Power lathe chucks

ROTA NCS 6

Assembly and Operating Manual

Translation of Original Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

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

Customer Management
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cmm@de.schunk.com

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

Table of Contents

1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

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

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.2 [🗋 6] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

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

⚠ DANGER

Dangers for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Calculation of the jaw centrifugal forces, "Technology" chapter in the lathe chuck catalog *

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

1.1.3 Sizes

This operating manual applies to the following sizes:

- ROTA NCS 6 260-6
- ROTA NCS 6 315-6
- ROTA NCS 6 400-6
- ROTA NCS 6 500-6

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the date of delivery from the production facility or 500 000 cycles* under the following conditions:

- Observe the applicable documents, ▸ 1.1.2 [🗋 6]
- Observe the ambient conditions and operating conditions, ▸ 2.6 [🗋 8]
- Observe the specified maintenance and lubrication intervals, ▸ 7 [🗋 41]

Parts touching the workpiece and wear parts are not included in the warranty.

* A cycle consists of a complete clamping process ("Open" and "Close").

1.3 Scope of delivery

1	**Power lathe chuck ROTA NCS 6**
3 or 6	**Fastening screws**
1	**Seal kit**
1	**Leakage testing device**
1	**Oil press with couplings**
1	**Reservoir with SGL 320 oil**
1	**Eye bolt**
1	**Operating manual**

2 Basic safety notes

2.1 Intended use

This product is intended for clamping workpieces on machine tools and other suitable technical devices.

- The product may only be used within the scope of its technical data, ▸ 3 [🗋 16].
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.
- The maximum RPM of the chuck and the required clamping force must be determined by the user for the respective clamping task based on the applicable standards and technical specifications of the manufacturer.
  (See also "Calculations for clamping force and RPM" in the chapter "Technical data"). ▸ 3 [🗋 16]

2.2 Not intended use

A not intended use of the product is for example:

- It is used as a press, a punch, a toolholder, a load-handling device or as lifting equipment.
- the product is used for unintended machines or workpieces.
- the technical data is exceeded when using the product. ▸ 3 [🗋 16]
- if workpieces are not clamped properly, paying particular attention to the clamping forces specified by the manufacturer.
- if it is used in working environments that are not permissible.
- if the product is operated without a protective cover.

2.3 Constructional changes

Implementation of structural changes

By conversions, changes, and reworking, e.g. additional threads, holes, or safety devices can impair the functioning or safety of the product or damage it.

- 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.

- Use only original spare parts or spares authorized by SCHUNK.

2.5 Chuck jaws

Requirements of the chuck jaws

Stored energy can make the product unsafe and poses the danger of serious injuries and considerable material damage.

- Only change chuck jaws if no residual energy can be released.
- Do not use welded jaws.
- The chuck jaws should be designed 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 for constructional reasons the special chuck jaws are heavier than the top jaws assigned to the lathe chuck, greater centrifugal forces must be accounted for when defining the required clamping force and the recommended speed.
- The maximum recommended speed may only be operated in conjunction with maximum actuating force and only with the lathe chuck in optimum, fully functioning condition.
- After a collision, the lathe chuck and the chuck jaws must be subjected to a crack test before being used again. Damaged parts must be replaced with original SCHUNK spare parts.
- Renew the chuck jaw mounting screws if there are signs of wear or damage. Only use screws with a quality of 12.9.
- Screw the jaw mounting screws into the bore holes furthest apart.

2.6 Environmental 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 to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▸ 3 [🗋 16].
- Make sure that the product is a sufficient size for the application.
- Only use high-quality cooling emulsions with anti-corrosive additives during processing.

Clamping force measurement

Depending on the operating conditions, the function and clamping force must be checked after a certain period of operation ▸ 7.2 [🗋 44].

With the smallest possible actuating pressure (hydraulic cylinder), the base jaws should 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 must be disassembled, cleaned, and relubricated ▸ 7 [🗋 41].

2.7 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician
Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel
Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person
Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer
Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.8 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.9 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.10 Transport

Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

2.11 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.12 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

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

2.13 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.13.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.13.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.13.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective

fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.13.4 Notes on particular risks

⚠ DANGER

Risk of fatal injury from suspended loads!

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.

⚠ 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

In the event of a power failure, the lathe chuck's clamping force may fail immediately and the workpiece may be released in an uncontrolled manner. This poses a risk of death or injury to the operating personnel and can result in serious damage to the automated system.

- The machine manufacturer and the operator of the machine must carry out and document a hazard assessment and risk analysis to ensure that suitable measures are taken to maintain the lathe chuck's clamping force until the machine comes to a standstill and the workpiece can be secured (e.g. using a crane or suitable lifting equipment).
- The machines and equipment must fulfill the minimum requirements of the EC Machinery Directive; specifically, they must have effective technical measures to protect against potential mechanical hazards.

⚠ DANGER

Possible risk of fatal injury to operating personnel if a jaw breaks or if the lathe chuck fails because the technical data have been exceeded and a workpiece is released or parts fly off

- The technical data specified by the manufacturer for using the lathe chuck must never be exceeded.
- The lathe chuck may only be used on machines and facilities that fulfill the minimum requirements of the EC Machinery Directive; specifically, they must have effective technical measures to protect against possible mechanical hazards.

⚠ DANGER

Possible risk of fatal injury to operating personnel from clothing or hair being caught on the lathe chuck and being dragged into the machine

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

- The machines and equipment must fulfill the minimum requirements of the EC Machinery Directive; specifically, they must have effective technical measures to protect against potential mechanical hazards.
- Always wear tight-fitting clothing and a hairnet when working on the machine and the lathe chuck.

⚠ CAUTION

Danger of slipping and falling in case of dirty environment where the chuck is used (e.g. by cooling lubricants or oil).

- Ensure that the working environment is clean before starting assembly and installation work.
- Wear suitable safety shoes.
- Follow the safety and accident-prevention regulations when operating the chuck, especially when working with machine tools and other technical equipment.

⚠ CAUTION

Danger of limbs being crushed by opening and closing of the chuck jaws during manual loading and unloading or when replacing moving parts.

- Do not reach between the chuck jaws.
- Automatic loading is preferred.
- If manual loading is used, adjust the jaw position so that the opening gap between the jaw and the workpiece is less than 4 mm.
- Wear protective gloves.
- Observe the safety and accident prevention regulations during operation of the chuck, especially in connection with machining centers and other technical equipment.

⚠ CAUTION

Risk of burns due to workpieces with high temperatures.

- Wear protective gloves when removing the workpieces.
- Automatic loading is preferred.

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

3 Technical data

3.1 Chuck data

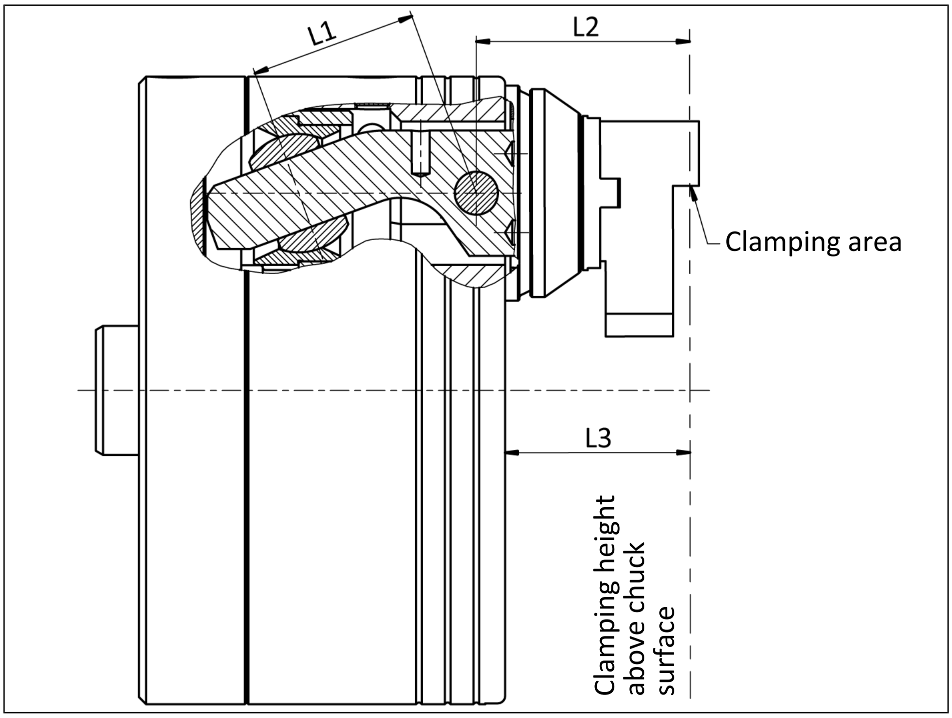
ROTA NCS	260-6	315-6	400-6	500-6
	DIN 6353 Z220 DIN 55028 A8	DIN 6353 Z220 DIN 55028 A8	DIN 6353 Z300 DIN 55028 A11	DIN 6353 Z380 DIN 55028 A15
Max. actuating force [kN]	20	48	48	65
Max. clamping force [kN] with L3 [mm] *	44 50	80 70	80 70	120 80
Max. clamping force [kN] with L3 [mm] *	40 55	70 80	70 80	83.5 115
Max. rotation speed [min-1]	3800	2200	2000	1400
Stroke per jaw [mm]	5.8	7.7	7.7	8.2
Piston stroke [mm]	21	25	25	30
Pull-down [mm]	0.3	0.3	0.3	0.5
Weight [kg]	45	67	150	230
Operating temperature	15 – 60°C			

* Due to the lever ratio (quotient made up of lever length and distance from pivot point to the middle of the clamping area) L1/ L2, the maximum clamping force changes, depending on the axial position of the clamping area. The greater the distance (L2 or L3), the smaller the maximum clamping force.

The maximum permissible speed for the specific machining has to be defined by the user on the basis of the required clamping forces. This speed must not exceed the maximum speed of the chuck.

The maximum speed stated is only valid with the maximum clamping force and when using the soft standard top jaws that go with the chuck, type SRK.

Size	260-6	315-6	400-6	500-6
Lever length L1 [mm]	46.5	53.5	53.5	75.5



$L_2 = L_3 + 8$ mm

L1	Lever length [mm]
L2	Distance pivot point to the middle of the clamping area [mm]
L3	Distance chuck surface to the middle of the clamping area [mm]

⚠ WARNING

Risk of personal injury and property damage due to parts flying off in the event of a screw breakage on unhardened top jaws!

Soft standard top jaws must be hardened in the countersink region.

They should only be depth-hardened, not surface-hardened.

If unhardened top jaws or chuck jaws in a special design are used, ensure that the jaws weigh as little as possible. For soft top jaws or jaws in special design, the speed permitted for the cutting task must be calculated in accordance with VDI 3106 whereby the max. recommended speed may not be exceeded. The calculated values must be checked by dynamic measurement. Function monitoring (piston movement and actuating pressure) must be performed in accordance with the guidelines of the Berufsgenossenschaft (employers' mutual insurance association).

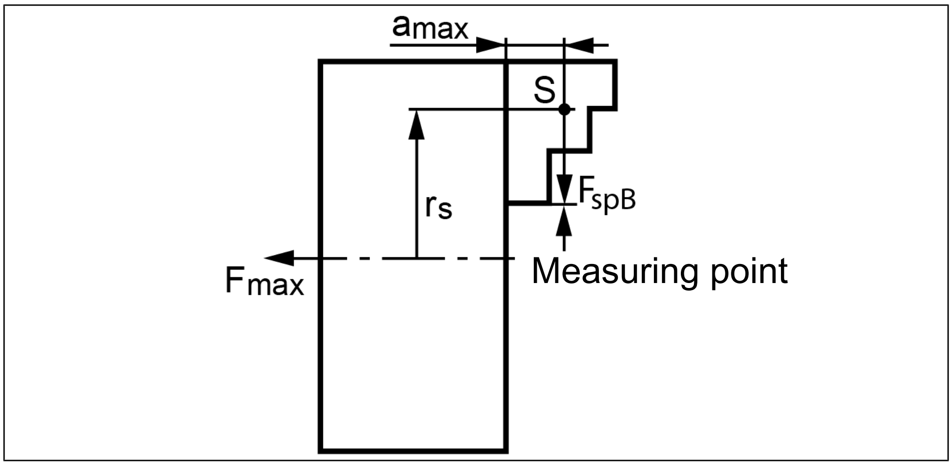
3.2 Clamping force / speed diagrams

Clamping force/RPM curves have been calculated using hard jaws. The chucks were operated with the max. permissable force and the jaws were located exactly on line with the chuck O.D.

The chuck is in perfect condition and lubricated with SCHUNK LINOMAX special grease.

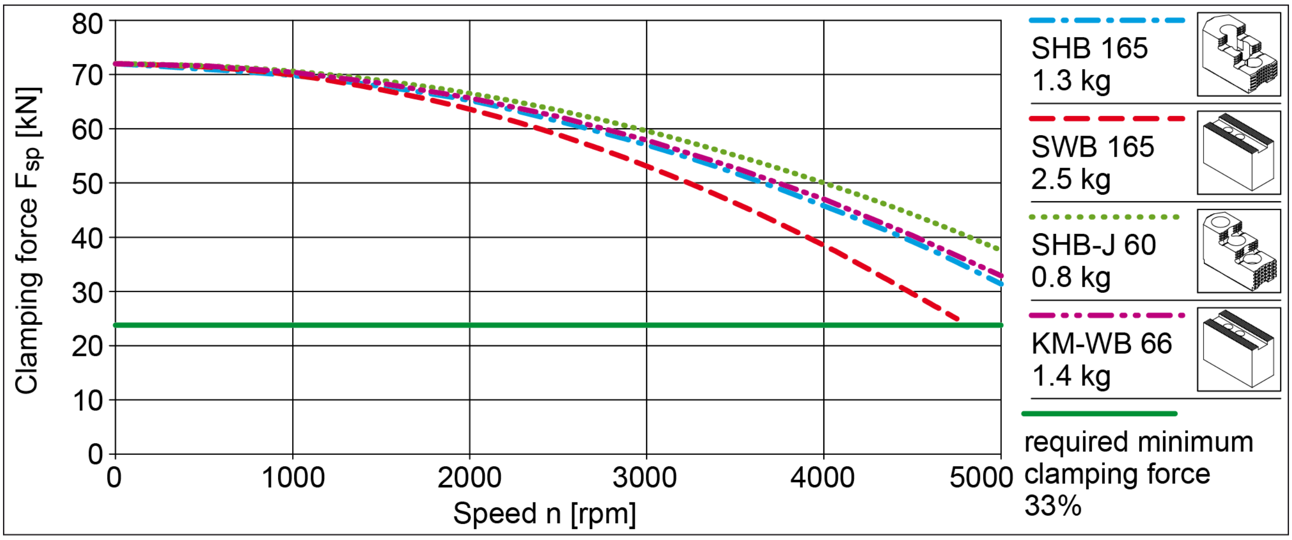
Should one or several of the above mentioned parameters be changed the diagrams are no longer valid.

Chuck set-up for clamping force / speed diagram

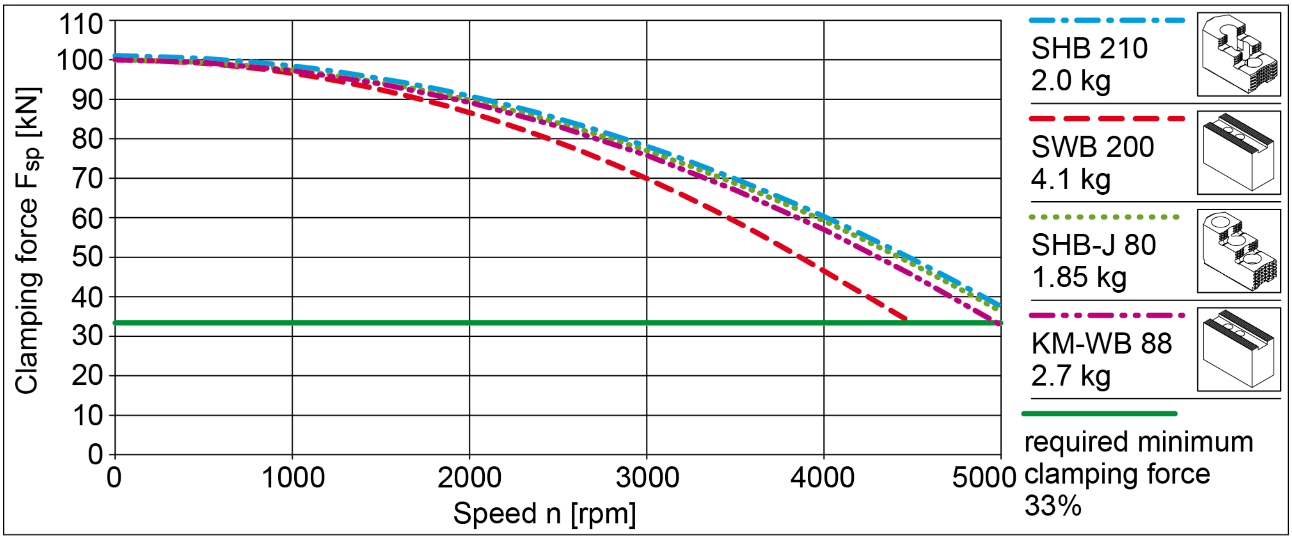


F/3	Clamping force per jaw	S	Center of gravity
r_s	Center of gravity radius	a_{max}	Max. jaw eccentricity of center of gravity in axial direction
F_{max}	Max. actuating force		

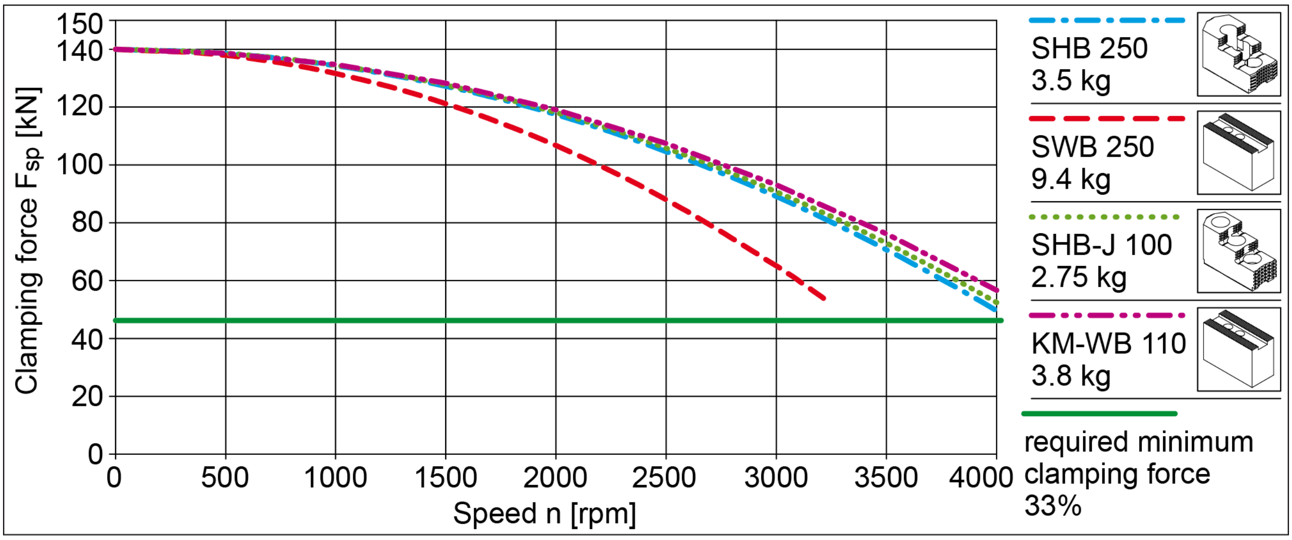
Clamping force / speed diagrams ROTA NC plus 185-52



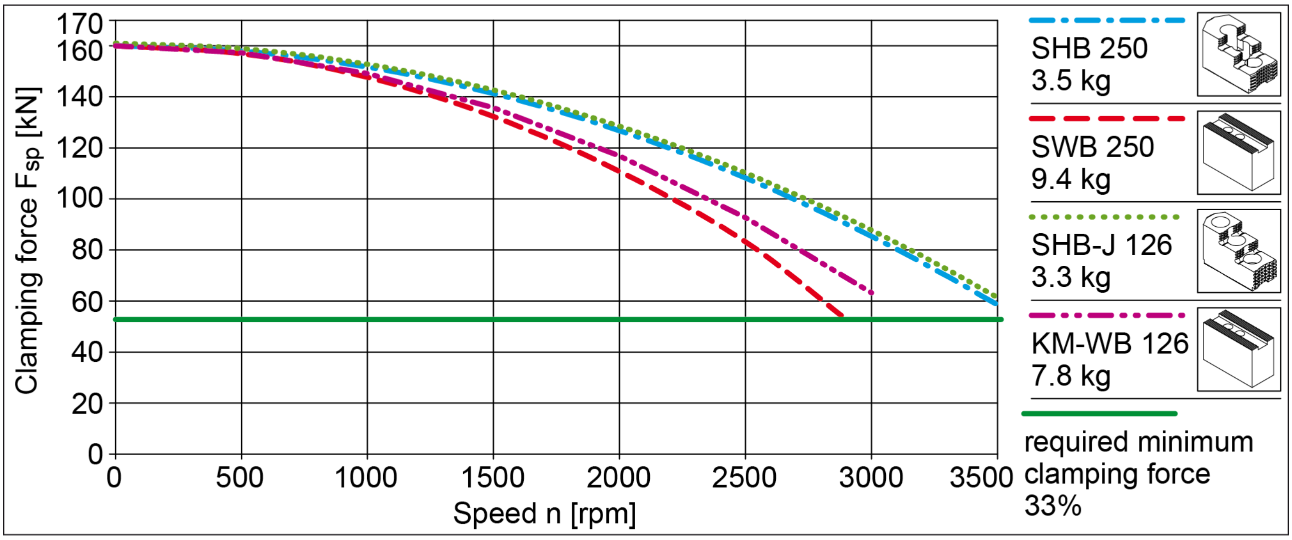
Clamping force / speed diagrams ROTA NC plus 215-66



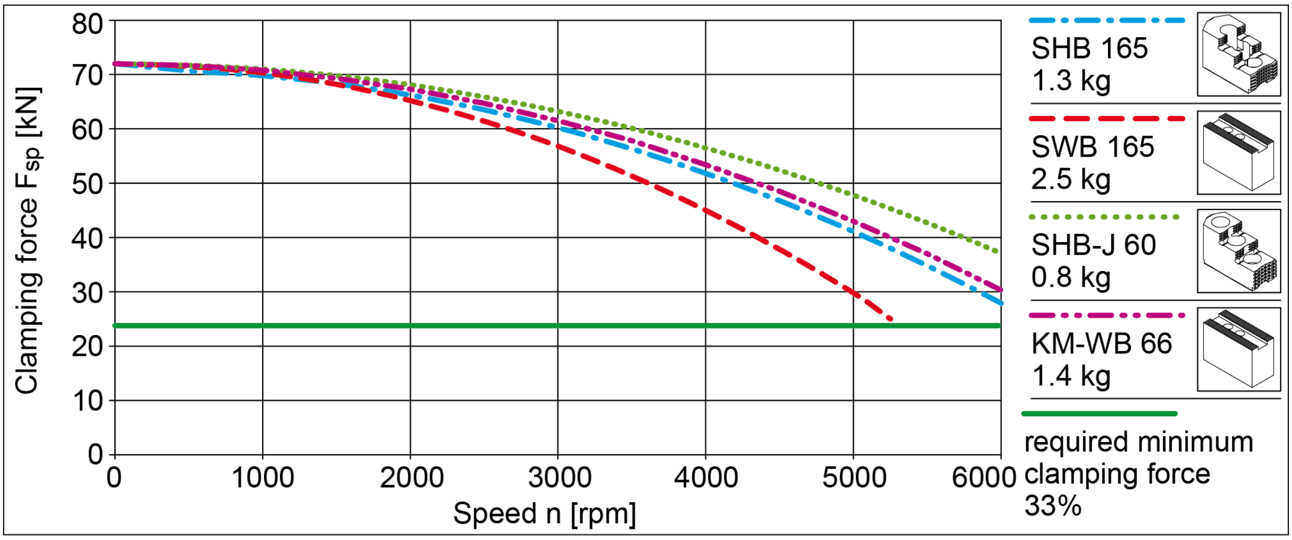
Clamping force / speed diagrams ROTA NC plus 260-86



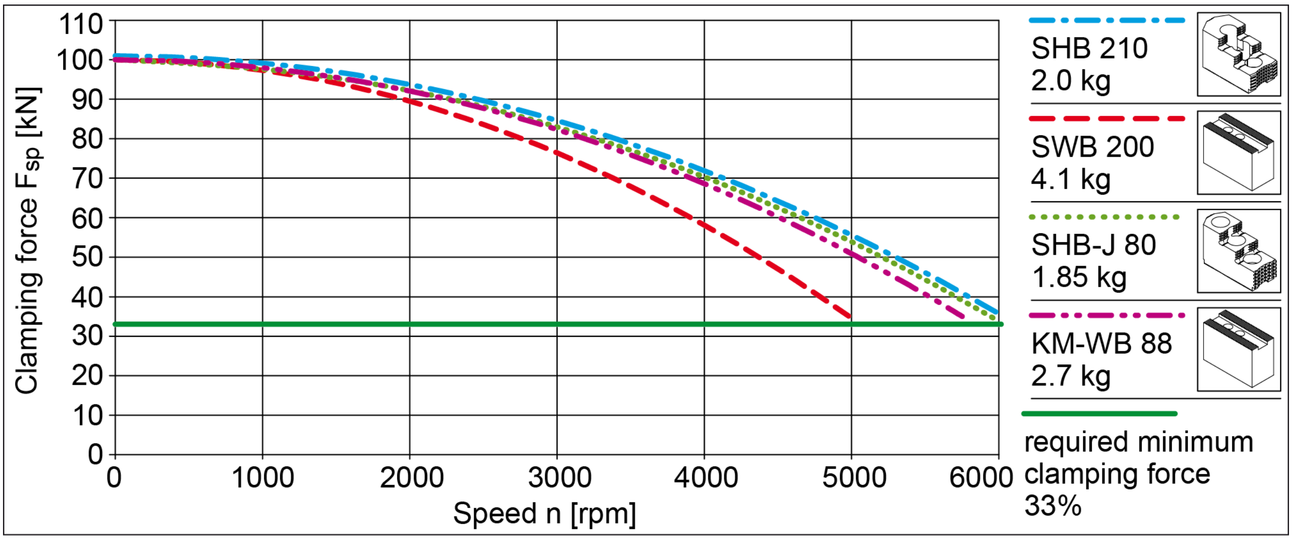
Clamping force / speed diagrams ROTA NC plus 315-104



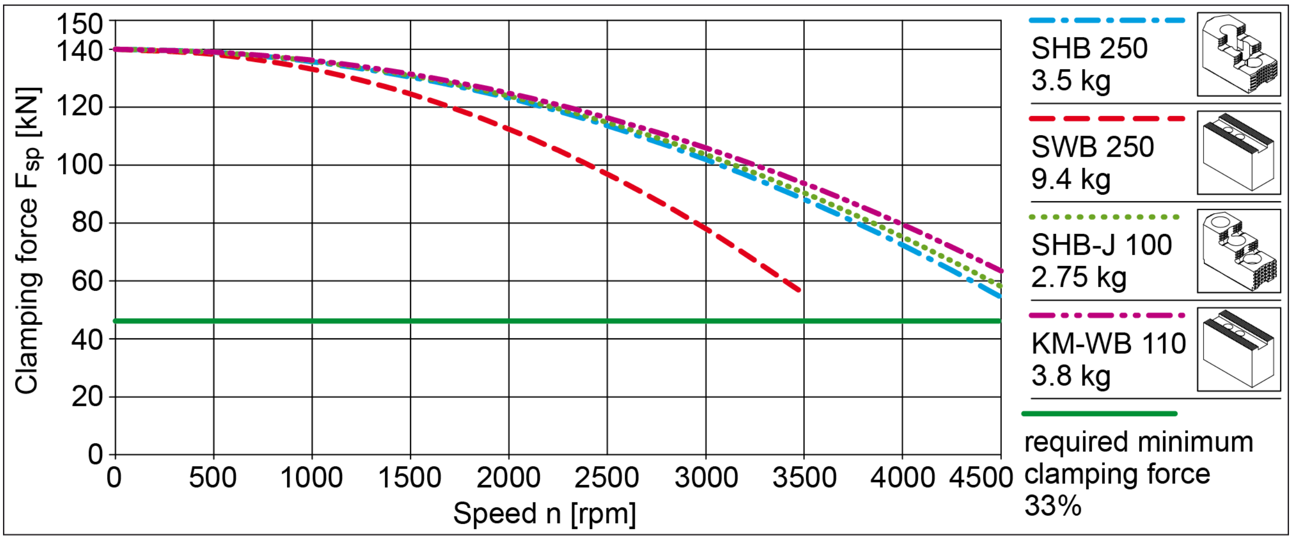
Clamping force / speed diagrams ROTA NCF plus 185-52



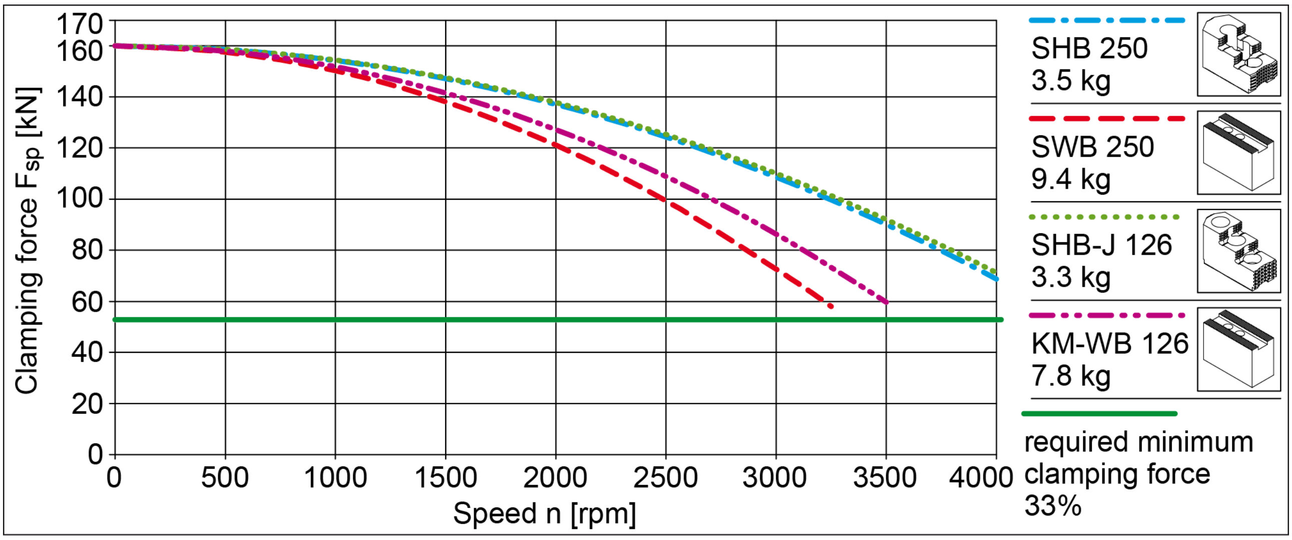
Clamping force / speed diagrams ROTA NCF plus 215-66



Clamping force / speed diagrams ROTA NCF plus 260-86



Clamping force / speed diagrams ROTA NCF plus 315-104



3.3 Clamping force / speed diagrams

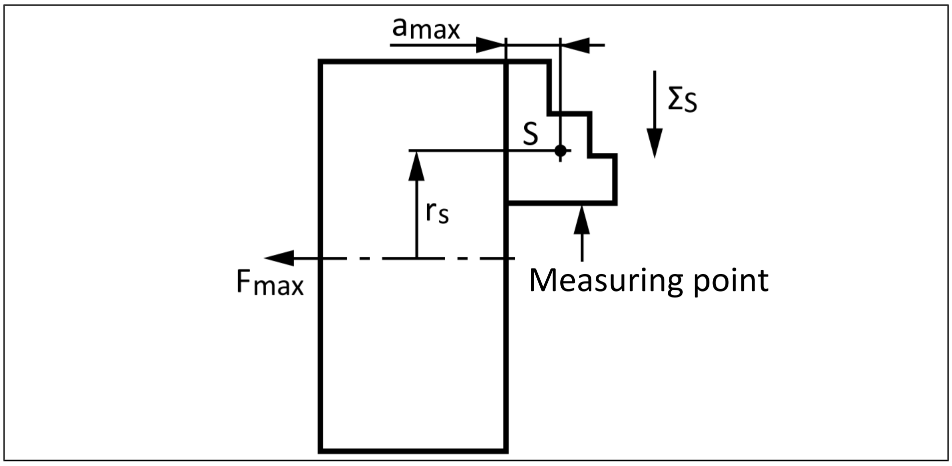
The diagrams relate to a 6-jaw chuck.

Clamping force/speed 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.

The chuck is in perfect condition and lubricated with lubricating oil SGL 320 plus special grease.

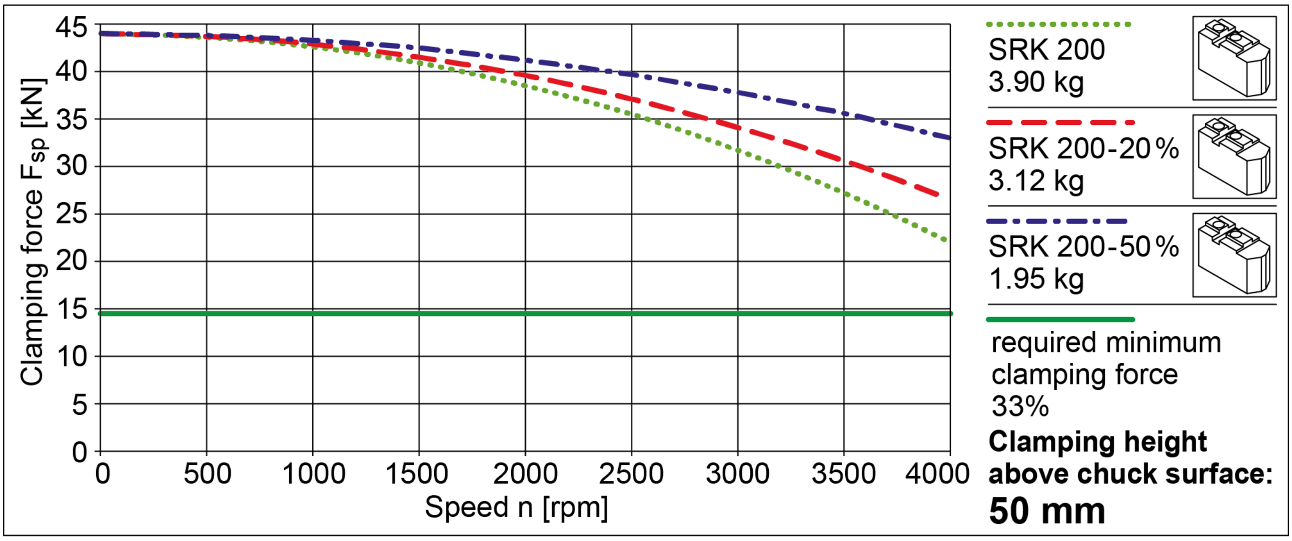
If one or more of these prerequisites is modified, the graphs will no longer be valid.

Chuck setup for clamping force/speed graph

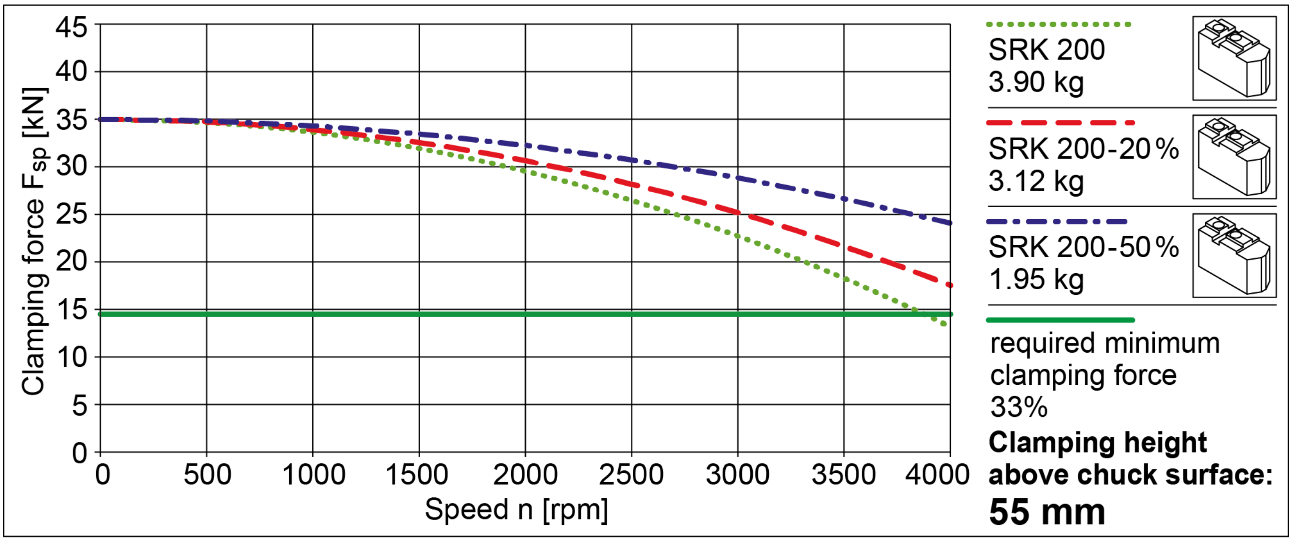


Σ_s	Max. clamping force [kN]	S	Center of gravity
r_s	Center of gravity radius of the chuck jaw to the chuck center [m]	a_{max}	max. chuck jaw eccentricity of center of gravity in axial direction [mm]
F_{max}	Actuating force [kN]		

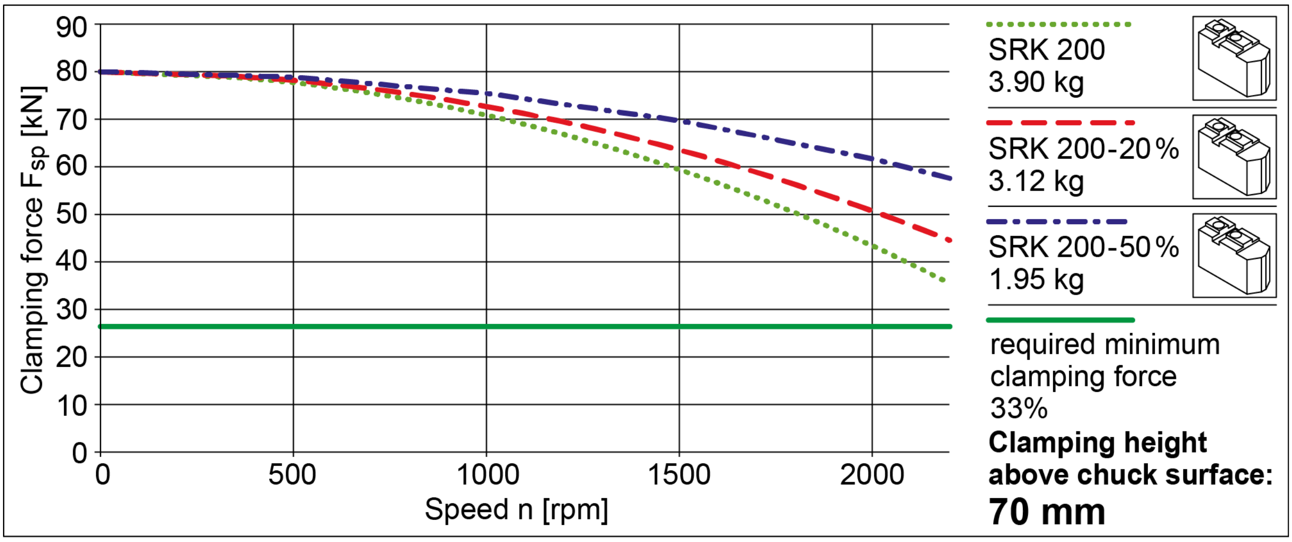
ROTA NCS 260-6 Clamping height 50 mm



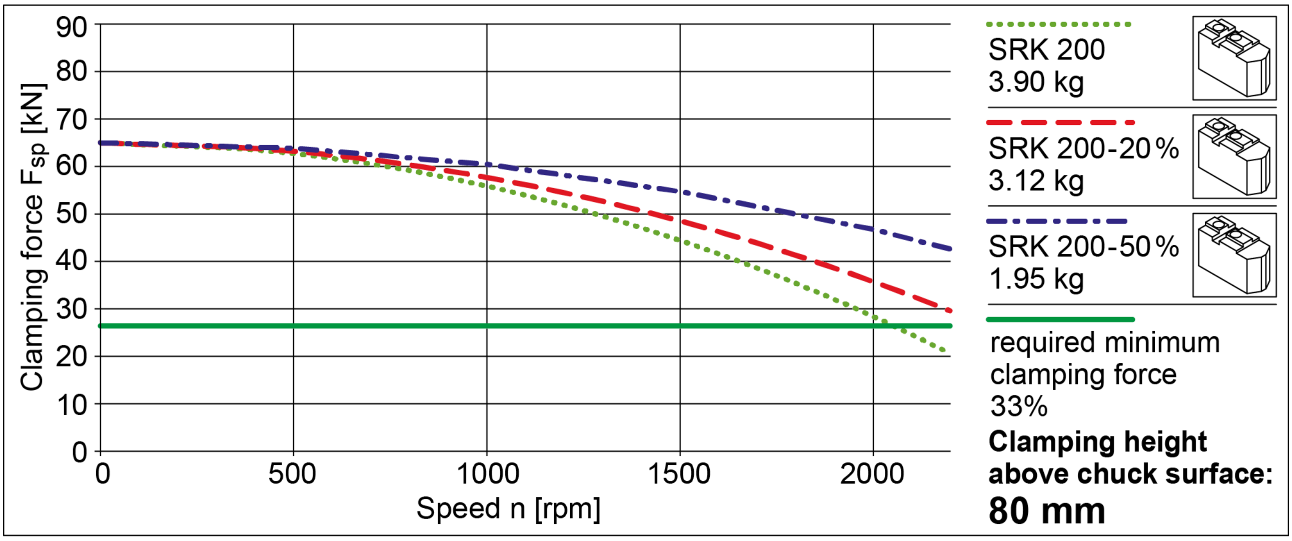
ROTA NCS 260-6 Clamping height 55 mm



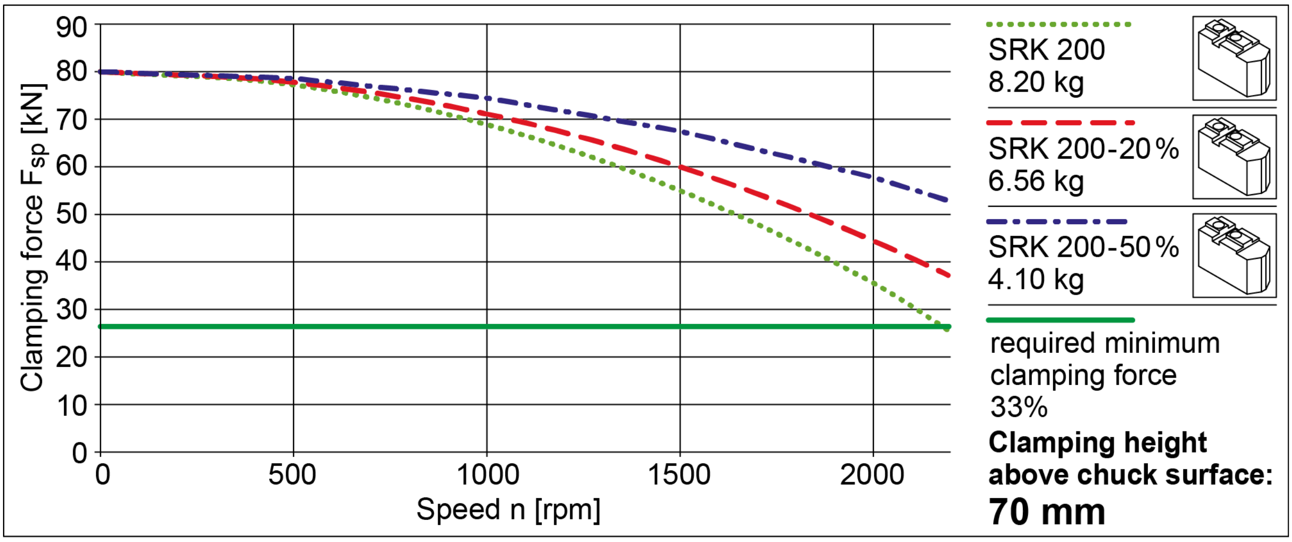
ROTA NCS 315-6 Clamping height 70 mm



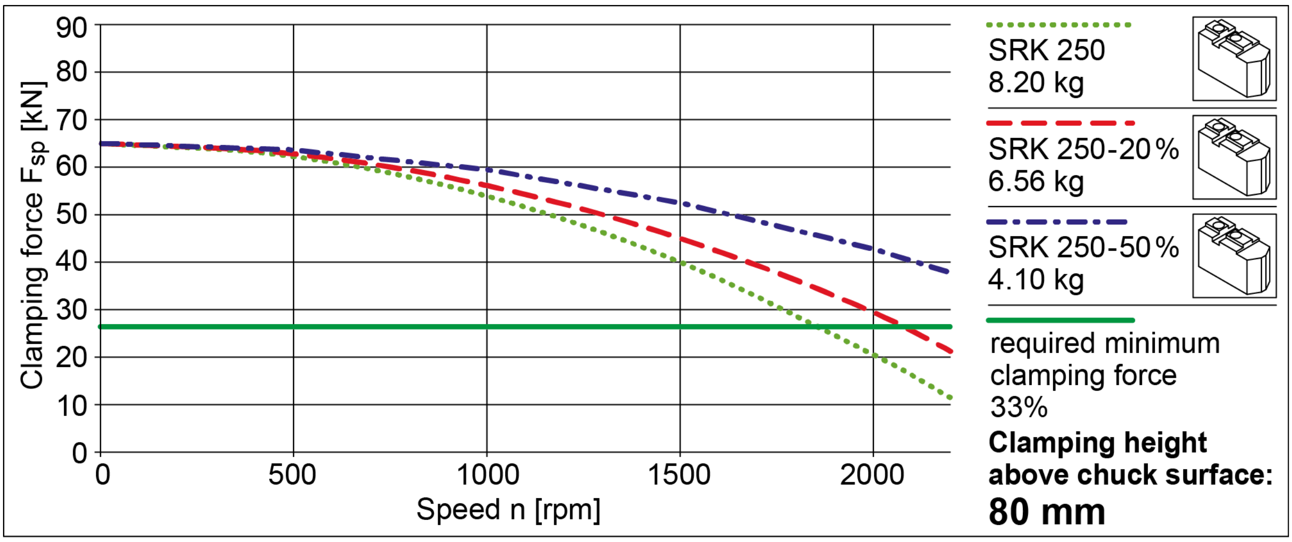
ROTA NCS 315-6 Clamping height 80 mm



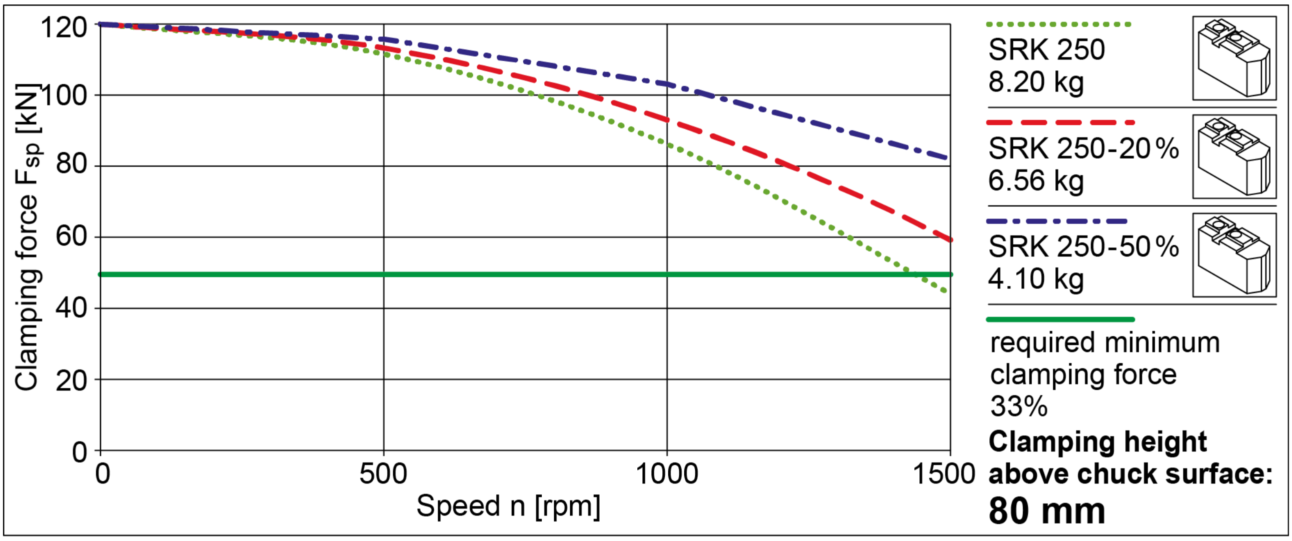
ROTA NCS 400-6 Clamping height 70 mm



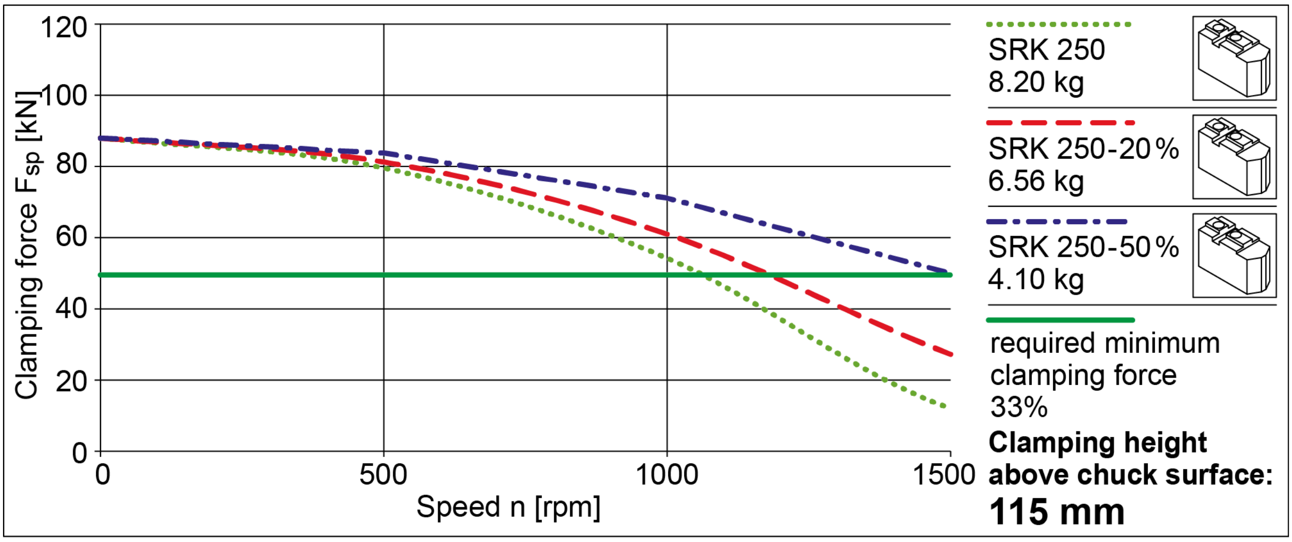
ROTA NCS 400-6 Clamping height 80 mm



ROTA NCS 500-6 Clamping height 80 mm



ROTA NCS 500-6 Clamping height 115 mm



3.4 Calculations for clamping force and speed

Missing information or specifications can be requested from the manufacturer.

Legend			
F_{Fl}	Centrifugal force [N]	r_s	Center of gravity radius of the chuck jaws to the chuck center [m]
F_{sp}	Effective clamping force [N]	r_{sAB}	Distance from top jaw center of gravity to chuck center [m]
Σ_S	Maximum clamping force [N]	r_{sGB}	Distance from base jaw center of gravity to chuck center [m]
F_{spmin}	Minimum required clamping force [N]	M_{Fl}	Centrifugal torque [kgm]
F_{sp0}	Initial clamping force [N]	M_{FlAB}	Centrifugal torque of top jaws [Kgm]
F_{spz}	Required clamping force for the cutting process [N]	M_{FlGB}	Centrifugal torque of base jaws [Kgm]
m_{GB}	Mass **of one** base jaw [kg]	i	Number of base and top jaws
m_{AB}	Mass **of one** top jaw [kg]	S_{sp}	Safety factor for clamping force
m_B	Mass of the chuck jaws [kg]	S_z	Safety factor cutting force
n	Speed [rpm]	kgm × 9.81 m/s² = Nm	

The following formulas, for calculating the initial clamping force F_{sp0} and permissible speed n_{perm}, have been heavily simplified. They only facilitate a rough estimation!

The clamping force for mounting the effective tilting moments F_{spk} (in accordance with VDI guideline 3106) is not taken into consideration. This must be determined for each clamping situation individually. The clamping situation is heavily influenced by the workpiece geometry, workpiece material, surface quality and cutting process.

The required clamping force for the cutting process F_{spz} is required for the transmission of the torques and axial forces. This also depends (among other things) on the cutting force F_c, passive force F_p and feed force F_f as well as the friction conditions between the chuck jaws and the workpiece.

The initial clamping force F_{sp0} and permissible speed n_{perm} is greatly influenced by the cutting process and the clamping situation and must be individually determined.

For more information, see VDI guideline 3106.

To inspect the calculated values, we recommend measuring the dynamic clamping force with the gripping force tester GFT-X (ID. no. 0890013). You can find more information at **schunk.com**.

3.4.1 Calculation of the required clamping force in case of a given rpm

The initial clamping force F_{sp0} is the force that acts radially on the workpiece via the chuck jaws due to the actuating force with the lathe chuck stationary.

Under the influence of rotation, the mass of the chuck jaws m generates an additional centrifugal force F_{Fl}. The centrifugal force F_{Fl} reduces the effective clamping force F_{sp} when clamping from the outside inwards. When clamping from the inside outwards, the centrifugal force F_{Fl} increases the effective clamping force F_{sp}.

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

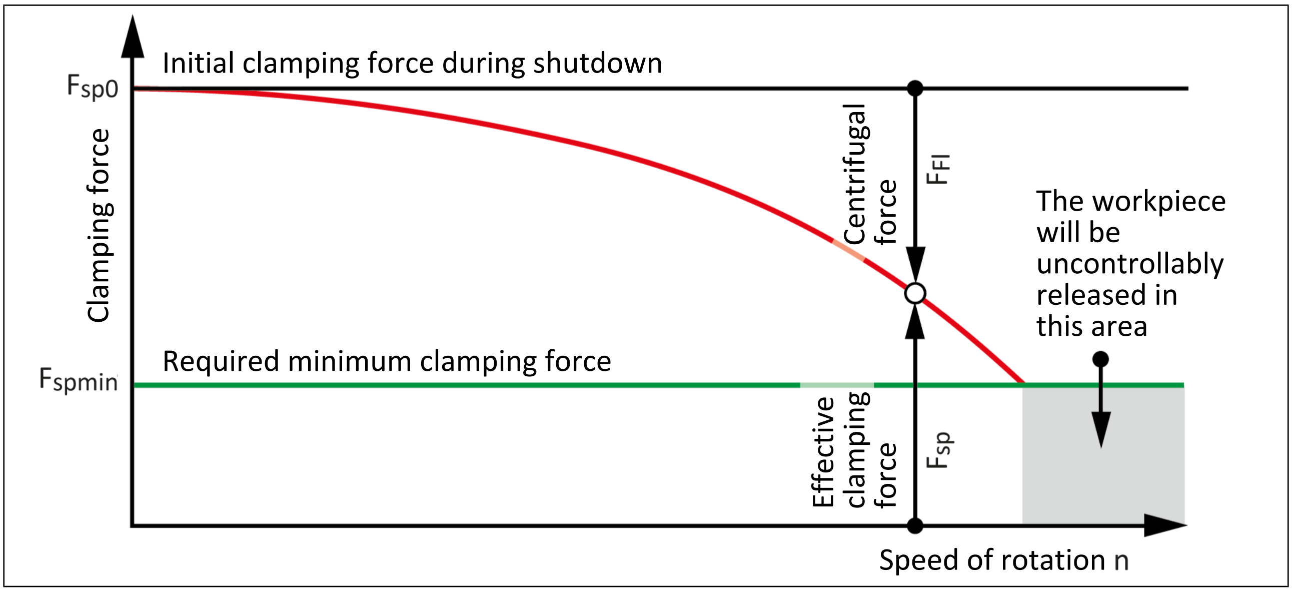
$$F_{sp} = F_{sp0} \mp F_{Fl} \text{ [N]}$$

(–) 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 F_{sp} by the magnitude of the centrifugal force F_{Fl}, at the specified speed n and when clamping from the outside inwards.

The **effective clamping force** F_{sp} available during machining can be calculated from the product of the **required clamping force for the cutting process** F_{spz}, the **safety factor cutting force** S_z and the **quotient of lever length and distance from the pivot point to the center of the clamping area L1/L2**.

The safety factor takes into account the cutting force fluctuations of the machining process. In accordance with VDI guideline 3106, $S_z \geq 1.5$.

$$F_{sp} = S_Z \cdot F_{spz} \cdot \frac{L1}{L2} \ [N]$$

The **initial clamping force** F_{sp0} can be calculated from the sum of the **effective clamping force** F_{sp} and the **centrifugal force** F_{Fl}, multiplied by the **safety factor clamping force** S_{sp}. The clamping force fluctuations of the lathe chuck are taken into consideration here by this safety factor. According to VDI guideline 3106, at least 1.5 must be assumed; $S_{sp} \geq 1.5$.

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

(+) for gripping from the outside inwards
(–) for gripping from the inside outwards

CAUTION

This calculated initial clamping force F_{sp0} may not be larger than the maximum clamping force Σ_S engraved on the chuck.

See also "Chuck data" table

$F_{sp0} \leq \sum s$

The centrifugal force F_{Fl} depends on the mass m and the distance from the center of gravity r_s of the chuck jaws and the speed n. The mass m is made up of the jaw fastening screws and the T-nuts as well as the chuck jaws. With split chuck jaws, the masses of the base and top jaws as well as the masses of the jaw fastening screws and T-nuts must be taken into consideration. The distances between the center of gravity depend on the respective clamping situation and the jaw type (e.g. standard chuck jaws or weight-reduced jaws).

CAUTION

For safety reasons, in accordance with DIN EN 1550, the centrifugal force F_{Fl} may be a maximum of 67% of the initial clamping force F_{sp0}.

$F_{Fl} \leq 0.67 \cdot F_{sp0}$

The formula for the calculation of the total centrifugal force F_{Fl} is:

$$F_{Fl} = M_{FlAB} \cdot \left(\frac{\pi \cdot n}{30}\right)^2 \cdot \frac{L2}{L1} \ [N]$$

with

$M_{FlAB} = m_{AB} \cdot i \cdot r_{sAB}$ [kgm]

results in the formula for:

$$F_{Fl} = (m_{AB} \cdot i \cdot r_{sAB}) \cdot \left(\frac{\pi \cdot n}{30}\right)^2 \cdot \frac{L2}{L1} \ [N]$$

The product from the mass of **one** top jaw m_{AB}, number of jaws **i** and the distance from the center of gravity of the top jaws rs_{AB} is referred to as the "centrifugal torque".

The mass of **one** top jaw, made up of top jaw, jaw fastening screws and T-nuts, must be determined by the user.

The mass of **one** used top jaw **(without jaw fastening screws or T-nuts)** can be found in the chuck jaws catalog. With a weight specification in the chuck jaws catalog of "m/set", this figure must be divided by the number of jaws or the factor "Number of chuck jaws **i**" must be removed from the aforementioned formula.

The mass of the jaw fastening screws and T-nuts must be determined by the user and taken into consideration in the calculation.

3.4.2 Calculation example: required initial clamping force for a given speed

Required initial clamping force F_{sp0} for a given speed n

The calculation example refers to a ROTA NCS 6-jaw lathe chuck of size 260-6.

The following data is known for the machining job:

- 6-jaw lathe chuck with top jaws SRK 132 (version 2)
- Lever length L1 = 46.5 mm (chuck-specific, see "chuck data" table ▸ 3.1 [16])
- Clamping height above chuck surface L3 = 50 mm (application-specific)
- max. clamping force Σ_S = 44 kN (chuck-specific, see "chuck data" table ▸ 3.1 [16])
- Clamping from outside inwards
- Required clamping force for the cutting process F_{spz} = 3000 N (application-specific)
- max. speed n_{max} = 3800 rpm (chuck-specific, see "chuck data" table ▸ 3.1 [16])
- Specified speed n = 2800 rpm
- Mass of **one** top jaw m_{AB} = 0.232 kg (depending on the top jaw, jaw fastening screws and T-nuts used)
- Distance from center of gravity of the top jaw to the chuck center r_{sAB} = 0.07528 m (depending on the top jaw used)
- Safety factor cutting force S_z = 1.5 (according to VDI guideline 3106)
- Safety factor clamping force S_{sp} = 1.5 (according to VDI guideline 3106)

The required effective clamping force F_{sp} is determined using the application-specific required clamping force for the cutting process F_{spz} as well as the leverage of the lathe chuck.

$$L_2 = L_3 + 8\text{ mm}$$

$$F_{sp} = S_z \cdot F_{spz} \cdot \frac{L1}{L2} = 1.5 \cdot 3000\text{ N} \cdot \frac{46.5\text{ mm}}{50\text{ mm} + 8\text{ mm}} = 3608\text{ N}$$

The initial clamping force F_{sp0} during shutdown is calculated as follows:
[(+) for clamping from the outside inwards]

$$F_{sp0} = S_{sp} \cdot (F_{sp} + F_{Fl})\text{ N}$$

with the centrifugal force F_{Fl}:

$$F_{Fl} = (0.232\text{ kg} \cdot 6 \cdot 0.07528\text{ m}) \cdot \left(\frac{\pi \cdot 2800\text{ min}^{-1}}{30}\right)^2 \cdot \frac{50\text{ mm} + 8\text{ mm}}{46.5\text{ mm}} = 11237\text{ N}$$

Initial clamping force F_{sp0} during shutdown:

$F_{sp0} = 1.5 \cdot (3608\ N + 11237\ N) = 22268\ N$

$F_{sp0} \leq \sum s$

and

$F_{Fl} \leq 0.67 \cdot F_{sp}$

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

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

In case of a given initial clamping force F_{sp0}, the permissible speed n_{perm} is calculated according to:

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\left(\frac{F_{sp0}}{S_{sp}} \mp \left(S_z \cdot F_{spz} \cdot \frac{L1}{L2}\right)\right) \cdot \frac{L1}{L2} \cdot \frac{1}{m_{AB} \cdot i \cdot r_{sAB}}}$$

(–) for gripping from the outside inwards
(+) for gripping from the inside outwards

CAUTION

The calculated permissible speed n_{perm} may not exceed the maximum speed n_{max} inscribed on the chuck for safety reasons!

3.4.4 Example of calculation: Permissible speed for a given initial clamping force

Permissible speed n_{perm} for a given initial clamping force F_{sp0}

The calculation example refers to a ROTA NCS 6-jaw lathe chuck of size 260-6. The following data is known for the machining task:

- 6-jaw lathe chuck with top jaws SRK 132 (version 2)
- Lever length L1 = 46.5 mm (chuck-specific, see "chuck data" table ▸ 3.1 [🗋 16])
- Clamping height above chuck surface L3 = 50 mm (application-specific)
- max. clamping force Σ_s = 44 kN (chuck-specific, see "chuck data" table ▸ 3.1 [🗋 16])
- Clamping from outside inwards
- Required clamping force for the cutting process F_{spz} = 3000 N (application-specific)
- Max. speed n_{max} = 3800 rpm (chuck-specific, see "chuck data" table ▸ 3.1 [🗋 16])
- Mass of **one** top jaw m_{AB} = 0.232 kg (depending on the top jaw, jaw fastening screws and T-nuts used)

- Distance from center of gravity of the top jaw to the chuck center r_{sAB} = 0.07528 m (depending on the top jaw used)
- Safety factor cutting force S_z = 1.5 (according to VDI guideline 3106)
- Safety factor clamping force S_{sp} = 1.5 (according to VDI guideline 3106)

The permissible speed n_{perm} can be calculated from:
[(–) for clamping from the outside inwards]

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\left(\frac{4400\ N}{1.5} - \left(1.5 \cdot 3000\ N \cdot \frac{46.5\ mm}{50\ mm + 8\ mm}\right)\right) \cdot \frac{46.5\ mm}{50\ mm + 8\ mm} \cdot \frac{1}{0.232\ kg \cdot 6 \cdot 0.07528\ m}} = 4236\ min^{-1}$$

$n_{perm} \geq n_{max}$

The calculated permissible speed n_{perm} = 4236 rpm is greater than the maximum speed of the chuck n_{max} = 3800 rpm.
The calculated speed n_{perm} may **not** be used.

The permissible speed n_{perm} selected must be less than or equal to the maximum speed n_{max} ($n_{perm} \leq n_{max}$).

3.5 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.

3.6 Permissible imbalance

The ROTA NCS 6 in ungreased state without top jaws corresponds to the balancing quality class 6.3 (according to DIN ISO 1940-1). 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 1940-1.

4 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

5 Mounting

5.1 Installing and connecting

⚠ 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.

1. Checking the spindle nose for mounting the chuck flange ▸ 5.2 [🗋 33]
2. Chuck assembly
   ⇨ Chuck assembly with cylindrical recess ▸ 5.3.1 [🗋 35] or
   ⇨ Assembly of the chuck with reduction or extension flange ▸ 5.3.2 [🗋 36] or
   ⇨ Assembly of the chuck with direct mount ▸ 5.3.3 [🗋 37]
3. Performing a functional check ▸ 6 [🗋 40]

5.2 Inspection of the spindle nose for mounting the chuck flange

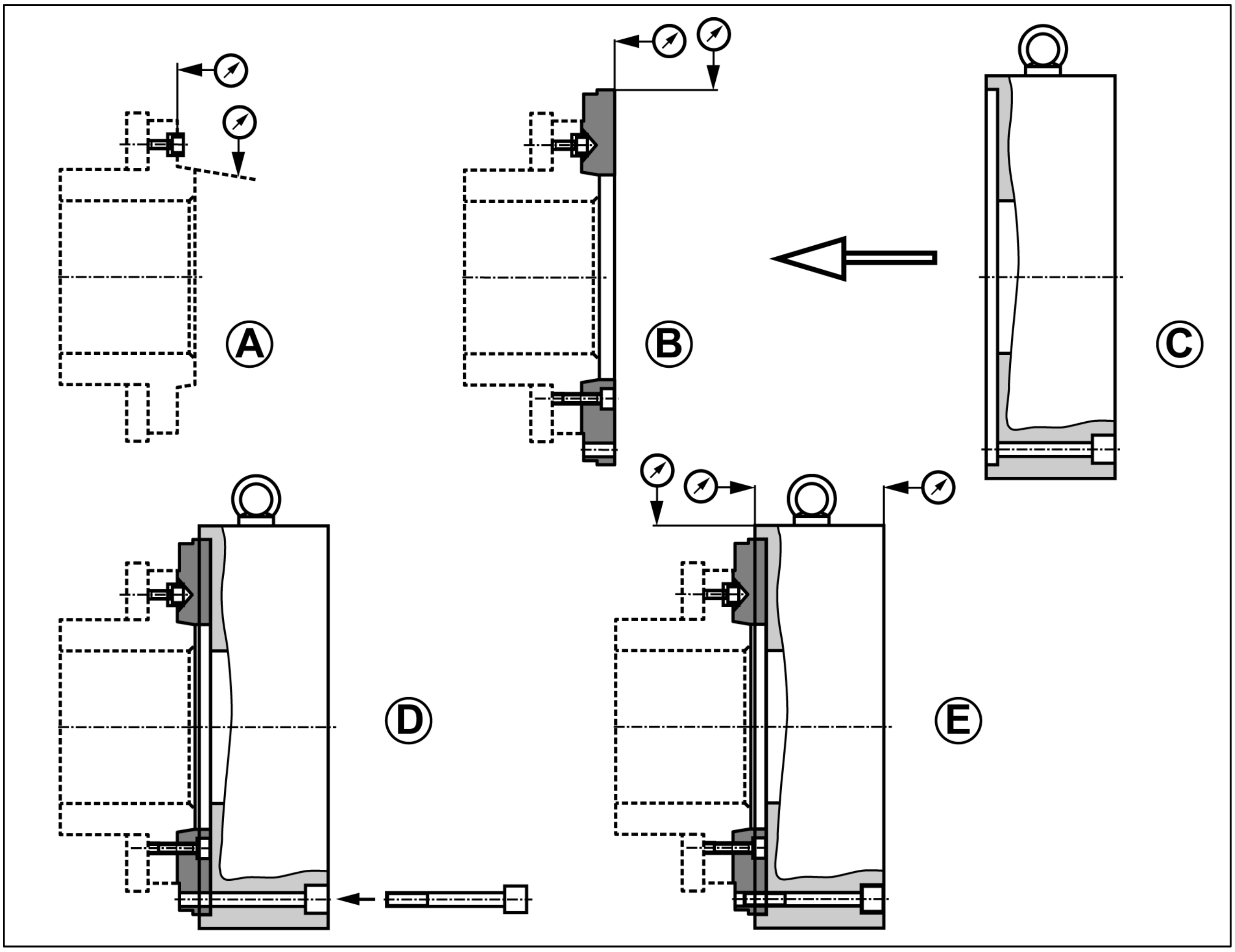
The machine side must be aligned prior to the flange being installed in order to achieve high run-out accuracy of the chuck. To do this, check the contact surfaces on the spindle for axial and concentric run-out using a dial indicator (see Fig. "Chuck assembly" - A).

There should be a maximum concentricity error in the centering of the mount of 0.005 mm and a maximum axial run-out error in the contact surfaces of 0.005 mm. The flat surface of the spindle must also be checked for flatness using a straight edge.

Make sure that the surface area of the flat surface is deburred at the bore holes and is clean.

5.3 Assembly of the chuck on the machine

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▸ 9 [48].



Chuck assembly

The radial and axial run-out accuracy to be reached depend on the diameter of the chuck. The table shows the attainable maximum radial and axial run-out tolerances:

Chuck size [mm]	Max. concentricity error [mm]	Max. axial run-out error [mm]
260-6	0.025	0.01
315-6	0.030	0.02
400-6	0.040	
500-6	0.050	0.04

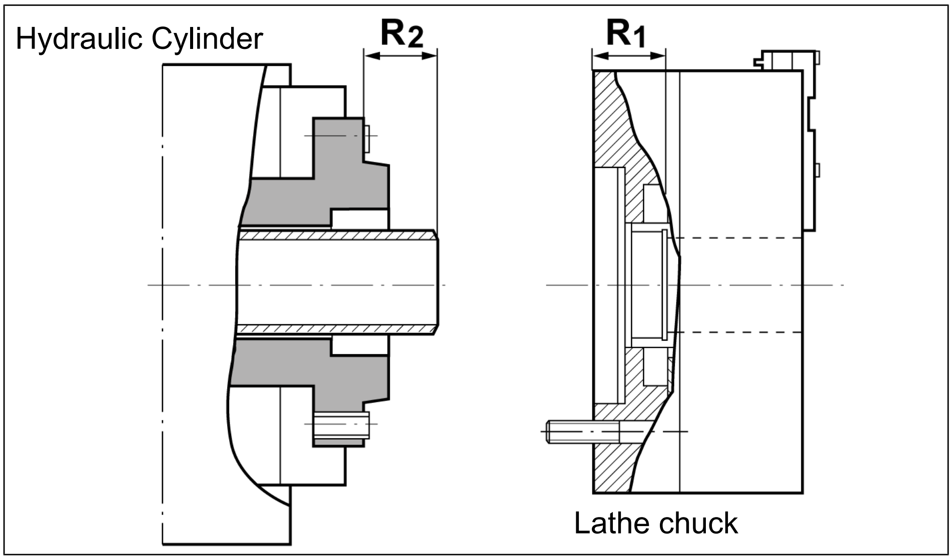
5.3.1 Chuck assembly with cylindrical recess

- Completely remove the mounting screws (item 20).
- Actuate the hydraulic cylinder and move the draw tube to its foremost position (see Fig. "piston position").

Using a crane on an assembly belt or eye bolt, raise the chuck in front of the spindle lug until it is flush with the center of the spindle.

- By rotating the draw tube, pull the chuck onto the spindle.
- Tighten the chuck mounting screws (item 20) alternately.
- Check radial and axial runout at the checking edge (see "Chuck assembly" Fig. - A ▸ 5.3 [🗋 34]).
- Check the actuating force is functioning and is sufficient.
- Ensure smooth operation.
- In accordance with identification 1, 2 and 3, secure the top jaws to the base jaws with screws.

The parts are disassembled in the same way but in the reverse order.



Piston position

Cylinder piston in foremost position

R1 = Push the chuck piston to its foremost position and measure with a depth gauge

R2 = R1 – 0.5 mm (max. – 1 mm)

5.3.2 Mounting the chuck with a reduction or extension flange

If the chuck is screwed on with an intermediate flange, the following points must be observed:

To mount the chuck with a reducing or extension flange on the machine spindle with a short taper, a corresponding chuck flange must be fastened to the spindle nose.

- Before assembly of the chuck flange, remove any dirt or chips from the machine spindle and from the centering mount and contact surface of the flange.
- A chuck flange produced by the user must be fully machined on the machine spindle and balanced before assembly of the chuck.
- After assembly, ensure that the flange is in contact with the entire surface.
- Then check radial and axial run-out. (See "Chuck assembly" Fig. – B and the table of the attainable maximum radial and axial run-out tolerances ▸ 5.3 [🗋 34]).

After the flange has been aligned, the chuck is assembled. Remove any contaminants on the flange and the chuck contact surfaces.

- Using a crane on an assembly belt or eye bolt, raise the chuck in front of the spindle lug until it is flush with the center of the spindle (see "Chuck assembly" Fig. – C ▸ 5.3 [🗋 34]). The eye bolt is included in the scope of delivery from size 250.

The eye bolt must be removed after the chuck has been assembled and prior to starting up the chuck.

- If necessary, turn the adapter on the chuck.
- Push the chuck onto the intermediate flange. Ensure that the through-bores for fastening the chuck line up with the threaded holes of the flange (see "Chuck assembly" Fig. – D ▸ 5.3 [🗋 34]).
- Insert and **slightly tighten** the mounting screws.
- Check the chuck for radial and axial run-out accuracy and, if necessary, align at the outer diameter with gentle taps using a hammer. (See "Chuck assembly" Fig. – E and the table of the attainable maximum radial and run-out tolerances ▸ 5.3 [🗋 34]).
- Then tighten the mounting screws with a torque wrench. Observe the specified maximum tightening torques (see "Screw tightening torques" chapter ▸ 4 [🗋 32]).
- Check radial and axial run-out again.

5.3.3 Mounting the chuck by means of a direct mount

When assembling the chuck via the direct mounting with screw-through, the flange is first secured to the chuck and then mounted on the spindle. The following points must be observed:

- Before mounting the chuck flange on the cylindrical recess of the chuck, any dirt or chips from the centering mount and contact surface of the flange must be removed.
- Secure the flange onto the chuck with the supplied screws. **Slightly tighten** the screws and align the flange to the chuck body. Check the radial and axial run-out.
- Then tighten the screws with a torque wrench. Observe the specified maximum tightening torques (see "Screw tightening torques" chapter ▸ 4 [🗋 32]).
- After assembly, the flange must be in contact with the entire surface. Check radial and axial run-out.

After mounting the flange on the chuck, the chuck is mounted on the machine spindle.

- Push the chuck onto the intermediate flange. Ensure that the through-bores for fastening the chuck line up with the threaded holes of the flange (see "Chuck assembly" Fig. - D ▸ 5.3 [🗋 34]).
- Insert and **slightly tighten** the mounting screws.
- Check the chuck for radial and axial run-out. (See "Chuck assembly" Fig. - E and the table of the attainable maximum radial and axial run-out tolerances ▸ 5.3 [🗋 34]).
- Then tighten the fastening screws with a torque wrench. Observe the specified maximum tightening torques (see "Screw tightening torques" chapter ▸ 4 [🗋 32]).
- Check radial and axial run-out again.

5.4 Exchanging and turning the top jaws

When changing the top jaws, the tongue and groove must be cleaned. Tighten the screws with the specified torque (see "Screw torques" chapter ▸ 4 [32]).

⚠ WARNING

Risk of personal injury and property damage due to parts flying off in the event of a screw breakage on unhardened top jaws!

Soft standard top jaws must be hardened in the countersink region.
They should only be depth-hardened, not surface-hardened.

Chuck jaws for maximum clamping repeat accuracy must be turned or ground in the chuck under clamping pressure.

When turning or grinding, ensure that the turning ring or turning pin is clamped **by the top jaws** and not by the base jaws.
When turning or grinding, ensure that the lever is at 0° to the chuck axis.
Tighten jaw mounting screws (screw quality 12.9) to specified torque (see "Screw torques" chapter"). ▸ 4 [32]

Tighten the mounting screws of the top jaws with a torque wrench. Never tighten the Allen key with an extension pipe or by hitting it with a hammer.

5.5 Modification from O.D. to I.D. clamping

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▸ 9 [48].

Move the pistons to the front end position.

If using in a vertical position, always replace the uppermost lever separately.

Remove the screws (item 22) and use the threaded extraction holes to lift them off the chuck body together with the cap and and cover. Turn the lever assembly 180° and reinstall by following the steps in reverse order.

To change the other lever, turn the chuck so that the lever you wish to replace is at the top.

When loosening the screws (item 22), oil may leak from the chuck(place an oil collection container under the chuck).

After modification, refill the oil levels in the chuck (see chapter "maintenance"▸ 7 [41]).

5.6 Modification from chuck with a pulldown function to chuck without a pulldown function

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▸ 9 [🗋 48].

Move the pistons to the front end position.Remove the screws (item 22) and use the threaded extraction holes to lift them off the chuck body together with the cap and and cover.Turn the lever assembly 180° and reinstall by following the steps in reverse order.

Detach the bearing seats (item 8) from the sides of the lever assembly and re-insert the bearing seats (item 17) with pins. Ensure that the guide pin (item 25) is positioned symmetrically in the lever.

Remove the springs (item 31) from the chuck body.

Then insert the lever assembly into the chuck body and fasten using the screws (item 22).

6 Function

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▸ 9 [48].

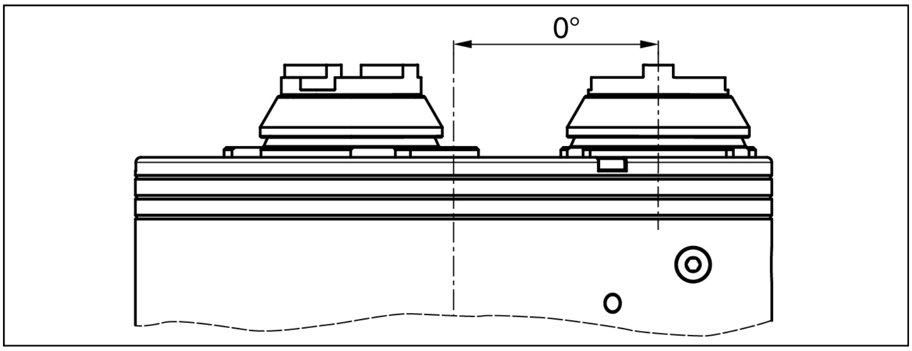
Precise plane parallel clamping, e.g.
of brake disks, brake drums and flanges.

6.1 Function and handling

The mechanism inside the clamp moves in a closed oil reservoir.

The hermetically sealed chuck is encapsulated to protect it from being permeated by steel or cast-iron chips, dust and emulsion. These chucks have a very high bearing load capacity, and are completely reliable for work in serial and mass production. The lever chuck is actuated using a rotating solid or open-center cylinder. The axial tension and pressure forces are diverted to the radial jaw clamping force by means of leverage in the piston. The clamping and opening path of the chuck jaws is determined by the clamping cylinder. The serration of the base jaws can be used to mount standard jaws as well as special jaws for complicated workpiece shapes.

The optimum clamping area is available when the lever is at 0° to the chuck axis!
Do not clamp in the front or rear end positions, as full clamping force cannot be achieved here!



Optimal clamping position

⚠ WARNING

Clamping further above the chuck surface results in lower clamping force.

If the workpiece is released in an uncontrolled manner, operating personnel may be injured and the system may be damaged.

- Refer to the "Technical data" chapter!

7 Maintenance

7.1 Lubrication

Upon delivery, the chuck is filled with oil!

After prolonged storage:

- Before the chuck is put back into operation: pour oil with the oil press through the quick coupling into the chuck. ▸ 7.1 [42]
- For optimum oil distribution, the clamping piston must travel the entire stroke several times.

Once a week or every 120 operating hours:

- Check the internal oil level of lathe chuck at least once a week or every 120 operating hours. Do this by removing the seal plug and topping up the oil level if necessary. ▸ 7.1 [42]
- For optimum oil distribution, the clamping piston must travel the entire stroke several times.

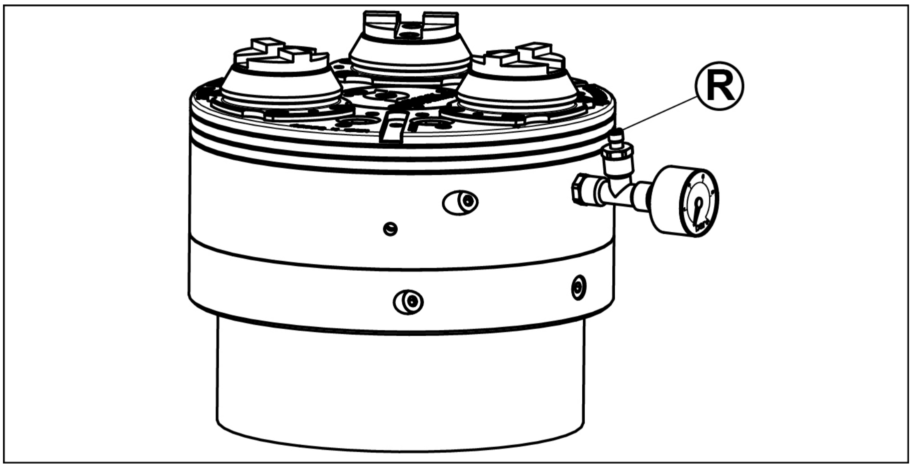
Every 6 months or every 60,000 cycles:

- Check the tightness of the chuck. Change the seals if necessary. If necessary, refill with oil. ▸ 7.1 [42]
- For optimum oil distribution, the clamping piston must travel the entire stroke several times.

Leak test:

Remove a locking screw (item 26) ("Filling the chuck" picture).

Screw the leakage testing device into the bore hole of the sealing plug ("Leak test" picture). Fill the chuck through the check valve (R) using a compressed air gun with approx. 4 bar.
If hardly any drop in pressure is detected in 10 minutes, then the chuck has no leakages.

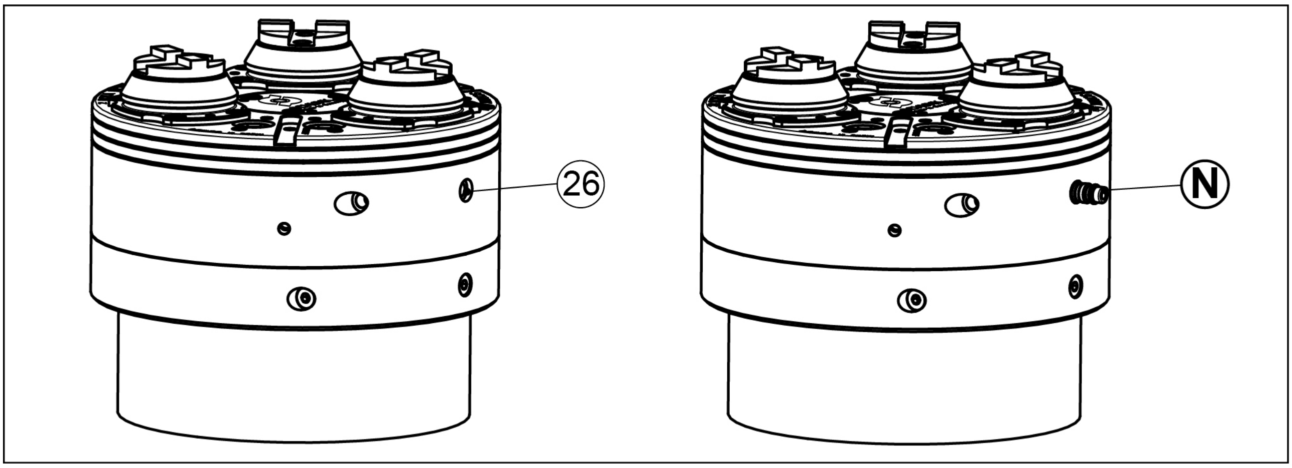


Leak test

Filling the chuck

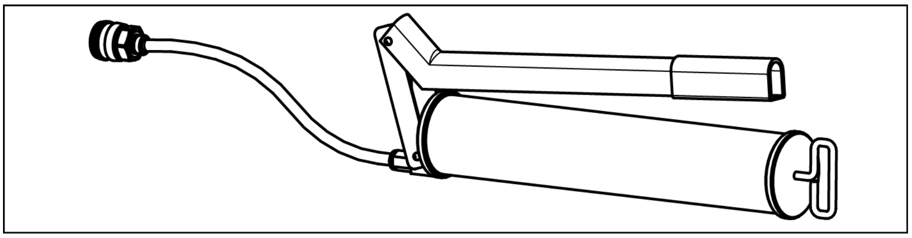
Type of oil: lubricating oil SGL 320 (or similar)

To fill the chuck, remove the locking screws (item 26). Rotate the supplied plug nipple (N) into a bore hole of the locking screws ("Filling the chuck" picture).



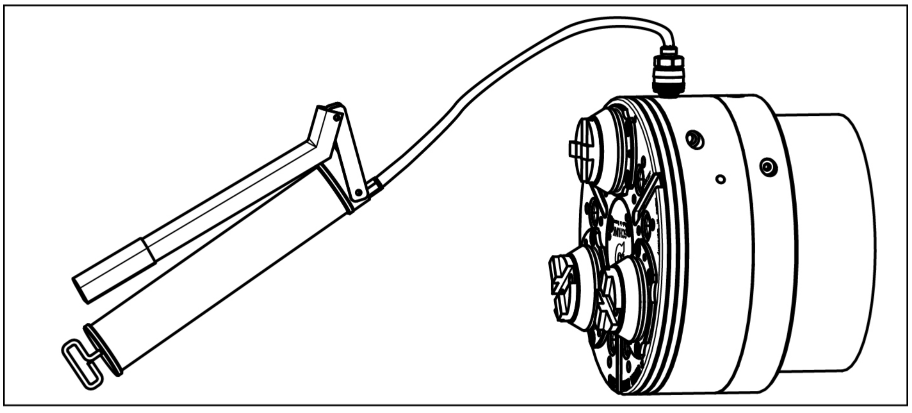
Filling the chuck

Attach the filled oil press to the plug nipple (N) via the quick-change coupling ("Oil press" picture, "Filling the chuck"). Use the lever on the oil press to press oil into the chuck. Repeat this action until the oil is pushed out of the other open locking screw bore hole (item 26). The oil press can fill a maximum of 0.5 liters of oil.



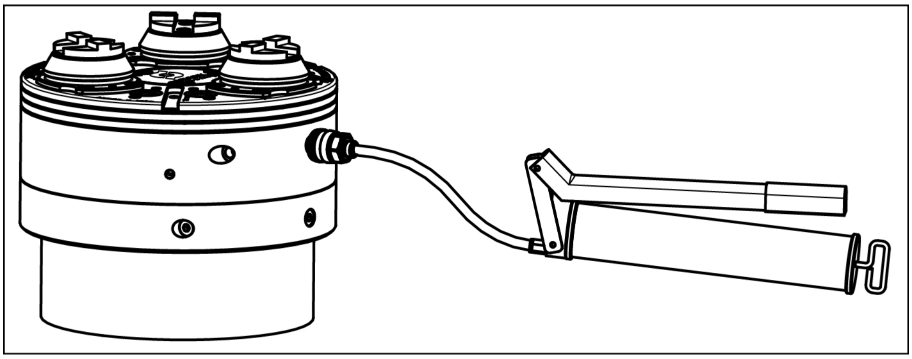
Oil press

Filling a horizontally set up chuck ("Filling horizontally" picture).



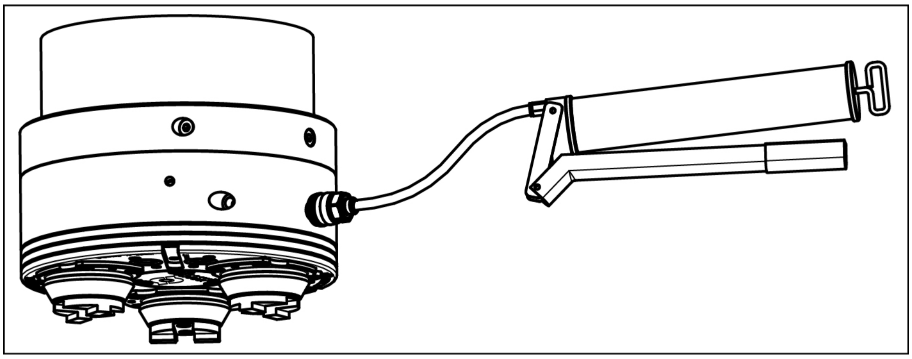
Filling horizontally

Filling a vertically positioned chuck ("Vertical filling (upright)" picture).



Vertical filling (upright)

Filling a vertically suspended chuck ("Vertical filling (suspended)" picture).



Vertical filling (suspended)

Operating conditions

Depending on the operating conditions, the function and clamping force must be checked after a certain period of operation. Only use a calibrated clamping force tester for measuring in the clamping force test (SCHUNK GFT-X, ID no. 0890013).

Technical condition

With the smallest possible actuating pressure (clamping cylinder), the base jaws should 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 significantly or if the base jaws and piston no longer move properly, then the chuck has to be disassembled, cleaned and re-filled with oil.

Only use genuine SCHUNK spare parts when replacing damaged parts.

7.2 Maintenance intervals

Operating hours	Contamination
5,000 operating hours or max. 250,000 clampings	Full cleaning with disassembly of chuck depending on type of contamination and quantity

Checking the oil level

At least once a week or every 120 operating hours. **Refill if necessary.**

If the chuck shows a low oil level during normal operation, search for the leak immediately, seal the leak and refill the lost oil.

Oil capacity

Size	**260-6**	**315-6**	**400-6**	**500-6**
Fill quantity approx. liters	1.1	1.89	2.82	9.14

7.3 Disassembly and assembly of the Chuck

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▸ 9 [🗋 48].

The lathe chuck must only be disassembled once it has been uninstalled (see "Mounting the chuck to the machine" chapter ▸ 5 [🗋 33]).

- Remove the seal plug (item 26) and pour the oil into a collection container.
- Push the screw (item 22) and the lever (item 3) out of the chuck body through the threaded extraction holes in the cover plate (item 9). Mark the position of the lever (item 3) in relation to the chuck body (item 1).
- Mark the position of the back plate (item 4) in relation to the chuck body. Remove the set screw (item 30), remove the screw (item 21) and screw it into the bore hole of the back plate for extraction (item 30), and push out the back plate.
- Pull the piston (item 2) out of the chuck body. Mark the position of the lever (item 2) in relation to the chuck body (item 1).

Disassembly of the lever assembly

- Push the pin (item 12) out of the lever. This enables removal of the components (items 7, 8, 9, 12, 43, 44, 45) from the lever.

Disassembly of the piston assembly

- Remove the screw (item 27 + 28) from the piston. This enables removal of the components (items 5, 6, 7, 12, 15, 25, 29) from the piston.

Degrease and clean all parts and check them for damage.
Replace all seals (see "Assembly drawing" chapter ▸ 9 [🗋 48]).

Only use genuine SCHUNK spare parts when replacing damaged parts.

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

When assembling the lever, make sure that the number of the lever matches the number of the lever guide.

8 Spare parts

When ordering spare parts, it is imperative to specify the type, size and above all the serial no. of the chuck.

Seals, sealing elements, screw connections, springs, bearings, screws and wiper bars plus parts coming into contact with the workpiece are not covered by the warranty.

Seal kit

Size	260	315	400	500
ID no.	9984278	9984279	9984280	9984281

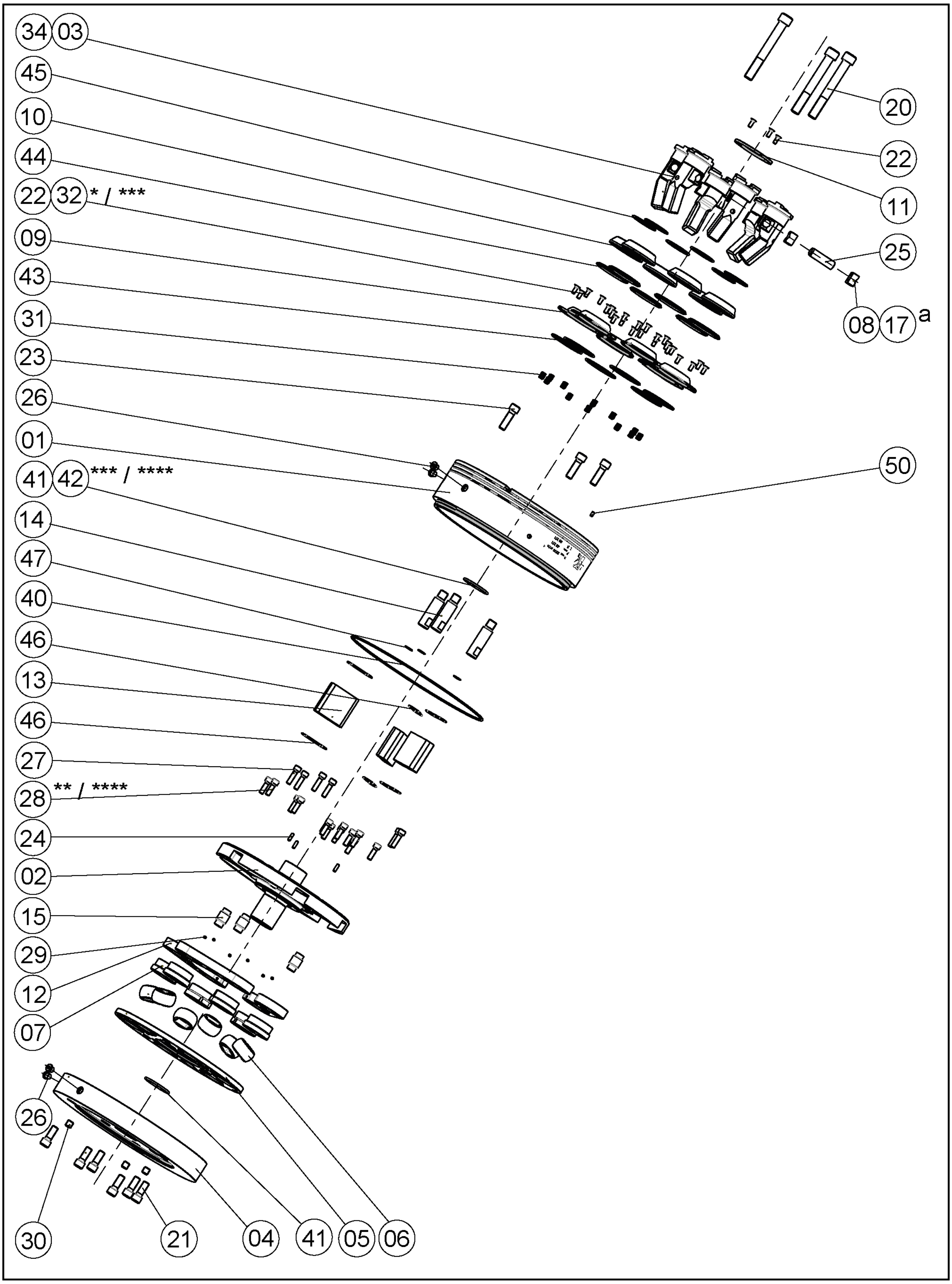
Spare parts

Item	Characterization
1	Chuck body
2	Piston
3	Lever
4	Integrator
5	End cap
6	Ball pressure piece
7	Ball bushing
8	Seat of bearing
9	Cover
10	Cover plate
11	Protection sleeve
12	Pendulum piece
13	Bush
14	Position picker
15	Shaft
17 (a)	Seat of bearing
20	Screw
21	Screw
22	Screw
23	Screw
24	Cylindrical pin
25	Guide pin
26	Locking screw
27	Screw
28	Screw
29	Set-screw

30	Cylindrical pin
31	Compression spring
32	Screw
33	Screw
34	Compression spring
40	O-ring
41	O-ring
42	O-ring
43	O-ring
44	Sealing ring
45	O-ring
46	O-ring
47	O-ring
48	Screw
50	Emblem
60	Eye bolt **

(a) Bearing seat for modification "without pull-down function"

9 Assembly drawing



* only 260	** only 315	*** only 400	**** only 500

a	Bearing seat for modification "without pull-down function"

10 Boring of chuck jaws

In order to achieve a high level of run-out accuracy and repeat accuracy, top jaws or monoblock jaws must be ground or turned in the lathe chuck on which they will be subsequently used for workpiece clamping.

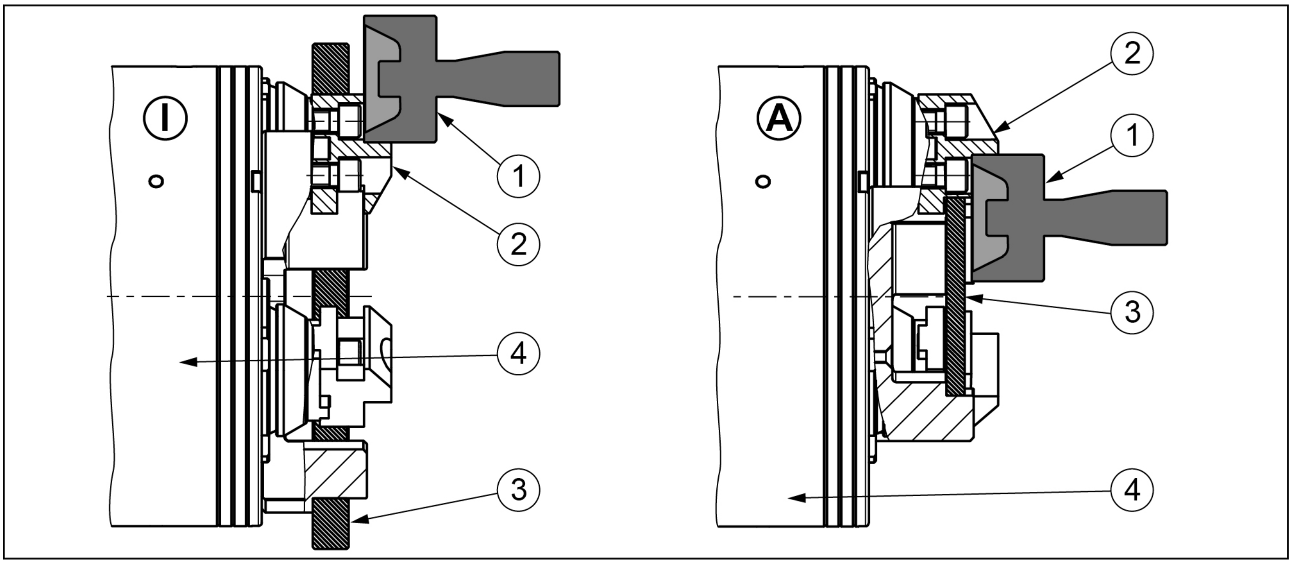
The sum of the tolerance-related dimension differences of all individual parts that are involved in the drive results in the different radial positions of the jaws. The jaws are marked to ensure that the same jaw is mounted in the same guide or on the same base jaw.

Turning or grinding of jaws must be done on an operationally ready lathe chuck.

A correctly dimensioned ring must be pushed over the steps of the jaws for turning/grinding for I.D. clamping and clamped with the same force as the work to be done (Illustration **I** = I.D. clamping).

For turning/grinding for O.D. clamping, a turning ring must be clamped as closely as possible next to the surface to be ground/ turned (Illustration **A** = O.D. clamping). Turning/grinding takes place under clamping pressure.

When turning or grinding, ensure that the turning ring or turning pin is clamped by the top jaws and **not by the base jaws**.



Turning chuck jaws

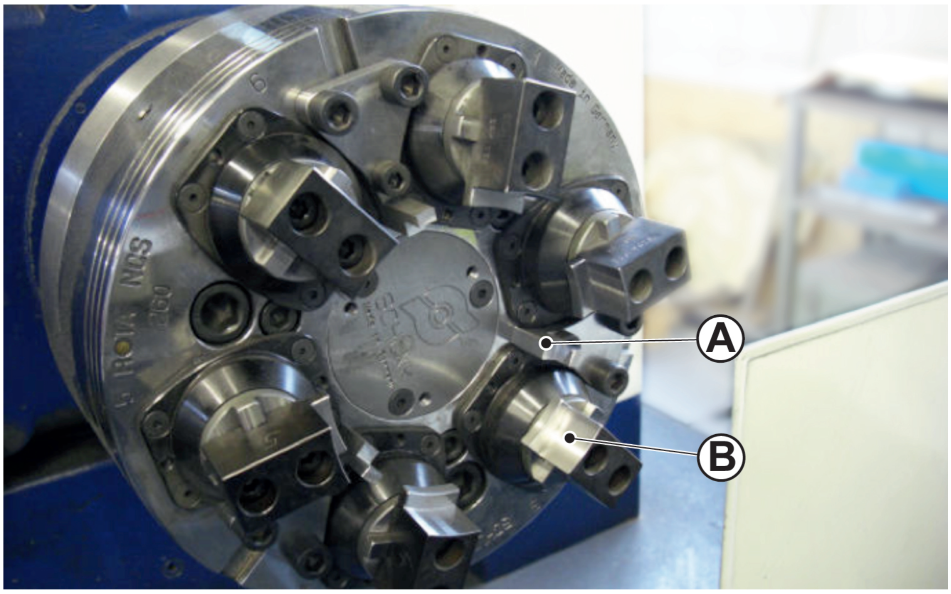
1	Grindstone	2	Chuck jaw
3	Turning ring	4	Lathe chuck

NOTE

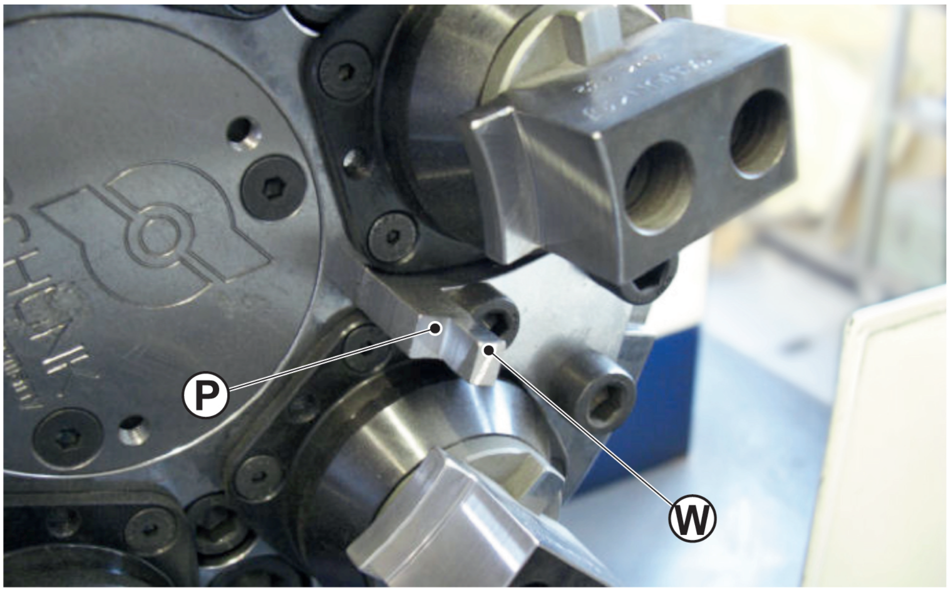
The highest level of run-out accuracy and repeat accuracy is achieved when turning/grinding of top jaws is done under the same conditions that apply during machining. The specified tolerances only apply for hard top jaws that have been ground with 2/3 actuating force.

Turning chuck jaws on a ROTA NCS-chuck

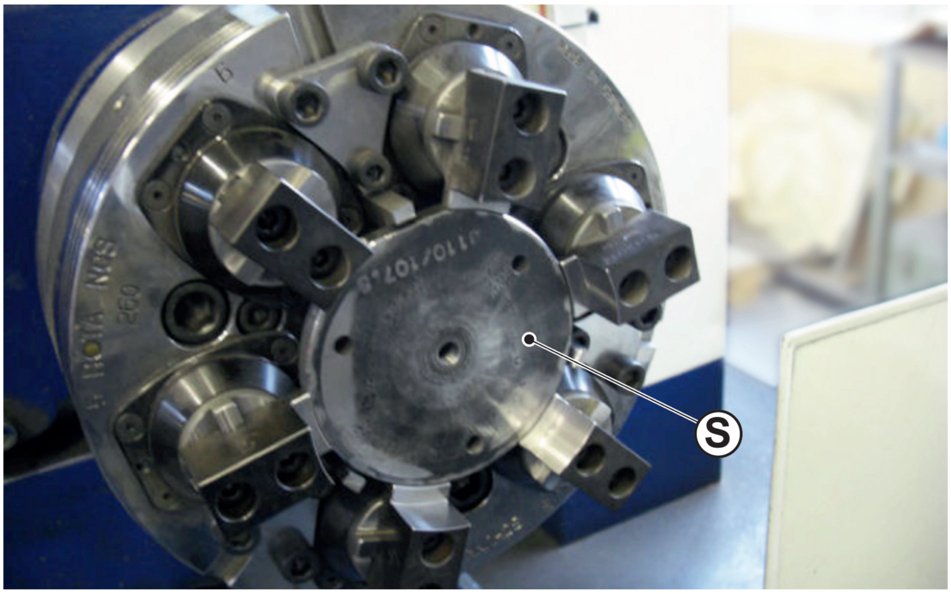
- After mounting the chuck on the machine, the chuck must be aligned to the machine.
- Mount the radial support/back stop and inspect the flat surface with the dial gauge for axial run-out. If the axial run-out does not meet the requirements, the flat surface must be ground.
- Afterwards the top jaws must be screwed in according to their numbered sequence. Tighten the screws with the specified torque (see "Screw torques" chapter ▸ 4 [32]).
- Press the turning ring on a flat work surface on the radial support/back stop and clamp. The diameter of the turning ring must be chosen so that when the ring is clamped the jaws are at 0° (this means 90° to the chuck flat surface).
- Now the chuck jaws can be ground to the desired clamping diameter.
- Check the run-out accuracy again after grinding.



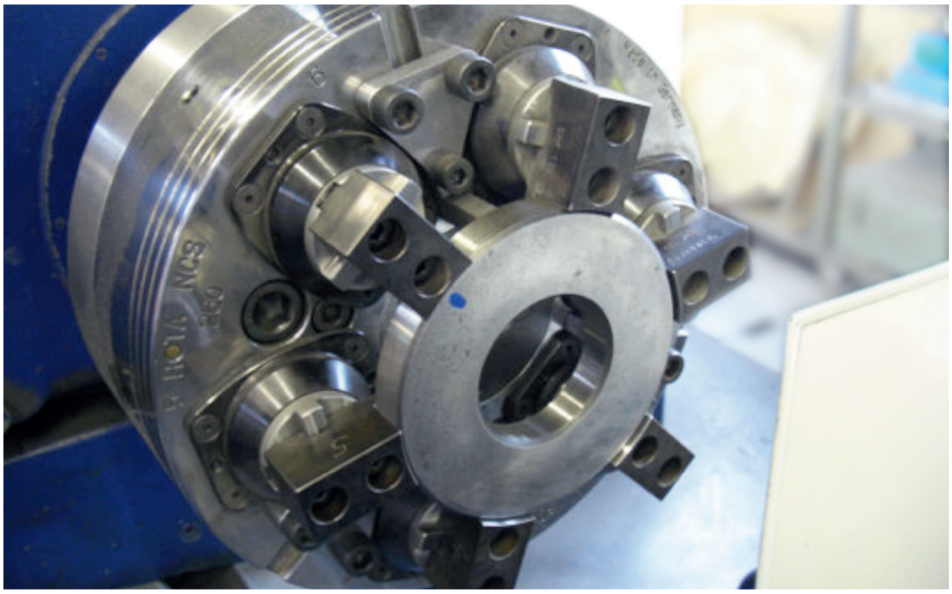
A	Radial support/back stop	**B**	Top jaws



P	Flat work surface turning ring/washer	**W**	Work piece flat work surface



S	Turning ring/washer



Clamping a workpiece or test ring.
Check of the radial and axial run-out.

The following radial and axial run-out values can be achieved with the ROTA NCS:

Chuck size [mm]	**260-6**	**315-6**	**400-6**	**500-6**
Max. concentricity error [mm]	0.02	0.03	0.03	0.05
Max. axial run-out error [mm]	0.01	0.02	0.02	0.04

The specified tolerances only apply for hard top jaws that have been ground with 2/3 actuating force.

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07-2023 03.00 | ROTA NCS 6 | Power lathe chucks | en | 0889069

Manufacturer certificate

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

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 correct operation are defined in the operating manual.
- an $MTTF_D$ value of 150 years can be estimated for mechanical components using the informative procedure in Table C.1 of ISO 13849-1:2015.
- the **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, 25. Apr. 2023

i. V. Philipp Schräder

i.V. Alexander Koch

p.p. Philipp Schräder / Head of Development standard products

p.p. Alexander Koch / Head of Engineering Design special products