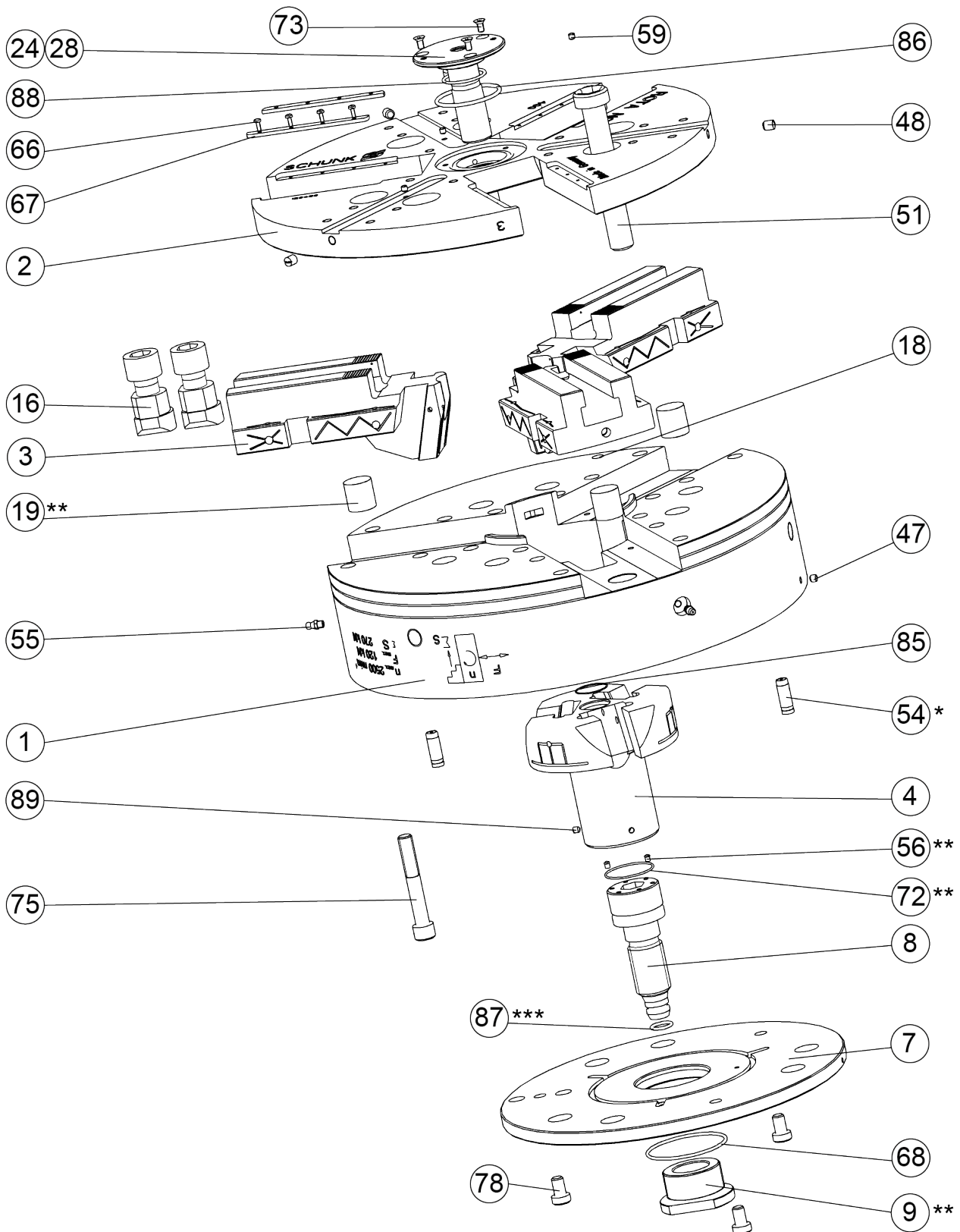
Item	Designation	Quantity	Note
55	Lubricating nipple	3	
56	Pressure piece	2	210 / 260 / 315 / 400 / 500 / 630
59	Set screw	3	165 / 210 / 260 / 315 / 400 / 500
66	Oval-head screw	12	165 / 210
	Oval-head screw	18	260 / 315
	Oval-head screw	24	400 / 500
	Oval-head screw	30	630
67	Wiper	6	
68	O-ring	1	
69	Strip right	3	500
	Strip left	3	630
70	Strip left	3	500
	Strip right	3	630
72	O-ring	1	210 / 260 / 315 / 400 / 500 / 630
73	Countersunk screw 10.9	3	165 / 210 / 260 / 315 / 400
74	O-ring	1	165 / 210 / 260 / 315
	Screw 10.9	3	630
75	Screw 10.9	15	315
	Screw 10.9	18	165 / 210 / 260 / 400
	Screw 10.9	30	500
	Screw 10.9	42	630
78	Screw	3	165 / 210 / 260 / 315 / 400
	Screw	6	500 / 630
85	O-ring	2	
86	O-ring	1	
87	O-ring	1	210 / 260 / 315 / 400 / 500 / 630
	O-ring	2	165
88	O-ring	1	400 / 500 / 630
89	Set screw	1	165 / 260 / 315 / 400 / 500 / 630

#### Parts list key

165	for size 165	500	for size 500
210	for size 210	630	for size 630
260	for size 260	KV	with tongue and groove
315	for size 315	SV	with fine serration
400	for size 400	Z	Accessories for media feed-through

# 10 Assembly drawings

## ROTA NCO 165 – 400

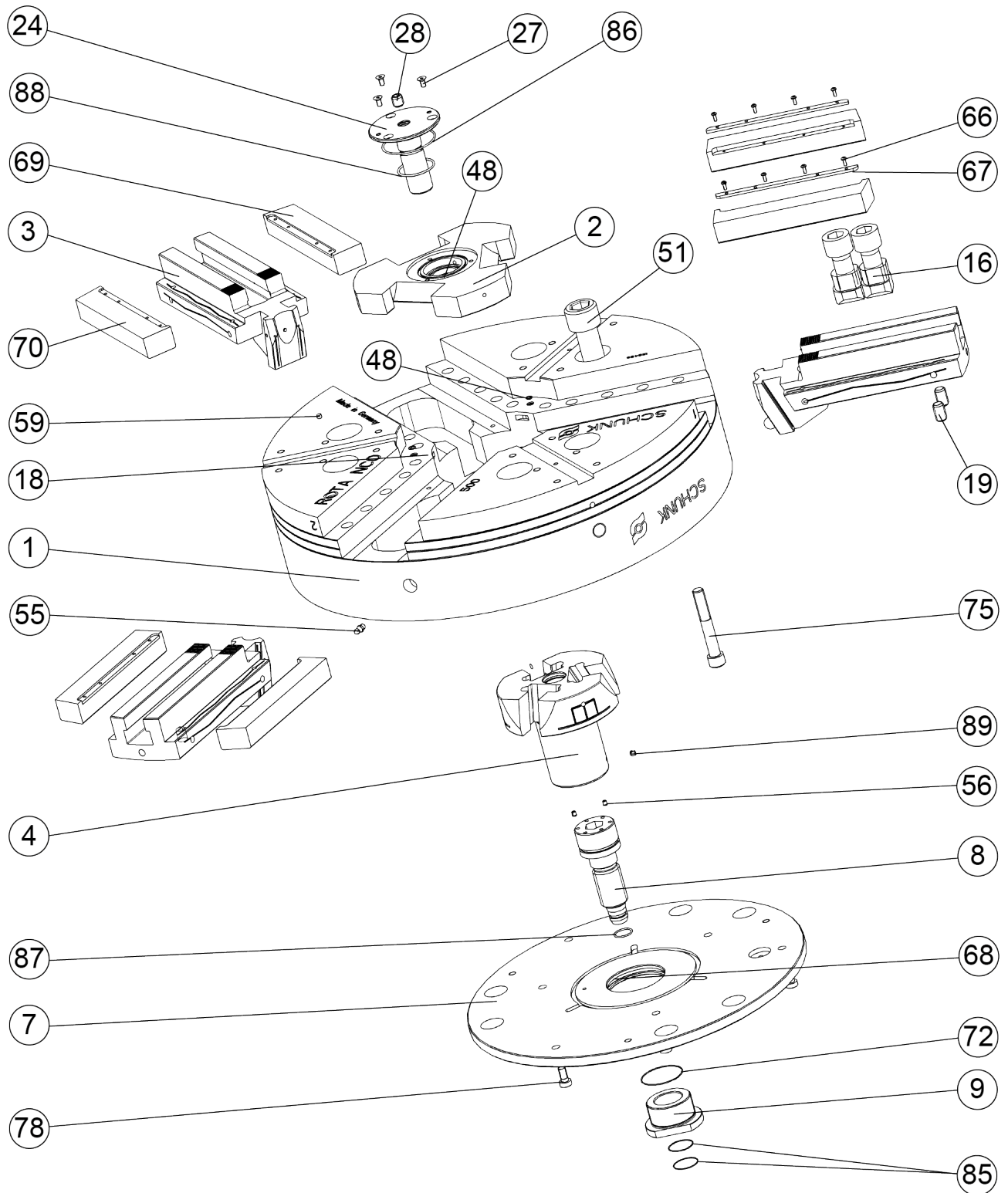


\* At modification oil central lubrication

\*\* Not used for NCO 165, Item 8 is screwed with Item 4

\*\*\* 2 x for NCO 165

## ROTA NCO 500 – 630



## 11 Manufacturer certificate

Manufacturer / Distributor:	H.-D. SCHUNK GmbH & Co. Spanntechnik KG Lothringer Str. 23 D-88512 Mengen
Product:	Lathe chuck
Designation:	ROTA
Type designation:	2B, NCA, NCD, NCE, NC, NCF, NCK, NCO, NCR, NCS, NCX, TH, THW, HSH, HSA, DFF

**Heinz-Dieter SCHUNK GmbH & Co. Spanntechnik KG** certifies that the above-mentioned products, when used as intended and in compliance with the operating manual and the warnings on the product, are safe according to the national regulations and:

- a **risk assessment** has been carried out in accordance with ISO 12100:2010.
- an **operating manual** for the assembly instructions has been created in accordance with the contents of the Machinery Directive 2006/42/EC Annex I No. 1.7.4.2. and the contents of the provisions of Annex VI of the Machinery Directive 2006/42/EC.
- the relevant basic and proven safety principles of the Annexes of **ISO 13849-2:2012**, taking into account the requirements of the documentation have been observed for the component. The parameters, limitations, ambient conditions, characteristic values, etc. for proper operation are defined in the operating manual.
- an  $MTTF_0$  value of 150 years can be estimated for mechanical components using the informative procedure in Table C.1 of ISO 13849-1:2015.
- **fault exclusion** against the fault "Unexpected release without pending release signal".
- the **fault exclusion** against the fault "Breakage during operation" in compliance with the parameters, limitations, ambient conditions, characteristic values and maintenance intervals, etc., specified in the operating manual.
- that internal bore diameters in the **pipe or control lines** are at least 2 mm for pneumatic clamping systems and at least 3 mm for hydraulic clamping systems

### Harmonized Standards applied:

- **ISO 12100:2010** Safety of machinery – General principles for design – Risk assessment and risk reduction
- **EN 1550:1997+A1:2008** Machine-tools safety – Safety requirements for the design and construction of lathe chucks for the workpiece mount

### Other related technical Standards and specifications:

- **ISO 702-1:2010-04** Machine tools – Connecting dimensions of spindle noses and lathe chucks – Part 1: front short-taper mount with screws
- **ISO 702-4:2010-04** Machine tools – Connecting dimensions of spindle noses and lathe chucks – Part 4: cylindrical mount
- **VDI 3106:2004-04** Determination of permissible RPM of lathe chucks (jaw chucks)

Mengen, 02nd of August 2023

*Signature: see original declaration*

*Signature: see original declaration*

p.p. Philipp Schröder  
Head of Development standard products

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