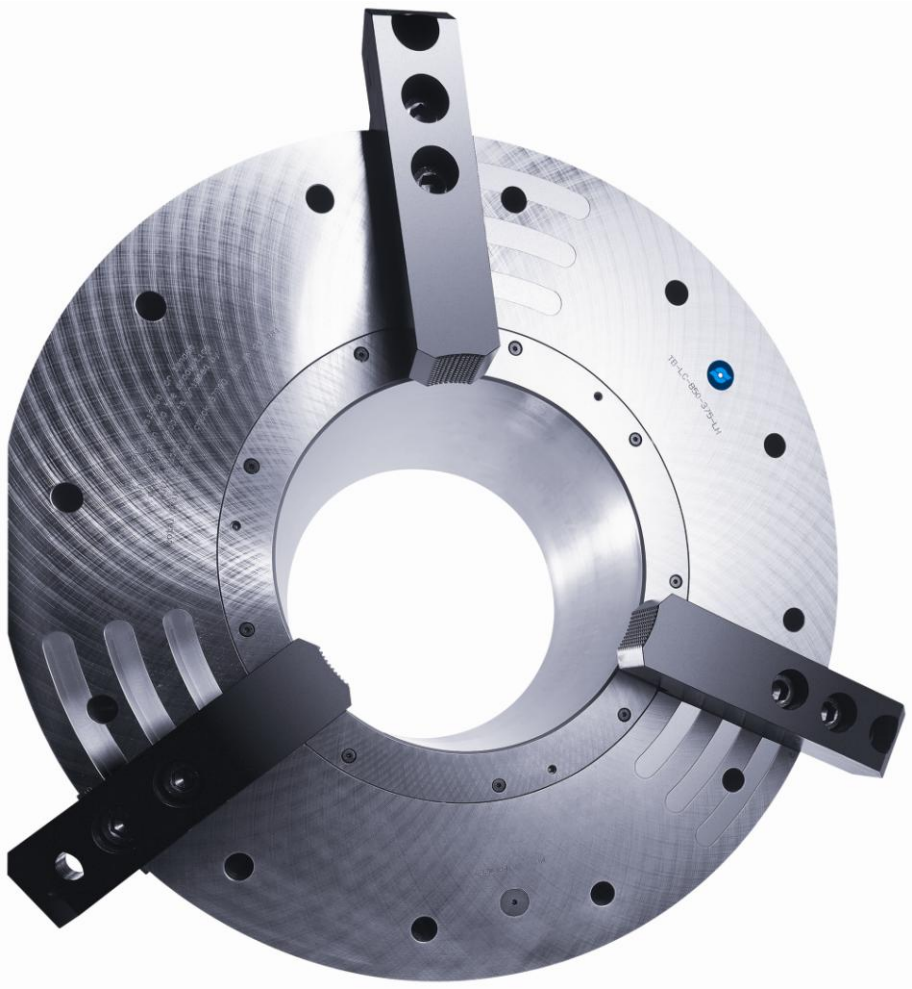
Pneumatic power chuck
ROTA TB /TB-LH / TBS / TBS-LH / EP / EP-LH

Assembly and Operating Manual



Imprint

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

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Dear customer,

congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase.

Kindest Regards

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Reg. No. 003496 QM08

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Table of contents

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.

Illustrations in this manual are provided for basic understanding of the product and may differ from the actual product design.

In addition to these instructions, the documents listed under (☞ 1.2, Page 6) are applicable.

1.1 Warnings

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

	**⚠ DANGER** **Danger for persons.** Non-compliance will inevitably cause irreversible injury or death.

	**⚠ WARNING** **Dangers for persons.** Ignoring a safety note like this can lead to irreversible injury and even death.

	**⚠ CAUTION** **Dangers for persons.** Non-observance can cause minor injuries.

NOTICE

Material damage
Information about avoiding material damage.

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 marked with an asterisk (*) can be downloaded on our homepage **www.de.schunk.com**.

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.

Report any failures and damage immediately and repair without delay to keep the extent of the damage to a minimum and prevent compromising the safety of the product.
Only use original SCHUNK spare parts.

2.1 Intended use

The chuck is used to clamp workpieces on machine tools and other suitable technical facilities, paying particular attention to the technical data specified by the manufacturer.
The technical data specified by the manufacturer must never be exceeded.

The product is intended for industrial use.

Intended use also means that the user has read and understood this operating manual in its entirety, especially the chapter “Basic safety notes”.

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”). (☞ 6, Page 17)

2.2 Not intended use

The product is not being used as intended if, for example,

- It is used as a press, a punch, a chuck, a load-handling device or as lifting equipment.
- It is used in working environments that are not permissible.
- Workpieces are not clamped properly, paying particular attention to the clamping forces specified by the manufacturer.

- People work on machines or technical equipment that do not comply with the EC Machinery Directive 2006/42/EC, in violation of the applicable safety regulations.
- The technical data for use of the product specified by the manufacturer are exceeded.

2.3 Notes on particular risks

This product may pose a danger to persons and property if, for example:

- It is not used as intended;
- It is not installed or maintained properly;
- The safety and installation instructions, local applicable safety and accident prevention regulations or the EC Machinery Directive are not observed.

⚠ DANGER

Possible 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 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 system.

- Due to the carried out and documented danger assessment and risk evaluation, the machine manufacturer and its operator have to ensure that appropriate measures have been taken in order to maintain the clamping force of the chuck until the machine's standstill, and to secure the workpiece correspondingly (e.g. via a crane or a suitable hoist).
- The machines and facilities must fulfill the minimum requirements of the EC Machinery Directive 2006/42/EC; specifically, they must have effective technical measures to protect against possible mechanical hazards.

⚠ DANGER

Possible risk of fatal injury to operating personnel if a jaw breaks or if the 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 chuck must never be exceeded.
- The chuck may only be used on machines and facilities that fulfill the minimum requirements of the EC Machinery Directive 2006/42/EC; 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 chuck and being dragged into the machine

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

- The machines and facilities must fulfill the minimum requirements of the EC Machinery Directive 2006/42/EC; specifically, they must have effective technical measures to protect against possible mechanical hazards.
- Always wear tight-fitting clothing and a hairnet when working on the machine and the chuck.

⚠ WARNING

Risk of injury due to dropping the chuck during transport, installation or removal.

- Take special care in the danger zone when transporting, installing or removing the chuck.
- Note the relevant load securing regulations for working safely with cranes, ground conveyors, lifting gear and load-handling equipment.

⚠ CAUTION

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

- Make sure the work environment is clean before beginning assembly and installation tasks.
- Wear suitable safety shoes.
- Observe the safety and accident prevention regulations during operation of the chuck, especially in connection with machining centers 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 jaws.
- Wear safety 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

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

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

- The T-nuts combine the top jaws with the base jaws and they should never protude over the base jaws in radial direction.
- The outer diameter of the screwed top jaws must not exceed the outer diameter of the chuck by more than 10%.

⚠ 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.

2.4 Notes on safe operation

- The machine spindle may only be started up when clamping pressure has built up in the cylinder and clamping has followed in the permitted work area.
- Unclamping may only be possible when the machine spindle has come to a standstill.
- If the clamping energy fails, the workpiece must remain firmly clamped until the spindle is shut down and the workpiece is secured.
- The technical safety requirements in the respective operating instructions must be observed exactly.

Functional test
After installation of the chuck, its function must be checked prior to start-up.

Two important points are:

- **Clamping force** At max. actuating force/pressure, the clamping force specified for the chuck 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 spindle must not start up until the clamping piston has passed through the safety margin.

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, adjust the stroke control to the new situation.

Speed

⚠ DANGER

Possible risk of fatal injury to operating personnel if the chuck's top speed is exceeded and a workpiece is released or parts fly off.
If the machine tool or technical equipment can reach a higher speed than the chuck's top speed, a reliable speed limiter must be installed and proof must be provided that the speed limiter is effective.

Maintenance instructions

The chuck'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, LINO MAX. Unsuitable lubricants can have a negative impact on the functioning of the chuck (clamping force, coefficient of friction, wear characteristics).
  (For product information about LINO MAX, 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 piston to its end positions several times, lubricate again, and then check the clamping force.
- We recommend checking the clamping force using a clamping force tester before starting a new production run and between maintenance intervals. "Only regular checks can guarantee optimal safety."
- The clamping force should always be measured in the state of the chuck as used for the current clamping situation. 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. The operating clamping force must in this case be determined by means of dynamic measurement.

- Move the clamping piston 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. This means that the clamping force is retained for longer).

Safety notes for servicing

Follow all the applicable legal norms for health and safety during servicing. Use suitable personal protective equipment, especially protective gloves, goggles and safety boots, paying particular attention to the operating system and hazard assessment.

DANGER

Possible risk of fatal injury to operating personnel due to chuck failure if the servicing instructions for the chuck are disregarded!
The servicing instructions specified by the manufacturer must be complied with to ensure safe operation of the chuck.
Work must be carried out by qualified specialist personnel with the relevant safety training.

Use of special chuck jaws

When using special chuck jaws, please observe the following rules:

- 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).
- Do not use welded jaws.
- If for constructional reasons the chuck jaws in special design are heavier than the top jaws assigned to the clamping device, greater centrifugal forces must be accounted for when defining the required clamping force and the recommended speed.
- Screw the jaw mounting screws into the bore holes furthest apart.
- The maximum recommended speed may only be operated in conjunction with maximum actuating force and only with the chuck in optimal, fully functioning condition.

- If the chuck is involved in a collision, it must be subjected to a crack test before using it again. Replace damaged parts with original SCHUNK spare parts.
- Replace the chuck jaw mounting screws if there are signs of wear or damage. Only use screws with a quality of 12.9.

2.4.1 Substantial modifications

No substantial modifications may be made to the chuck.

If the operator carries out a substantial modification to the chuck, the product shall no longer conform to the EC Machinery Directive 2006/42/EC.

2.5 Personnel qualification

Assembly and disassembly, commissioning, operation and repair of the chuck may be performed only by qualified specialists who have been instructed with respect to safety.

All persons who are assigned to operate, maintain and repair our chuck must have access to the operating manual, especially the chapter “Fundamental safety instructions”.
We recommend that the operator create in-house safety operating instructions.

Persons in training may be assigned to machines and technical equipment in which a chuck is mounted only if they are under the constant guidance and supervision of qualified specialists.

2.6 Organizational measures

Obeying the rules
Via suitable organizational measures and instructions, the operator must ensure that the relevant safety rules are obeyed by the persons asked to operate, maintain and repair the chuck.

Checking the behavior of personnel
The operator must at least occasionally check that the personnel are behaving in a safety conscious manner and are aware of the potential hazards.

Danger signs
The operator must ensure that the signs concerning safety and hazards mounted on the machine where the chuck is mounted are clearly legible and are observed.

Faults
If a fault occurs on the chuck and this fault endangers safety or if a problem is suspected due to production characteristics, the machine tool where the chuck is mounted must be immediately stopped and remain shut down until the fault has been located and remedied. Only allow specialists to remedy faults.

Spare parts
Only ever use original SCHUNK spare parts.

Environmental regulations
Comply with the applicable legal norms when disposing of waste.

2.7 Using personal protective equipment

When using this product, you must comply with the relevant health and safety at work rules and you must use the required personal safety equipment (minimum: category 2).

3 Warranty

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

- Observe the applicable documents(☞ 1.2, Page 6)
- Observe the environmental and operating conditions.
- Observation of the maximum clamping cycles(☞ 6, Page 17)
- Observe the mandatory maintenance and lubrication intervals.(☞ 9, Page 46)

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

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
Torque M_A (Nm)	16	30	50	70	130	150	220	450

5 Scope of delivery

1 ROTA TB chuck

6 T-Nuts

2 Elbow connectors

2 Straight connectors

1 Eye bolt

Mounting screws

1 Operating manual

6 Technical data

6.1 Chuck data

ROTA TB

Size	400-115	400-140	470-185	500-160	500-205	500-230	600-275	630-265
Chuck Ø	400	422	470	500	540	570	610	630
Chuck through bore [mm]	115	140	185	160	205	230	260	265
Max. clamping force [kN]	200	180	115	300	240	230	190	330
Max. rotation speed [min-1]	1700	1700	1700	1300	1300	1300	1300	1000
Stroke per jaw [mm]	7	7	7	8.5	8.5	8.5	12	10
Serration of the jaws [mm]	3/32" x 90°							
Distributor ring Ø [mm]	467	467	470	570	570	570	570	685
Centrifugal torque of base jaw [kgm] M_{cGB}	0.497	0.535	0.626	0.749	0.847	0.891	1.300	1.624
Max. jaw eccentricity of center of gravity in axial direction [mm] a_{max}	36							

ROTA TB

Size	630-310	630-330	800-365	800-410	1000-534	400-140-LH	470-185-LH	500-205-LH
Chuck Ø	662	685	800	800	1000	467	470	570
Chuck through bore [mm]	310	330	365	410	534	140	185	205
Max. clamping force [kN]	280	280	420	400	280	180	115	240
Max. rotation speed [min-1]	1000	700	750	750	450	1300	1300	1100
Stroke per jaw [mm]	10	10	12	12	12	19	20	25.4

Size	630-310	630-330	800-365	800-410	1000-534	400-140-LH	470-185-LH	500-205-LH
Serration of the jaws [mm]	3/32" x 90°							
Distributor ring Ø [mm]	685	685	850	850	850	467	470	570
Centrifugal torque of base jaw [kgm] M_{cGB}	1.745	1.815	3.031	3.172	4.292	0.866	0.823	1.399
Max. jaw eccentricity of center of gravity in axial direction [mm] a_{max}	36		42			36		

ROTA TB

Size	500-230-LH	600-275-LH	630-265-LH	630-325-LH	850-375-LH	1000-560-LH	1200-640-LH
Chuck Ø	570	610	685	720	850	1000	1200
Chuck through bore [mm]	230	275	265	325	375	560	640
Max. clamping force [kN]	220	180	330	280	330	170	170
Max. rotation speed [min-1]	1100	1100	900	900	750	450	180
Stroke per jaw [mm]	25.4	25.4	38	25.4	25.4	25.4	38
Serration of the jaws [mm]	3/32" x 90°						
Distributor ring Ø [mm]	570	570	685	685	850	850	925
Centrifugal torque of base jaw [kgm] M_{cGB}	1.312	1.349	2.251	2.641	4.806	5.189	9.062
Max. jaw eccentricity of center of gravity in axial direction [mm] a_{max}	36				42		

ROTA EP

Size	380-127	460-165	460-185	500-260	460-165-LH	460-185-LH
Chuck Ø	380	460	460	500	460	460
Chuck through bore [mm]	127	165	185	26	165	185
Max. clamping force [kN]	160	230	230	80	230	220
Max. rotation speed [min^{-1}]	2300	1600	1600	1000	1600	1600
Stroke per jaw [mm]	7	7	7	15	19	19
Serration of the jaws [mm]	3/32" x 90°			1/16" x 90°	3/32" x 90°	
Distributor ring Ø [mm]	380	460	460	467	460	460
Centrifugal torque of base jaw [kgm] M_{cGB}	0.432	0.622	0.640	0.343	0.787	0.816
Max. jaw eccentricity of center of gravity in axial direction [mm] a_{max}	36			32	36	40

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

⚠ 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 chuck jaws in special design, the permissible speed of rotation according to VDI 3106 must be calculated for the machining job in question. The recommended maximum speed must not be exceeded. The calculations must be checked using dynamic measurement. Function monitoring (piston movement and actuating pressure) must be performed in accordance with the guidelines of the Berufsgenossenschaft (employers' mutual insurance association).

Warranty and maximum clamping cycles

Duration of warranty	24 Months
Maximum clamping cycles	500 000

6.2 Clamping force / speed diagrams

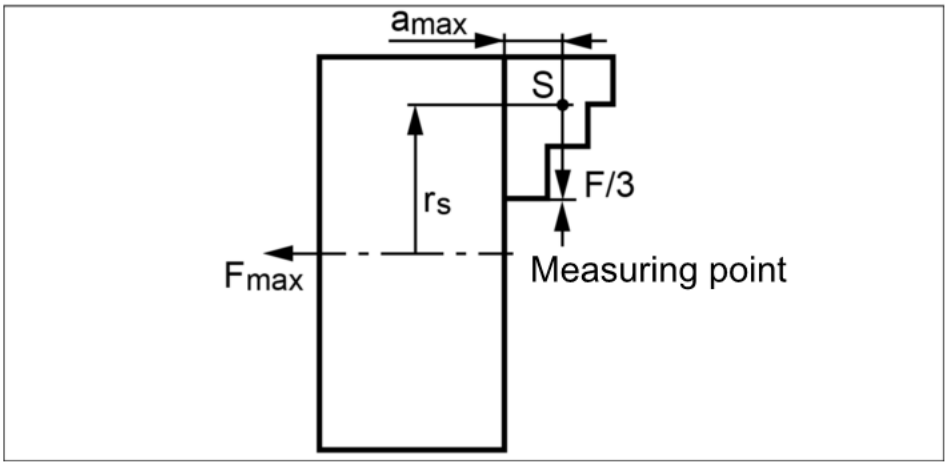
The diagrams refer to 3-jaw-chuck.

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.

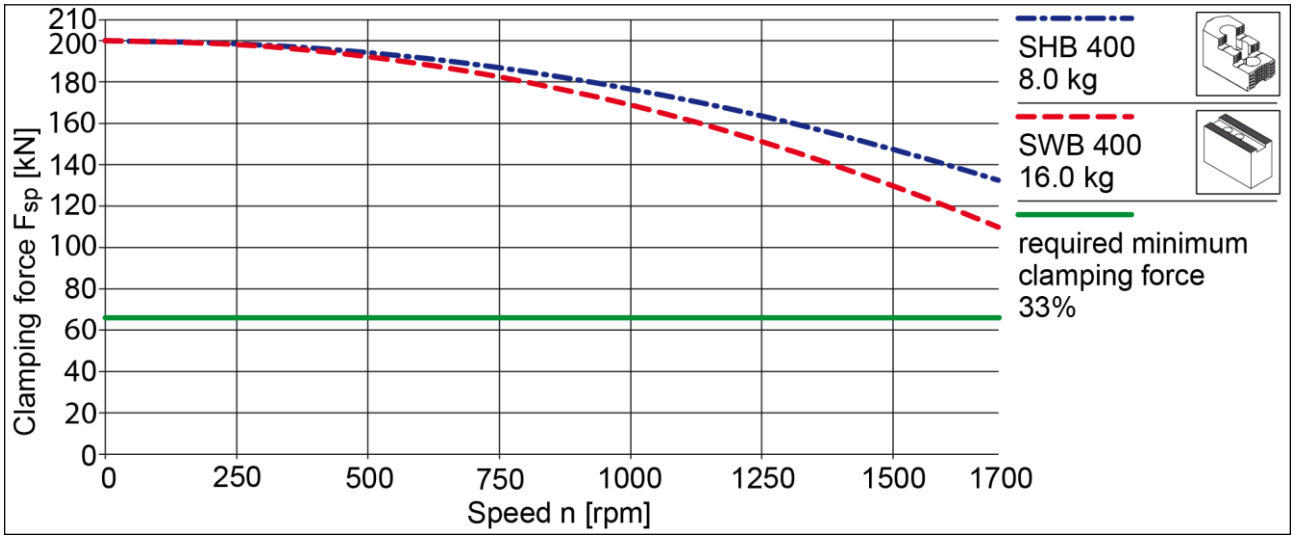
Should one or several of the above mentioned parameters be changed the diagrams are no longer valid.

Chuck set-up for clamping force / speed diagram

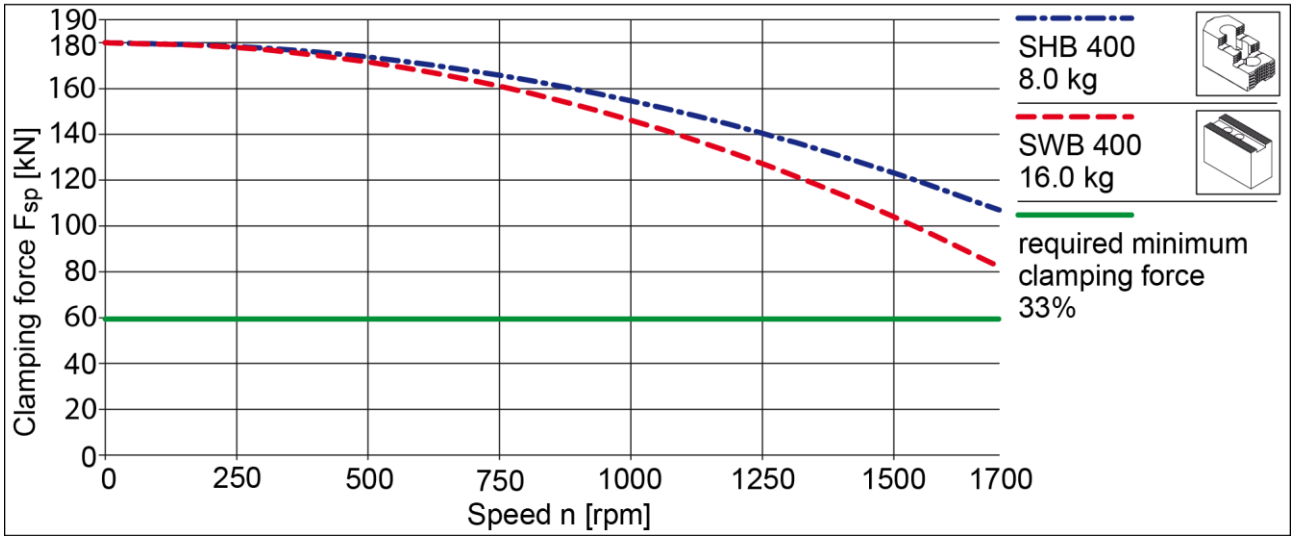


F/3	Clamping force per jaw	S	Center of gravity
r_s	Center of gravity radius	a_{max}	Max. jaw eccentricity of center of gravity in axial direction
F_{max}	Max. actuating force		

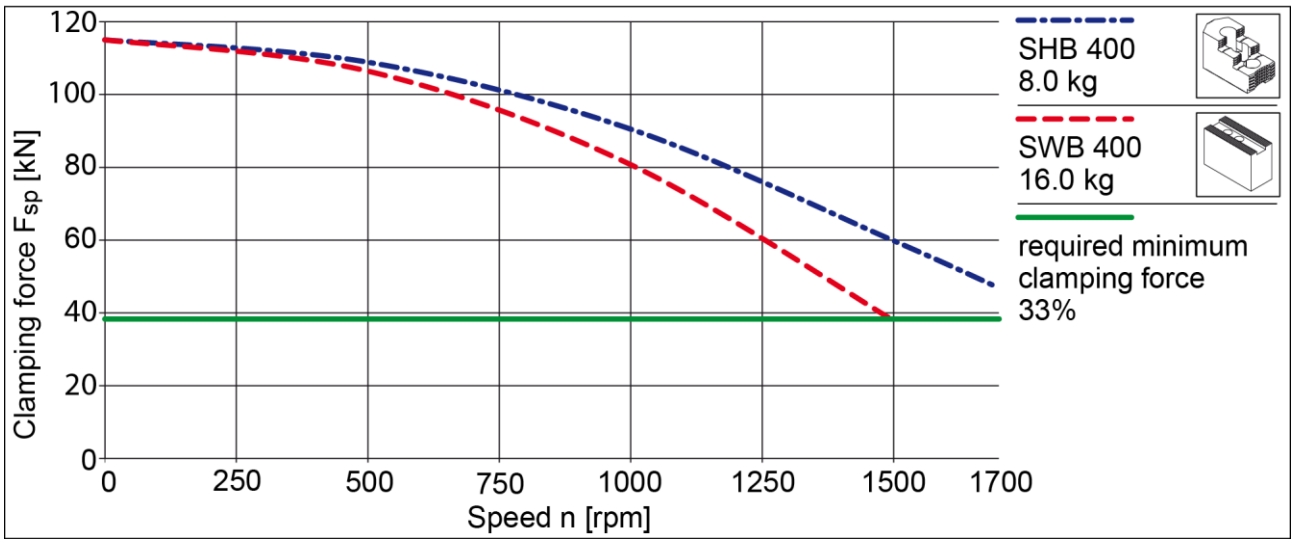
Clamping force-RPM-diagram ROTA TB 400-115



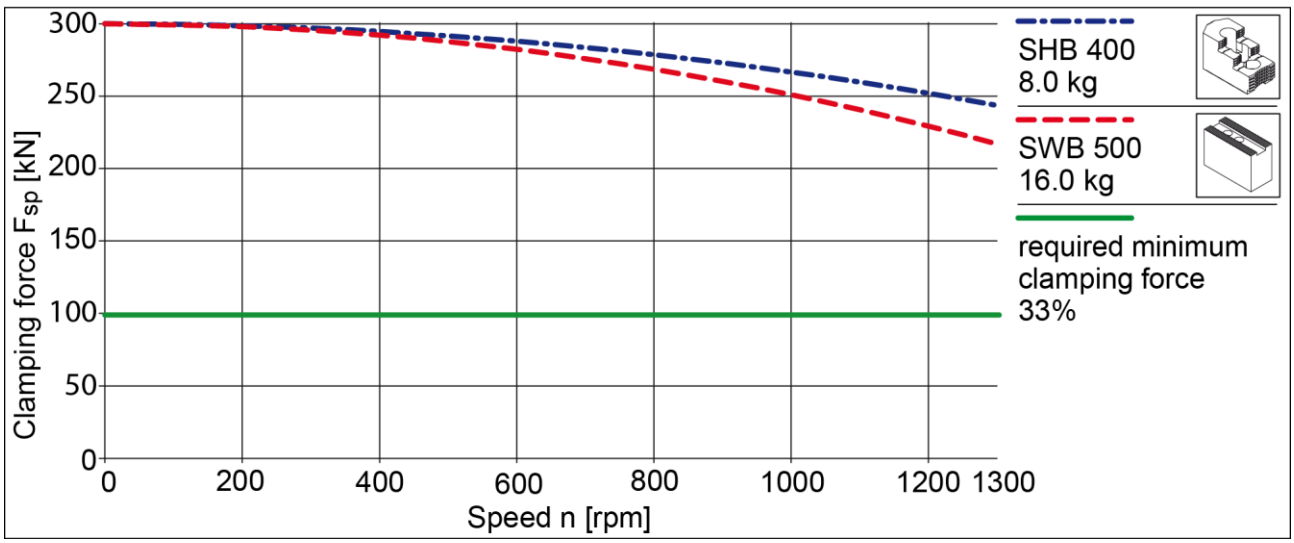
Clamping force-RPM-diagram ROTA TB 400-140



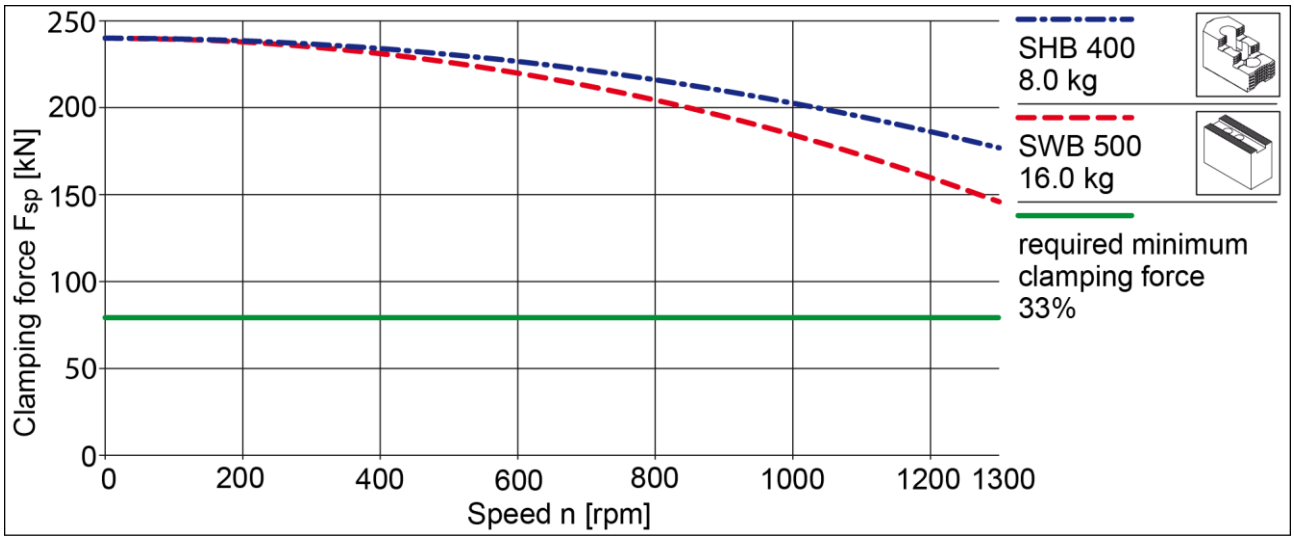
Clamping force-RPM-diagram ROTA TB 470-185



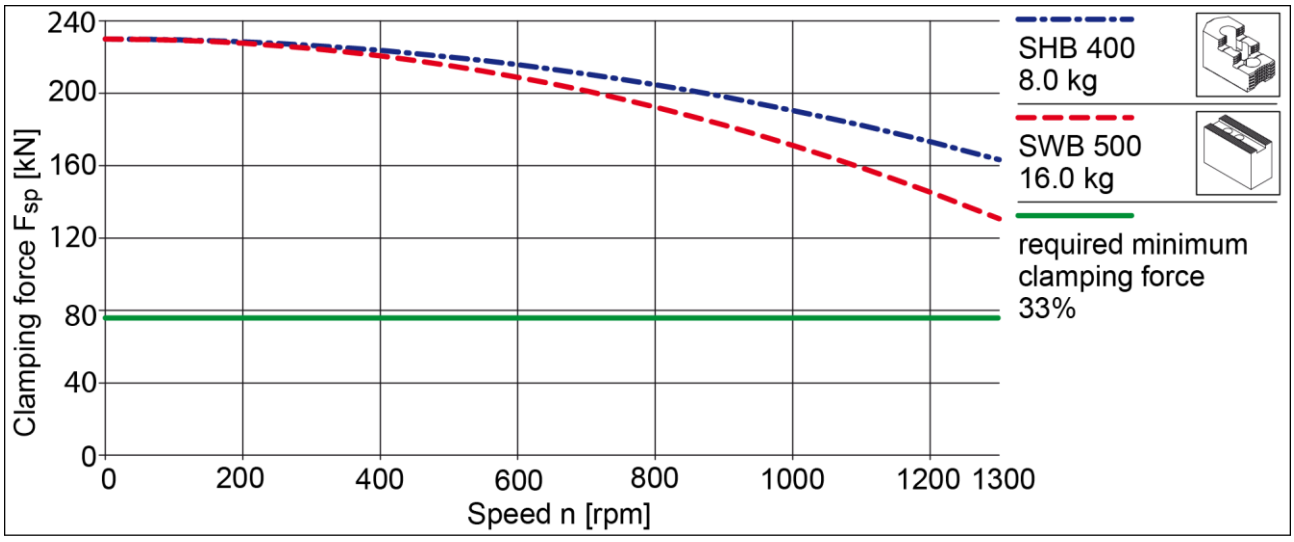
Clamping force-RPM-diagram ROTA TB 500-160



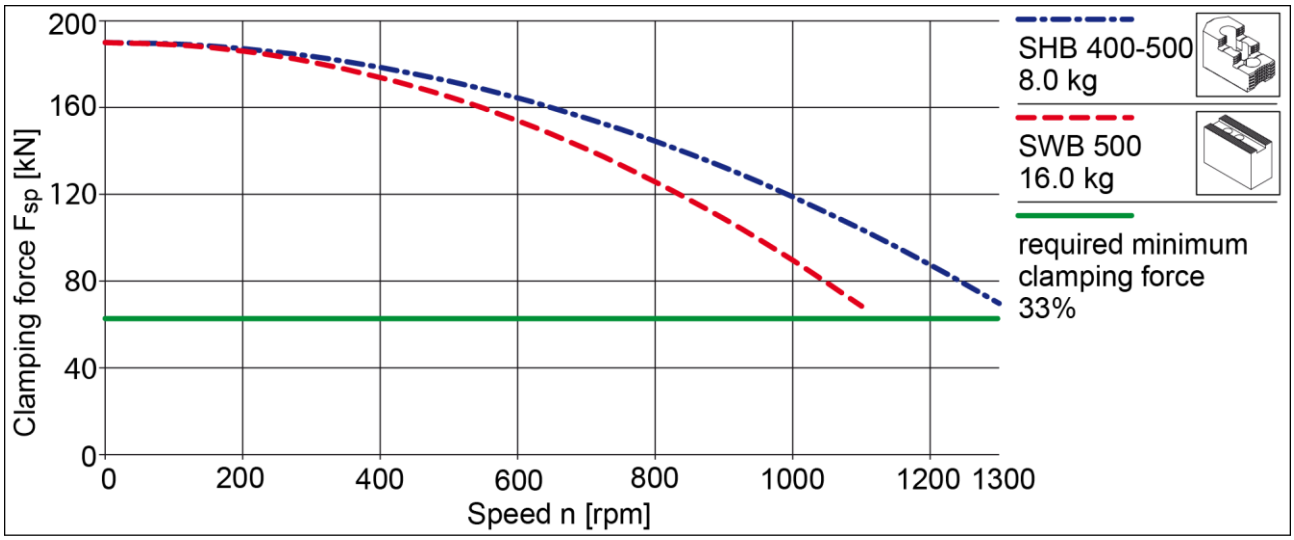
Clamping force-RPM-diagram ROTA TB 500-205



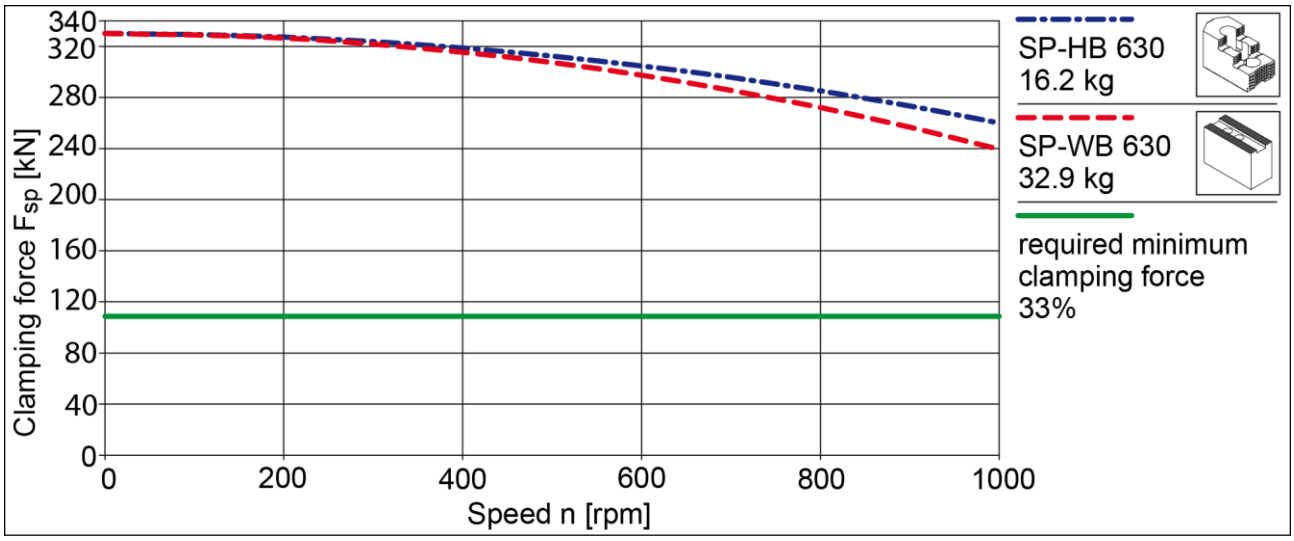
Clamping force-RPM-diagram ROTA TB 500-230



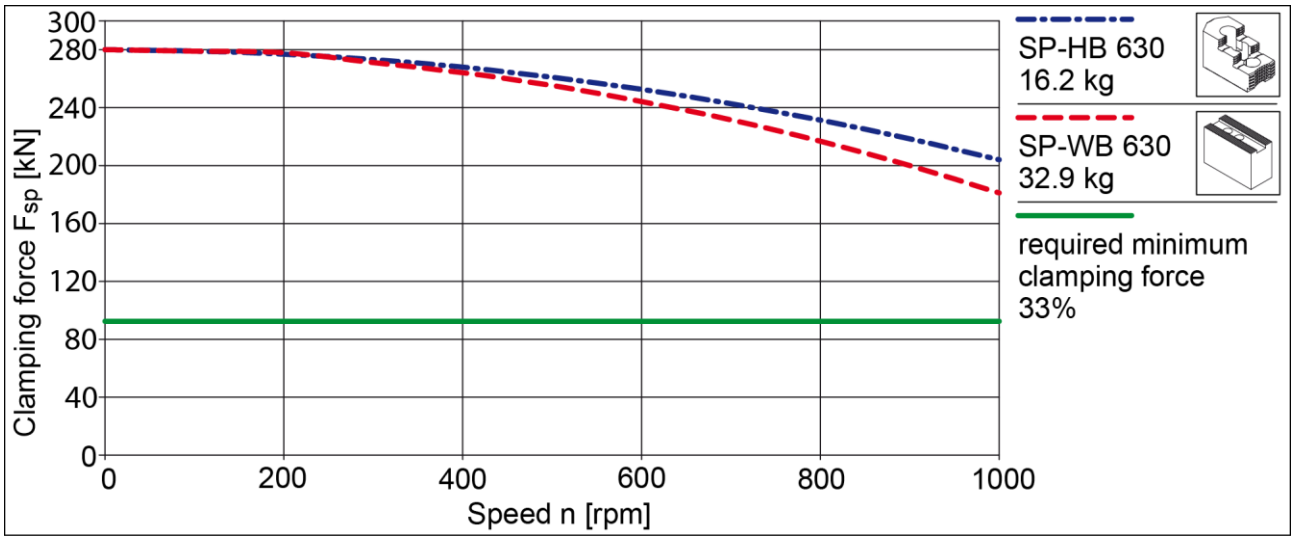
Clamping force-RPM-diagram ROTA TB 600-275



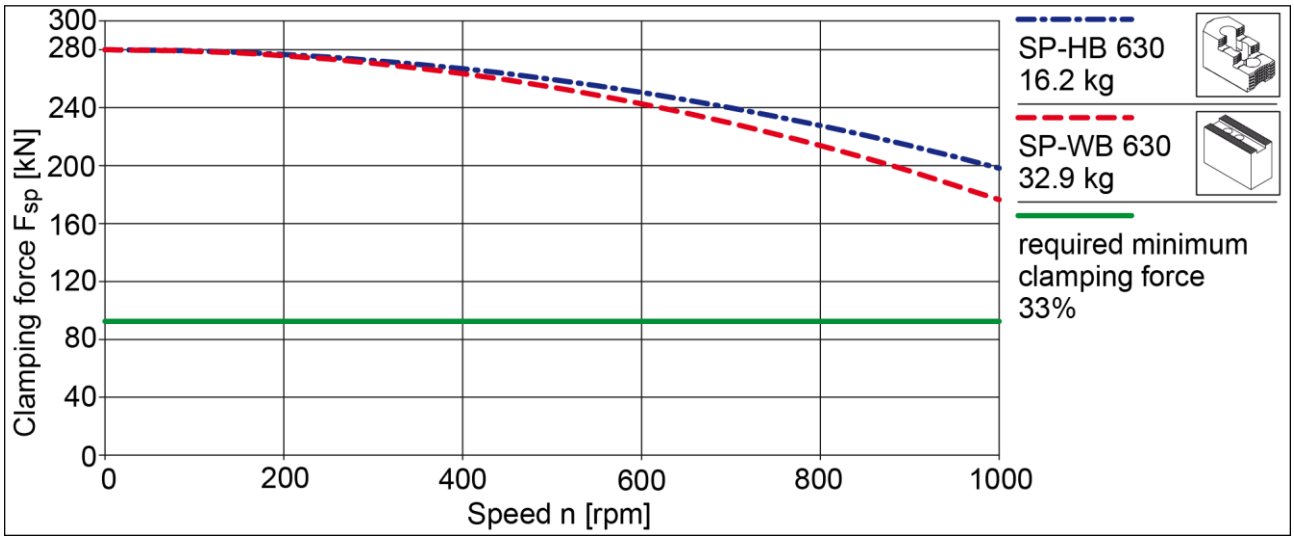
Clamping force-RPM-diagram ROTA TB 630-265



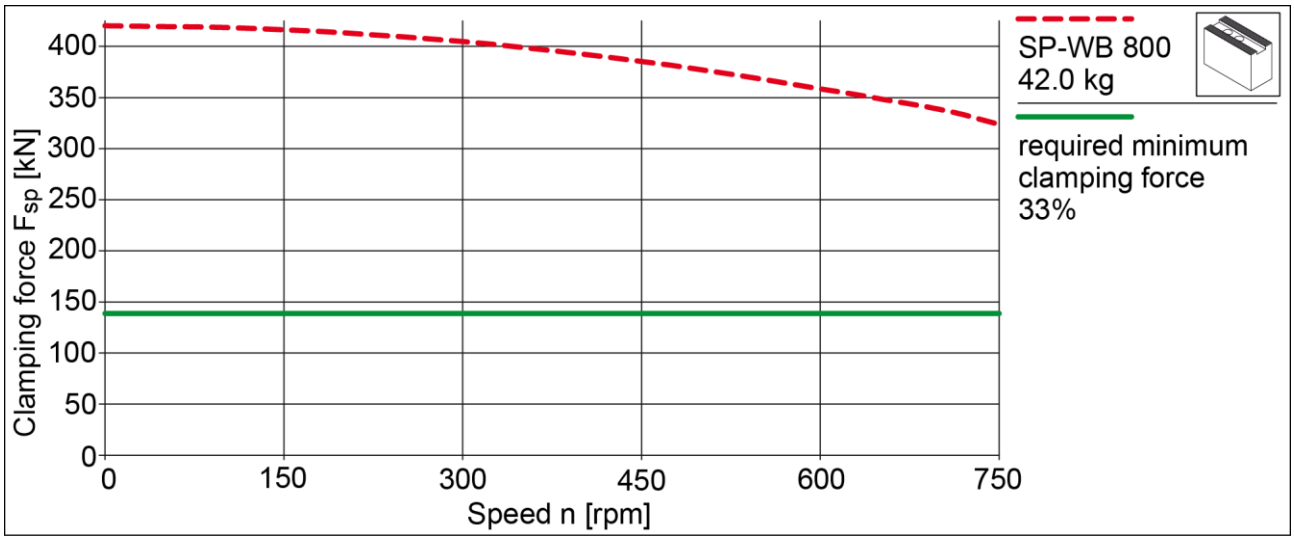
Clamping force-RPM-diagram ROTA TB 630-310



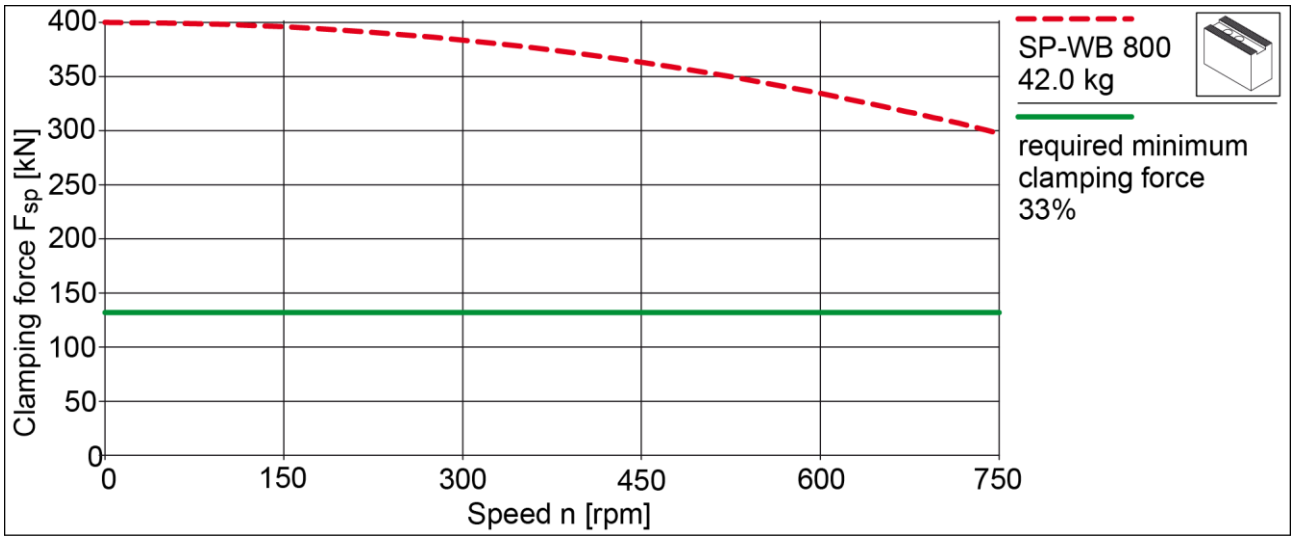
Clamping force-RPM-diagram ROTA TB 630-330



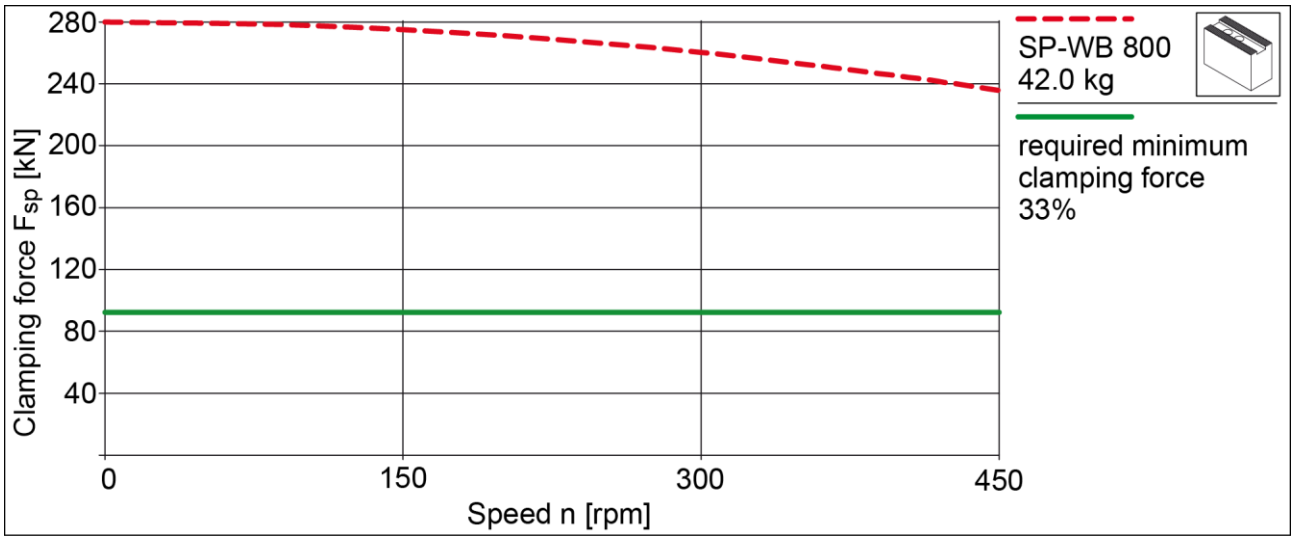
Clamping force-RPM-diagram ROTA TB 800-365



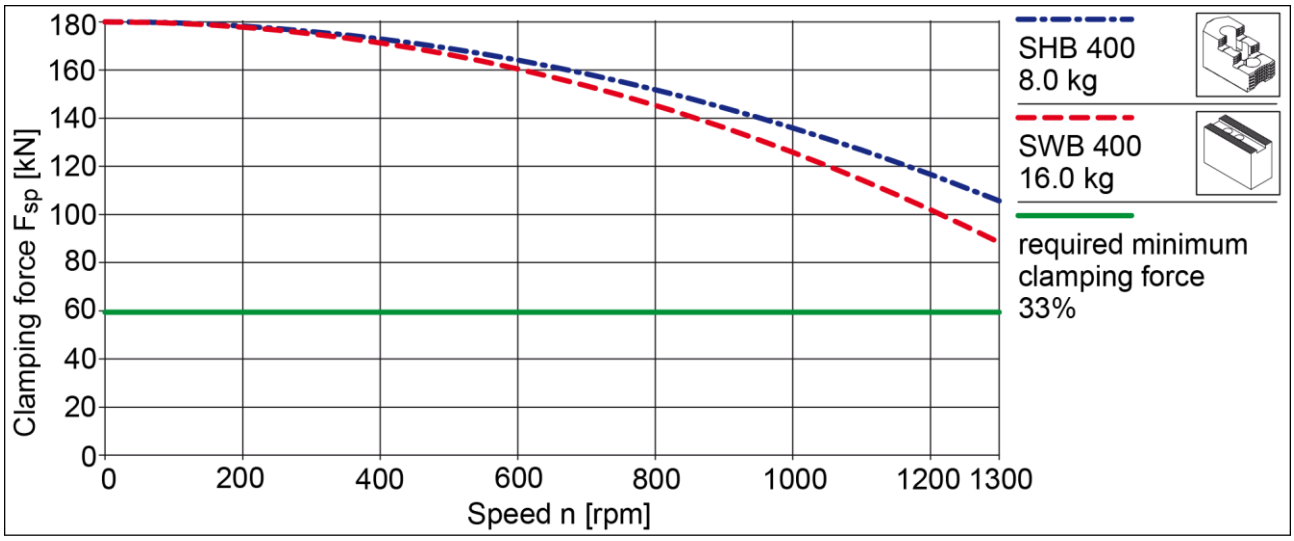
Clamping force-RPM-diagram ROTA TB 800-410



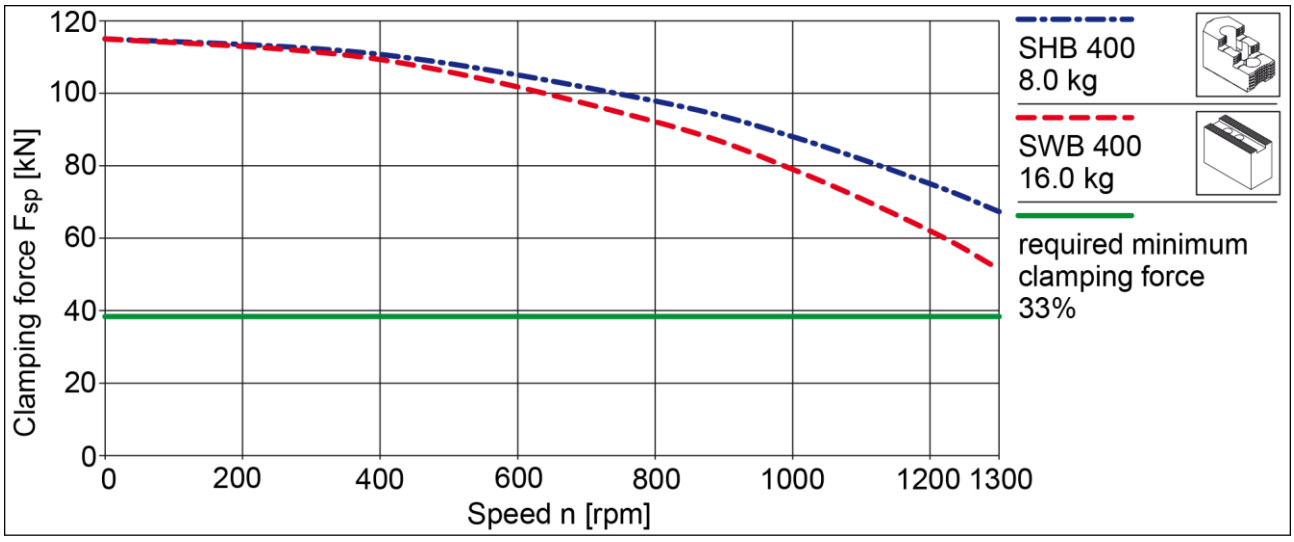
Clamping force-RPM-diagram ROTA TB 1000-534



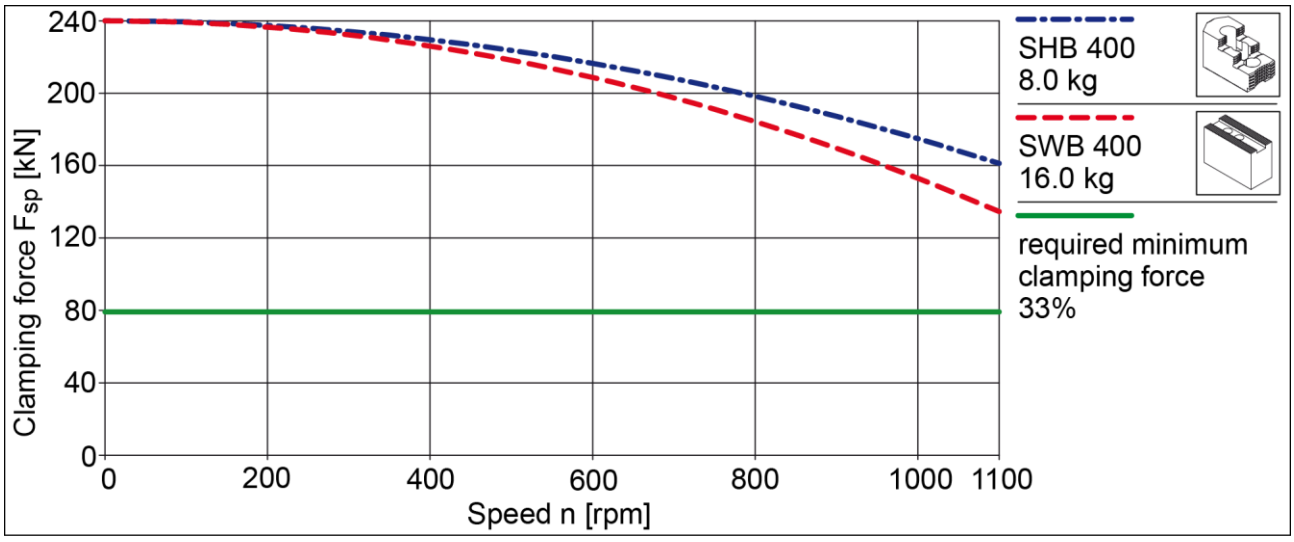
Clamping force-RPM-diagram ROTA TB-LH 400-140



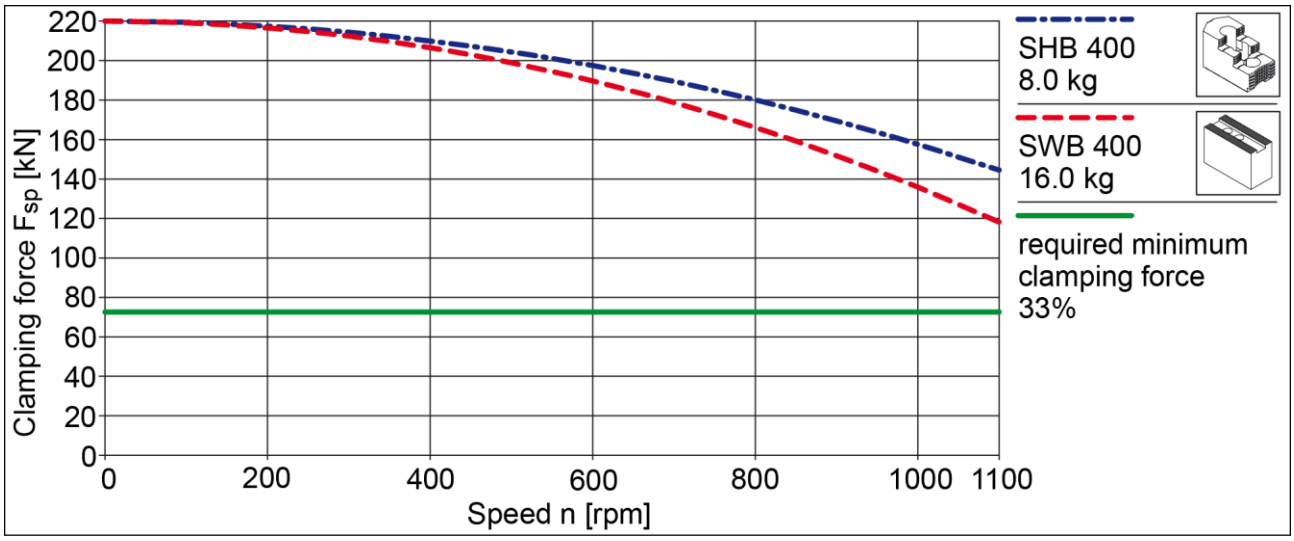
Clamping force-RPM-diagram ROTA TB-LH 470-185



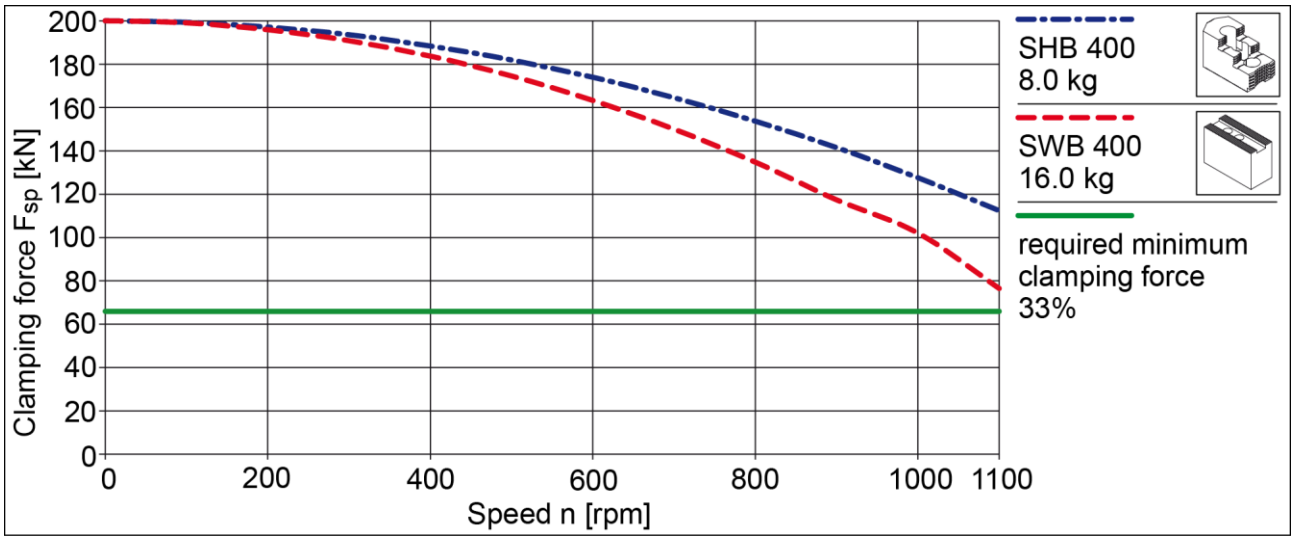
Clamping force-RPM-diagram ROTA TB-LH 500-205



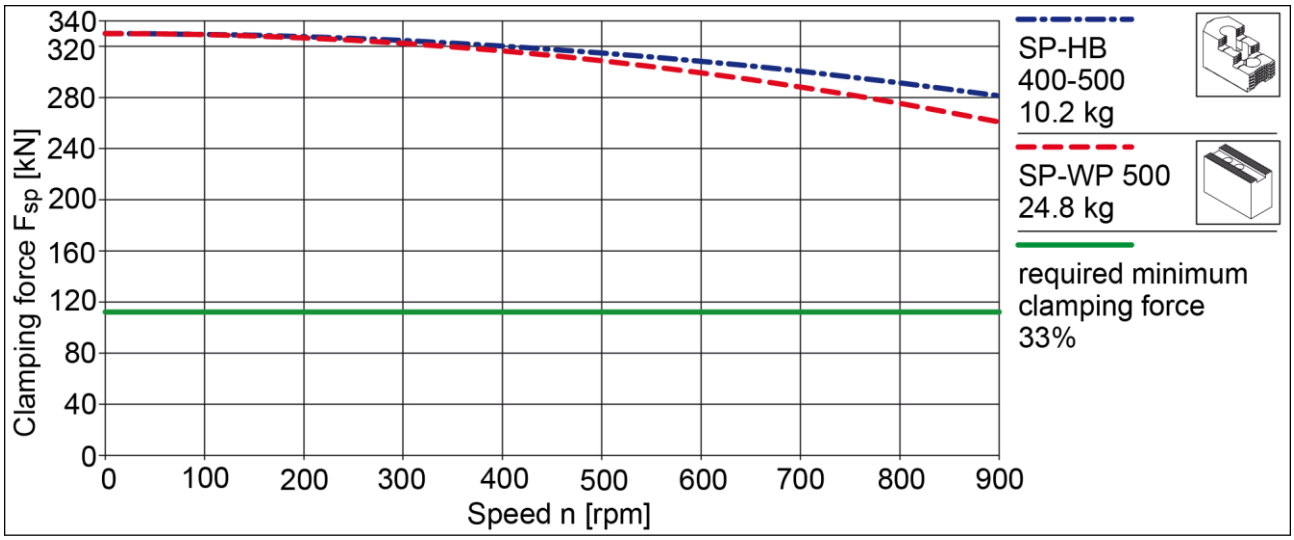
Clamping force-RPM-diagram ROTA TB-LH 500-230



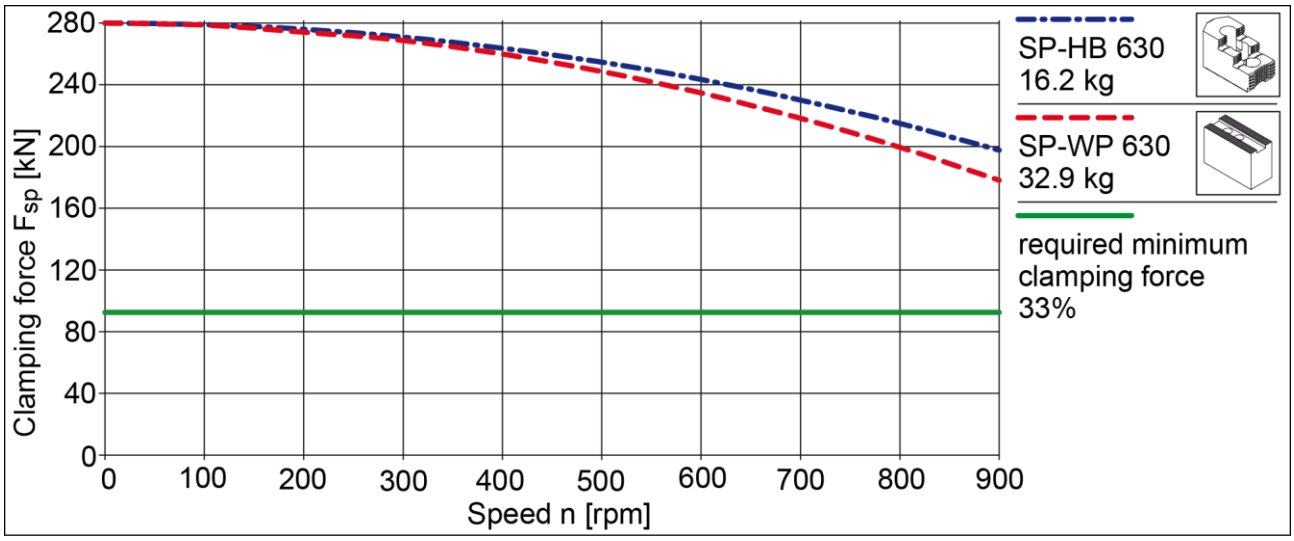
Clamping force-RPM-diagram ROTA TB-LH 600-275



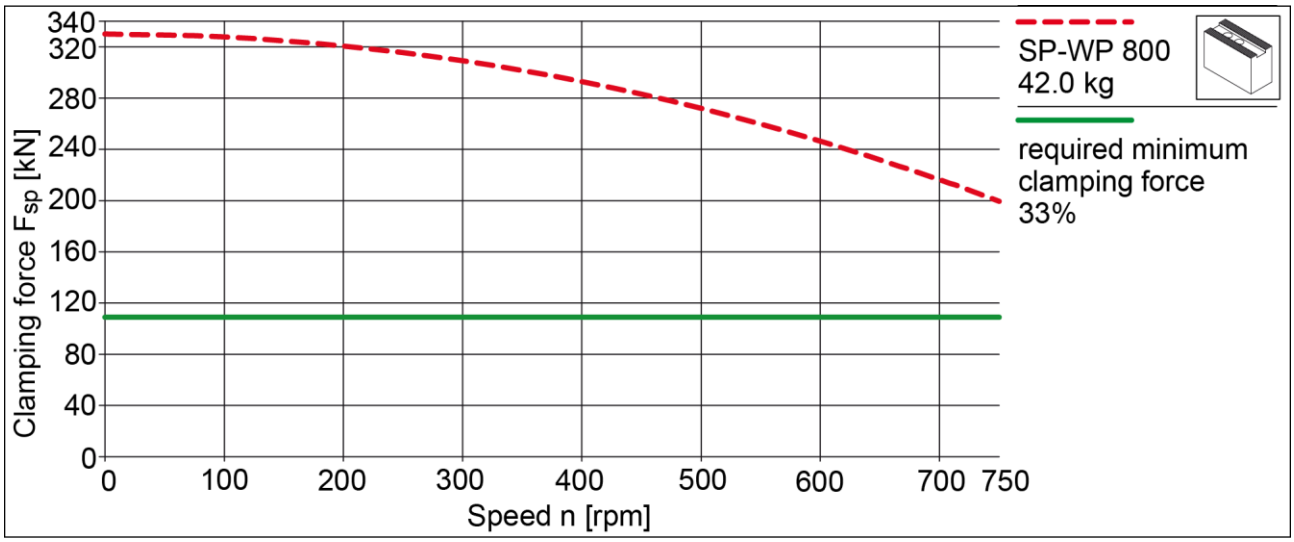
Clamping force-RPM-diagram ROTA TB-LH 630-265



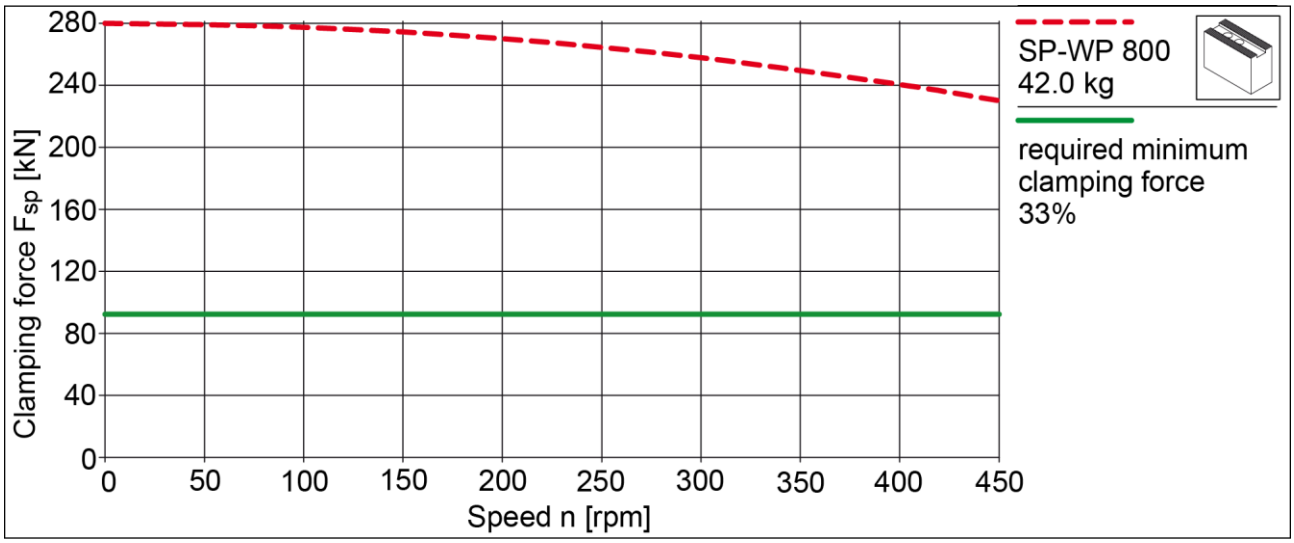
Clamping force-RPM-diagram ROTA TB-LH 630-325



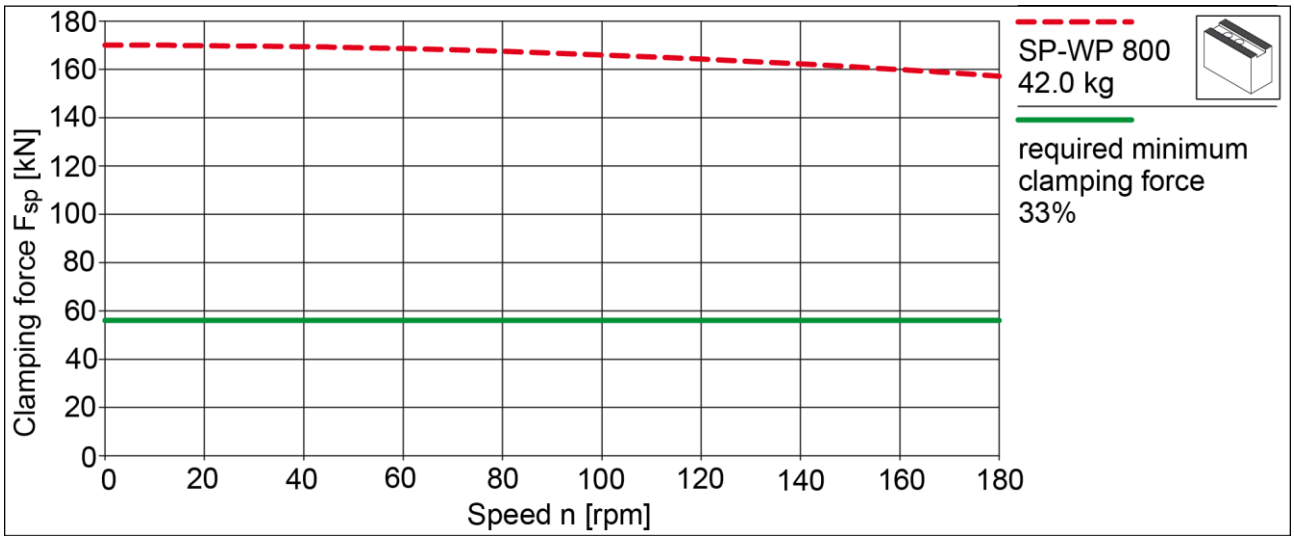
Clamping force-RPM-diagram ROTA TB-LH 850-375



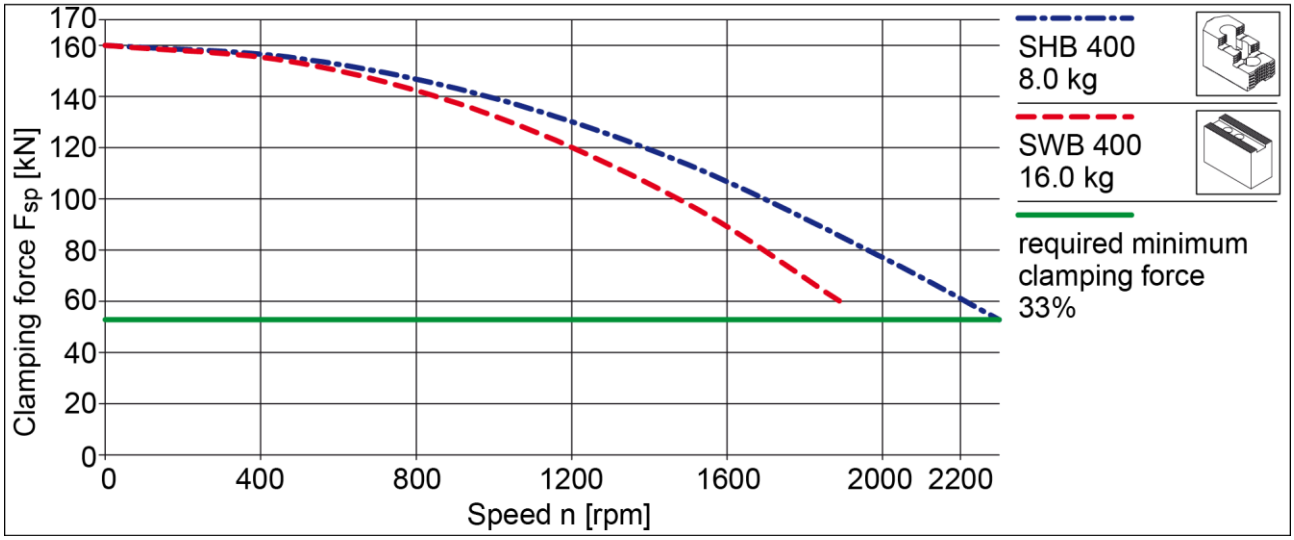
Clamping force-RPM-diagram ROTA TB-LH 1000-560



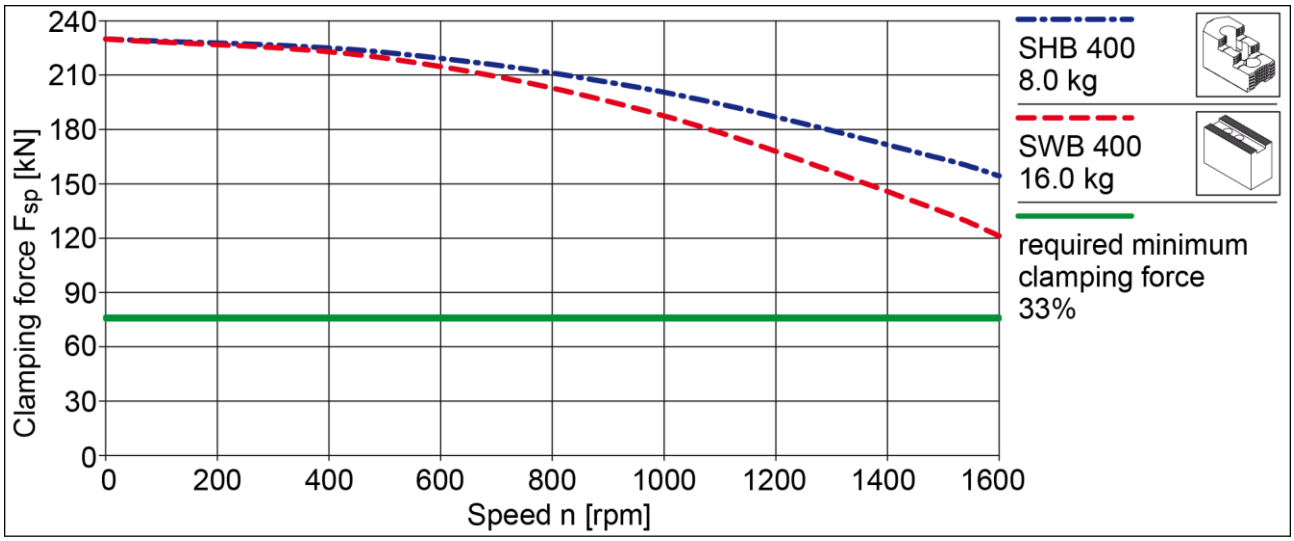
Clamping force-RPM-diagram ROTA TB-LH 1200-640



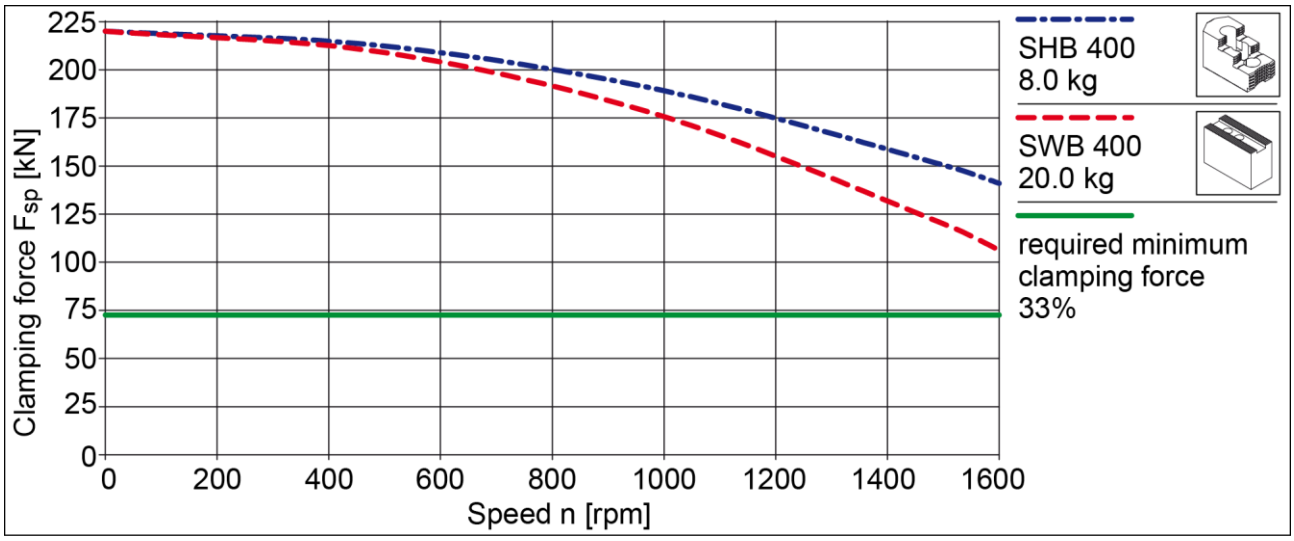
Clamping force-RPM-diagram ROTA EP 380-127



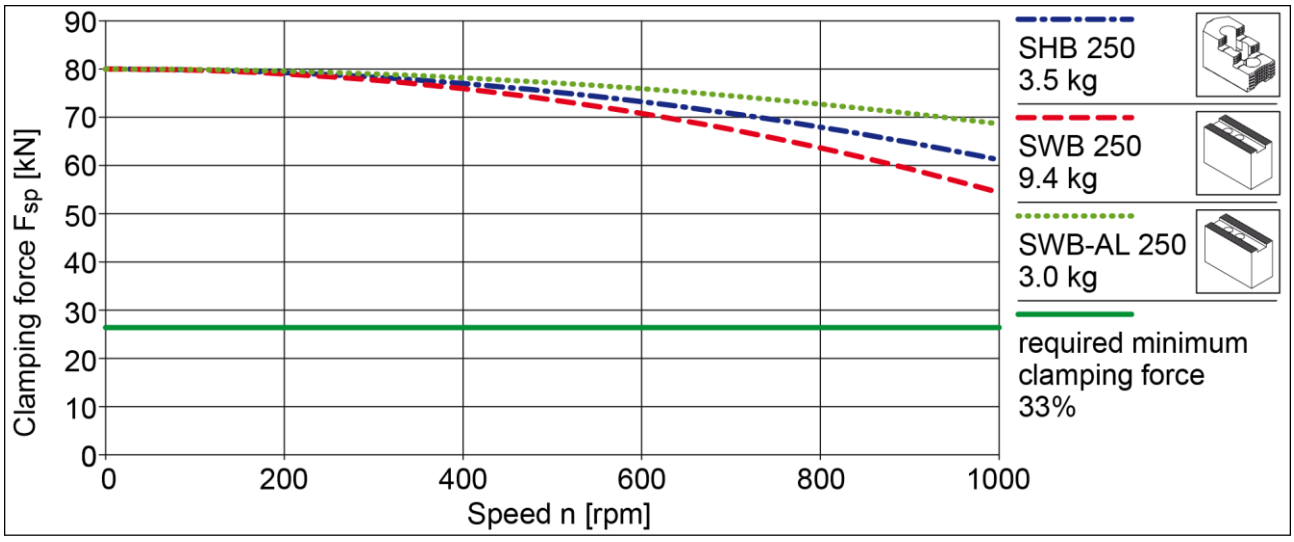
Clamping force-RPM-diagram ROTA EP 460-165



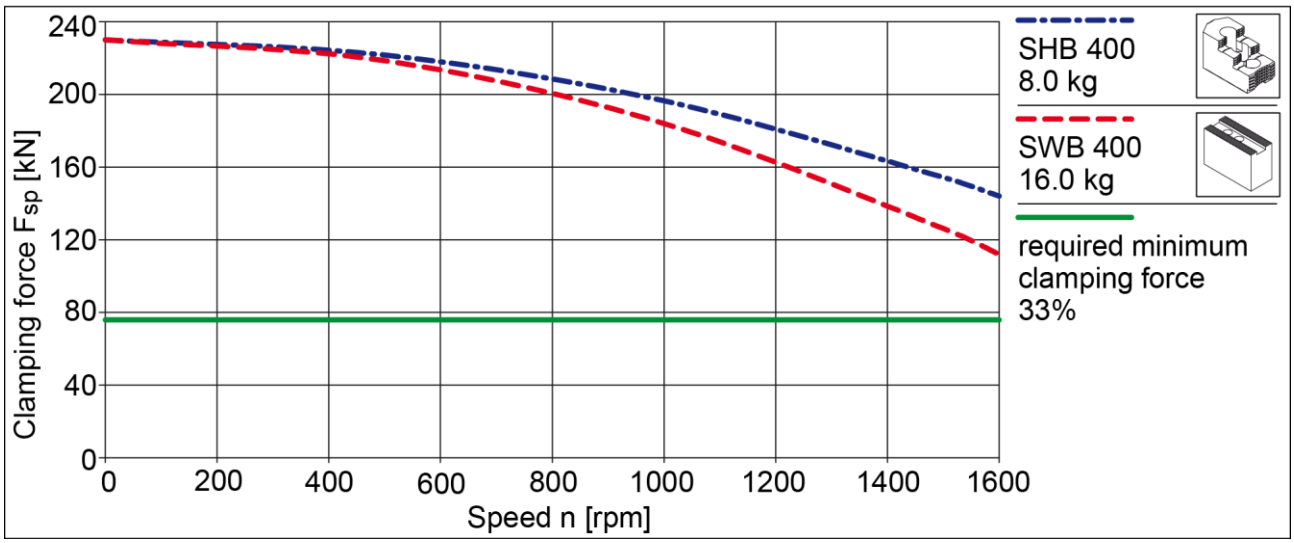
Clamping force-RPM-diagram ROTA EP 460-185



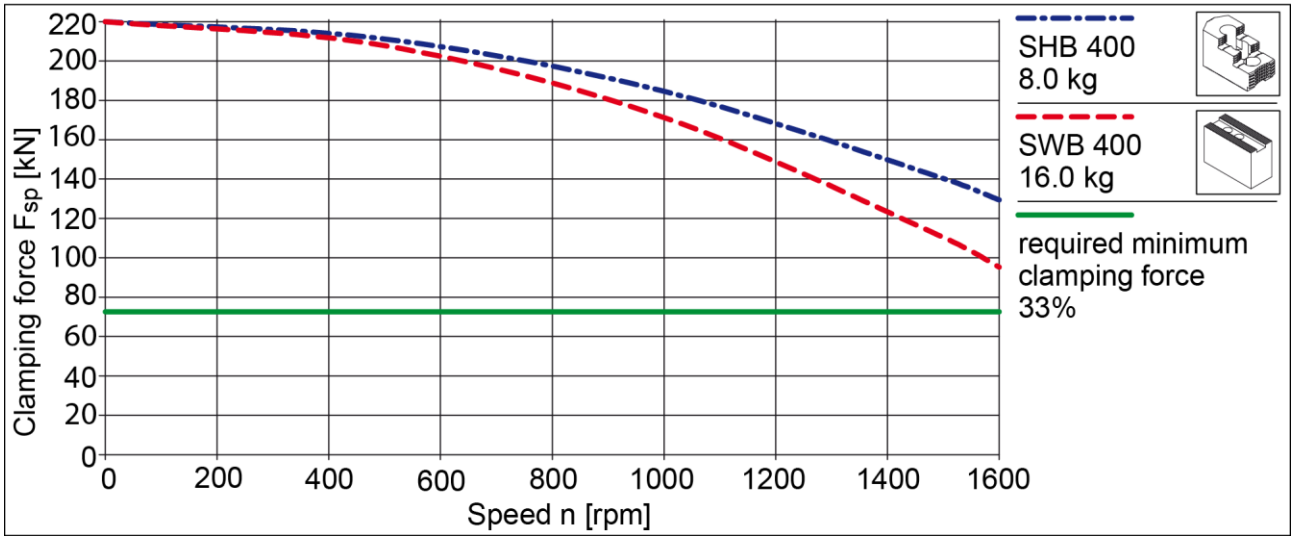
Clamping force-RPM-diagram ROTA EP 500-260



Clamping force-RPM-diagram ROTA EP-LH 460-165



Clamping force-RPM-diagram ROTA EP-LH 460-185



6.3 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 [rpm]
F_{sp0}	Initial clamping force [N]	r_s	Center of gravity radius [m]
F_{spz}	Cutting force [N]	r_{sAB}	Center of gravity radius of top jaw [m]
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 force torque [Kgm]	Σ_s	Max. clamping force of chuck [N]

6.3.1 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 rpm, 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}**.

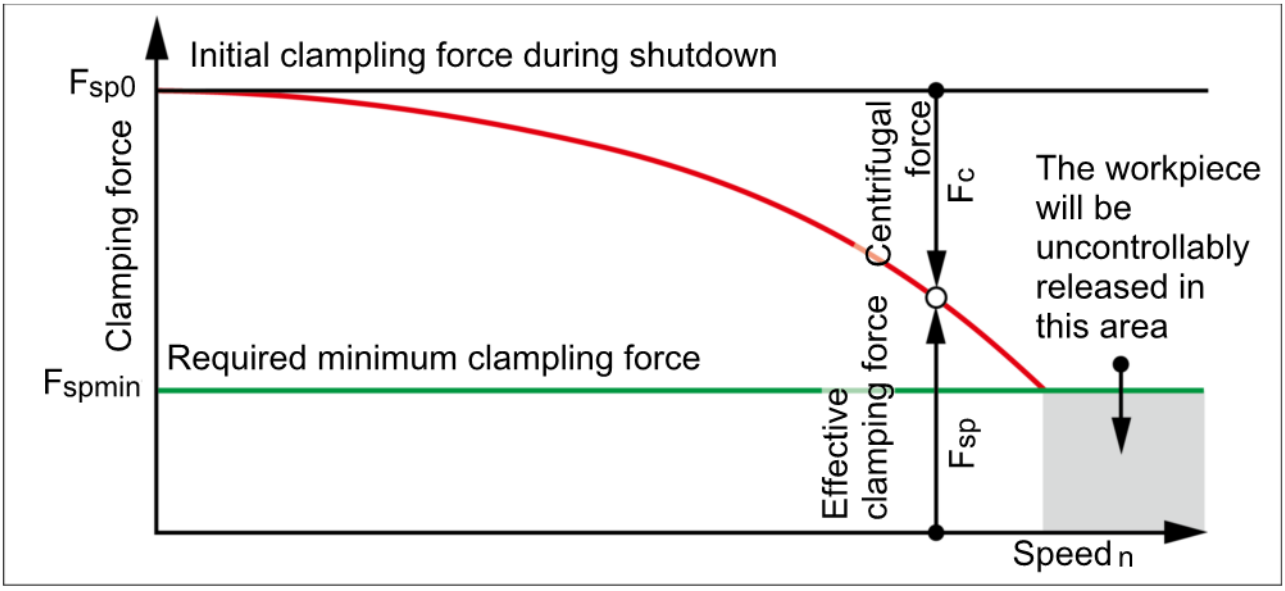
$$F_{sp} = F_{sp0} \mp F_c \text{ [N]}$$

(–) for gripping from the outside in
(+) for gripping from the inside out

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}** with the **safety factor S_z**. This factor takes into account uncertainties in the calculation of the clamping force. According to VDI 3106, the following is valid: **$S_z \geq 1.5$.**

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

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

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

(–) for gripping from the outside in
(+) for gripping from the inside out

NOTICE

This calculated force must not be larger than the maximum clamping force ΣS engraved on the chuck.
See also the table “Chuck data”(☞ 6.1, Page 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 both on the sum of the masses of all jaws and on the center of gravity radius and the RPM.

NOTICE

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

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

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

n is the given speed in r.p.m. The product **$m_B \cdot r_s$ is described as the centrifugal force torque M_c.**

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

In case of chucks 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 base jaws M_{cGB}** and the **centrifugal torque of 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} is taken from the table “Chuck data”(☞ 6.1, Page 17); the centrifugal torque of the top jaws M_{cAB} is calculated as follows:

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

6.3.2 Calculation example: Required initial clamping force Fsp0 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. speed n_{max} = 3200 min^{-1} (“Chuck data” table)
- rpm n = 1200 min^{-1} (application specific)
- Mass of one (!) top jaw m_{AB} = 5.33 kg (application specific)
- Center of gravity radius of the top jaw r_{sAB} = 0.107 m (application-specific)

- Safety factor S_z = 1.5 (as per VDI 3106)
- Safety factor S_{sp} = 1.5 (as per 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 determined using the specific machining force:

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

Initial clamping force during shutdown:

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

Calculation of total centrifugal force:

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

For two-part chuck jaws, the following is valid:

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

The centrifugal torques of the base jaw and the top jaw are taken from the table “Chuck data”:

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

For centrifugal torque of the top jaw, the following is valid:

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

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:

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

Initial clamping force during shutdown that was sought was:

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

6.3.3 Calculation example: permissible RPM for a given effective clamping force

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

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

	***NOTICE*** **The calculated permissible RPM may not exceed the maximum RPM inscribed on the chuck for safety reasons!**

Calculation example: permissible RPM for a given effective clamping force

The following data is known from previous calculations:

- Initial clamping force when not rotating F_{sp0} = 17723 N
- Machining force for machining job F_{spz} 3000 N (application-specific)
- Total centrifugal force of all jaws $\sum M_c$ = 2.668 kgm
- Safety factor S_z =1.5 (as per VDI 3106)
- Safety factor S_{sp} = 1.5 (as per 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_{zul} = 1495 min^{-1}, is smaller than the maximum permissible RPM of the chuck n_{max} = 3200 min^{-1}, (see table “Chuck data”(☞ 6.1, Page 17)).

This calculated RPM may be used.

6.4 Grades of Accuracy

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

6.5 Permissible imbalance

The permissible imbalance for lathe chucks is quality class G 6.3 as per DIN ISO 1940-1.

7 Assembly

7.1 Pre-assembly measures

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

⚠ CAUTION

Danger of injury due to sharp edges and rough or slippery surfaces
Use personal protective gear, especially safety gloves.

Check the delivery for completeness and for transport damage.

NOTICE

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. Check the machine spindle nose and ready-machined intermediate flange for radial and axial run-out.
   The permissible limit is 0.005 mm in accordance with DIN 6386 and ISO 3089.
2. The contact surface must be chamfered and completely clean at the bore holes.

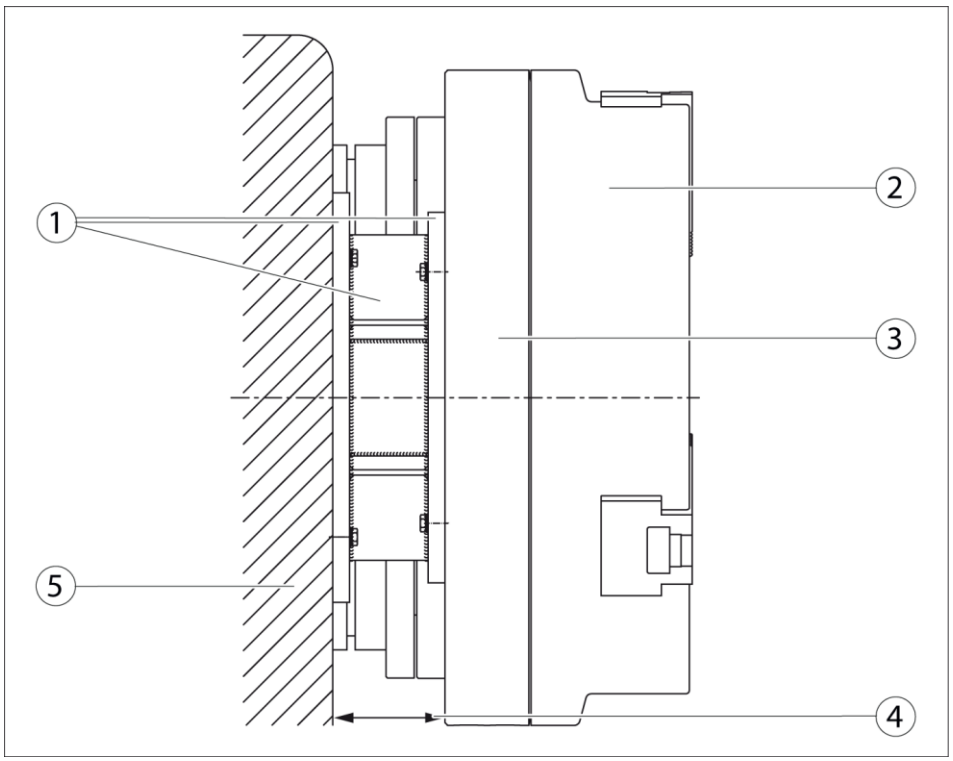
7.2 Distributor ring

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 a spacing console.

Once the chuck has been mounted on the lath spindle nose for the first time, the height dimension of the spacing console is determined. When determining which version of the console to use, it is important to consider whether the front mounting surface on the lathe headstock is machined or unmachined.

NOTICE

The axial labyrinth gap between the chuck body and the distributor ring must be 1.5 mm on all TB chucks. This is the only way to ensure that the air is transmitted properly from the distributor ring to the chuck body.



1	Spacing console	4	Height dimension
2	Chuck	5	Headstock
3	Distributor ring		

7.2.1 Mounting with bracket

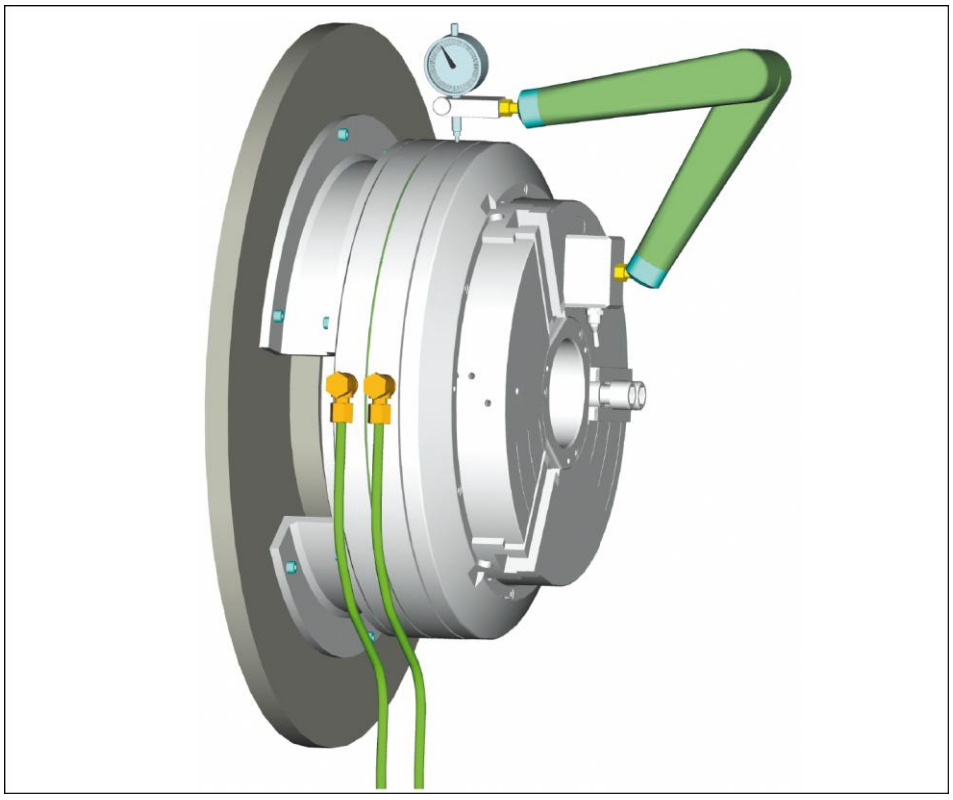
The console height dimension is calculated by adding together the distances between the face side of the headstock and that of the distributor ring. If the headstock face surface is machined, the calculated dimension can be taken as the height dimension for the spacing console. If the end face of the headstock is unmachined, the height dimension should be calculated by adding together the individual distances then subtracting 4 - 5 mm. In accordance with the sketch overleaf, the spacing console comprises two shells and is made of suitable steel plate. The main dimensions match the individual chuck sizes, and can be taken from the sketch overleaf.

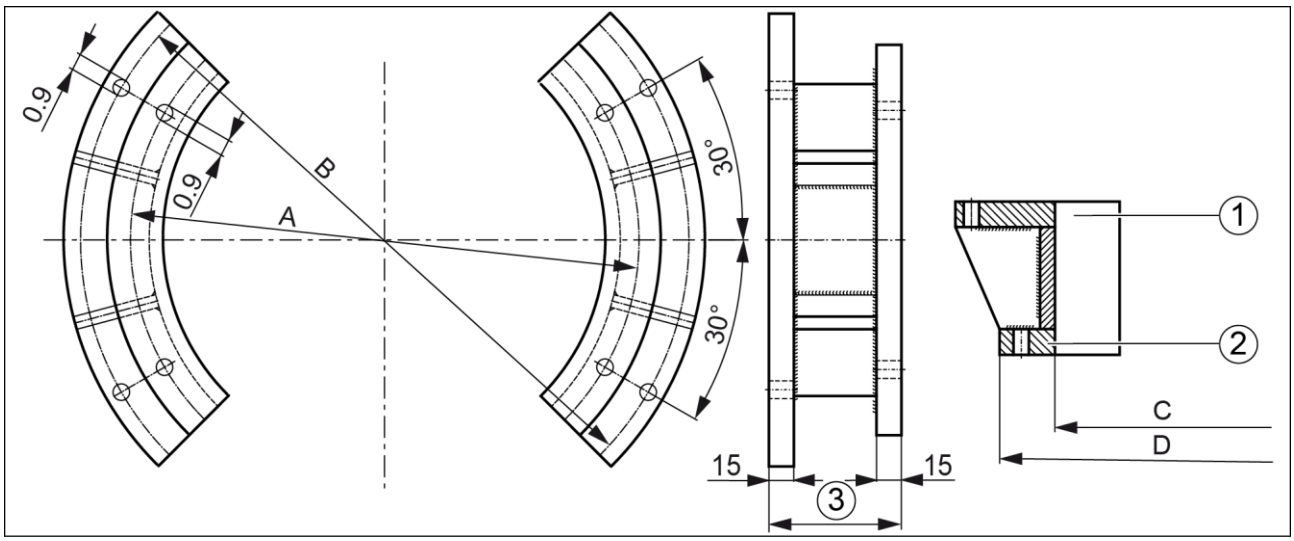
Incidentally, the spacing console can be customized, but it should achieve the stability of the design shown. The spacing console is mounted using 6 M8 threaded holes in the chuck distributor ring, which have been drilled in at a 60° angle. When the threaded mounting holes in the headstock and the holes in the spacing console have been drilled, the spacing console is screwed onto the distributor ring.

The chuck with the distributor ring and the bolted-on spacing console are now finally mounted on the spindle nose. The outer diameter of the distributor ring matches the max. outer diameter of the chuck. As such, the distributor ring can be centrally aligned with the chuck using a ruler for complete accuracy, then screwed onto it.

	***NOTICE*** **The distributor ring must be aligned with the outer chuck diameter in such a way that a radial and axial run-out tolerance of at least 0.1 mm is achieved.**

When detaching the chuck from the spindle nose, the spacing console remains attached to the distributor ring, and is only detached from the headstock. No more adjustments must be made to the positioning sleeves. When detaching the chuck from the spindle nose, the spacing console remains attached to the distributor ring, and is only detached from the headstock. No more adjustments must be made to the positioning sleeves.





1	Headstock mounting surface	3	Height dimension
2	Distributor ring mounting surface		

Type	TB-400	TB-500	TB-630	TB-800/850
ØA	448	550	665	830
ØB*	497	600	715	880
ØC	410	510	620	785
ØD	467	570	685	850

* Example only (deviations possible)

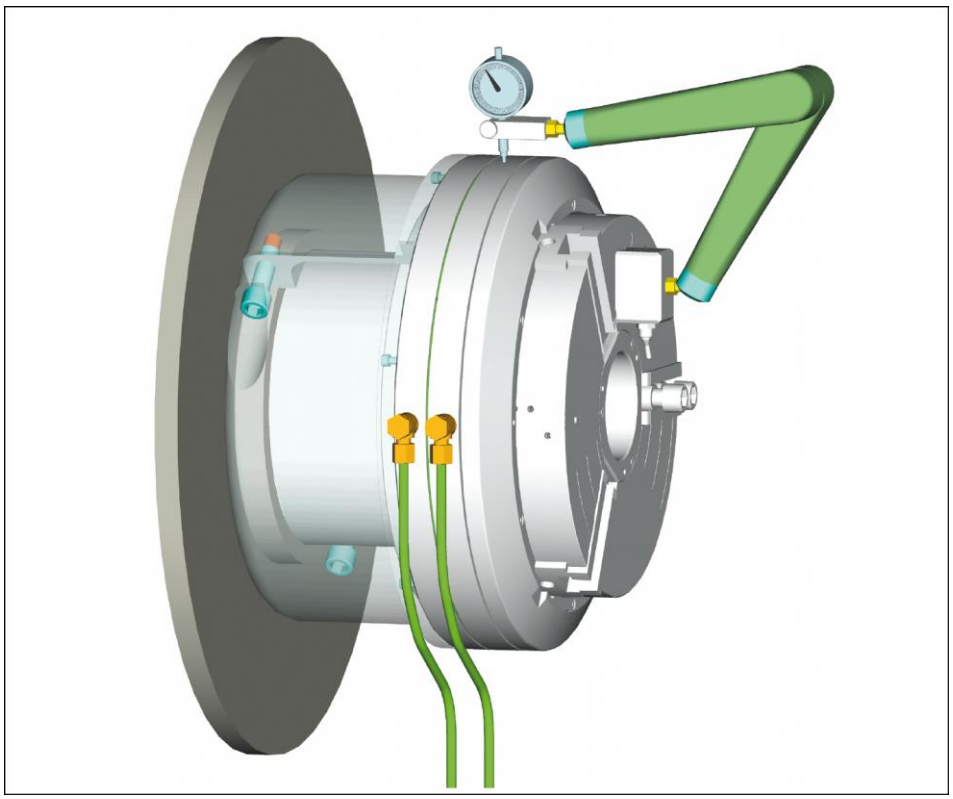
7.2.2 Mounting with 2-part clamping ring (D.R.M.B.)

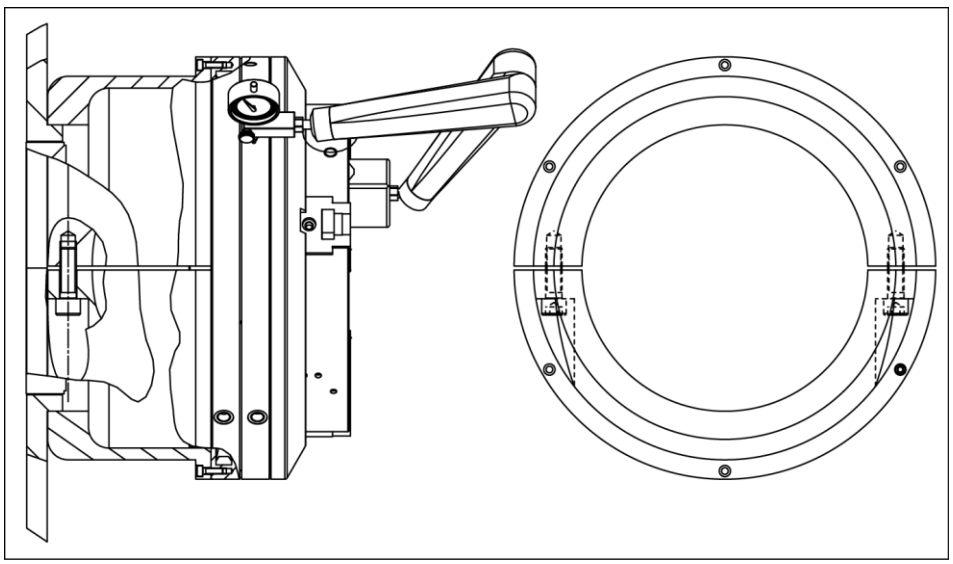
The distributor ring can be clamped onto a rigid collar on the machine (at least 8 mm wide) using a two-piece clamping ring. The distributor ring is clamped onto this collar using two screws. The height of the clamping ring is configured as described in the previous chapter (☞ 7.2.1, Page 36).

During assembly, this two-piece clamping ring is first screwed to the threads of the distributor ring. Once this is done, the 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.

NOTICE

The distributor ring must be aligned with the outer chuck diameter in such a way that a radial and axial run-out tolerance of at least 0.1 mm is achieved.





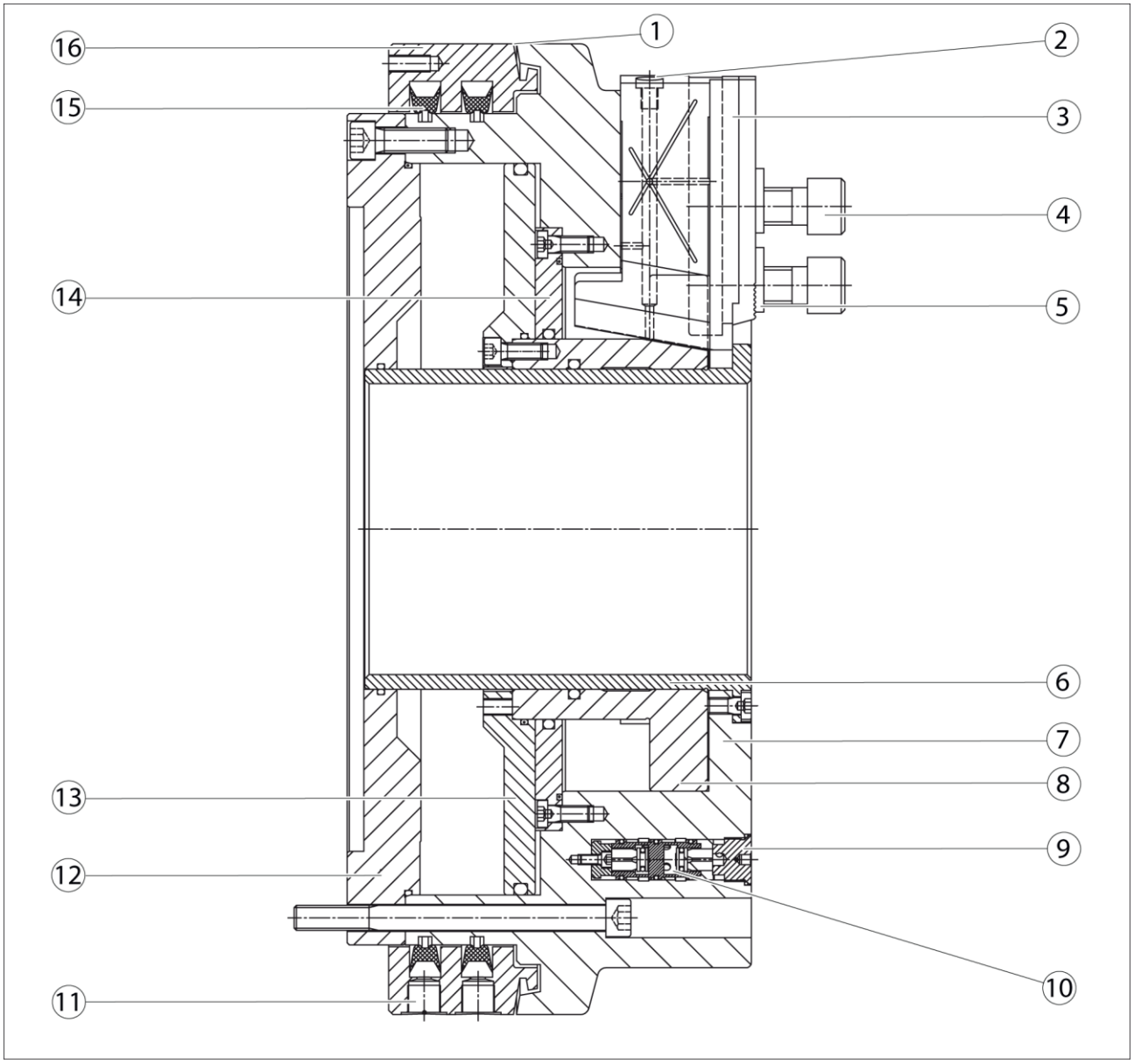
7.3 Attachment

7.3.1 All TB 400 – 850, TB-LH 400 – 850, TB/TB-LH 1000 (2010 or later*)

* TB/TB-LH 1000 for year of construction 2010 or later

For power chuck types TB and TB-LH in size 400 – 850, a chuck flange is mounted on the spindle nose. 12 M12, M16 or M24 hexagon socket screws (for TB-400 9 x 40°) are used to screw the chuck onto the chuck flange by the front face side. The cylindrical recess on the flange must protrude 1 mm from the floor of the cylindrical recess on the mount (depth 8 mm) - i.e. only screwed in only 7 mm deep - to ensure that it touches the outer edge of the chuck.

SCHUNK provides standard flanges that can be used to mount the pneumatic chuck on spindles in accordance with DIN 55026, DIN 55027 and DIN 55029.



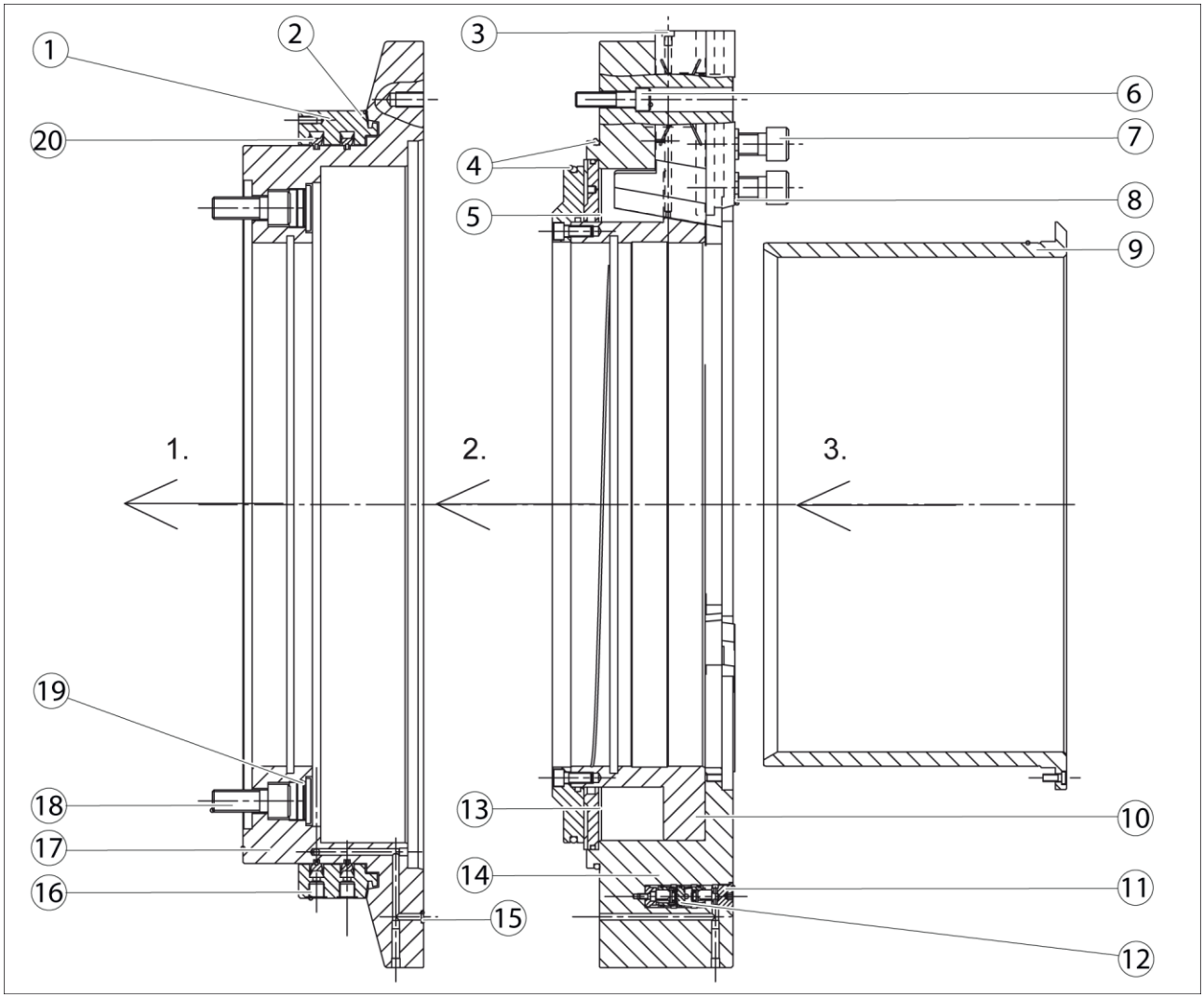
TB and TB-LH 400 – 850

1	Labyrinth gap 1.5 mm	9	Locking screw
2	Lubricating nipple	10	Pilot-controlled check valve
3	Base jaw	11	Pneumatic connection
4	Hexagon socket screw	12	Chuck mount
5	T-nut	13	Piston cover
6	Guide bushing	14	Sealing disk
7	Chuck body	15	Profile seal
8	Piston	16	Distributor ring

7.3.2 All TB/TB-LH 1000 (up to 2009*) and EP/EP-LH

* TB/TB-LH 1000 for year of construction up to 2009

For power chuck types EP, EP-LH, TB and TB-LH in sizes of 1000 and larger, mounting is a several-step process. First, the chuck body is unscrewed and separated from the cylinder. The cylinder is then screwed onto the spindle nose/chuck flange, and the bore holes are sealed using DIN 908 locking screws and copper sealing rings. In order to simplify the mounting procedure, the bushing is removed from the chuck body. The chuck body cannot be screwed onto the cylinder until this is done. When doing this, pay attention to the three O-rings used to seal the channel bore holes, taking care to ensure that they are mounted properly and not damaged.



TB and TB-LH for size 1000 and larger - all EP and EP-LH

1	Distributor ring	11	Locking screw
2	Profile gap 1.5 mm	12	Pilot-controlled check valve
3	Lubricating nipple	13	Piston cover
4	O-rings	14	Chuck body
5	Sealing disk	15	O-rings
6	Screw (for mounting chuck body on cylinder)	16	Pneumatic connection
7	Cylindrical screw with hexagon socket	17	Cylinder
8	T-nut	18	Screw for mounting cylinder on flange or spindle
9	Guide bushing	19	DIN 908 locking screw and copper seal
10	Piston	20	Profile seal

In order to prevent the chuck from being subjected to greater loads, the centering mount can be replaced with one that has a short taper and is suitable for direct mounting on the spindle nose using a bayonet (DIN 55027) or Camlock (DIN 55029).
The inner and outer O-rings that are used for static sealing must be taken into account if doing this. The guide bushing can only be mounted with screws once this is done.

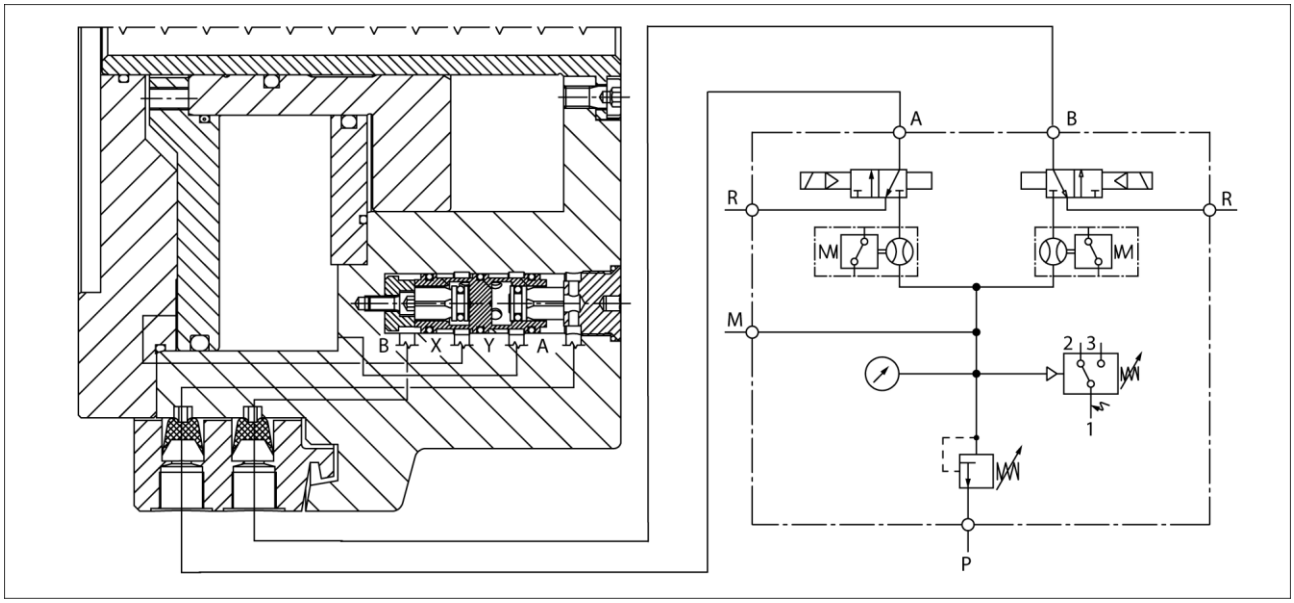
8 Function

The item numbers specified for the corresponding individual components relate to chapter drawings.(☞ 16, Page 61)

8.1 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 non-return valve to one of the two pressure chambers. The pilot controlled non-return valve controls the feeding to one 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.

8.2 Air transmission system



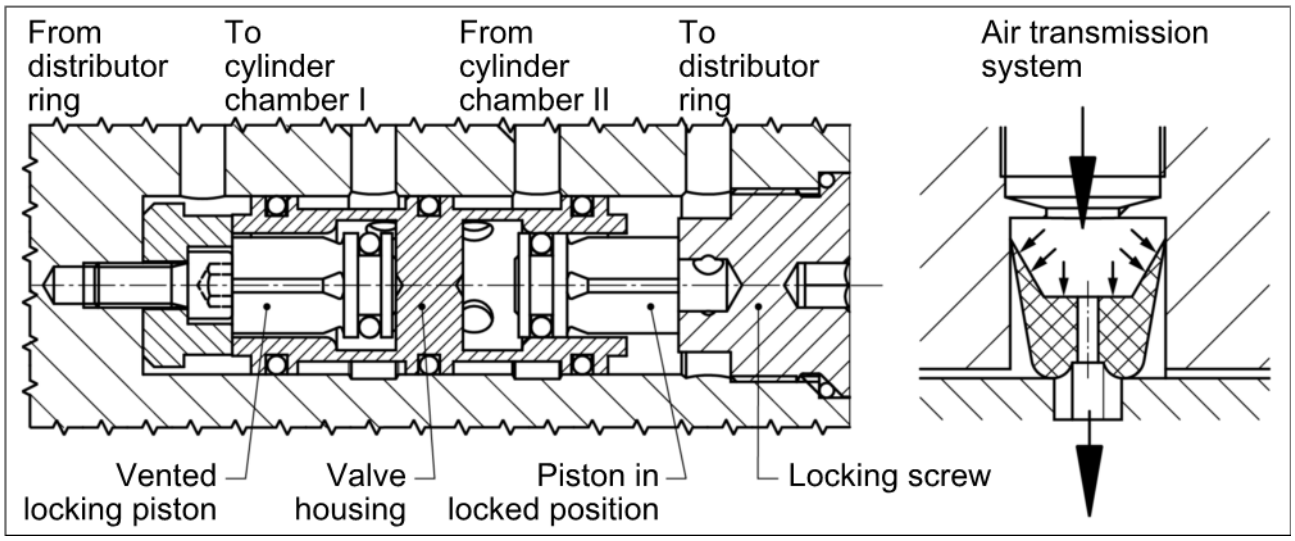
Air transfer takes place only when the headstock spindle is at a standstill, via profile seals provided radially in the distributor ring. The profile seal is designed so that the outer upper section of the surface is larger than the surface of the openings.
Upon pressurization the difference in surface 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.

	NOTICE
	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).

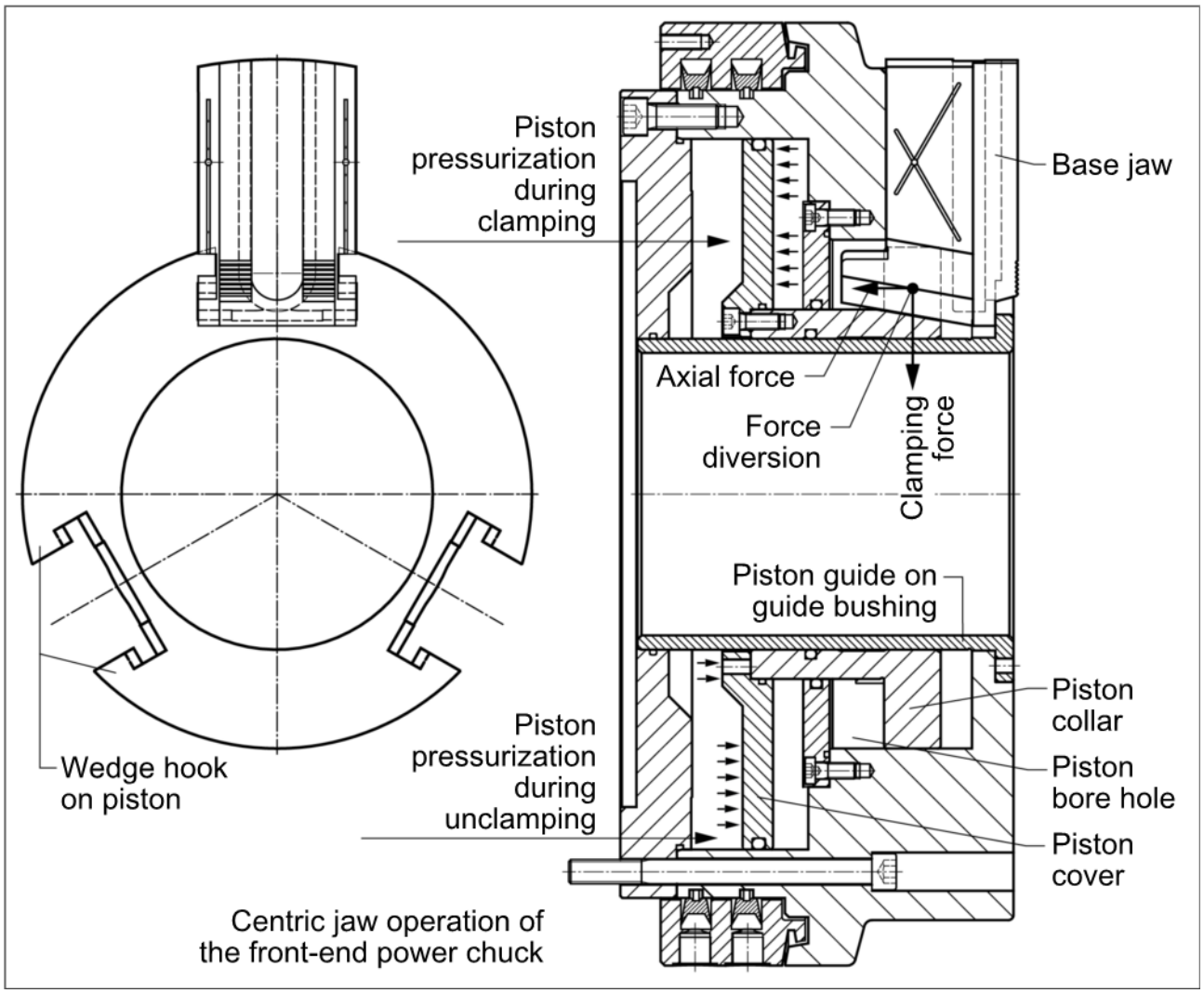
8.3 Pilot controlled check valve



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.

8.4 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.

9 Commissioning and maintenance

9.1 Commissioning

Check that the jaw guides and the piston of the ROTA B-type power chuck are sufficiently lubricated at the lubrication nipples set into the base jaws; if not, relubricate LINOMAX acid-free grease with the base jaws in the retracted position. 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 non-return valve controls the pressurization and venting of the two pressure chambers and blocks the pressure from the outside. It is very important that the bore hole of the valve system be lightly lubricated with oil so that the valve system can move easily. Too much grease lubrication and dirt in the valve bore hole will significantly impair the function of the chuck, and should be avoided.

NOTICE

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).

NOTICE

Facing or skimming of the pneumatic power chuck is not permitted. Drilling of the chuck on the front face side may be performed only in accordance with the drilling patterns on the SCHUNK dimension sheets.

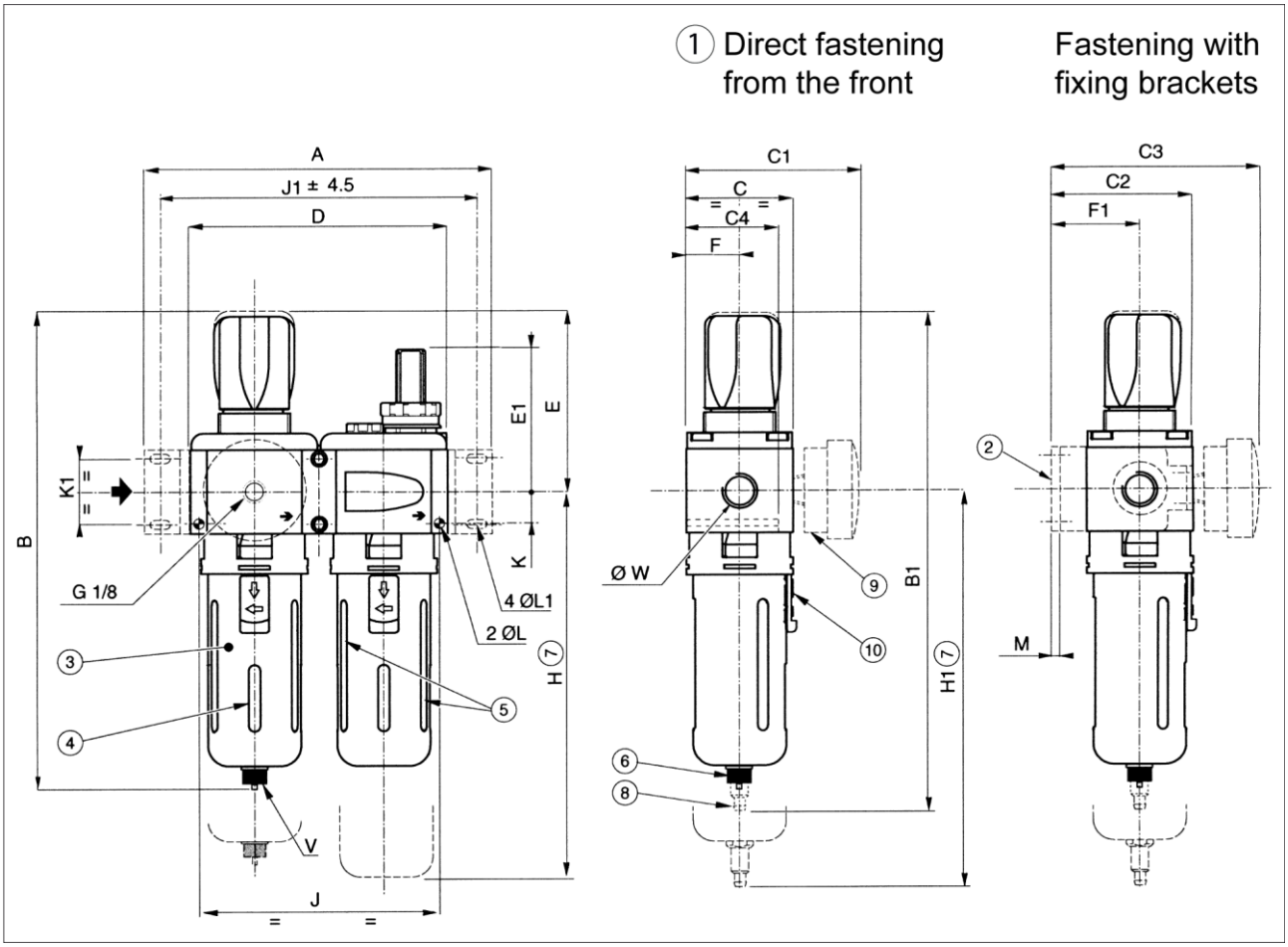
9.2 Maintenance

A WEH-type maintenance unit, consisting of a filter, a water separator and an oiler, must be connected upstream of the power chuck. The oil-enriched air provides all the sliding parts of the cylinder chamber with a film of oil. The oil level in 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 how much condensation is accumulated, the condensation drain screw should be opened occasionally.

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

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



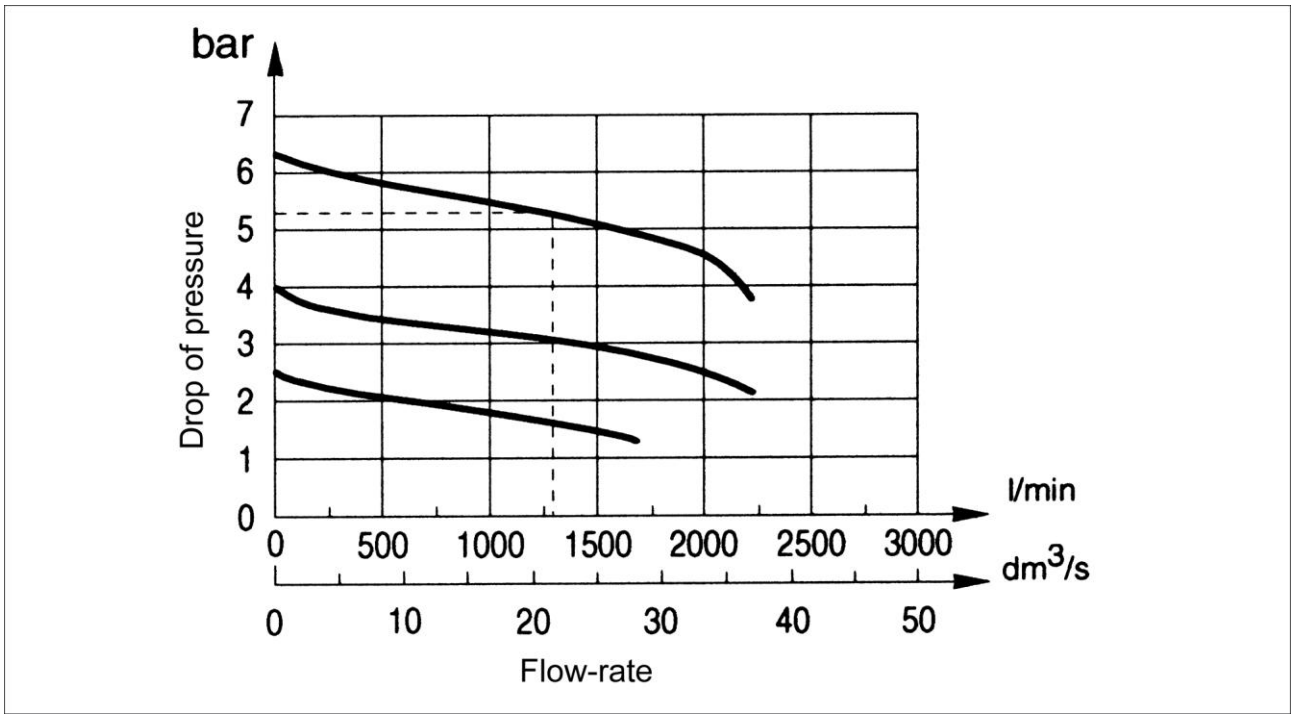
1	Mounted directly from front: 2 bore holes Ø L, depth C4	7	Required distance for removing the tank
2	Lateral mounting with two retaining brackets (accessories)	8	Automatic condensate drain can be connected using a hose with I.D. 6
3	Protective metal cage with transparent polycarbonate tank	9	Pressure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

Ø W	G 1/4”	D	84	K	10
Tank	7 cl	D1	42	K1	28
A	125	E	89	Ø L	4.1
W	213	E1	65	Ø L1	4.5
B1	-	F	21	M	3
C	42	F1	40	Ø T	G 1/8”
C1	76	H	215	V	G 1/8”
C2	61	H1	-	Weight [kg]	0.760 (weight without pressure gauge)
C3	95	J	74		
C4	38	J1	110.5		

Basic setting for oiler

Chuck type	Air consumption/jaw stroke at 6 bar	Clamping strokes	Number of oil drops	Oil quantity
ROTA TB 400 to ROTA TB 1200	5 – 11 liters	10	approx. 2 - 4	approx. 24 mm^3

Flow rate characteristic curves and pressure drops



Cleaning and lubrication of the chuck

The chuck's accuracy, life span and ability to maintain an even clamping force depend greatly on regular cleaning and sufficient lubrication. Rust, scale, casting dust, and chips produce friction and reduce motion.

As such, the chuck must be lubricated with LINOMAX special grease paste from a grease gun at the three base jaw lubrication nipples every 20 – 30 operating hours. The chuck must be actuated two to three times without a workpiece; the fully extended jaw stroke will then distribute the grease.

The chuck valve system must occasionally be lightly lubricated with oil. In order to do this, the locking screw the face side of the chuck first needs to be removed. The non-return 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, otherwise the run-out accuracy will be impaired.

Foreign matter, such as dust, scale, casting dust, and fine chips, penetrates into almost every chuck, despite the optimal sealing provided by closed base jaws and the hardened guide bushing in the through-hole. Coolant washes away lubricant. As such, every chuck must occasionally be completely disassembled, cleaned and

lubricated, and the sealing rings replaced if necessary. 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. As such, it is not possible to specify a generally applicable rule for this.

9.3 Maintenance intervals

Lubrication of the grease areas:

Lubrication interval	Strain
every 25 hours	normal / coolant utilization
every 8 hours	high / coolant utilization
after 1200 hours or as needed	Total cleaning with disassembly of the chuck, depending on type and degree of contamination

9.4 Hardened Reversible Jaws and Soft Top Jaws

The fine serration of the base and top jaws for sizes 400 – 1200 is 3/32” x 90°, so the adjusting stroke from tooth to tooth is 2.4 mm.

Care must be taken to ensure that the top jaws are set on the fine serration in such a way that a maximum of 2/3 of the jaw stroke is extended for clamping (clamping reserve).

Hardened reversible jaws should only be used in sets in accordance with the packaging, as they are ground on the chuck in sets. 1 set of hardened reversible jaws is normally ordered for a chuck. When installing and removing the reversible jaws numbered 1 to 3, make sure that the individual jaws are installed/removed on/from the base jaws with the same designation in order to ensure a high level run-out accuracy.

The soft top jaws are turned on the chuck in the same clamping position and under the same operating pressure as are used for machining the workpiece. When doing this, it is important to ensure that all the mounting screws are screwed in tightly and evenly.

The fine serration of the base jaws and top jaws should always be cleaned, especially when the top jaws are adjusted, otherwise the run-out accuracy will be impaired. Hardened reversible jaws and soft top jaws must be tightened to the same torque. Insufficient tightening of the top jaws will cause significant run-out inaccuracies!

10 Disassembly and assembly

The item numbers specified for the corresponding individual components relate to chapter drawings.(☞ 16, Page 61)

10.1 TB 400 - 850, TB-LH 400 - 850, TB/TB-LH 1000 (year of construction 2010 or later)

10.1.1 Disassembly

1. Unscrew both the pneumatic quick coupling pieces from the distributor ring (8), then detach the distributor ring (8) from the spindle nose together with the mount. Screw in the eye bolt (thread on circumference of chuck body) and mount using a cargo crane. Undo the chuck mounting screws (24) and lift the chuck off the spindle nose.
2. Remove both profile ring seals (47) from the distributor ring (8) and check for wear.
3. Carefully unscrew the locking screw (15) and remove the pilot-controlled non-return valve system and O-ring (37).

NOTICE

Pressure in the chuck!
The valve system (13) must be removed before proceeding with disassembly.

4. Check all the O-rings in the valve system for wear and replace them if necessary.
5. Unscrew the hexagon socket screws (23) from the chuck mount (7), then screw 3 of them into the threaded extraction holes provided and use them to extract the mount. Remove the mount and O-rings (39,44).
6. Undo the hexagon sockets screws (25) that connect the piston cover (6) to the piston (3).
7. Screw three hexagon socket screws into the threaded holes on the piston cover (6) and extract the piston cover (6) from the piston (3).
8. On the front side of the chuck, undo the hexagon socket screws (20) on the bushing (4) and pull out the bushing (4) from the front, tapping it lightly from the back of the chuck to move it forward.
9. Remove the sealing disk (5) that is held in place by hexagon socket screws (21) and take out the O-ring (43).

10 The piston (3) can be pulled out of the chuck body (1) and the base jaws (2) can be pulled out of the base jaw guides from the inside, through the piston bore hole in the chuck body.

11 Clean and blow out all parts of the chuck. Check all O-rings for possible damage and wear, and replace them if necessary. Lubricate the cylinder chamber of the chuck with oil. The jaw guides in the chuck body, the base jaws and the piston on the wedge hooks are greased with LINOMAX special grease paste.

SCHUNK offers complete sealing kits for the O-rings.

10.1.2 Assembly

The chuck is assembled in the same way, but in reverse order. Observe the following points when doing this:

1 The base jaws (2), the base jaw guides in the chuck body (1) and the hardened reversible jaws are all numbered 1, 2, and 3. Insert the base jaws (2) in the corresponding guides to achieve the same run-out accuracy.
NOTE
The piston wedge hook with the dot marking on the inside is aligned using jaw guide 1.

2 Allow the piston with the O-rings (40) to snap into the base jaw wedge hooks (2) and push it in up to the end of the stroke.

3 Insert the O-ring (43) and sealing disk (5) with O-ring (42) and screw them into the chuck body securely and air-tight using the hexagon socket screws (21).

4 Push the piston cover (6) with O-ring (41) into the piston (3) and tighten the hexagon socket screws (25).

5 Place the chuck on the chuck mount with O-rings (39, 44) and fasten it with hexagon socket screws (23).

6 Lubricate the valve system (13) and valve bore hole with oil, install the valve system, and seal it with the locking screw (15) and O-ring (37).

7 Insert the guide bushing (4) from the front side of the chuck and fasten it tightly using the hexagon socket screws (20).

8 Before inserting the profile ring seals (47) in the slots in the distributor ring, rub them with grease by hand so that they remain elastic. There must be no visible grease residue.
When re-inserting the profile ring seals (47), ensure the that air passage openings do not overlap with the pneumatic connections on the distributor ring.

9 Mounting the distributor ring (see chapter “ Mounting with a 2-piece clamping ring" (☞ 7.2, Page 35)).

	***NOTICE*** **All parts of the SCHUNK power chuck move easily. As such, hard hammer blows should never be used during assembly.**

10.2 All TB/ TB-LH up to size 1000 (until year of construction 2009) and all EP/EP-LH

10.2.1 Disassembly

1 The chuck is still entirely on the machine spindle.

2 Remove the T-nuts (9) from the base jaw.

3 Carefully unscrew the locking screw (15) and remove the pilot-controlled non-return valve system and O-ring (37).

	***NOTICE*** **Pressure in the chuck!** **The valve system (13) must be removed before proceeding with disassembly.**

4 Check all the O-rings in the valve system for wear and replace them if necessary.

5 Unscrew the screws (24) in the chuck and extract the bushing (4) from the chuck body using the extraction threads. Disassemble the bushing completely.

6 Use the supplied eye bolt (thread on circumference) to secure the chuck body (part 1) to a cargo crane.

7 First, undo the screws (21). Remove the locking screws (31) (TB sizes 1000 and larger only). The chuck bodies can now be extracted from the chuck through the cylinder through-hole using three screws. Place the detached part (chuck body with accessories) on the crane with the front face pointing down.

8 Unscrew both the pneumatic quick coupling pieces from the distributor ring, then detach the distributor ring (8) from the spindle nose together with the bracket.

9 Use the eye bolt (thread on circumference) to secure the cylinder body (10) to a cargo crane.

10 Unscrew the locking screw from the cylinder together with the copper sealing rings (18 and 46). Remove the cylindrical screws (27) and set down the cylinder with the spindle side facing down. Remove the O-ring (41) and small O-rings (42) from the cylinder.

11 Remove both profile ring seals (49) from the distributor ring. Check the profile rings for damage.

12 Undo the hexagon socket screws (22) and extract and remove the piston cover (6). Remove the O-rings (36 and 40) check for wear and renew if necessary.

13 On TB sizes 1000 and larger, the sealing disk (5) can now be removed from the chuck. On all EP chucks, the cylindrical screws with copper sealing rings (23 and 48) must first be unscrewed. Remove the O-rings (38 and 39), check for wear and renew if necessary.

14 Pull the piston (3) out of the chuck body using the screws. Remove the O-ring (37), check for wear and renew if necessary.

15 Secure the whole chuck body to a cargo crane with the eye bolt on the circumference, then turn it 180° with the front facing upward.

16 All the base jaws can now be removed from the jaw guide from the inside. The lubricating nipples (28) can be unscrewed from the base jaws.

17 Clean and blow out all parts of the chuck. Check all O-rings for possible damage and wear, and replace them if necessary. The jaw guides in the chuck body, the base jaws and the piston on the wedge hooks are greased with LINOMAX special grease paste.

SCHUNK offers complete sealing kits for the O-rings.

10.2.2 Assembly

The chuck is assembled in the same way, but in reverse order. Observe the following points when doing this:

1 Both the base jaws (2) and the base jaw guides in the chuck body (1) are numbered 1, 2, and 3. Insert the base jaws (2) from the chuck bore hole back into the corresponding jaw guide in the chuck body (1) in order to achieve the same run-out accuracy.

2 Allow the piston with the O-rings (36 and 37) to snap into the base jaw wedge hooks and push them in up to the end of the stroke.

NOTE
The piston wedge hook with the dot marking on the inside is aligned using jaw guide 1.

3 Insert the sealing disk (5) with the O-rings (38 and 39) into the chuck body and, if you are working on an EP chuck, evenly tighten the screw with the copper sealing rings (23 and 48) beneath it.

4 Push the piston cover (6) with the O-rings (36 and 40) into the piston (3) and tighten the cylindrical screws (22) evenly.

5 Insert the O-ring (35).

6 Before inserting the profile ring seals (47) in the slots in the distributor ring, rub them with grease by hand so that they remain elastic. There must be no visible grease residue. **When re-inserting the profile ring seals (47), ensure the that air passage openings do not overlap with the pneumatic connections on the distributor ring.**

7 Mounting the distributor ring (see chapter " Mounting with a 2-piece clamping ring" (☞ 7.2, Page 35)).

8 Using the supplied eye bolt, hold the cylinder (10) in front of the spindle on the cargo crane, together with the O-ring (41). Screw the cylinder onto the spindle or intermediate flange using the matching cylindrical screws. Install the locking screws with the copper sealing rings beneath them into the cylinder. Insert the three small O-rings (42) into the cylinder.

9 Using the cargo crane, hold the chuck body in front of the spindle nose together with the other accessories, and screw it onto the cylinder using the cylindrical screws (21).

10 Slide the bushing (4) into the chuck and secure it using cylindrical screws (24).

11 Install the double check valve. Fix the sealing cover (16) in place using the screw (19). Carefully insert the valve (13) into the fitting bore up to the stop. Screw the locking screw (15) with the O-ring (45) into the chuck body.

NOTICE

All parts of the SCHUNK power chuck move easily. As such, hard hammer blows should never be used during assembly.

11 Control of types TB / TB-LH / EP / EP-LH

For actuation of the front-end power chuck, a 24V electro-pneumatic safety control block is available, consisting of a pressure control valve, a pressure switch, 2 magnetic valves with automatic clamping time monitoring including 2 sensors and 2 analysis units.

A maintenance unit consisting of a filter, water separator and oiler must be installed upstream of this control block.

12 TBS, TBS-LH stationary power chucks

NOTICE

No distributor ring,
no check valve,
always continuous pressure

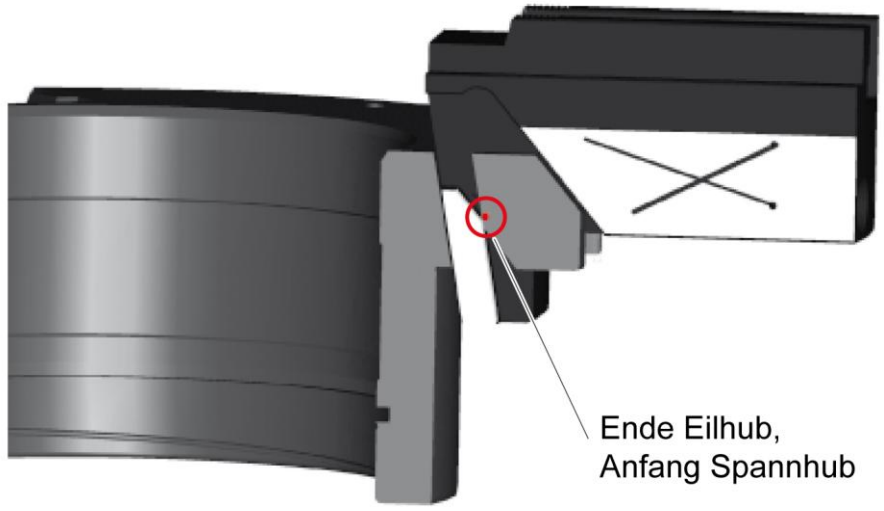
The operating manual for the types TB / TB-LH also applies analogously for the types TBS / TBS-LH. Due to the horizontal chuck utilization, extra care should be taken with respect to lubrication of the base jaws and cleaning of the fine serration.

Instead of the control unit described above, normal 5/2-way valves are used for actuation.

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

Do not use dual stroke chucks (LH series) for I.D. clamping. Also, do not clamp workpieces on the fast stroke, since this stroke executes very large jaw strokes but very low clamping forces (1). In chucks of the TB2 LH series, make sure that the entire fast stroke plus at least 1/3 of the clamping stroke (corresponding to the basic overlap) is traveled during workpiece clamping (2).

1



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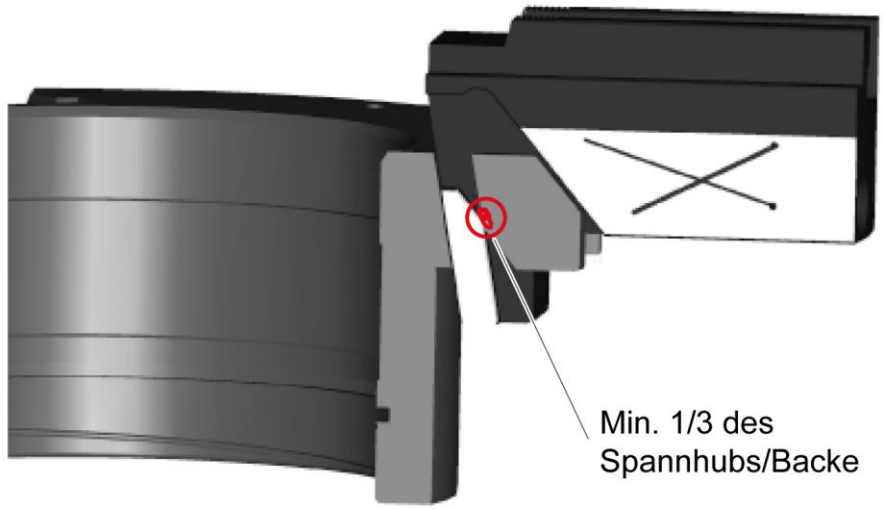


14 Disposal

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

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

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

15 Spare parts

When ordering spare parts, it is imperative to specify the type, size and above all the manufacturing 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.

Spare parts list for all TB 400 – 850 and TB-LH 400 – 850

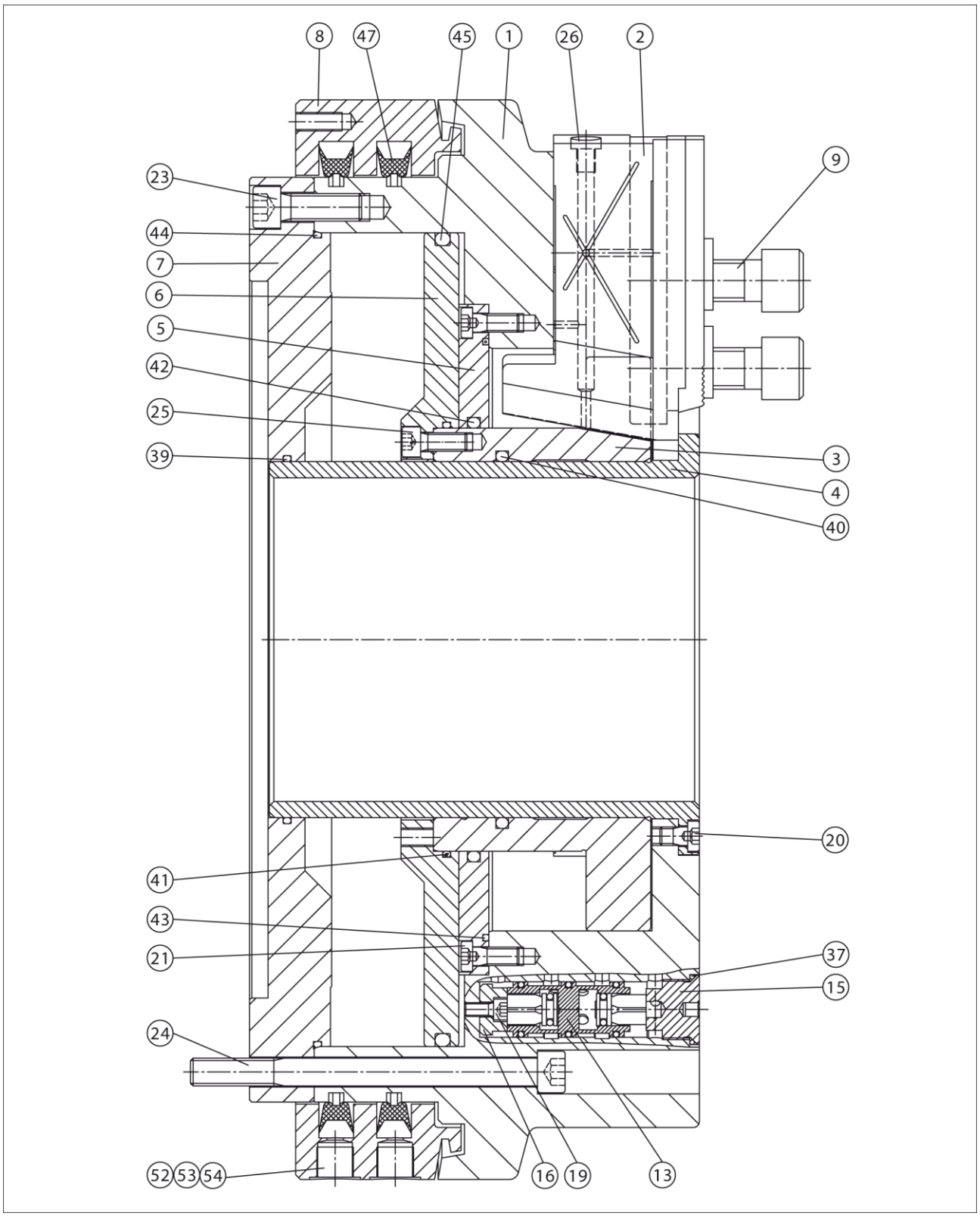
Item	Designation
1	Chuck body
2	base jaw
3	Piston
4	Sleeve
5	Sealing disk
6	Piston cover
7	Cylinder mount
8	Distributor ring
9	T-nuts
13	double check valve
15	Locking screw
16	Filler plug
19	Screw DIN EN ISO 4762/10.9
20	Screw DIN 7984 / 10.9
21	Screw DIN 7984 / 10.9
23	Screw DIN EN ISO 4762 / 10.9
24	Screw DIN EN ISO 4762 / 10.9
25	Screw DIN EN ISO 4762/10.9
26	funnel lubrication nipple
37	O-ring DIN 3771
39	O-ring DIN 3771
40	O-ring DIN 3771
41	O-ring DIN 3771
42	O-ring DIN 3771
43	O-ring DIN 3771
44	O-ring DIN 3771
45	O-ring DIN 3771
47	Profile seal
52	Straight screw connection
53	Swivel fitting
54	Fiber sealing

Spare parts list for all TB / TB-LH from size 1000 and EP / EP-LH

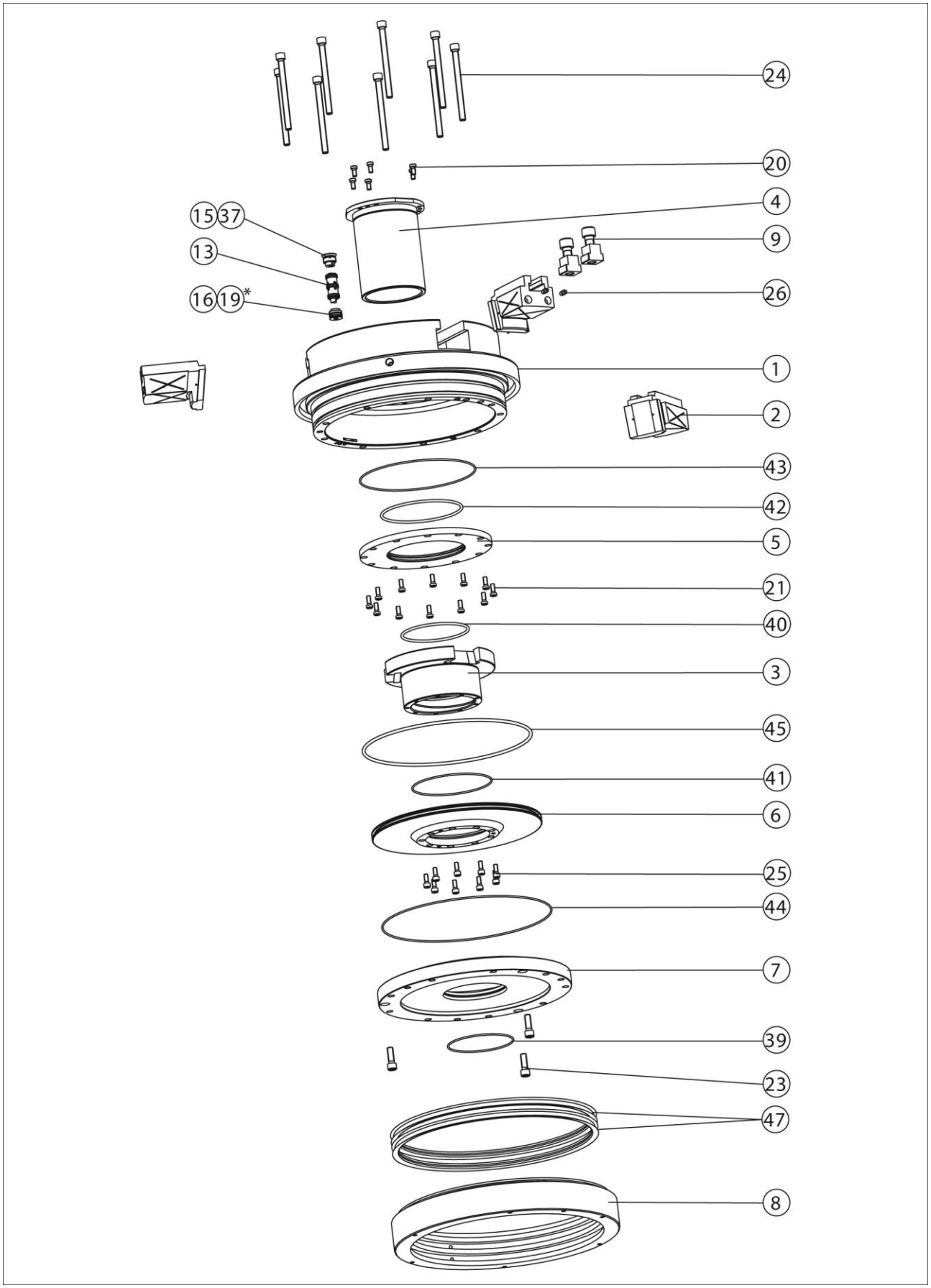
Item	Designation
1	Chuck body
2	base jaw
3	Piston
4	Sleeve
5	Sealing disk
6	Piston cover
7	Cylinder mount
8	Distributor ring
9	T-nuts
10	Cylinder
13	Double check valve
15	Locking screw
16	Filler plug
19	Screw DIN EN ISO 4762 / 10.9
22	Screw DIN EN ISO 4762 / 10.9
23	Screw DIN EN ISO 4762/10.9
24	Screw DIN EN ISO 4762/10.9
25	Screw DIN EN ISO 4762/10.9
28	Funnel- or Hydraulic-type lubrication nipple
35	O-ring
36	O-ring
37	O-ring
38	O-ring
39	O-ring
40	O-ring
41	O-ring
42	O-ring
45	O-ring
46	Copper sealing ring DIN 7603
48	Copper sealing ring DIN 7603
49	Profile ring seal
52	Straight screw connection
53	Swivel fitting
54	Fiber sealing

16 Assembly drawings

TB 400 – 850

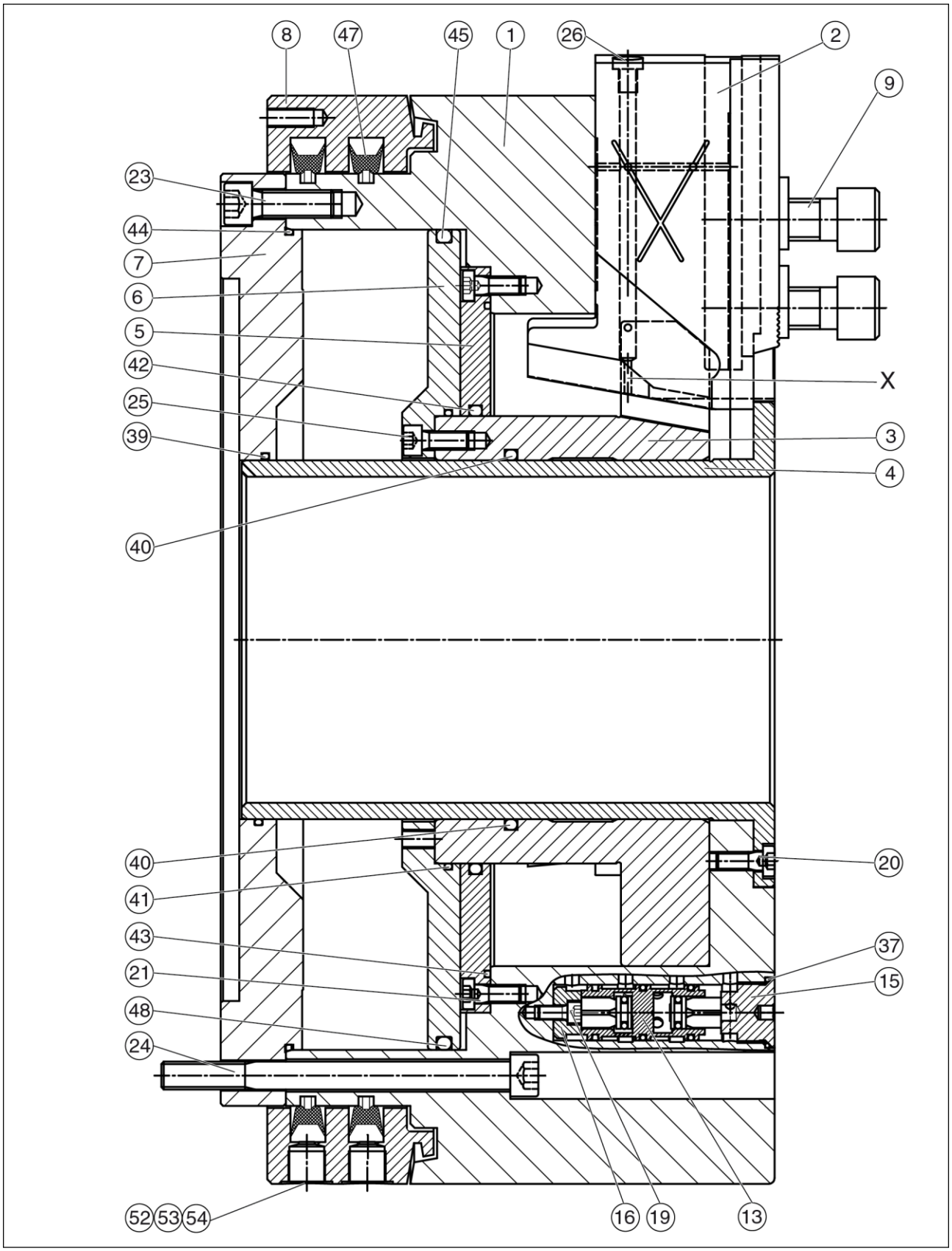


TB 400 – 850 (LH)



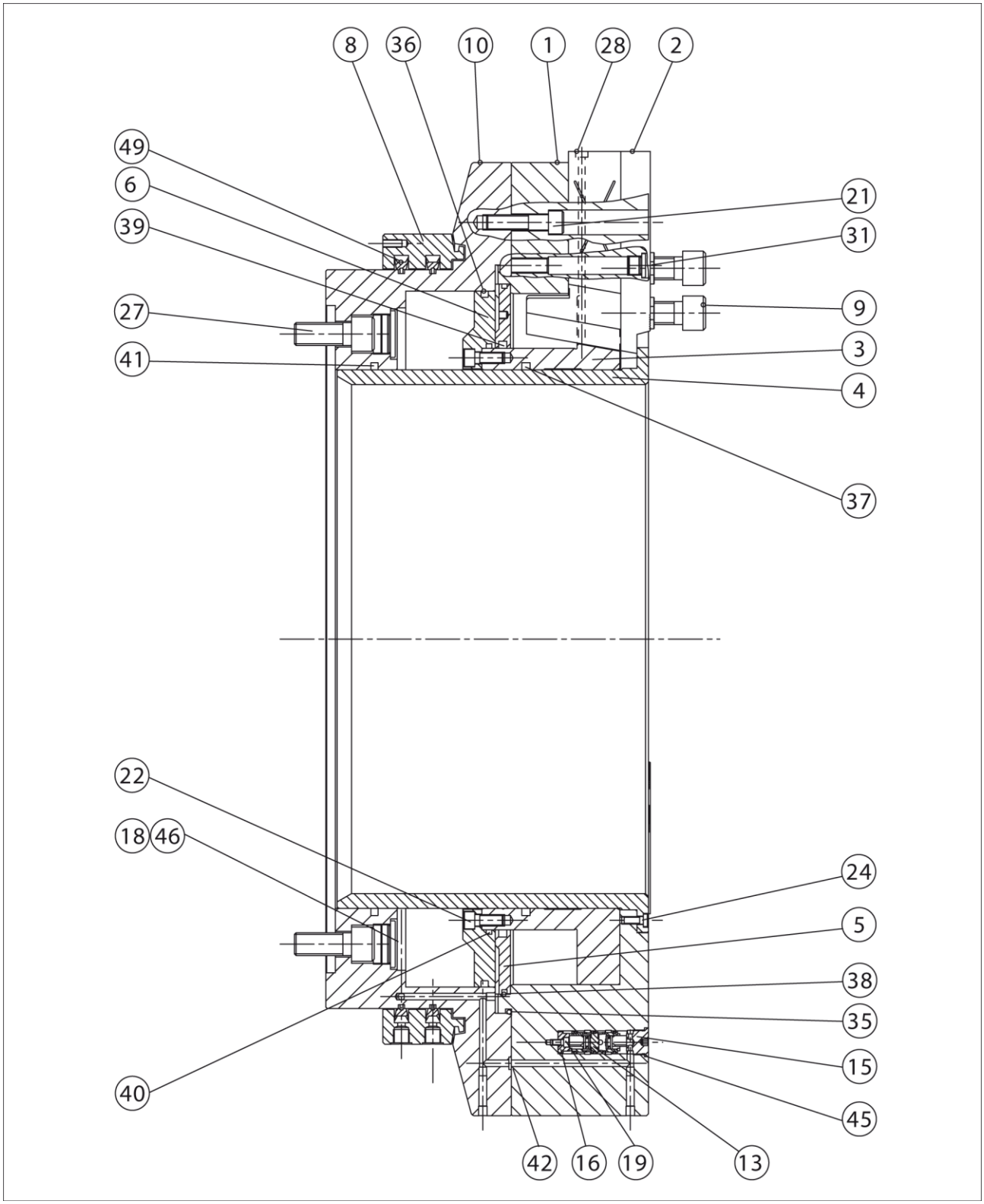
* Item. 14 for TB 400-115 and TB 400-140

TB 400 – 850 LH



X	Clamping stroke

TB 1000 (LH)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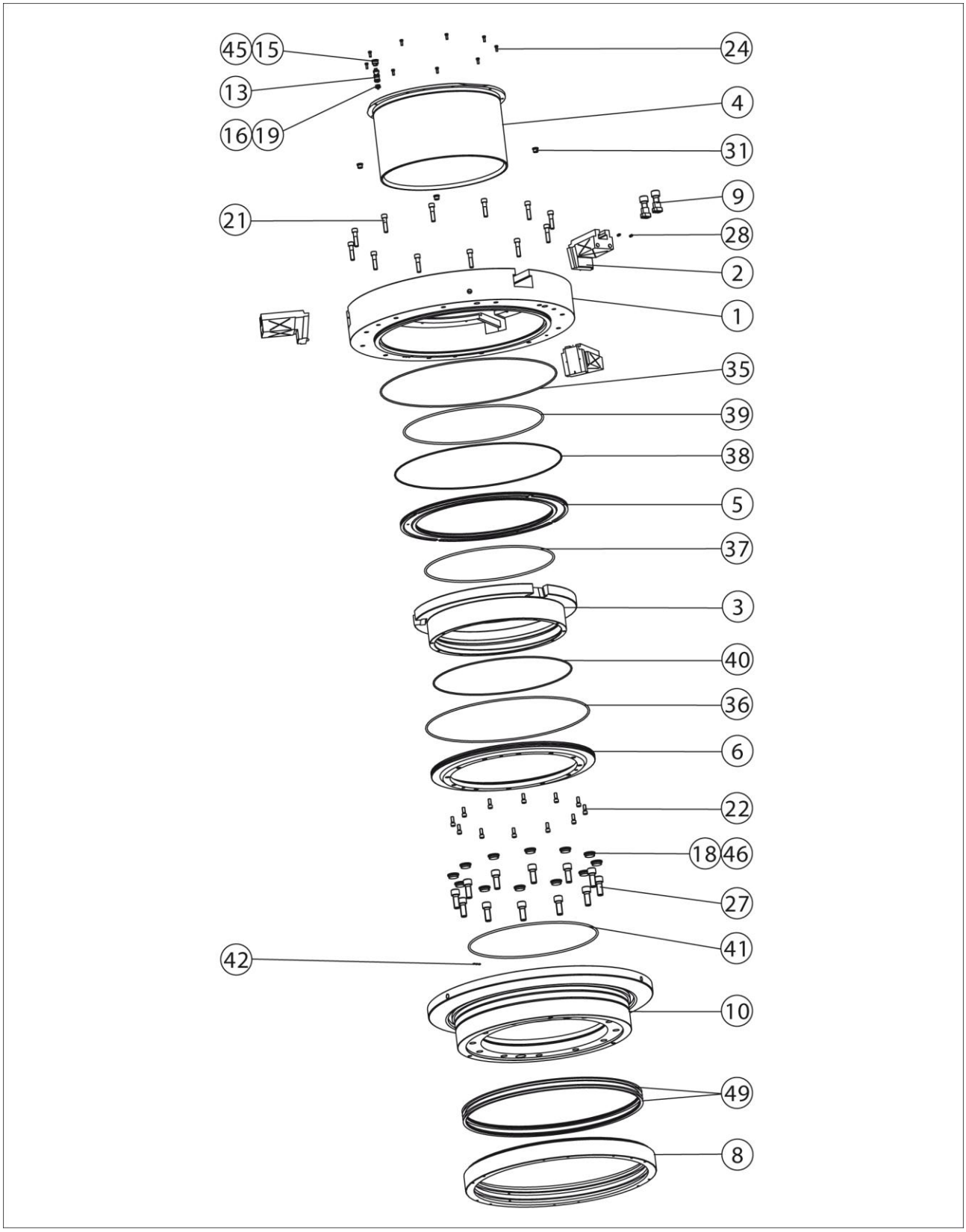
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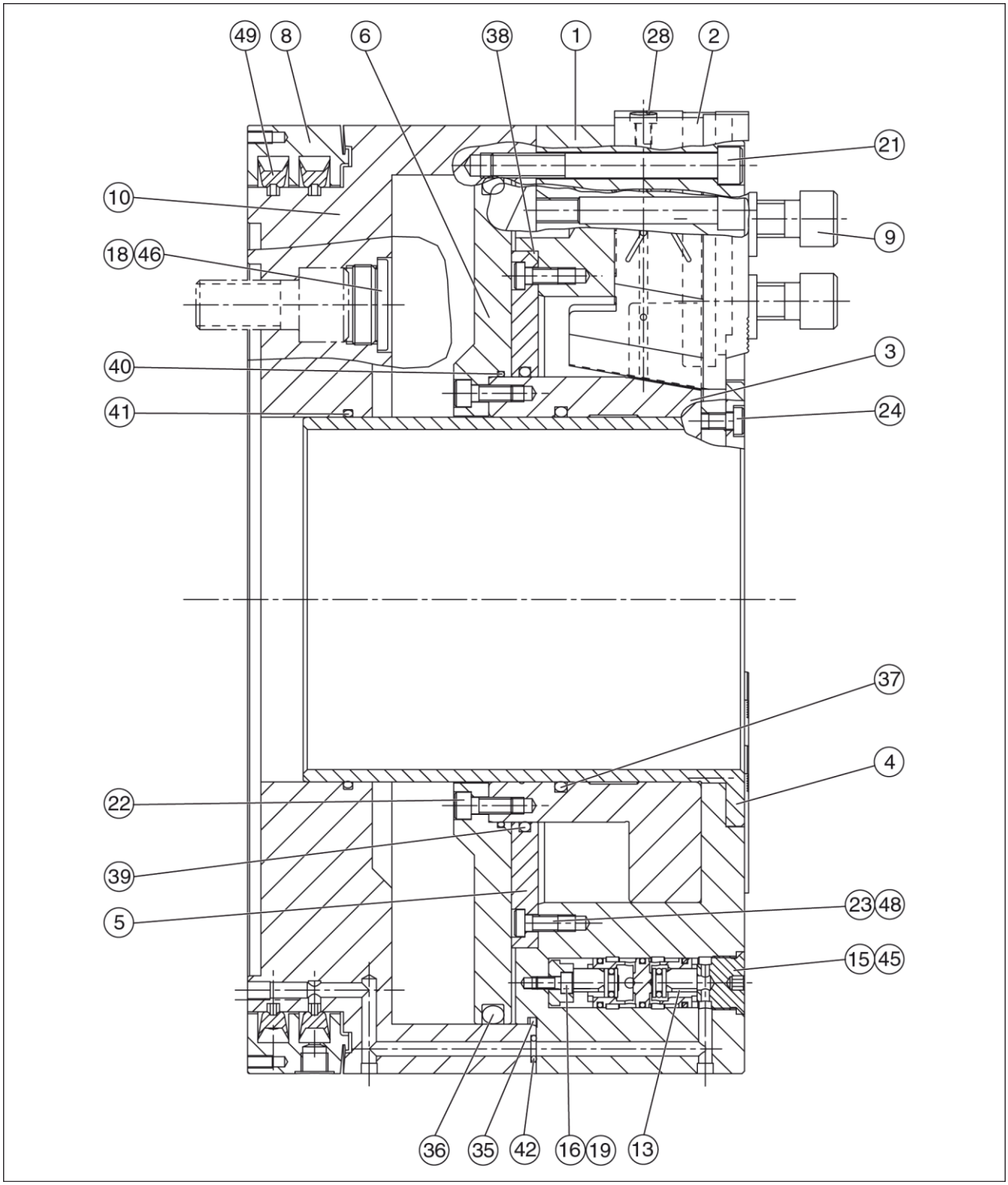
EP (LH)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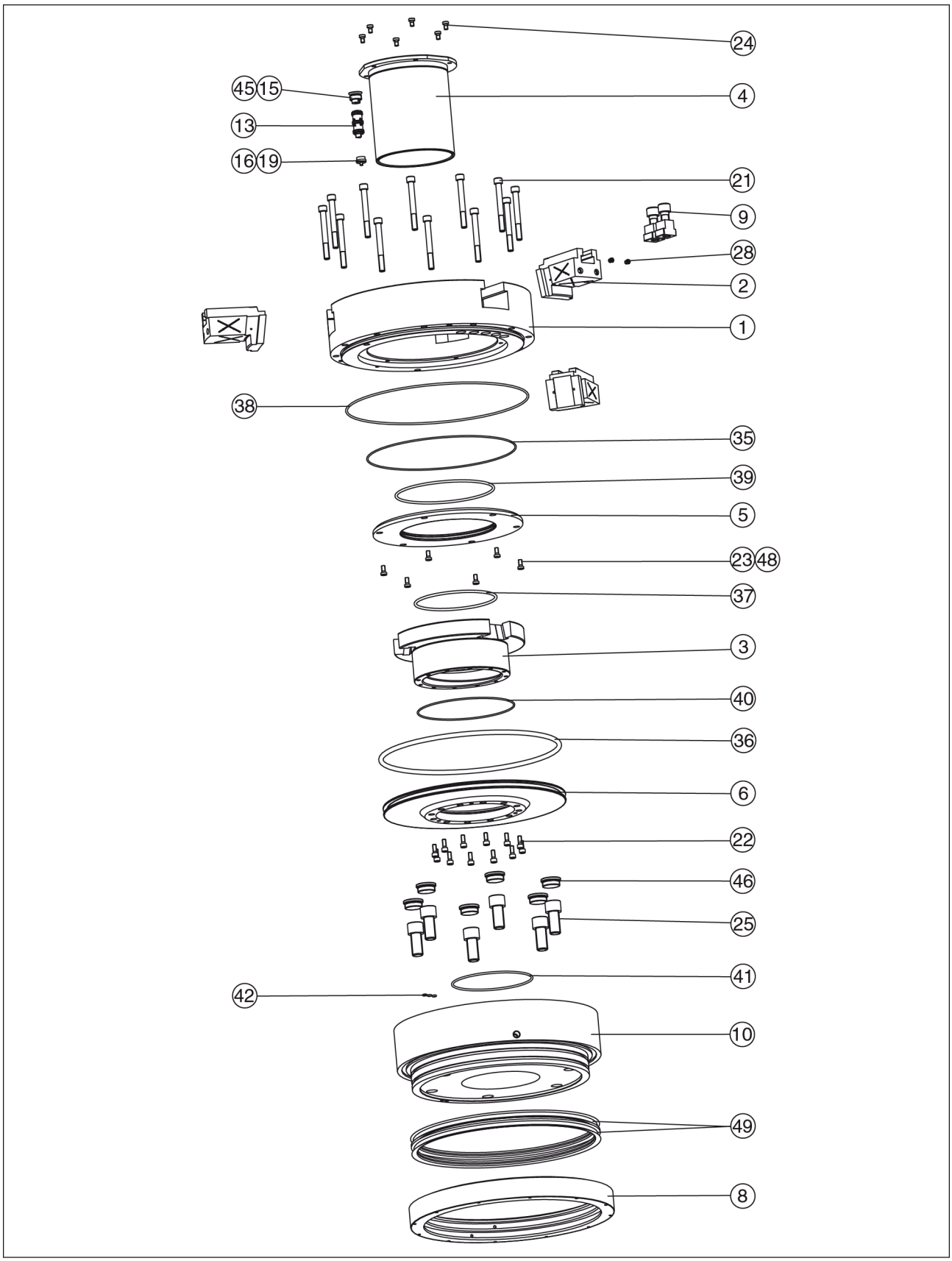
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Translation of original EC declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1.B of the European Parliament and of the Council on machinery.

Manufacturer/ Distributor	H.-D. SCHUNK GmbH & Co.Spanntechnik KG Lothringer Str. 23 D-88512Mengen

We hereby declare that on the date of the declaration the following incomplete machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Product designation:	ROTA TB/TB-LH/TBS/TBS-LH/EP/EP-LH ROTA TB 400-115; 400-140; 470-185; 500-160; 500-205; 500-230; 600-275; 610-260; 630-265; 630-310; 630-325; 630-330; 800-365; 800-375; 800-395; 800-410; 1000-534 pneumatic chucks. ROTA TB-LH 400-140; 470-185; 500-205; 500-230; 600-275; 610-260; 630-265; 630-275; 630-325; 850-375; 1000-560; 1200-640. ROTA TB-LH-LC 850-375. ROTA EP 380-127; 460-165; 460-185; 500-260. ROTA EP-LH 460-165; 460-185; 500-260; 610-265.
ID number	0818001; 0818002; 0818011; 0818012; 0818050; 0818122; 0818131; 0818017; 0818032; 0818040; 0818041; 0818240; 0818005; 0818004; 0818015; 0818016; 0818019; 0818051; 0818125; 0818026; 0818135; 0818141; 0818014; 0818035; 0818003; 0818006; 0818007; 0818052; 0818008; 0818009; 0818023; 0818018

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

DIN EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN ISO 1550: 1997+A1:2008	Machine-tools safety – Safety requirements fort the design and constructions of work holding chucks

Other related technical standards and specifications:

DIN ISO 702-1:2009	Machine tools - Connecting dimensions of spindle noses and work holding chucks - Part 1: front short-taper mount with screws
DIN ISO 702-4:2004	Machine tools - Connecting dimensions of spindle noses and work holding chucks - Part 2: cylindrical assembly
VDI 3106:2004-04	Determination of permissible speed (rpm) of lathe chucks (jaw chucks)

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery to state offices.

The relevant technical documentation according to Annex VII, Part B, belonging to the partly completed machinery have been created.

Person authorized to compile the technical documentation:
Philipp Schräder, Address: see manufacturer's address

Mengen, January 2016

p.p. Philipp Schräder; Head of Engineering Design

Appendix on Declaration of Incorporation, as per 2006/42/EC, annex II, No. 1 B

1. Description of the basic safety and health protection requirements, as per 2006/42/EC, annex I, that apply to and are fulfilled for the scope of the incomplete machine:

Product designation	Pneumatic chuck ROTA TB/TB-LH/TBS/TBS-LH/EP/EP-LH
Type designation	ROTA TB 400-115; 400-140; 470-185; 500-160; 500-205; 500-230; 600-275; 610-260; 630-265; 630-310; 630-325; 630-330; 800-365; 800-375; 800-395; 800-410; 1000-534. ROTA TB-LH 400-140; 470-185; 500-205; 500-230; 600-275; 610-260; 630-265; 630-275; 630-325; 850-375; 1000-560; 1200-640. ROTA TB-LH-LC 850-375. ROTA EP 380-127; 460-165; 460-185; 500-260. ROTA EP-LH 460-165; 460-185; 500-260; 610-265.
ID number	0818001; 0818002; 0818011; 0818012; 0818050; 0818122; 0818131; 0818017; 0818032; 0818040; 0818041; 0818240; 0818005; 0818004; 0818015; 0818016; 0818019; 0818051; 0818125; 0818026; 0818135; 0818141; 0818014; 0818035; 0818003; 0818006; 0818007; 0818052; 0818008; 0818009; 0818023; 0818018

		To be provided by the System Integrator for the overall machine ⇓	Fulfilled for the scope of the incomplete machine ⇓	Not relevant ⇓
1.1	**Essential Requirements**			
1.1.1	Definitions		X	
1.1.2	Principles of safety integration		X	
1.1.3	Materials and products		X	
1.1.4	Lighting			X
1.1.5	Design of machinery to facilitate its handling		X	
1.1.6	Ergonomics			X
1.1.7	Operating positions			X
1.1.8	Seating			X
1.2	**Control Systems**			
1.2.1	Safety and reliability of control systems			X
1.2.2	Control devices			X
1.2.3	Starting			X
1.2.4	Stopping			X
1.2.4.1	Normal stop			X
1.2.4.2	Operational stop			X
1.2.4.3	Emergency stop			X
1.2.4.4	Assembly of machinery			X
1.2.5	Selection of control or operating modes			X
1.2.6	Failure of the power supply			X
1.3	**Protection against mechanical hazards**			
1.3.1	Risk of loss of stability		X	
1.3.2	Risk of break-up during operation		X	
1.3.3	Risks due to falling or ejected objects			X
1.3.4	Risks due to surfaces, edges or angles		X	
1.3.5	Risks related to combined machinery			X
1.3.6	Risks related to variations in operating conditions		X	
1.3.7	Risks related to moving parts		X	
1.3.8	Choice of protection against risks arising from moving parts			X
1.3.8.1	Moving transmission parts			X
1.3.8.2	Moving parts involved in the process			X
1.3.9	Risks of uncontrolled movements			X
1.4	**Required characteristics of guards and protective devices**			
1.4.1	General requirements			X
1.4.2	Special requirements for guards			X

1.4.2.1	Fixed guards			X
1.4.2.2	Interlocking movable guards			X
1.4.2.3	Adjustable guards restricting access			X
1.4.3	Special requirements for protective devices			X
1.5	**Risks due to other hazards**			
1.5.1	Electricity supply			X
1.5.2	Static electricity			X
1.5.3	Energy supply other than electricity			X
1.5.4	Errors of fitting		X	
1.5.5	Extreme temperatures		X	
1.45.6	Fire			X
1.5.7	Explosion			X
1.5.8	Noise		X	
1.5.9	Vibrations		X	
1.5.10	Radiation	X		
1.5.11	External radiation	X		
1.5.12	Laser radiation	X		
1.5.13	Emissions of hazardous materials and substances			X
1.5.14	Risk of being trapped in a machine			X
1.5.15	Risk of slipping, tripping or falling			X
1.5.16	Lightning			X
1.6	**Maintenance**			
1.6.1	Machinery maintenance		X	
1.6.2	Access to operating positions and servicing points		X	
1.6.3	Isolation of energy sources			X
1.6.4	Operator intervention			X
1.6.5	Cleaning of internal parts			X
1.7	**Information**			
1.7.1	Information and warnings on the machinery		X	
1.7.1.1	Information and information devices		X	
1.7.1.2	Warning devices			X
1.7.2	Warning of residual risks		X	
1.7.3	Marking of machinery	X		
1.7.4	Instructions	X		
1.7.4.1	General principles for the drafting of instructions		X	
1.7.4.2	Contents of the instructions	X		
1.7.4.3	Sales literature		X	
	The classification from Annex 1 is to be supplemented from here forward.			
2	Supplementary essential health and safety requirements for certain categories of machinery			X
2.1	Foodstuffs machinery and machinery for cosmetics or pharmaceutical products			X
2.2	Portable hand-held and/or guided machinery			X
2.2.1	Portable fixing and other impact machinery			X
2.3	Machinery for working wood and material with similar physical characteristics			X
3	Supplementary essential health and safety requirements to offset hazards due to the mobility of machinery			X
4	Supplementary essential health and safety requirements to offset hazards due to lifting operations			X
5	Supplementary essential health and safety requirements for machinery intended for underground work			X
6	Supplementary essential health and safety requirements for machinery presenting particular hazards due to the lifting of persons			X