SCHUNK

Pneumatic Power Chuck
ROTA TP / ROTA TP-LH
Assembly and operating manual

Translation of the original manual

Hand in hand for tomorrow

Imprint

Copyright:

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

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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 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 [5]

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.

CAUTION

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 [🗋 5]
- Observance of the ambient conditions and operating conditions, ▸ 2.5 [🗋 8]
- Observance of the specified maintenance and lubrication intervals ▸ 6.4 [🗋 45]

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 Sizes

This operating manual applies to the following sizes:

- ROTA TP 125-26
- ROTA TP 160-38
- ROTA TP 200-52
- ROTA TP 250-68
- ROTA TP 315-90
- ROTA TP 315-105
- ROTA TP 350-115 / 350-115 LH

1.4 Scope of delivery

1	**Power lathe chuck**
6	**T-nuts**
2	**Elbow connectors**
2	**Straight connectors**
1	**Spacer ring**
1	**Headless screw for fastening the distributor ring**
1	**Angle for eye bolt**
1	**Eye bolt**
6	**Nuts for assembling the chuck**
6	**Studs for assembling the chuck**
1	**Assembly and operating manual**

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.

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**.

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.

Instructed person
Instructed persons have been instructed by the operator regarding the tasks entrusted to them and the potential dangers of inappropriate behavior.

Manufacturer's service personnel
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.
- Do not start the machine spindle until the clamping force has built up on the chuck jaws and clamping has taken place in 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). If the chuck jaws are changed, the stroke control will have to be adjusted to the new situation.

Maintenance instructions

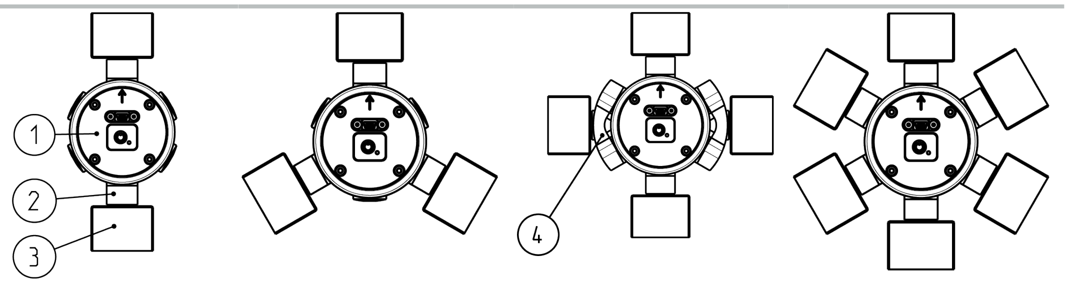
The clamping device's reliability and safety can only be guaranteed if the operator complies with the manufacturer's maintenance instructions.

- 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)**
				
Measuring device	SCHUNK IFT clamping force tester	SCHUNK IFT clamping force tester	SCHUNK IFT clamping force tester	SCHUNK IFT clamping force tester
Accessories	–	–	IFT MA4	–
Measuring points	0°/180°	0°/120°/240°	0° / 180° / 90° / 270° (IFT MA4)	0°/60°/120°/180°/ 240°/300°
Please note	Operating manual SCHUNK IFT Clamping force tester	Operating manual SCHUNK IFT Clamping force tester	Operating manual SCHUNK IFT Clamping force tester **Attention** Compensation must be activated, otherwise it may lead to inconsistent results.	Operating manual SCHUNK IFT Clamping force tester **Attention** 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 is 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)

CAUTION

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

Serration of the jaws [mm]	1/16"x90°

ROTA TP Size	125	160	200	250	315	315	350	350 LH
Chuck through bore [mm]	26	38	52	68	90	105	115	115
Max. clamping force [kN]	22	39	68	105	140	100	90	90
Max. speed of rotation [RPM]	4200	4200	3800	3500	2500	3000	2200	2200
Stroke per jaw [mm]	3.0	4.2	4.2	5.0	5.0	5.0	5.0	5.0
Chuck diameter [mm]	130	165	205	255	320	335	350	350
Distributor ring Ø [mm]	204	255	300	372	413	372	372	372
Centrifugal torque of base jaw [kgm] M_{cGB}	0.012	0.033	0.061	0.118	0.186	0.200	0.209	0.275
Max. jaw eccentricity of center of gravity in axial direction [mm] a_{max}	16	24	30	40	32	32	32	32

The specified maximum speed of rotation stated only applies when using the maximum clamping force and the SHB-type, soft, standard stepped jaws that go with the chuck.

Ensure minimal weight for all jaws.
For unhardened top jaws or chuck jaws in special design, the permissible RPM according to VDI 3106 must be calculated for the respective machining job. Whereby the recommended maximum speed must not be exceeded. The values calculated must be checked by means of dynamic measurement using a clamping force tester.

3.2 Clamping force / speed diagrams

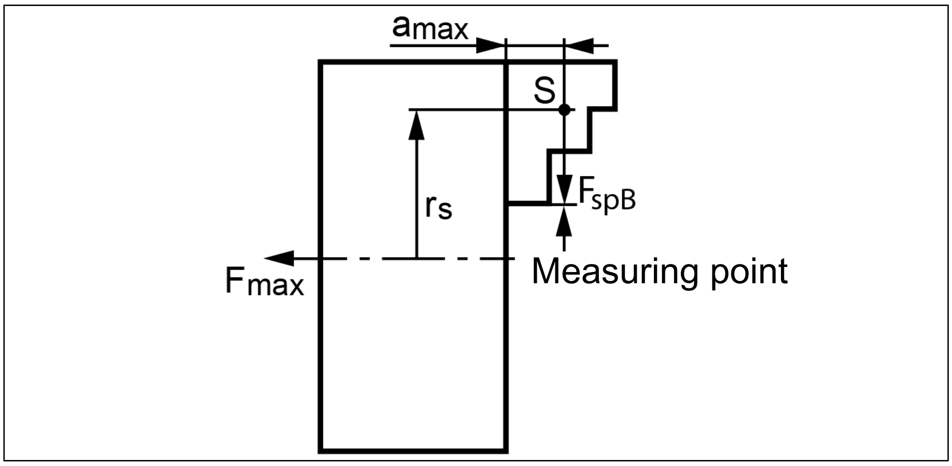
The diagrams refer to 3-jaw-chuck.

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 .

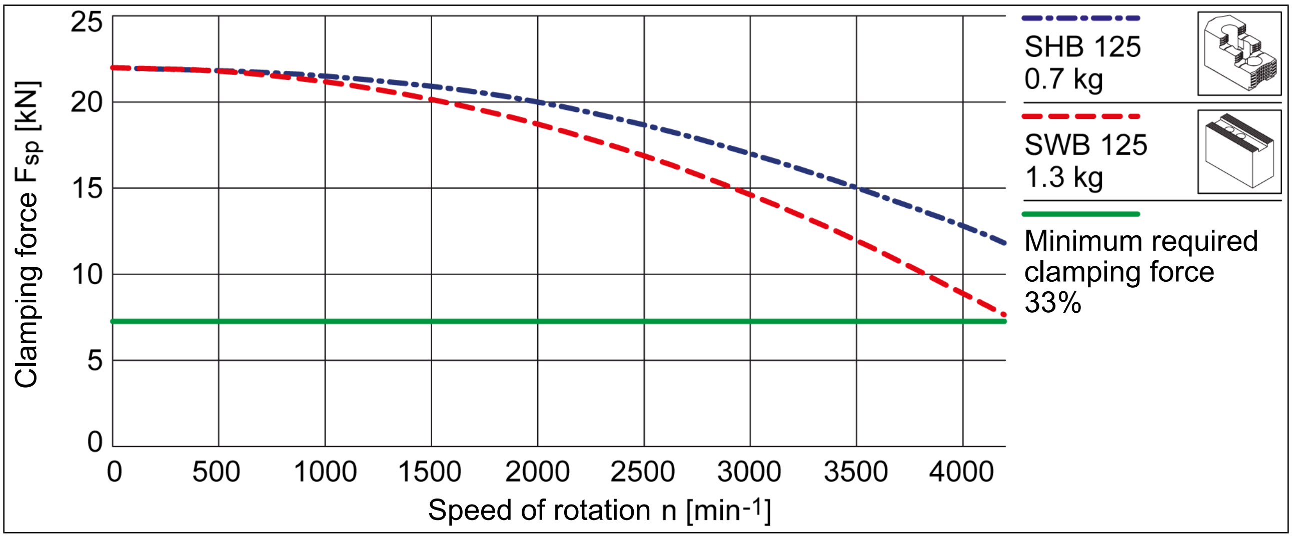
If one or more of these prerequisites is altered, the diagrams will no longer be valid.

Chuck setup for clamping force/RPM diagram

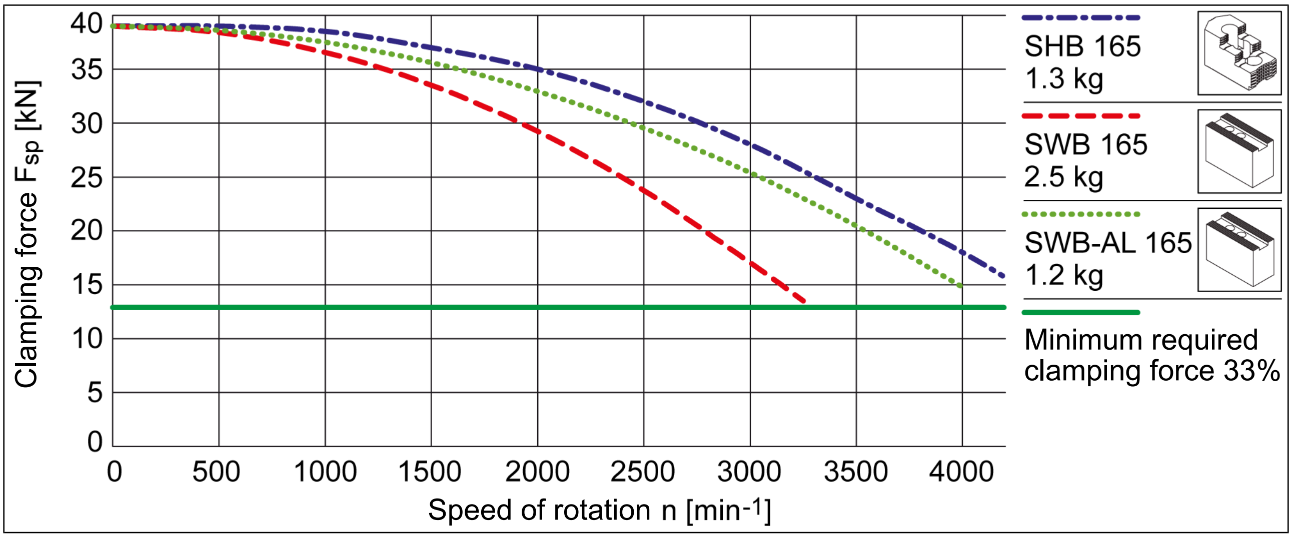


F_{spB}	Clamping force per jaw	S	Center of gravity
r_s	Center of gravity radius	a_{max}	Max. jaw center of gravity eccentricity in axial direction
F_{max}	Max. actuating force		

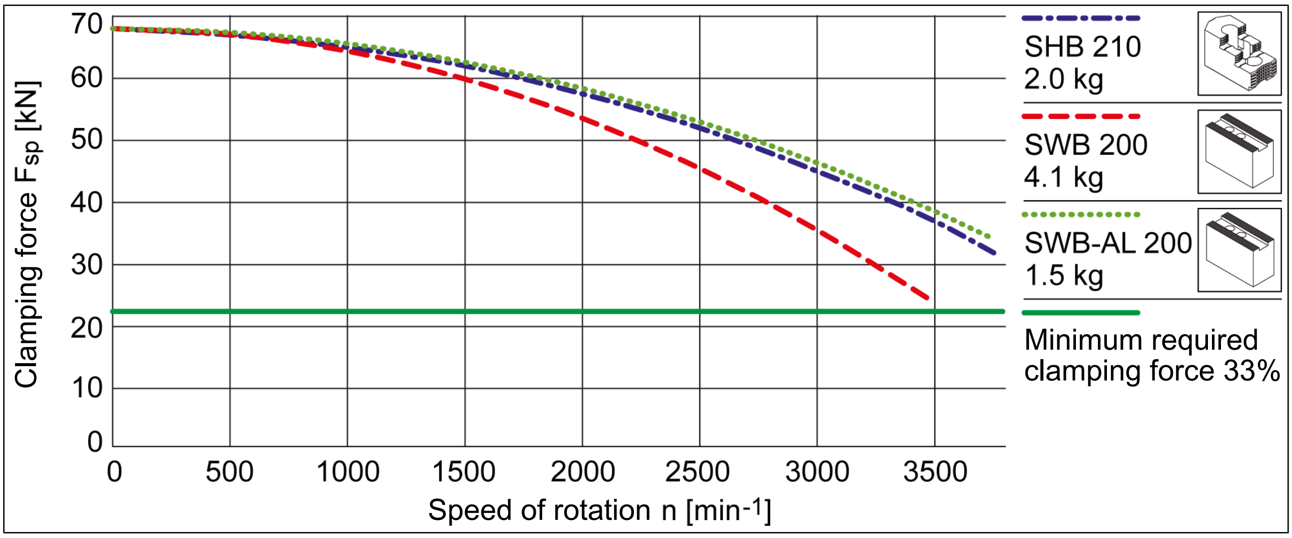
Clamping force / speed diagram ROTA TP 125-26



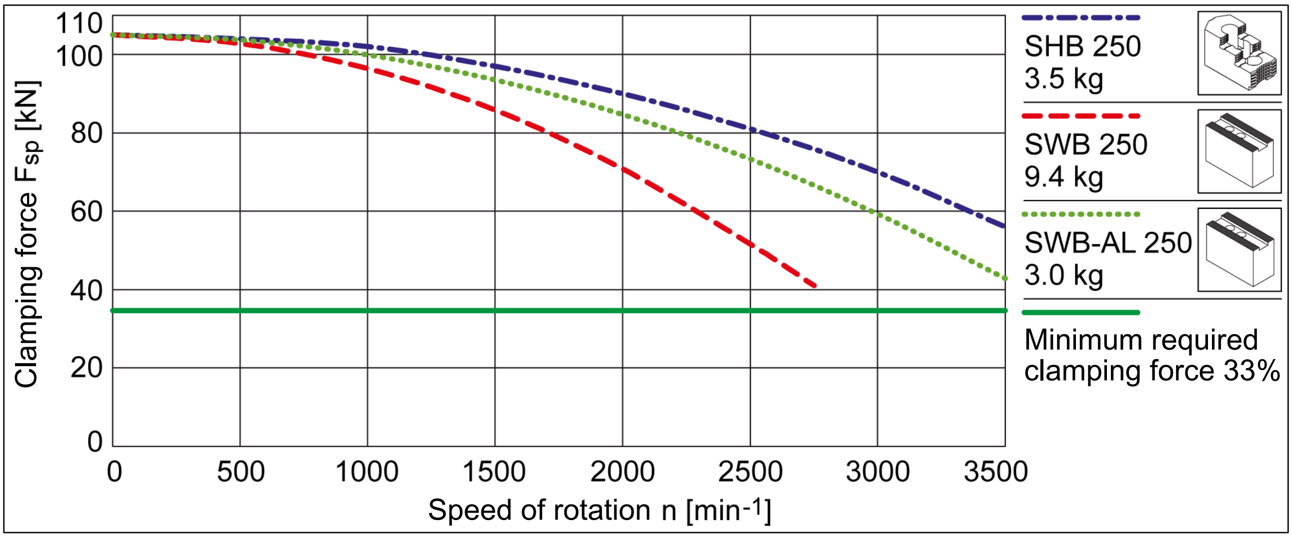
Clamping force / speed diagram ROTA TP 160-38



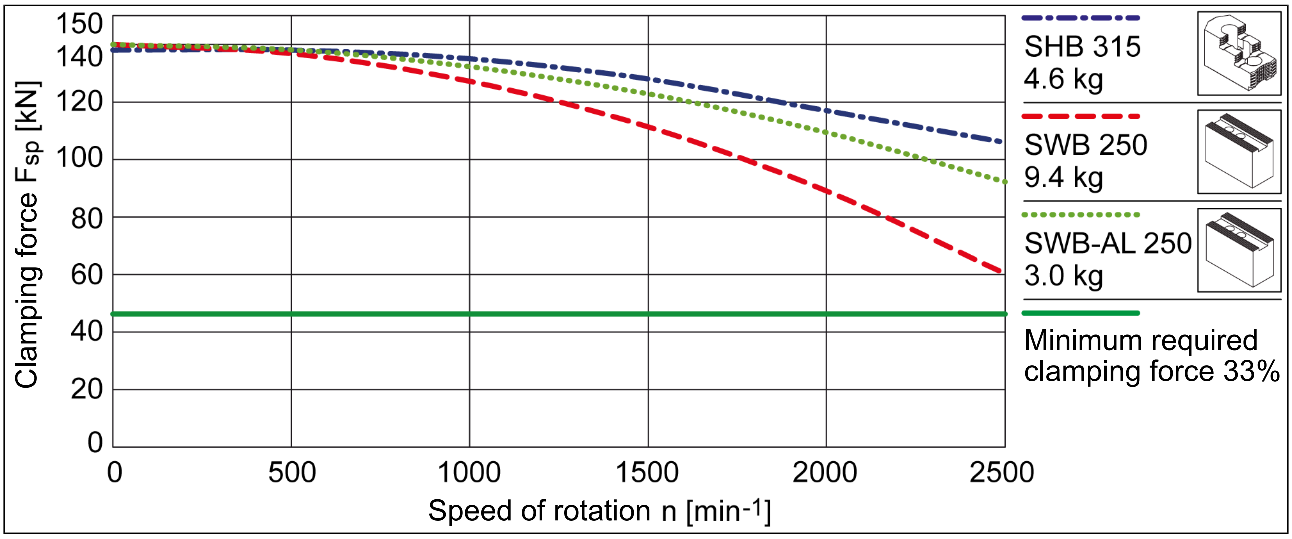
Clamping force / speed diagram ROTA TP 200-52



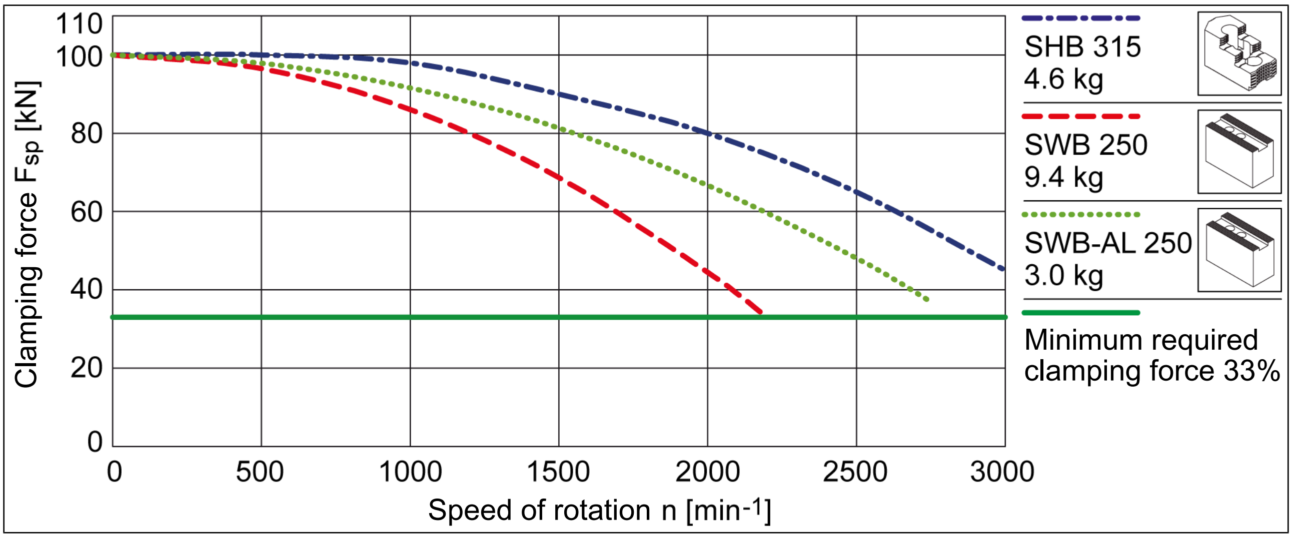
Clamping force / speed diagram ROTA TP 250-68



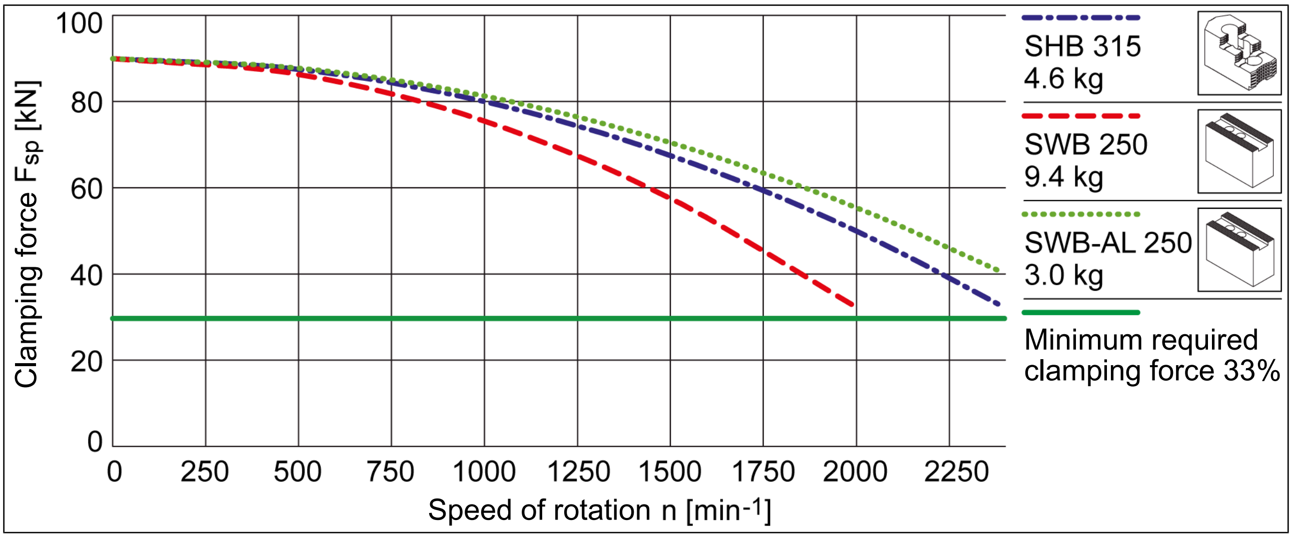
Clamping force / speed diagram ROTA TP 315-90



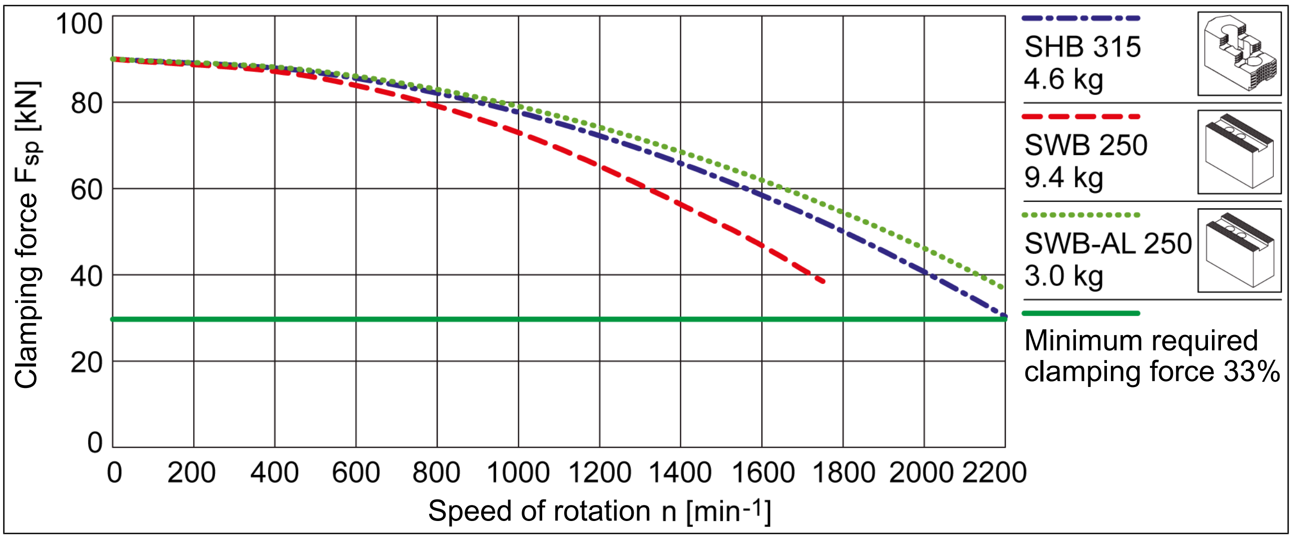
Clamping force / speed diagram ROTA TP 315-105



Clamping force / speed diagram ROTA TP 350-115



Clamping force / speed diagram ROTA TP-LH 350-115



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]	Σ_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}**.

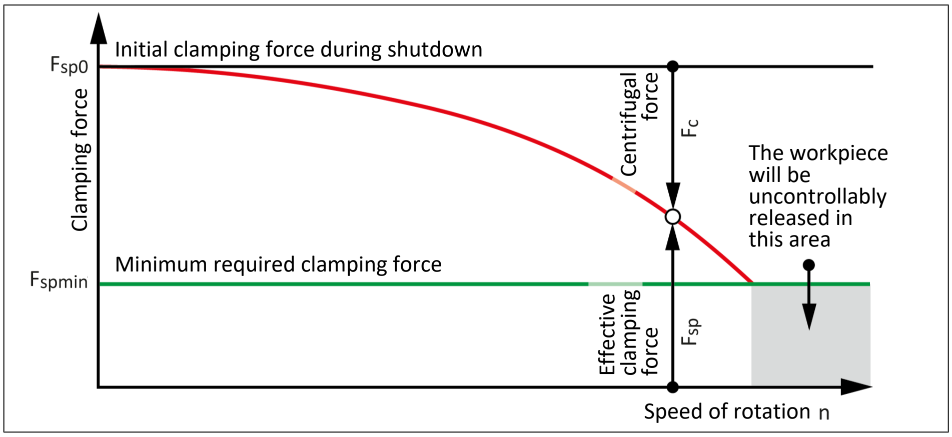
$$F_{sp} = F_{sp0} \mp F_c \text{ [N]}$$

(–) 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

CAUTION

This calculated force must not be larger than the maximum clamping force ΣS 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.

CAUTION

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 · 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 N (application-specific)
- max. RPM n_{max} = 3200 RPM ("Lathe chuck data" table)
- RPM n = 1200 RPM (application-specific)
- Mass of one (!) top jaw m_{AB} = 5.33 kg (application-specific)
- Center of gravity radius of top jaw r_{sAB} = 0.107 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:

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

Initial clamping force during shutdown:

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

Calculation of total centrifugal force:

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

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:

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

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

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

Centrifugal torque for one jaw:

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

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

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

The total centrifugal force can now be calculated:

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

Initial clamping force during shutdown that was sought:

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

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:

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

CAUTION

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 N
- Machining force for machining job F_{spz} 3000 N (application-specific)
- Total centrifugal torque of all jaws ΣM_c = 2,668 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:

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\frac{F_{sp0} - (F_{spz} \cdot S_Z)}{\sum M_C}} = \frac{30}{\pi} \cdot \sqrt{\frac{69947 - (3000 \cdot 1.5)}{2.668}} \Rightarrow \mathbf{n_{zul} = 1495\ min^{-1}}$$

The calculated RPM n_{perm} = 1495 RPM is smaller than the maximum permissible RPM of the lathe chuck n_{max} = 3200 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

The ROTA TP / ROTA TP-LH 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.

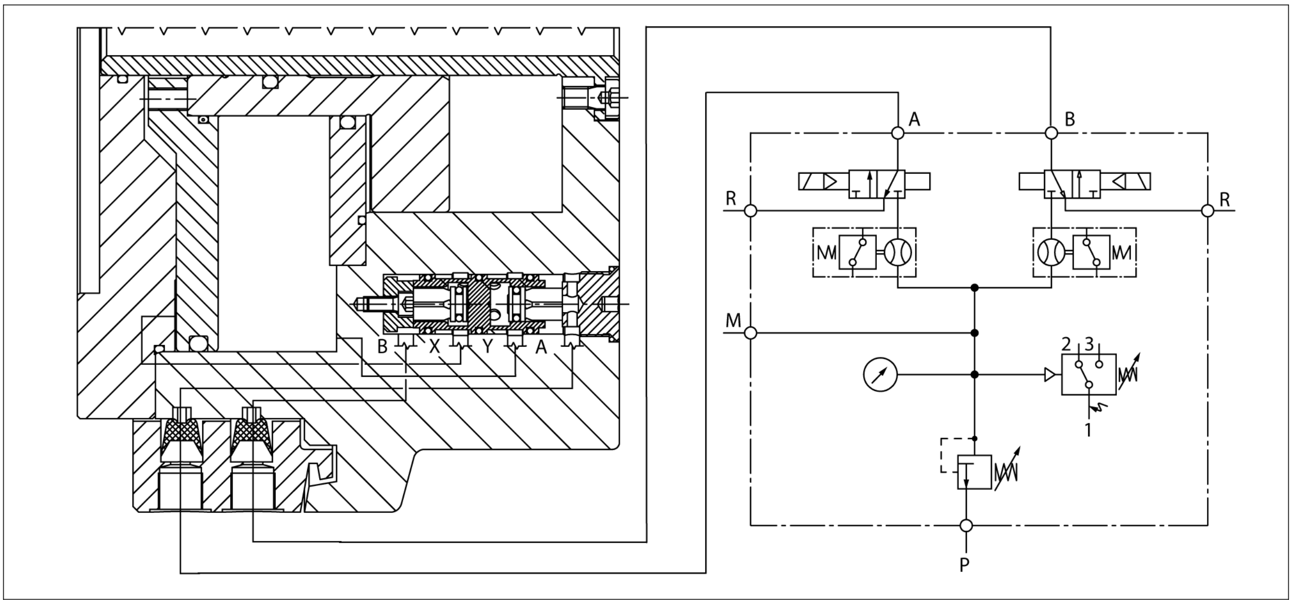
4 Function

The item numbers specified for the corresponding individual components relate to the chapter Drawings, ▸ 10 [🗋 53].

4.1 Principle of Operation

The problem of air supply was solved by a stationary distributor ring with profile ring seals arranged therein. Openings in the two elastic radially deformable profile seals allow the compressed air to flow through a double check valve to one of the two pressure chambers. The double check valve controls the filling to an pressure chamber and the simultaneous forced ventilation of the second pressure chamber. This triggers the piston stroke and the base jaws are moved by the wedge hook. The valve system blocks and stores the pressure in the chuck body while the profile seals, due to their elasticity, are raised from the chuck body by the ventilation of the supply lines and therefore are not subject to wear from the rotating chuck.

4.2 Air transmission system



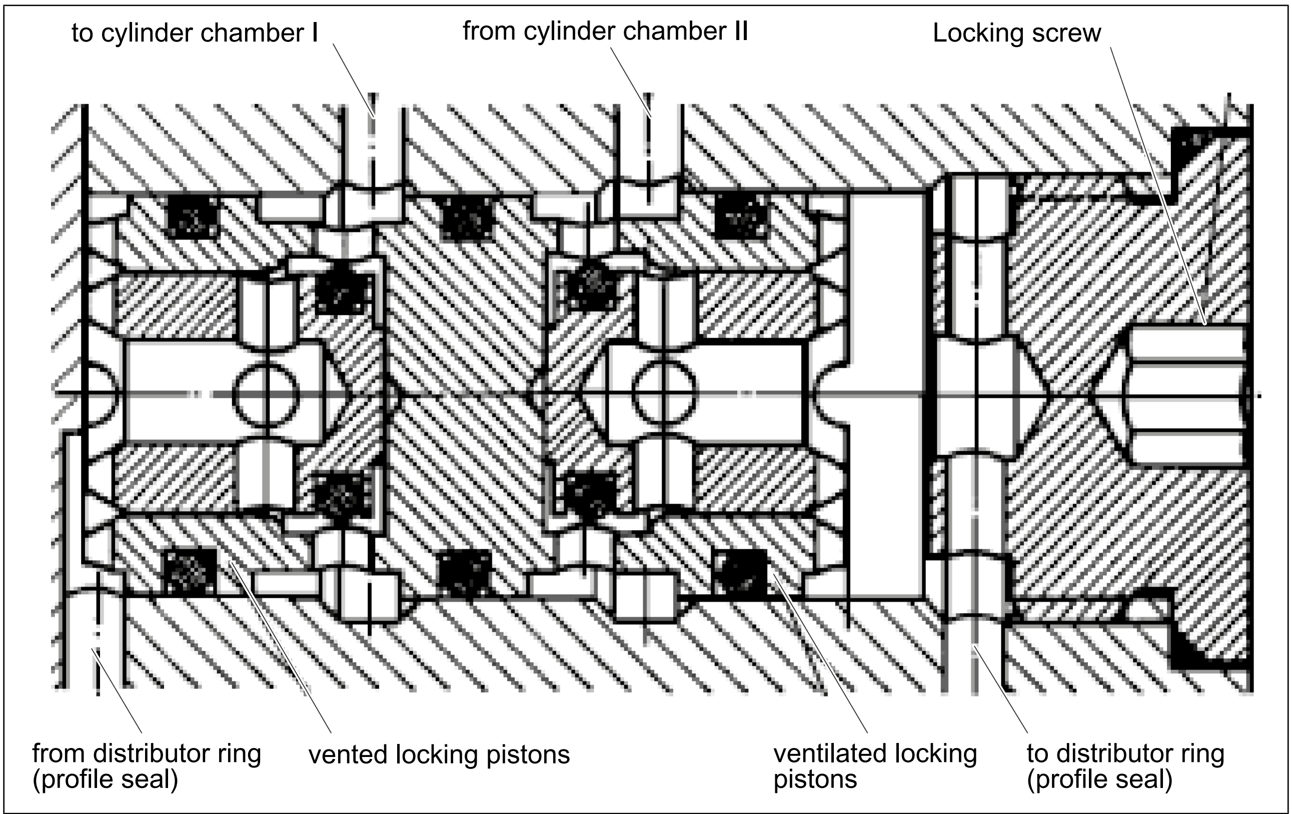
Air transfer takes place only when the headstock spindle is at a standstill, via profile seals provided radially in the distributor ring. The profile seal is designed so that the outer upper section of the surface is larger than the surface of the openings. Upon pressurization the difference in surface area exerts a radial force on the profile seal in the ring-shaped chamber of the distributor ring, resulting in optimal static sealing of the profile seal at the air transfer point. This allows low-loss flow of the air through the openings in the profile seal into the cylinder chamber of the chuck.

If the supply of compressed air is stopped, the double check valve closes and the pre-tensioned profile seal raises from the chuck body due to its elasticity and is not subjected to wear during rotation of the chuck. The off- and return air out of the opposit cylinder chamber leaves for the most part directly below the associated profile sealing.

CAUTION

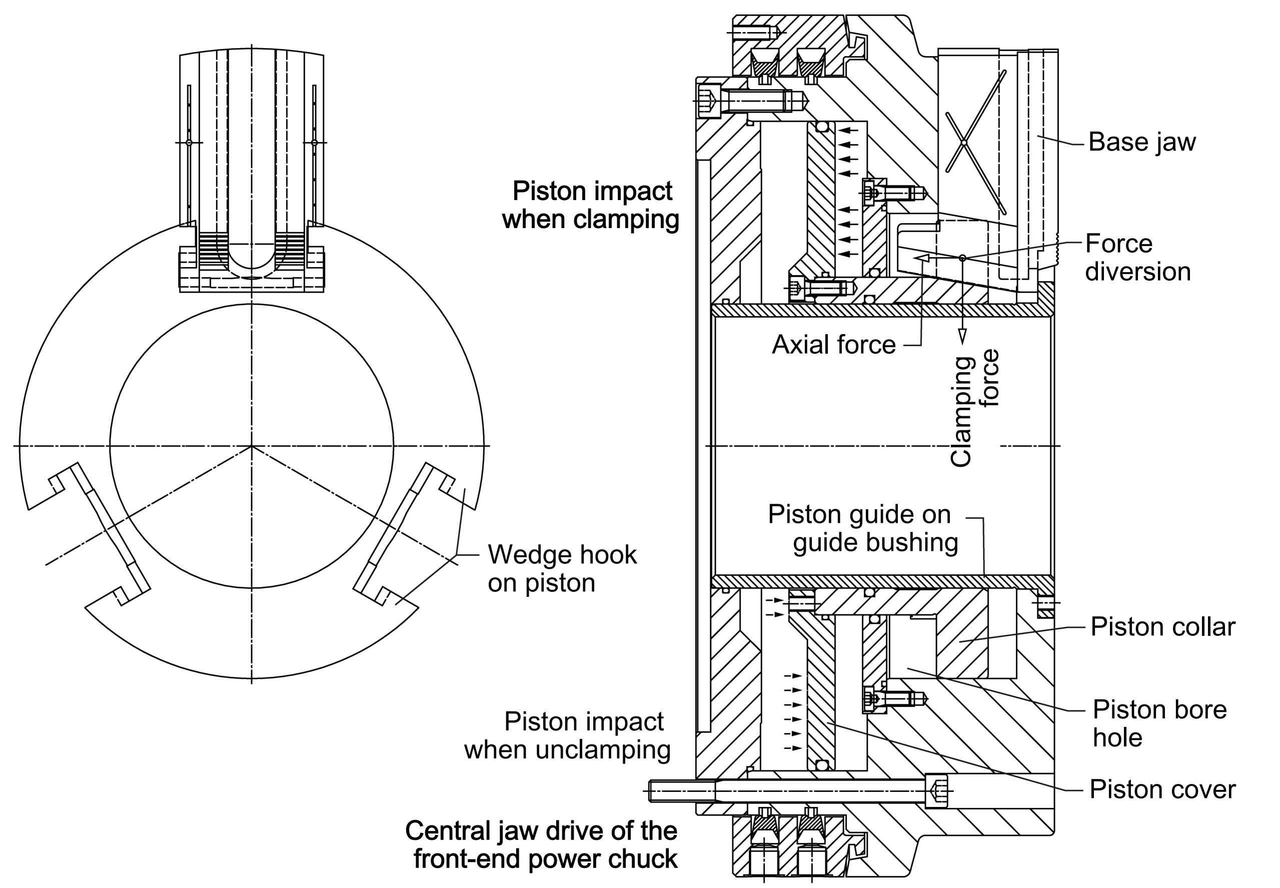
During actuation of the clamping device (clamping or releasing) it must be ensured that a short ventilation time is maintained between the switching processes. This ventilation time must last at least 0.5 seconds, depending on the hose length. For this purpose we recommend the use of a 4/3- or 5/3- way valve (central position depressurized).

4.3 Pilot controlled check valve



The pilot-controlled check valve is an intrinsically sealed unit, and comprises a valve body plus two locking pistons. Light maintenance can be performed on it from the face side of the chuck via a locking screw. The locking pistons of the valve unit control the rate of the air that flows to and from the profile seals through two air ducts. By changing the pressure of the air at the profile seals, the air duct is vented into a cylinder chamber (relief chamber) on one side. During this process, the compressed air is rerouted from one cylinder chamber due to the valve housing moving axially while the two individual locking/check pistons execute only one stroke when locking their respective cylinder chambers. As a result of this process, both O.D. and I.D. clamping are possible throughout the valve system.

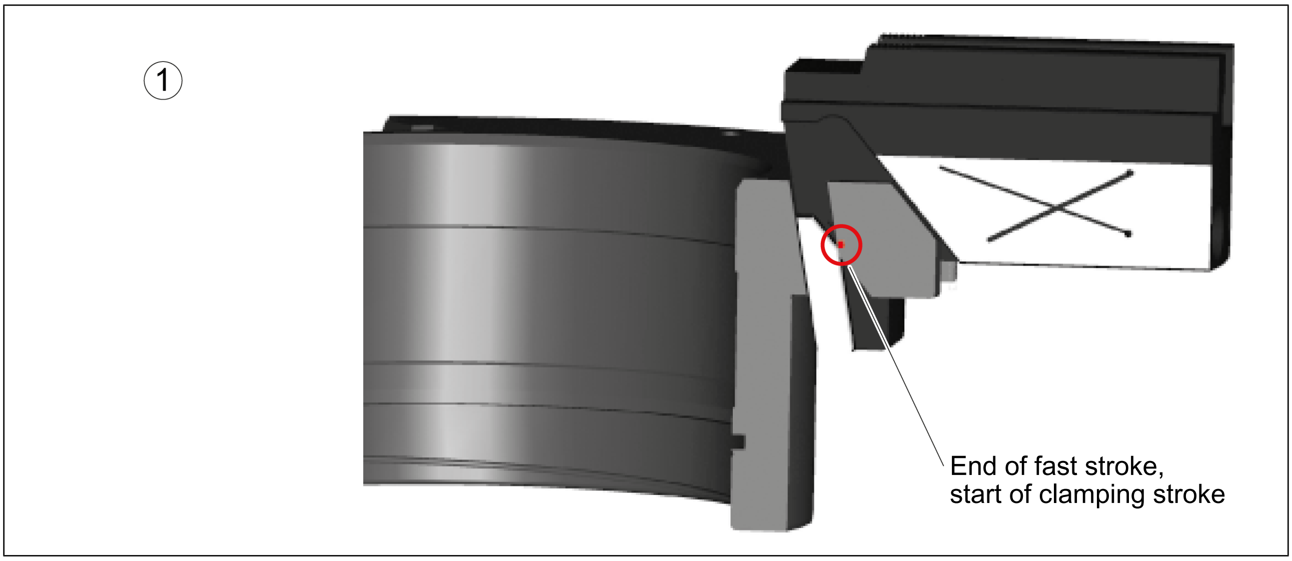
4.4 Clamping or jaw actuation

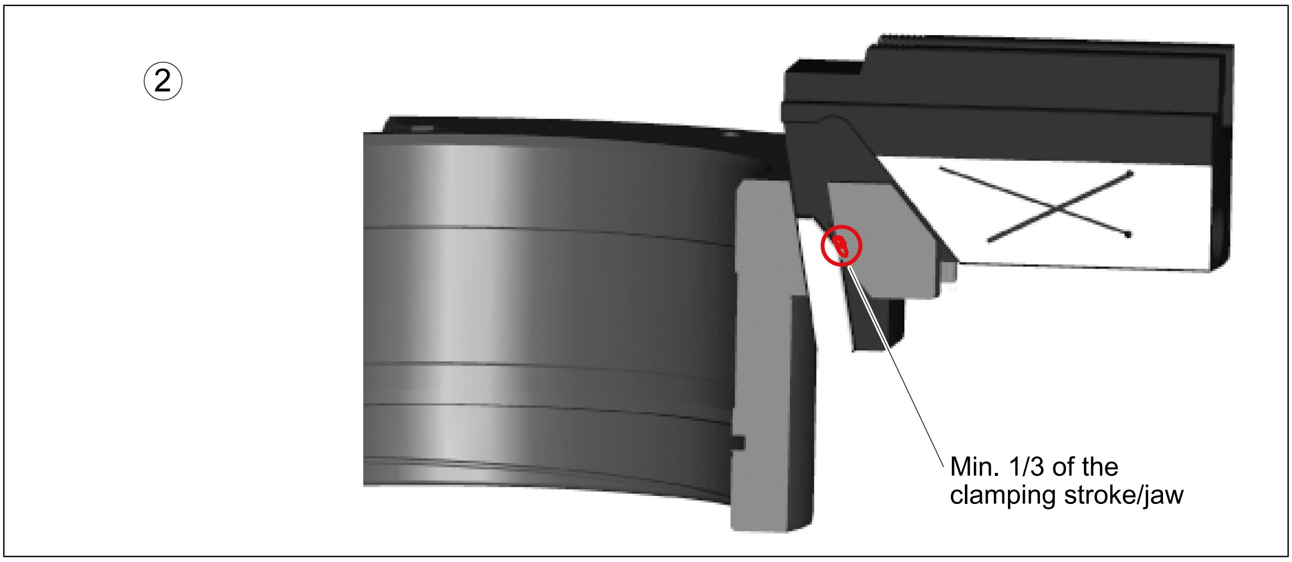


All three base jaws are centrically driven by a piston with a collar. The force is transmitted on the two-sided, extended and self-locking (10° wedge slant standard) wedge hook or base jaw. The clamping forces are absorbed by the diameter of the piston collar and braced against by the chuck body. Both sides of a piston cover screwed onto the piston neck for clamping and unclamping are pressurized, thus causing the piston cover to trigger the axial motion of the piston.

4.5 Power Chuck with extended and standard jaw stroke (LH)

Lathe chucks with dual stroke system (LH-serie) are not allowed to be used for I.D. clamping. Moreover, no workpieces are allowed to be clamped on the fast jaw stroke, since due to the long jaw strokes the resulting clamping forces are lower (1). Please make sure that the entire fast stroke plus at least 1/3 of the clamping stroke (corresponding to the basic covering) of the TB-LH lathe chuck is executed during workpiece clamping (2).





5 Mounting

5.1 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

5.2 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.

CAUTION

Always use the correct length of mounting screws when mounting the chuck and flange. Screws that are too long may protrude from the tapping drill hole or damage the machine spindle.

1. Preparing the mount ▸ 5.4 [🗋 31]
2. Chuck assembly ▸ 5 [🗋 30]
3. Performing a functional check ▸ 6.1 [🗋 42]

5.3 Checking the chuck mount

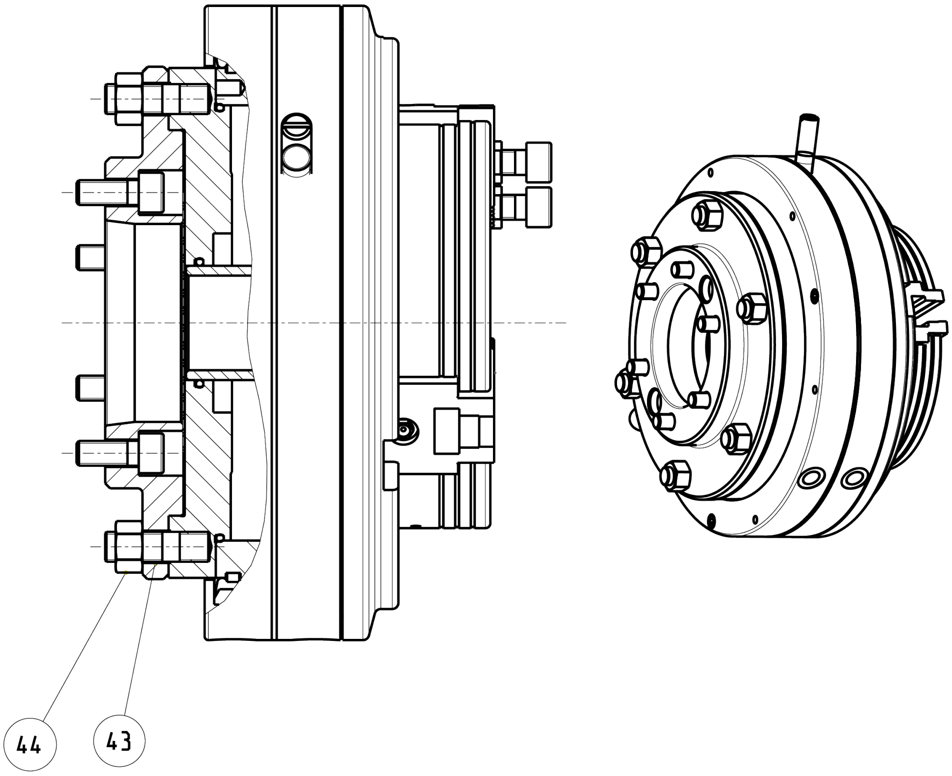
The machine side must be aligned prior to the flange being installed in order to achieve high run-out accuracy of the chuck. To do this, check the contact surfaces on the spindle for axial and radial run-out accuracy using a dial indicator.

There should be a maximum concentricity error in the centering of the mount of 0.01 mm and a maximum axial run-out error in the contact surfaces of 0.01 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.

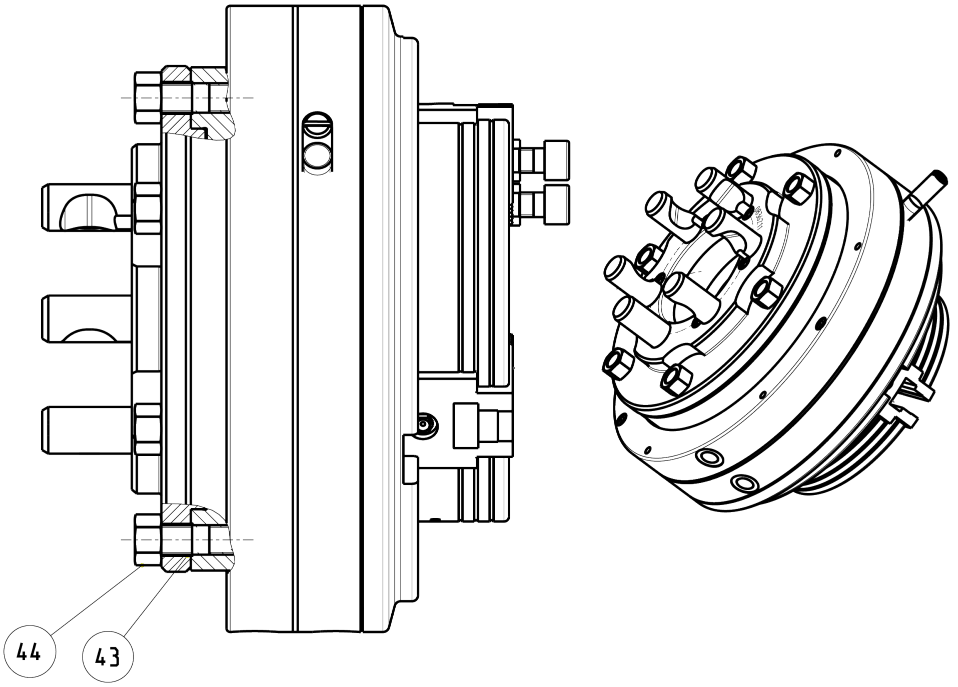
5.4 Mounting

A chuck flange is always screwed from the rear using the stud bolts (item 43) and nuts (item 44). First, the stud bolts (item 43) must be screwed to the chuck from the rear. Mount the shorter thread of the stud bolts in the chuck and tighten with a countered nut in the longer thread, for example. In the case of short taper fastening with screws according to DIN ISO 702-1, the chuck flange is first fastened to the spindle. The chuck is then screwed onto the chuck flange from behind using the nuts (item 44).

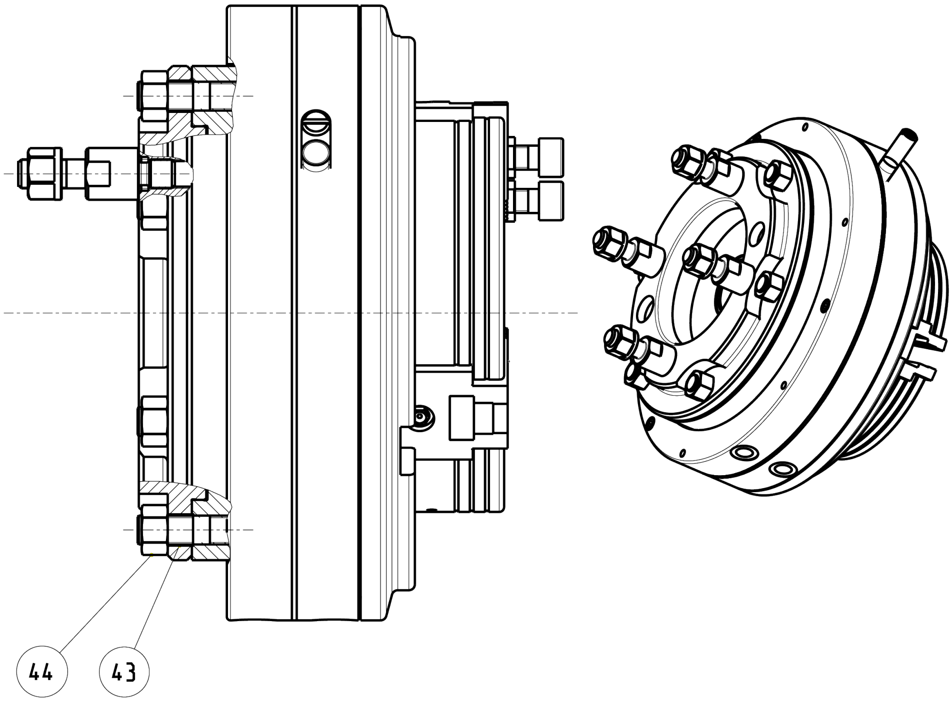


Mounting in accordance with DIN ISO 702-1

When using bayonet mounting in accordance with DIN ISO 702-3 or camlock mounting in accordance with DIN ISO 702-2, the chuck flange is fastened from behind with the nuts and the corresponding bolts and screws are fitted. The complete chuck can then be fastened to the spindle.



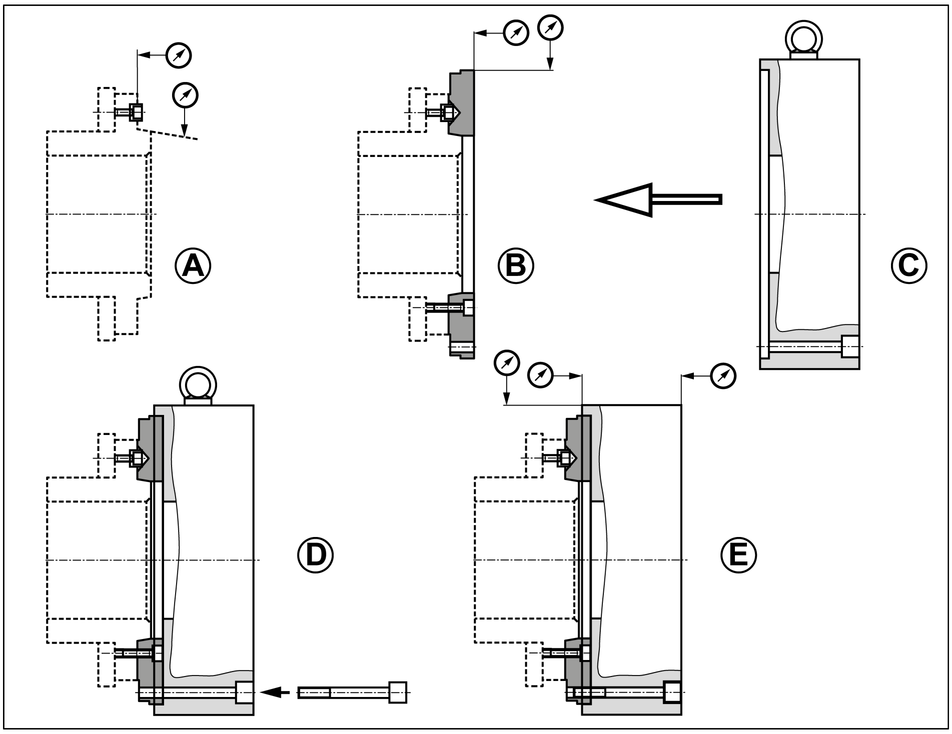
Mounting in accordance with DIN ISO 702-2



Mounting in accordance with DIN ISO 702-3

SCHUNK offers standard sizes for short taper fastenings with screws, camlock and bayonet fastenings. For other spindle connections, please consult the technical sales department at SCHUNK.

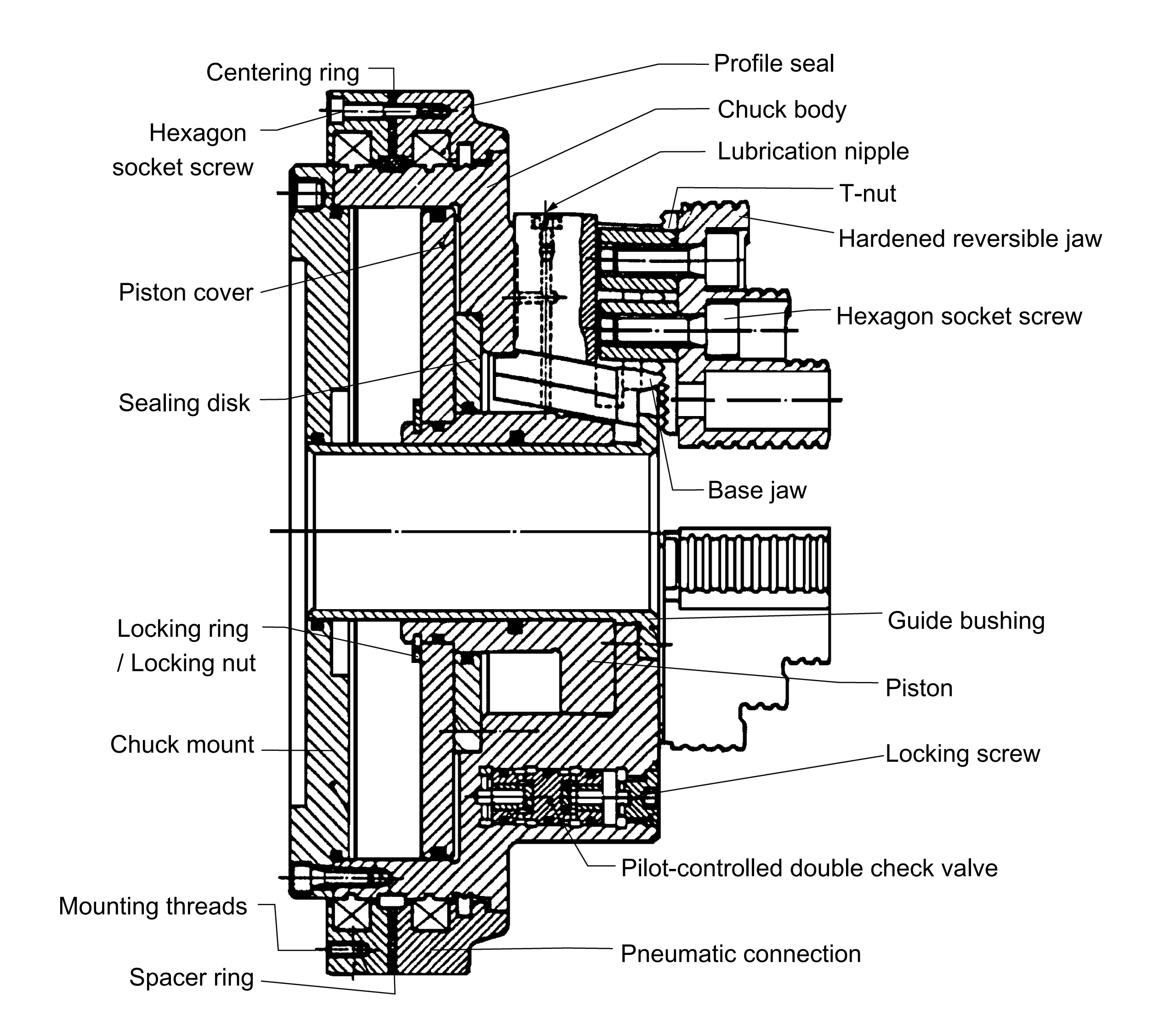
Check concentricity and axial run-out again.



Mounting of the chuck

Maximum achievable concentricity and axial run-out tolerances in relation to the chuck

Chuck size [mm]	max. concentricity error [mm]	max. axial run-out error [mm]
125	0.02	0.02
160	0.02	0.02
200	0.02	0.02
250	0.02	0.02
315	0.02	0.02
350	0.03	0.03



5.5 Distributor ring

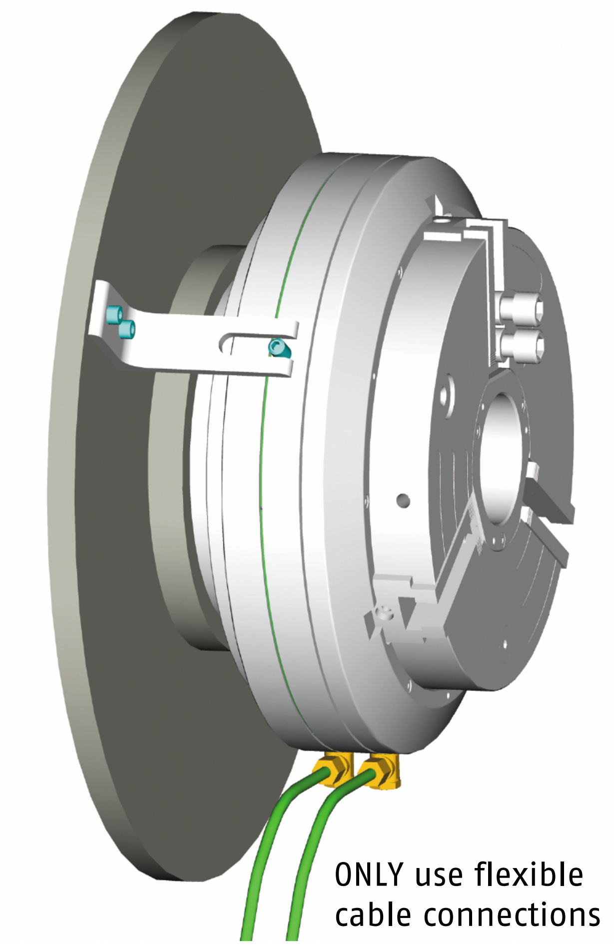
The distributor ring of the front-mounted power chuck model ROTA TP and ROTA TP-LH is supplied with 2 possible means of fastening as standard.

5.5.1 Distributor ring: normal fastening

The distributor ring is supported by a plastic centering sleeve in the chuck during rotation.
The following maximum speeds are possible with this mounting:

Size	Max. speed of rotation [RPM]
ROTA TP 125-25	4000
ROTA TP 160-38	4000
ROTA TP 200-55	2800
ROTA TP 250-58	2200
ROTA TP 315-90	1800
ROTA TP 315-105	2200
ROTA TP 350-115	2200
ROTA TP-LH 350-115	2200

Two threaded holes are arranged on the circumference at less than 120° from each other and from the pneumatic connection. The supplied shaft screw (item 42) can be fitted in one of the threaded holes. The shaft screw must be able to move back and forth freely in both directions, but no more than 3 mm, in a fork rigidly mounted in the headstock or lathe bed. And the fork must be produced and installed in such a way that it does not apply pressure to the distributor ring axially or radially. The fork with the shaft screw holds the distributor ring connections in one position and pneumatic lines can be routed from here to the control unit. Flexible cable connections must be used for this.

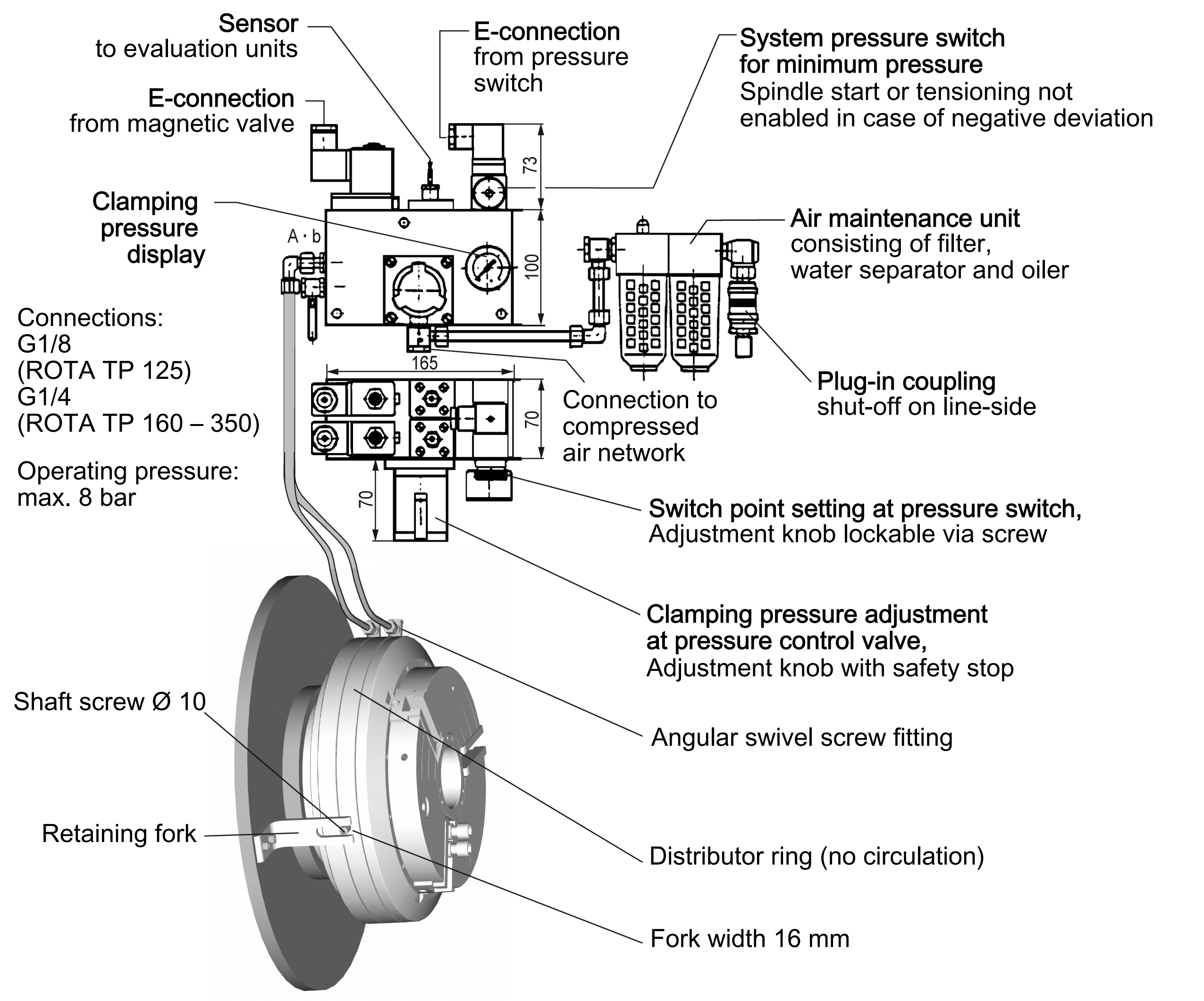


If the plastic centering sleeve of the distributor ring becomes worn slightly at the weight-loaded upper point of contact with the chuck body over time, it can be turned further by one third by removing the three hexagon socket screws. The three hexagon socket screws hold the two parts of the distributor ring and the plastic centering sleeve together.

The plastic centering sleeve must be inserted in such a way that the slotted location is on one of the three bore holes of the distributor ring. The flat surface of the chuck body which is raised in the area of the distributor ring prevents the penetration of dirt and chips between the distributor ring and the chuck body.

The hexagon socket screws of the distributor ring should be lightly tightened. The two parts of the distributor ring can be realigned with each other only by light knocking. Retighten the screws.

The profile seals only begin to wear if the chuck is actuated by the control unit during the rotation, which is generally prevented by the connection of the electrical interlock to the machine.

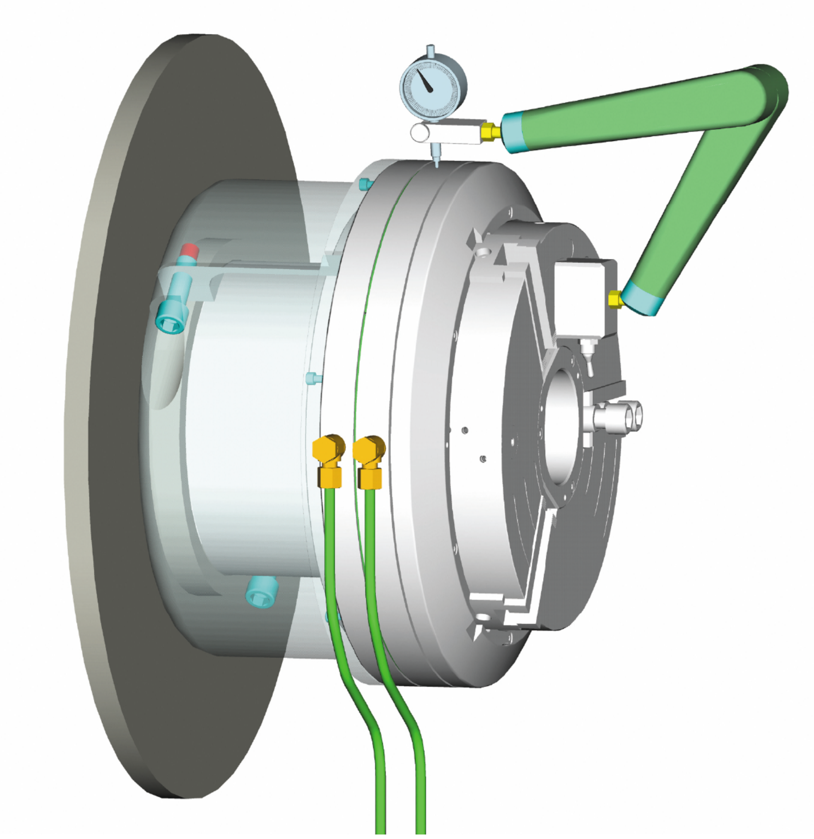


5.5.2 Stationary mounting of the distributor ring

If the distributor ring is mounted in a stationary position, the speed can be increased to the value provided in the table below.

Size	Max. speed of rotation [RPM]
ROTA TP 125-25	4200
ROTA TP 160-38	4200
ROTA TP 200-55	3800
ROTA TP 250-58	3500
ROTA TP 315-90	2500
ROTA TP 315-105	3000
ROTA TP 350-115	2200
ROTA TP-LH 350-115	2200

In this case, the distributor ring is a component that is completely separate from the chuck and is centered and retained on the headstock of the lathe axially and radially by means of spacing consoles. The stationary mounting can be accomplished by using M6 threaded holes on the rear face side of the distributor ring. It must be ensured that the distributor ring is aligned with the chuck body without contact. For this mounting type, the distributor ring must be equipped with a spacer ring instead of the plastic centering sleeve. This spacer ring is loosely enclosed with each ROTA TP / TP-LH front-end power chuck. If the distributor ring is to be fastened but is equipped standard with the centering sleeve, the centering sleeve must be replaced with the enclosed spacer ring.

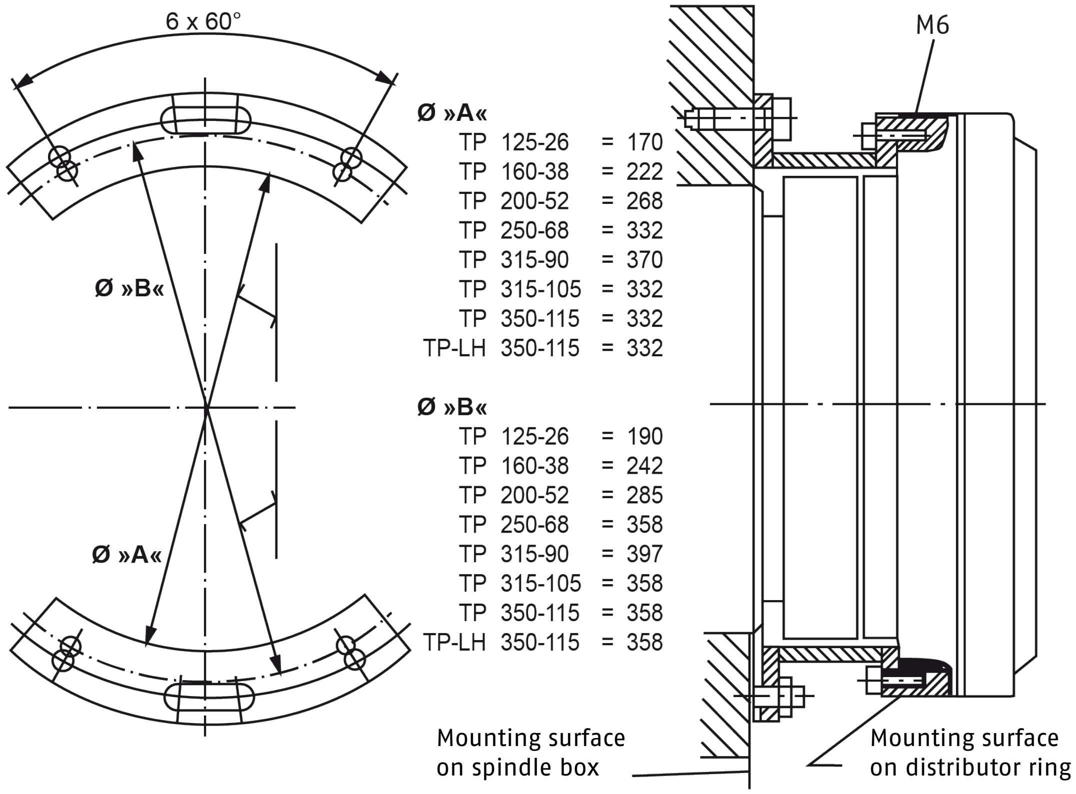


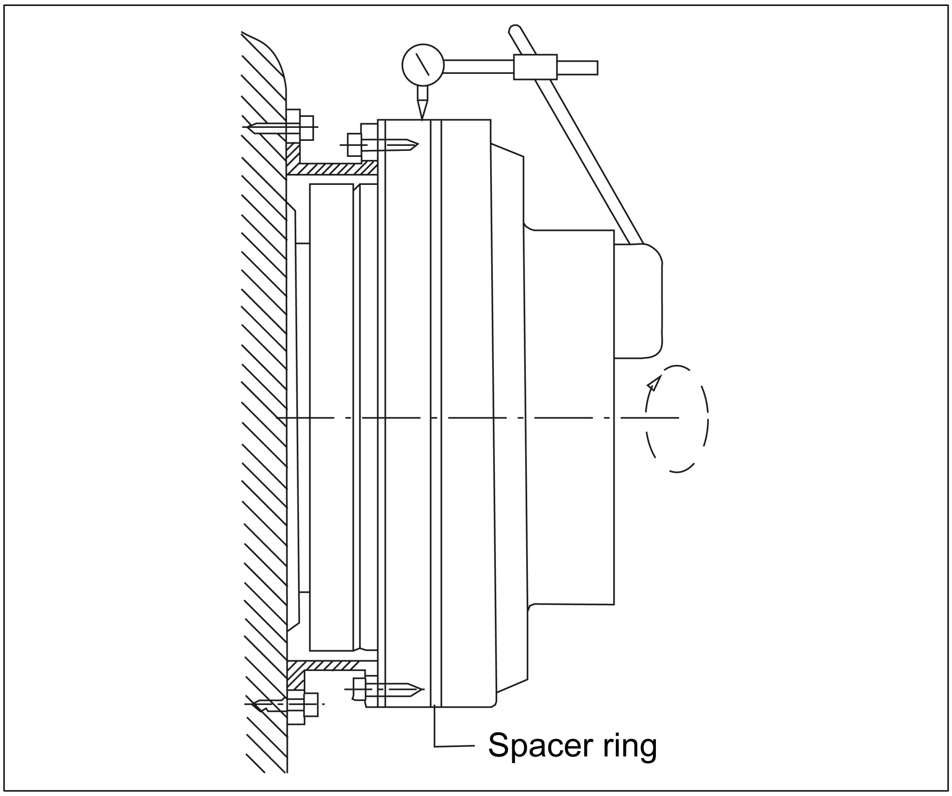
5.5.3 Mounting with bracket

First, the lathe chuck is installed onto the machine spindle with the loosely attached distributor ring and the distributor ring is aligned flush with the stepped front side of the chuck. The height dimension of the spacing consoles can only be determined by measuring between the face side of the headstock and the rear face side of the distributor ring. The determined dimension is the height dimension of the spacing consoles. In this case, the distance dimension **a** (clearance between the distributor ring and distributor ring cover) is subtracted.

Size	Distance dimension a [mm]
ROTA TP 125	0.5
ROTA TP 160	1.8
ROTA TP 200	1.7
ROTA TP 250	1.5
ROTA TP 315	1.5
ROTA TP 350	1.5
ROTA TP-LH 350	1.5

If the face side of the headstock is not machined, a mean must be determined and any height differences must be compensated by means of a positioning screw or positioning sleeve. Incidentally, the spacing consoles can be customized, but they should achieve the stability of the presented design.





5.5.4 Mounting with 2-part clamping ring (D.R.M.B.)

The distributor ring can be clamped onto a rigid collar on the machine (at least 8 mm wide) using a two-piece clamping ring. The distributor ring is clamped onto this collar by two screws. The height of the clamping ring is designed according to the chapter ▸ 5.5.3 [🗋 38].

During assembly, this two-piece clamping ring is first screwed to the threads of the distributor ring. Then they entire assembly group is clamped onto the rigid collar of the machine. When mounting the chuck with a bayonet or Camlock, the clamping ring should have a cut-out to allow access to the collar nuts or clamping cams using the corresponding wrench.

NOTE

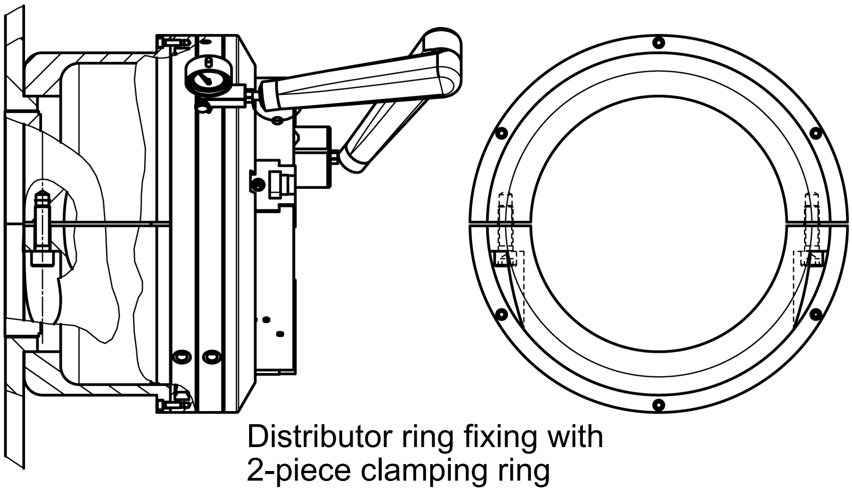
The distributor ring must be aligned with the outer chuck diameter in such a way that at least a radial and axial run-out tolerance of 0.2 mm is achieved.

During the assembly, as mentioned at the start, it must be ensured that the distributor ring is axially and radially aligned with the chuck body without contact and fixed.

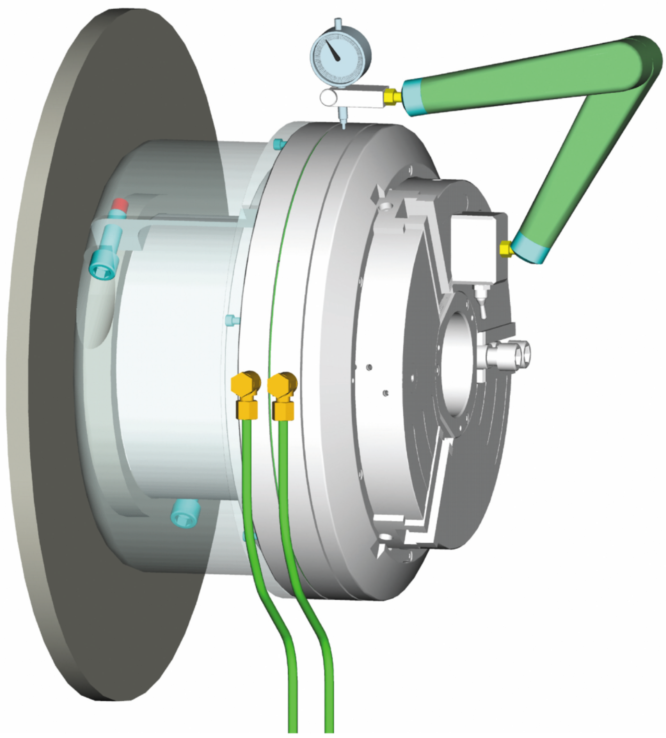
Note

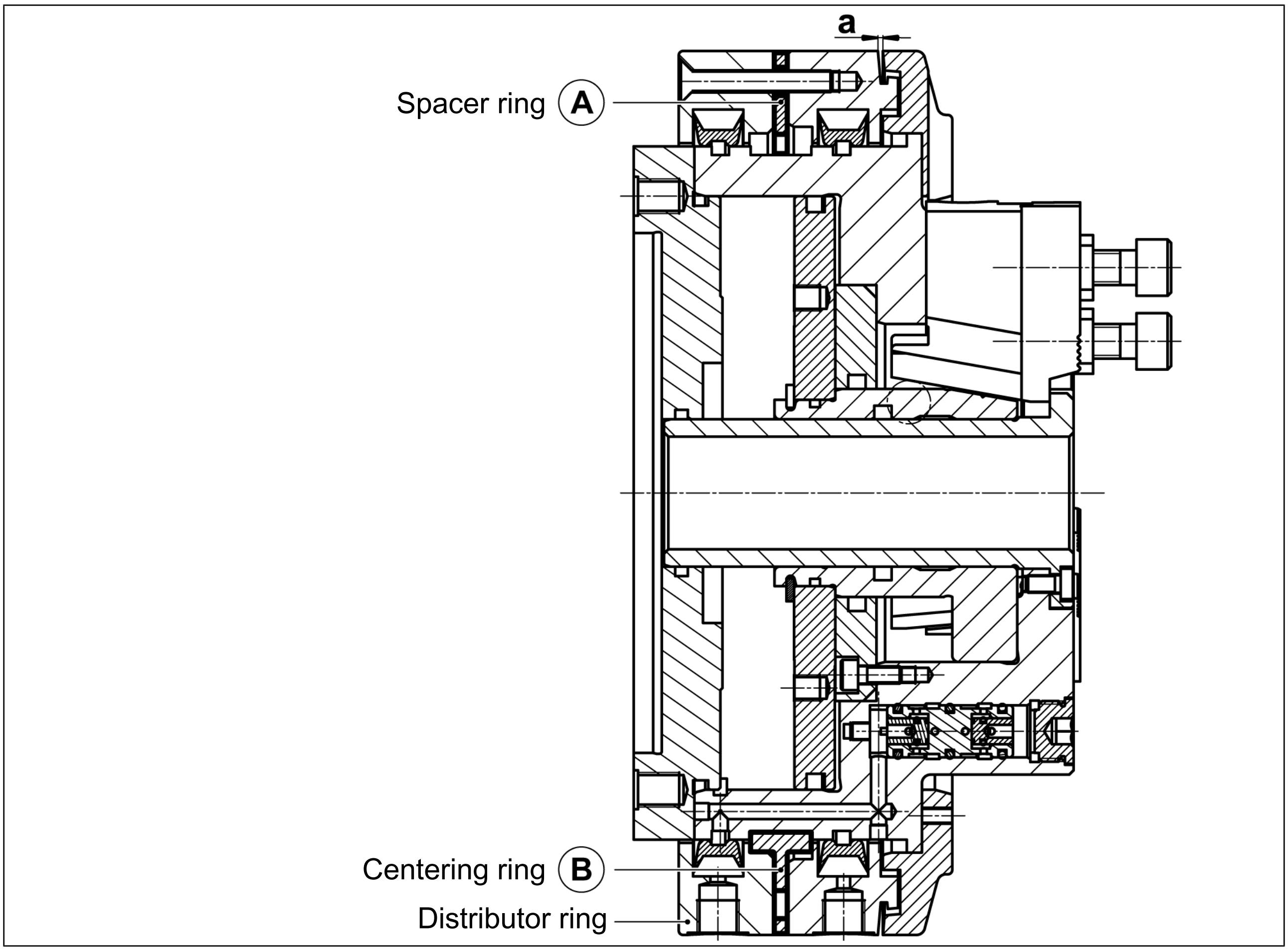
Therefore, ONLY flexible connection cables may be used.

The radial alignment of the distributor ring is correct if the distance between the distributor ring cover and the distributor ring equals **a** (see chapter ▸ 5.5.2 [🗋 37]) . The ring can be aligned radially with a feeler gauge. The air gap between the chuck body and the distributor ring at the front and rear should be uniform over the entire circumference (**Dimension a**). Additional measurement and alignment can be performed by using a magnetic dial indicator stand, which is placed on the face side of the chuck. The dial indicator is placed radially against the distributor ring and the distributor ring is aligned until the dial indicator no longer indicates a significant deviation (approx. 0.2 mm).



Distributor ring fixing with
2-piece clamping ring





A	Spacer ring, ▸ 5.5.2 [🗋 37]	**B**	Centering ring, ▸ 5.5.1 [🗋 34]

6 Commissioning and maintenance

6.1 Initial operation

Check that the jaw guides and the piston of the ROTA TP-type power chuck are sufficiently lubricated at the lubrication nipples set into the base jaws; if not, relubricate the base jaws in the retracted position with LINOMAX plus acid-free grease. When the chuck is dried out, the clamping force is significantly reduced.

A locking screw with a hexagon socket is located on the front face side of the chuck. Behind the locking screw, the pilot controlled double check valve controls the charging and exhausting of the two pressure chambers and blocks the pressure toward the outside. It is very important that the bore hole of the valve system is lightly lubricated with oil so that the valve system can move easily. Too much grease lubrication and dirt in the valve bore hole significantly impair the function of the chuck and should be avoided.

CAUTION

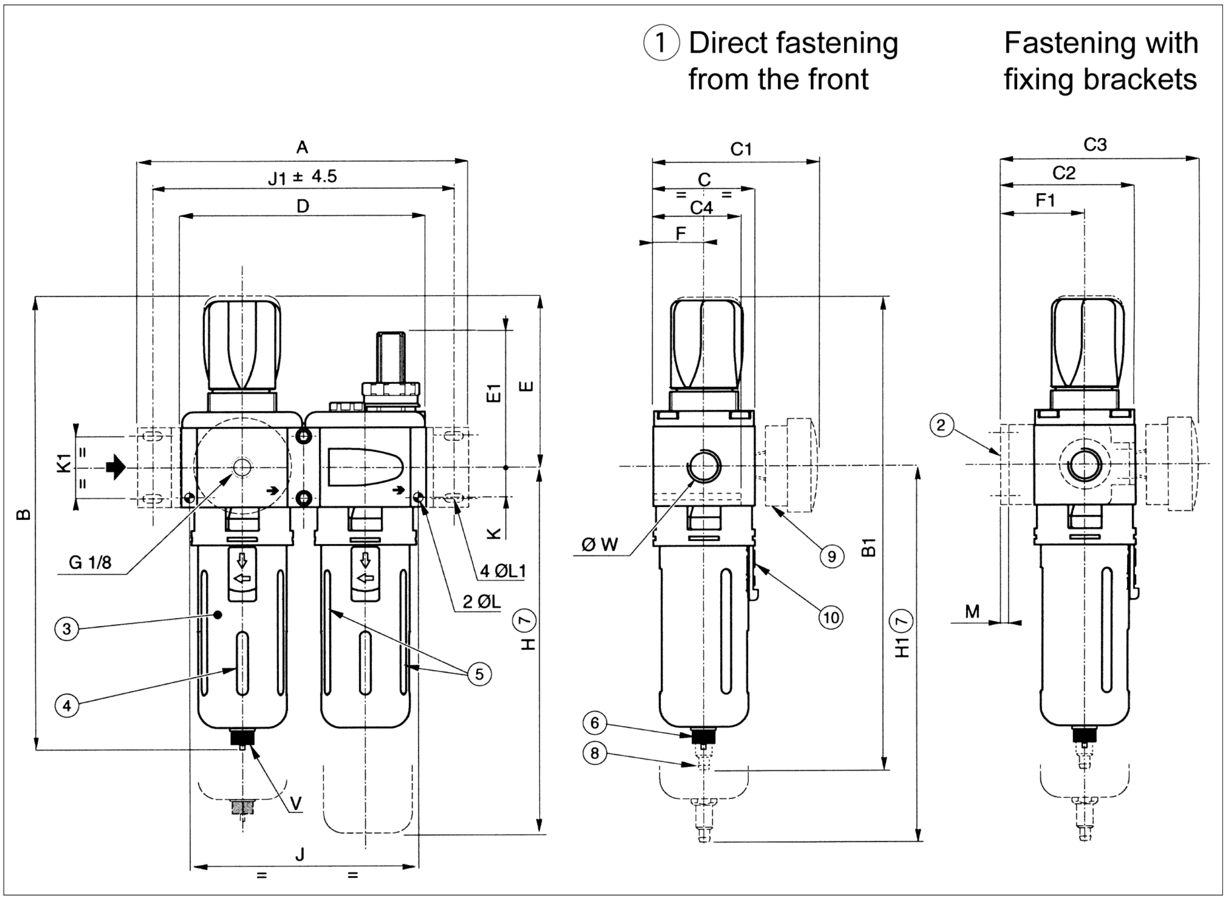
When actuating the clamping device (clamping or releasing), allow a short pause for ventilation between each shifting operation. This ventilation pause must be at least 0.5 seconds, depending on the length of the hose. We recommend using a 4/3 or 5/3 directional control valve for this (center position depressurized).

6.2 Maintenance

A type WEH maintenance unit, consisting of filter, water separator, and oiler, must be connected upstream of the power chuck. The air enriched with oil supplies all sliding parts of the cylinder chamber with an oil film. The oil level of the oil tank must be checked daily, and oil must be added if necessary. If the oil consumption is too low, i.e. if the oil level does not visibly drop over a period of 2 to 3 days, the oil adjustment screw must be opened slightly. Depending on the accumulation of condensation, the condensation drain screw must be opened occasionally.

2-part maintenance unit, type WEH with filter, oiler, and pressure control valve

Type	WEH-1
ID number	0890021
Oil type	Shell Tellus S2 MA 32 Esso Febis
Connection	G 1/4"
Nominal pressure	10 bar



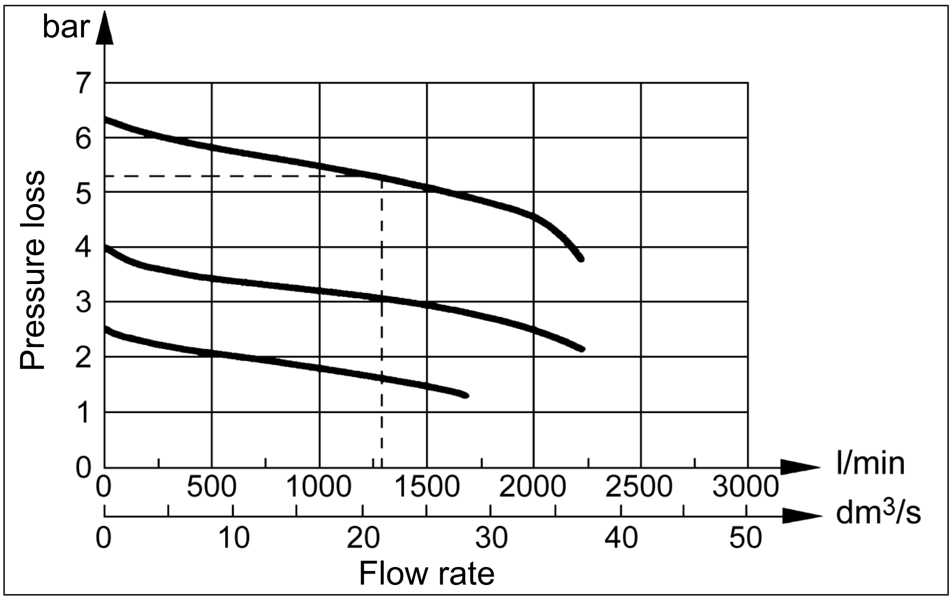
1	Mounted directly from front: 2 bore holes Ø L, depth C4
2	Lateral mounting with two retaining brackets (accessories)
3	Protective metal cage with container made of transparent polycarbonate
4	Fill level indication for condensate (small inspection port)
5	Fill level indication for oil – min./max. (large inspection port)
6	Semi-automatic condensate drain, G 1/8 connection
7	Required distance for removing the container
8	Automatic condensate drain can be connected by means of a hose with inner Ø 6
9	Pressure gauge, Ø 40
10	Protective cage lock
11	Distributor module as accessory: with two connections (Ø T) at front and rear and one already mounted center plug

Ø W	G 1/4"	C4	38	J	74
Container	7 cl	D	84	J1	110.5
A	125	D1	42	K	10
B	213	E	89	K1	28
B1	-	E1	65	Ø L	4.1
C	42	F	21	Ø L1	4.5
C1	76	F1	40	M	3
C2	61	H	215	Ø T	G 1/8"
C3	95	H1	-	V	G 1/8"
				Weight [kg]	0.76 (weight without pressure gauge)

Basic setting for oiler

Chuck type	Air consumption/ jaw stroke at 6 bar	Clamping strokes	Number of oil drops	Oil quantity
ROTA TP 125 ROTA TP 160	1 – 3 liters	100	approx. 1	approx. 6 mm^3
ROTA TP 200 ROTA TP 315-105	3 – 5 liters	100	approx. 2	approx. 12 mm^3
ROTA TP 250 ROTA TP 315-90 ROTA TP 350-115 / 350-115 LH	5 – 8 liters	100	approx. 2 - 3	approx. 18 mm^3

Flow rate characteristic curves and pressure drops



Cleaning and lubrication of the lathe chuck

The uniform clamping force, accuracy, and life span of the chuck depend greatly on regular cleaning and sufficient lubrication. Rust, scale, casting dust, and chips produce friction and reduce motion.

Therefore, the lathe chuck must be lubricated regularly (▸ 6.4 [🗋 45]) with LINOMAX plus special grease paste at the 3 base jaw lubrication nipples by means of a grease gun. The lathe chuck must be actuated two to three times without a workpiece to achieve grease distribution by means of the completely extended jaw stroke.

The valve system of the chuck must be occasionally lightly lubricated with oil after the locking screw has been removed on the face side of the chuck. The double check valve is removed from the bore hole, and the bore hole and the valve are cleaned to remove dirt and any foreign bodies.

The fine serration of the base jaws and top jaws must be cleaned when the hardened reversible jaws or soft top jaws are adjusted, because otherwise the run-out accuracy will be reduced.

Foreign matter, such as rust, scale, casting dust, and fine chips, penetrates into almost every chuck, even though there is optimal sealing provided by the hardened guide bushing in the through-hole and by the closed base jaws. Coolant washes away lubricant. Therefore, every lathe chuck occasionally must be completely disassembled, cleaned, and lubricated, and the sealing rings possibly replaced. The time for which the chuck can be used before full maintenance is required depends on the level of dirt it accumulates and the clamping frequency.

6.3 Leak test

Check chuck regularly for leaks:

- Clamp the chuck pneumatically and carry out a clamping force test, e.g. with the SCHUNK IFT clamping force measuring device.
- Switch off pressure.
- The clamping force must not drop more than 5% within 10 minutes. Otherwise, replace the double check valve and / or the O-Rings (Seals).

6.4 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.

6.5 Hardened Reversible Jaws and Soft Top Jaws

Make sure that the top jaws are set for clamping on the fine serration so that no more than 2/3 of the jaw stroke has to be extended (clamping reserve).

Hardened reverse jaws may be used only in sets as packaged at the factory, since they are ground in sets on the chuck. Normally, one set of hardened reverse jaws is ordered with the chuck. During assembly and disassembly of the reverse jaws numbered 1 to 3 make sure that the single jaws are paired with the base jaws with the same numbers in order to achieve good true running properties.

Turning of the soft top jaws must be performed on the chuck in the same clamping position and at the same operating pressure specified for machining of the workpiece.

Hardened roughing jaws whose clamping surfaces have conical teeth with good grip should be used for rough turning work or preturned workpieces.

6.6 Disassembly

1. Unscrew both pneumatic swivelling elbow screw-fittings from the distributor ring, remove front-mounted power chuck from spindle head.
2. After unscrewing the 3 hexagon socket head screws (item 38) in 3 pieces (item 9, 11, 12), remove the distributor ring backwards from the chuck.
   Note
   The chuck is pressurized! It is imperative that the valve system (item 18) be removed before any further disassembly!
3. Remove the pilot-controlled double check valve system (item 18) by carefully unscrewing the plug screw with the O-ring (item 13). Check all the O-rings in the valve system for wear and replace them if necessary.
4. Unscrew the 6 hexagon socket head screws (item 39) at the chuck mount (item 7), screw in 2 screws into the existing threaded holes, pushing the mount down
5. Chuck until 2015: Remove the visible snap ring (40). Chuck from 2015: Loosen radial set screw (34) in the fastening nut (40). The clamping effect of the copper bolt (33) decreases and the nut can be loosened with the enclosed assembly tool (80).

6. Remove the piston cover (6).
7. Screw in the two hexagon socket head bolts into the existing threaded holes of the piston cover (item 6) and pull out the piston cover (item 6).
8. Chuck with distributor ring cover: Loosen the screws (item 35) and remove the distributor ring cover (item 15).
9. On the front of the chuck, loosen the three hexagon socket screws (36) of the sleeve (4) and pull out the sleeve toward the front by lightly knocking from the back side of the chuck.
10. Disassemble the sealing disk (item 5) using the hexagon socket head screws (item 37) and remove the O-ring (item 51) sealing the pressure chamber.
    Note
    Do not lose the sealing rings (65) under the hexagon socket head screws (37)!
11. The piston (item 3) can be pulled out of the chuck body (item 1) as can the base jaws (item 2) from the base jaw guides by pulling inwards through the piston bore of the chuck body. The base jaws (2), the base jaw guides and the hardened re-versible jaws are designated as 1, 2, and 3 so that the same position and thus the same true running accuracy is achieved during assembly. The hardened base jaws simply have 1, 2, or 3 notches for marking the T-slots.
12. Remove all O-rings of the chuck and the profile seals (item 66) at the distributor ring. Wash all parts of the chuck with gaso-line and blow out.
13. Check all O-rings and profile seals (item 66) for possible dam-age and wear, replace them if necessary, and carefully rein-stall them. Before the profile seals are inserted, it is recom-mended that the profile seals (item 66) be rubbed with grease by hand so that they remain elastic. There must be no visible grease residue. When the profile seals (item 66) are reinsert-ed, ensure that air passage openings do not align with the pneumatic connections of the distributor ring.
14. The cylinder chamber of the chuck must be oiled. The jaw guides in the chuck body, base jaws, and piston at the wedge hooks are greased with LINOMAX plus grease.

6.7 Assembly

1. Insert the base jaws (item 2) in the guide shown, engage the piston with O-rings (item 3) into the key teeth of the base jaws and insert them as far as the end of the stroke.
   Note: The piston wedge hook with the dot marking on the inside is aligned using jaw guide 1.
2. Insert the O-ring (item 51) and the sealing disk with the O-ring (item 5, 50) and tighten to the chuck body until firm and air-tight using the 3 hexagon socket head screws (item 37) with sealing rings (item 65).
3. Insert the guide bushing (item 4) from the front of the chuck and secure with 3 hexagon socket head screws (item 36).
4. Push in piston cover with O-ring (6, 53) and **ROTA TP 125-26, ROTA TP 160-38, ROTA TP 200-52, ROTA TP 250-68, ROTA TP 315-90 (until 2014):** Allow snap ring (40) to snap into the recess without any problems. **ROTA TP 125-26, ROTA TP 160-38, ROTA TP 200-52, ROTA TP 250-68, ROTA TP 315-90 (from 2015):** To fit the lock nut (40), use the assembly tool supplied (pos. 80). Secure the nut with safety cord (33) (TP125) or radially with copper bolt (33) and set screw (34) (rest). **ROTA TP 315-105, ROTA TP 350-115, ROTA TP-LH 315-105, ROTA TP-LH 350-115:** Mount screws (pos.40) and tighten them alternately. .
5. Place down the chuck holder with the O-rings (item 7, 52) and screw it with the hexagon socket head screws (item 39).
6. Lubricate double check valve (item 18) and valve bore hole with oil, install and close with plug-in screw and O-ring (item 13).
   Note: All parts of the ROTA TP-type front-end power chuck are easily movable. As such, hard hammer blows should never be used during assembly.
7. Assembly of the distributor ring, ▸ 5 [🗋 30].
8. Screw the distributor ring cover (item 15) on the chuck body with screws (item 35).

7 Transport

⚠ DANGER

Risk of fatal injury from suspended loads!

Falling loads are sure to cause serious injuries and even death.

- Use suitable lifting equipment.
- Secure the product to prevent it from falling.
- Stand clear of suspended loads and do not step within their swiveling range.
- Only move loads when supervised and do not leave unattended.
- Wear suitable protective equipment.

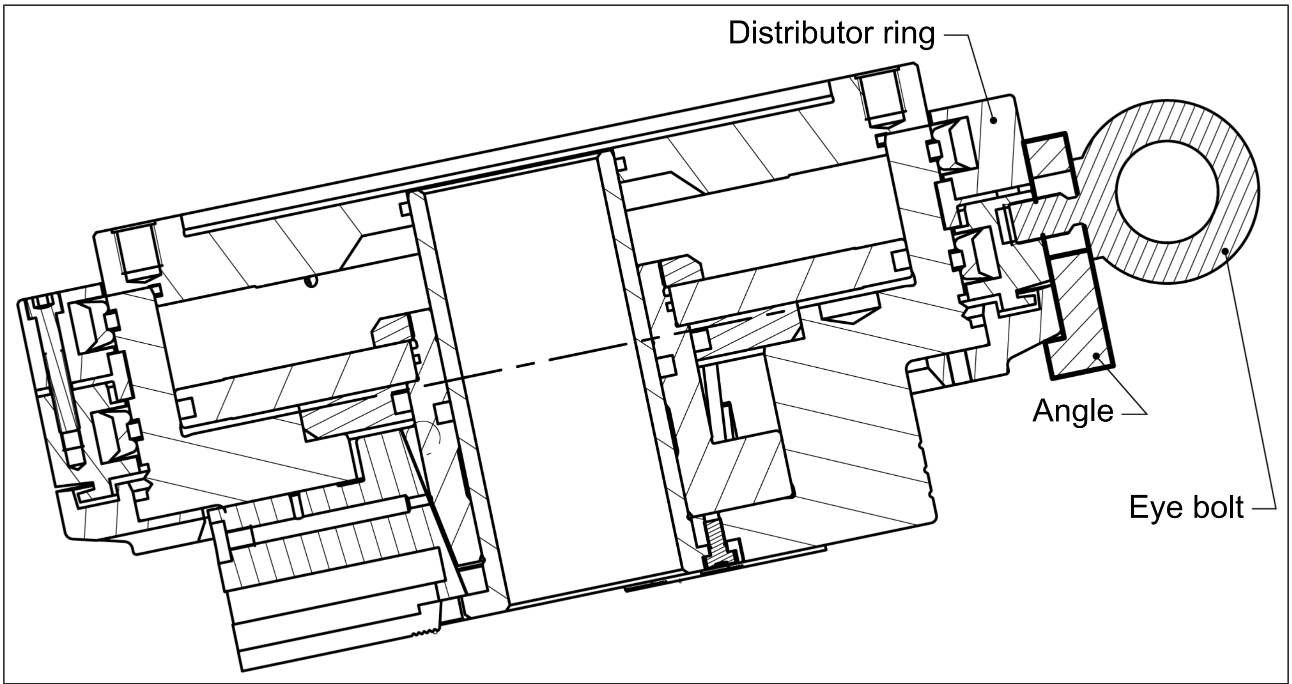
⚠ CAUTION

Risk of injury due to sharp edges and rough or slippery surfaces

Wear personal protective equipment, particularly protective gloves.

An eye bolt and an angle are included in the scope of delivery for transporting lathe chucks with a size of 160 and above. These chucks are only allowed to be transported on this eye bolt.

- Place the angle under the eye bolt on the distributor ring.
- Screw the eye bolt into the thread provided.



Using the angle prevents the distributor ring from slipping backwards out of the chuck.

8 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.

9 Parts list

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

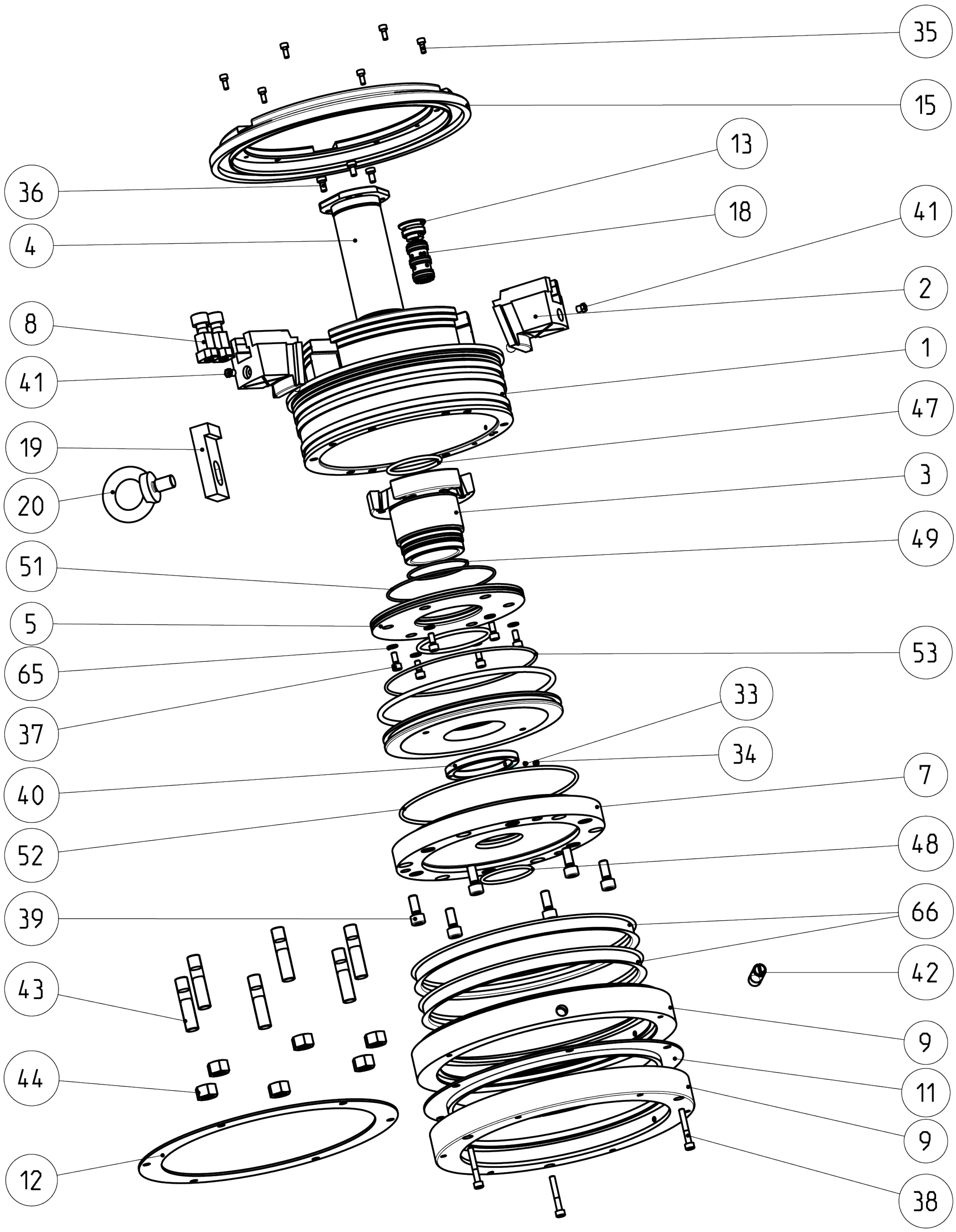
Seals, sealing elements, screw connections, springs, bearings, screws and wiper bars plus parts coming into contact with the workpiece are not covered by the warranty.

Item	Designation	Quantity	Note
1	Chuck body	1	
2	Base jaw	3	
3	Piston	1	
4	Bushing	1	
5	Sealing disk	1	
6	Piston cover	1	
7	Mount	1	
8	T-nut	6	
9	Distributor ring	1	
11	Centering sleeve	1	
12	Spacer ring	1	
13	Locking screw	1	125 / 160 / 200 / 250 / 315-105 / 350
	Locking screw	2	315-90
15	Distributor ring cover	1	125 / 160 / 200 / 250 / 315-90
	Angle	1	350
16	Eye bolt	1	350
18	Double check valve	1	
19	Transporting angle	1	160 / 200 / 250 / 315
	Screw	1	350
20	Eye bolt	1	160 / 200 / 250 / 315
33	Copper bolt	1	160 / 200 / 250 / 315-90
	Klemm-Tight thread	1	125
34	Set-screw	1	160 / 200 / 250 / 315-90
35	Screw	6	125 / 160 / 200 / 250 / 315-90
36	Screw	3	125 / 160 / 200 / 250 / 315-105 / 350 LH
	Screw	6	315-90 / 350

Item	Designation	Quantity	Note
37	Screw	3	125 / 160 / 315-90
	Screw	6	200 / 250 / 315-105 / 350
38	Screw	3	125 / 200 / 250 / 315-105 / 350
	Screw	6	160 / 315-90
39	Screw	6	125 / 160
	Screw	12	200 / 250 / 315 / 350
40	Circlip (until 2015)		125 / 160 / 200 / 250 / 315-90
	Lock nut (from 2015)	1	125 / 160 / 200 / 250 / 315-90
	Screw	6	315-105 / 350
41	Lubrication nipple	3	
42	Shaft screw	1	
43	Stud screw	6	
44	Hexagon nut	6	
45	Swivel screw fitting (Connection)	2	
46	Straight screw fitting (Connection)	2	
47	O-ring	1	
48	O-ring	1	
49	O-ring	1	
50	O-ring	1	
51	O-ring	1	
52	O-ring	1	
53	O-ring	1	
54	O-ring	1	160
65	Copper seal	3	125
	Copper seal	6	160 / 200 / 250 / 315 / 350
66	Profile seal	2	
67	Seal (Connection)	4	
70	Clamping sleeve	9	350-LH
80	Assembly tool (item 40)	1	125 / 160 / 200 / 250 / 315-90
90	Eye bolt	1	350

10 Assembly drawings

ROTA TP with standardized cover



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Manufacturer certificate

Manufacturer / Distributor:	Heinz-Dieter SCHUNK GmbH & Co. Spanntechnik KG. Lothringer Str. 23 D-88512 Mengen
Product:	**Lathe chuck**
Description:	**ROTA**
Type designation:	TB, EP, TP, ROTA-P

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 "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