Jaw quick-change with arbor or collet chuck adapter ROTA THW vario

Assembly and Operating Manual

Imprint

Technical changes:

We reserve the right to make technical improvements.

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Dear Customer

Dear Customer,

Thank you for putting your trust in 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. We look forward to your challenging questions. We will find a solution!

Best regards,

Your SCHUNK team

H.-D. SCHUNK GmbH & Co.
Spanntechnik KG

Lothringer Str. 23
D-88512 Mengen

Tel. +49–7572-7614-0
Fax +49-7572-7614-1099

info@de.schunk.com
schunk.com

Customer Management

Tel. +49–7572-7614-1300
Fax +49-7572-7614-1039

customercentermengen@de.schunk.com

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

1 General information

This operating manual is an integral part of the product and contains important information on safe and proper assembly, start-up, operation, care, maintenance and disposal. This manual must be kept in the immediate vicinity of the product, accessible to all users.

Pay particular attention to the chapter "Basic safety notes" prior to using the product described in this manual. (☞ 2, Page 8)

If transferring the product to a third party, be sure to include this operating manual.

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

We accept no liability for damage resulting from failure to observe and comply with this operating manual.

1.1 Safety notes

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

	**⚠ DANGER** **Danger to individuals!** Ignoring a safety note such as this will certainly lead to irreversible injury and even death.

	**⚠ WARNING** **Danger to individuals!** Ignoring a safety note such as this can lead to irreversible injury and even death.

	**⚠ CAUTION** **Danger to individuals!** Non-observance can cause minor injuries.

NOTICE

Material damage!
Information about avoiding material damage.

⚠ WARNING

Warning about hand injuries

⚠ WARNING

Warning about hot surfaces

1.2 Applicable documents

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

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

2 Basic safety notes

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

- Read through the manual carefully prior to assembly and installation.
- Report any failures and damage to the manual lathe chuck immediately following detection and repair it without delay to keep the extent of the damage minimal and prevent compromising the safety of the chuck. **Only use original SCHUNK spare parts when replacing damaged parts.**
- Keep this manual accessible to all users at all times.
- If transferring the product to a third party, be sure to include this manual.

2.1 Appropriate use

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

- The product may only be used within the scope of its technical data, (☞ 6, Page 19).
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.
- The maximum 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.
  (Also see "Calculation for clamping force and speed of rotation" in chapter "Technical data".) (☞ 6, Page 19)

2.2 Inappropriate use

The manual lathe chuck is not being used as intended if, for example:

- workpieces are not properly clamped.
- safety regulations are disregarded and persons are working at the manual lathe chuck (for example, to machine clamped workpieces) without additional protective equipment.
- the technical data is exceeded when using the manual lathe chuck.
- the manual lathe chuck is used with machines/systems or workpieces that are not designed to be used with it.

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

⚠ DANGER

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

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

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

⚠ 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 lathe chuck.
- Note the relevant load securing regulations for working safely with cranes, ground conveyors, lifting gear and load-handling equipment.

⚠ CAUTION

Risk of slipping or falling if the chuck's operational environment is not clean (e.g. contaminated with cooling lubricants or oil).

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

⚠ 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.
- Wear protective gloves.
- Follow the safety and accident prevention regulations when operating the chuck, especially when working with machine tools 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 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 workpiece, the base and top jaws may break.

- Make sure that the workpiece is clamped concentrically.
- If the chuck has a quick-change jaw system, the top jaws must not protrude beyond the base jaws in the radial direction. **Exception:** The supporting jaw variant 3 protrudes beyond the chuck base jaw due to its design. In this case, the T-nuts always need to be completely inserted into the groove of the chuck base jaw.

⚠ 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 RPM.
- Wear hearing protection.

NOTICE

If the lathe chuck is overlubricated, malfunctions (difficulty of movement) may occur when changing the jaws or release mechanism.

- Disassemble the chuck and remove excess grease.
- For lubrication, refer to the chapter "Maintenance".

2.4 Notes on safe operation

- Do not start the machine spindle until the workpiece is clamped and the spanner wrench has been removed from the clamping device.

Functional test
After installation of the clamping device, its function must be checked prior to commissioning:

- **Clamping force!** The max. clamping force specified for the clamping device must be reached at max. torque.
- **Indicator pin!** Never clamp or switch on the lathe when the indicator pin is protruding. (Golden pin on the chuck's shell).
- **Jaw lock!** The spindle can only be turned when all the chuck jaws have been fitted into the T-slot. This prevents the wedge bars from being brought into the working position without chuck jaws.

Maintenance instructions

The reliability of the clamping device can only be guaranteed if the maintenance instructions in the operating manual are precisely followed. Please observe the following in particular:

- For lubrication of the clamping device, we recommend using our proven high-performance grease LINOMAX. Unsuitable lubricants can have a negative impact on the functioning of the clamping device (clamping force, coefficient of friction, wear behavior).
- All surfaces to be lubricated must be reached during lubrication. (The tight fittings of the components require a high injecting pressure. Therefore use a high-pressure grease press.)
- For good distribution of the grease, move the chuck 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 (e.g. GFT 270, ID 0890013) before starting a new production run and between maintenance intervals. "Optimum safety can only be guaranteed through regular checks".
- 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, clamping must be done 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. In this case the value of the operating clamping force should be measured dynamically.
- It is useful to travel the clamping piston through to its end position several times after 500 clamping strokes, at the latest. (Removed lubricant will be pushed back to the pressure surfaces again so that the clamping force is retained for longer).

Safety during servicing

- Avoid any unsafe manner of working.
- Only operate the clamping device when all protective equipment has been fitted and is in full working order.
- Check the clamping device at least once per shift for externally visible damage and faults.
- Immediately report any changes including changed operational behavior to the competent units/persons; if necessary, immediately shut down and secure the machine on which the clamping device is mounted.
- Do not start up the machine that the clamping device is mounted on again until the malfunction has been eliminated.

Use of special chuck jaws

When using customized 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 front. (Clamping points at a greater distance cause higher surface pressure in the jaw guidance and can significantly reduce the clamping force.)
- Do not use welded jaws.
- If for constructional reasons the special chuck jaws are wider and/or higher 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.
- Fasten the mounting screws so as to achieve the largest possible effectiveness.
- If the clamping device 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.
- Renew 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 clamping device.

If the operator carries out a substantial modification to the clamping device, the product no longer conforms to the EC Machinery Directive 2006/42/EC!

2.5 Personnel qualification

Only specialist personnel may install or remove, commission or maintain the clamping device. Specialist personnel are persons who by their technical training, experience and knowledge are capable of assessing the work to be performed and recognizing potential dangers, and are thus able to take appropriate countermeasures.
If need be, take advantage of the manufacturer's training courses.

Every person called upon by the operator to work on the clamping device must have read and understood the complete assembly and operating manual, especially Chapter 2 "Basic safety notes" (☞ 2, Page 8).

The responsibility for operation, maintenance and repair must be clearly specified.
Only allow personnel who are considered experts in the context of the safety regulations to carry out maintenance and repair work in the safety-relevant areas of the clamping device.

Specify the operator's responsibility, also with regard to safe behavior, and authorize the operator to reject instructions from third parties which breach safety regulations.

During training and instruction, personnel must only be permitted to work with the clamping device if continuously supervised by a specialist.

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 clamping device.

Monitoring 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 clamping device is mounted are clearly legible and are observed.

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

Spare parts
Only use original SCHUNK spare parts.

Environmental regulations
The applicable environmental regulations must be observed for all maintenance and repair work.
The use of petroleum ether is prohibited. It is extremely flammable, can build up an electrostatic charge and can form an explosive gas air mixture. When selecting lubricants and lubricating oils, pay attention to environmental compatibility, health risks, disposal regulations and to local options for disposal according to regulations.

2.7 The use of personal protective equipment

When using this product, you must conform with the relevant heath & safety at work rules and you must use the required personal protective equipment.

- Use safety gloves, safety shoes and safety glasses.
- Maintain safe distances.

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:

- Refer to the applicable documents, (☞ 1.2, Page 7)
- Observance of the ambient conditions and operating conditions
- Observe the maximum number of clamping cycles - approx. 500,000 cycles
- Observance of the specified maintenance and lubrication intervals (☞ 10, Page 49)

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

4 Scope of delivery

4.1 ROTA THW vario 215-62

1	**Flange**
1	**Bayonet adapter**
1	**Set of protective jaws**
	Screws

4.2 ROTA THW vario D

Segmented mandrel
Screws

4.3 ROTA THW vario F

Collet chuck (without clamping head)
Screws

5 Screw torques

Tightening torques for mounting screws for clamping the chuck
(screw quality 10.9)

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

Tightening torques for mounting top jaws onto the lathe chuck
(screw quality 12.9)

Screw size	M8	M10	M12	M16	M20	M24
Maximum admissible torque (Nm)	25	60	80	100	180	230

6 Technical data

6.1 Chuck data

	ROTA THW vario
Max. actuating force [kN]	46
Max. clamping force [kN]	82
Max. speed of rotation [RPM]	5400
Stroke per jaw [mm]	7.4
Piston stroke [mm]	25
Chuck bore [mm]	62
Weight [kg]	25
Centrifugal torque of the base jaw **McGB** [kgm]	For the THW vario chuck, it is necessary to specifically determine this data. Examples of calculation can be found in the "Special chuck jaw design/technology" chapter in our current chuck jaw catalog.
Max. jaw eccentricity of center of gravity in axial direction **amax** [mm]	

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

If unhardened top jaws or special chuck jaws are used, ensure that the weight is as low as possible.

For soft top jaws or special chuck jaws, the speed of rotation permitted for the cutting task must be calculated in accordance with VDI 3106 whereby the maximum recommended speed may not be exceeded. The calculated values must be checked by dynamic measurement. Function monitoring (piston movement and actuating pressure) must be performed in accordance with the guidelines of the Berufsgenossenschaft (employer's liability insurance association).

⚠ WARNING

There is a risk of crushing when loading by hand!
If manual loading is used, set up the jaw position so that there is no risk of injury when inserting the parts. The maximum opening gap must be less than 8 mm when the workpiece is in contact with one of the jaws.

6.2 Clamping force RPM diagrams

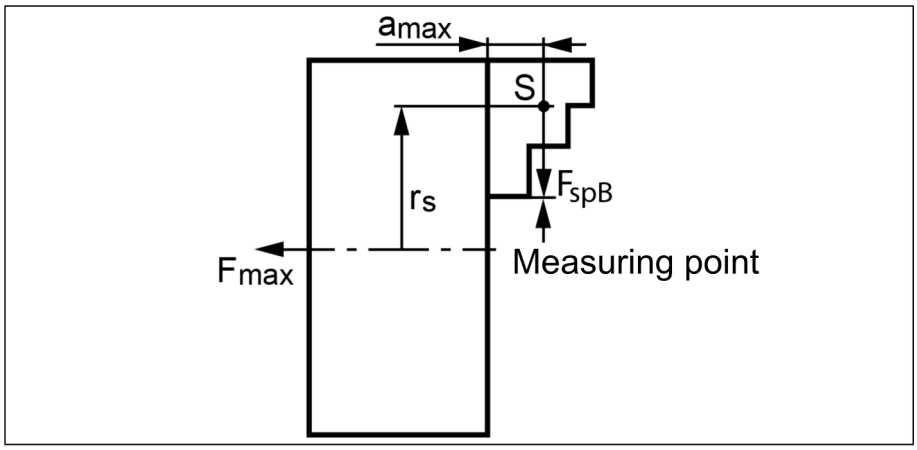
The diagrams relate to a 3-jaw chuck.

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

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

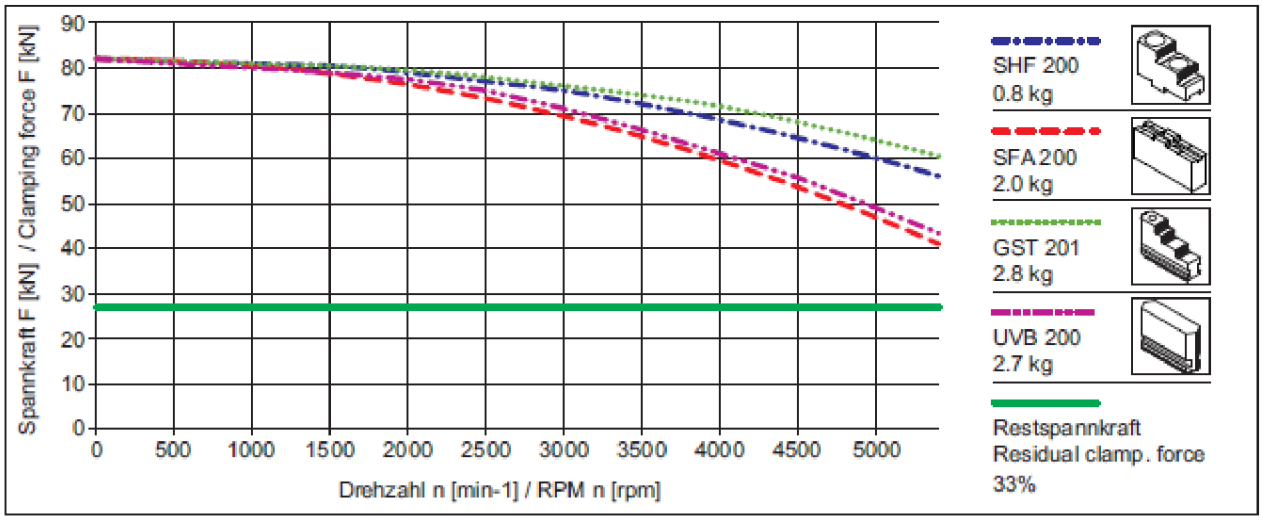
If one or more of these prerequisites is modified, the graphs will no longer be valid.

Chuck setup for clamping force/RPM diagram



F_{spB}	Jaw clamping force	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 for ROTA THW



6.3 Calculating the clamping force and RPM

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]
kgm × 9.81 = Nm			

6.3.1 Calculation of the required clamping force at a specified speed of rotation

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}**.

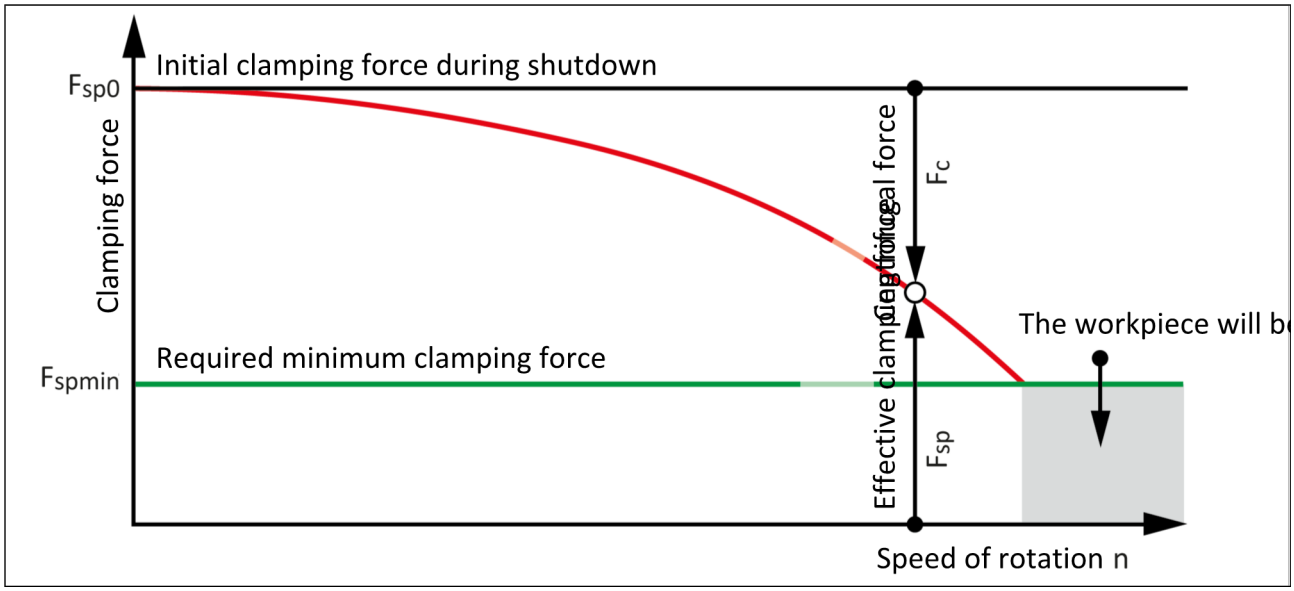
$$F_{sp} = F_{sp0} \mp F_c \text{ [N]}$$

(–) 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 a certain RPM limit is exceeded!
When clamping from the outside in, as the RPM increases, the effective clamping force decreases by the amount by which the centrifugal force increases (the forces are opposed). When the RPM limit is exceeded, the clamping force drops below the required minimum clamping force F_{spmin}. Consequently, the workpiece is released spontaneously.

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



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

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

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

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

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

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

NOTICE

This calculated force must not be larger than the maximum clamping force ΣS engraved on the lathe chuck.
See also "Lathe chuck data" table Link Futterdaten

From the above formula it is evident that the sum of the effective clamping force F_{sp} and the total centrifugal force F_c is multiplied by the **safety factor for the clamping force S_{sp}**. According to VDI 3106, the following also applies here: **$S_{sp} \geq 1.5$.**
The **total centrifugal force F_c** is dependent on both the sum of the masses of all jaws and on the center of gravity radius and the rpm.

NOTICE

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

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

$$F_C = \sum(m_B \cdot r_S) \cdot \left(\frac{\pi \cdot n}{30}\right)^2 = \sum M_C \cdot \left(\frac{\pi \cdot n}{30}\right)^2 \text{ [N]}$$

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

$$M_C = m_B \cdot r_S \text{ [kgm]}$$

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

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

The centrifugal torque of the base jaws M_{cGB} can be found in the table "Lathe chuck data"Link Futterdaten. The centrifugal torque of the top jaws M_{cAB} is calculated as per:

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

6.3.2 Calculation example: required initial clamping force for a given RPM

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 min^{-1} (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:

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

For two-part chuck jaws, the following applies:

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

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

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

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:

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

Initial clamping force during shutdown that was sought:

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

6.3.3 Calculation of the permissible RPM 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:

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

NOTICE

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

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

The following data is known from previous calculations:

- Initial clamping force during shutdown F_{sp0} = 17723 N
- Machining force for machining job F_{spz} 3000 N (application-specific)
- Total centrifugal torque of all jaws $\sum M_c$ = 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 Link Futterdaten).

This calculated RPM may be used.

6.4 Accuracy classes

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

6.5 Permitted imbalance

Rotating clamping stations without pallets and workpieces correspond to 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 in particular to high speeds of rotation, asymmetrical workpieces or the use of lathe chucks that do not correspond to balancing grade 6.3, as well as uneven lubricant application. 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.

7 Product description

7.1 Segmented mandrel ROTA THW vario D

The segmented mandrels are especially suitable for I.D. clamping, where high run-out accuracy is required.

The segmented clamping sleeves consist of hardened steel segments vulcanized together. As the functional surfaces are completely ground in a single operation during production, a high degree of run-out accuracy can be guaranteed. Vulcanization provides additional vibration damping and a large opening path.

During clamping, the axial tensile forces pull the workpiece firmly onto the flexible stop. This results in a very stable clamping of the workpiece even with the shortest clamping lengths. In addition, the entire clamping device is reinforced, which has an extremely positive effect on the service life of the tools.

The vario D is a segmented mandrel that may only be used in a ROTA THW vario 215-62.

The vario D is screwed onto the face of the power chuck and operated hydraulically via a special adapter. The protective jaws (item 82) move in the power chuck. (☞ 8.2.1, Page 33)

Simultaneous workpiece clamping with the power chuck and the segmented mandrel is not possible, as no independent clamping force application is provided.

In the standard version, the vario D is designed in such a way that the stroke control does not have to be changed over to the vario.

If no workpiece is clamped, the end positions of the power chuck are monitored. As the vario D does not require the same actuation stroke, a defined idle stroke is driven over the sliding sleeve for clamping and unclamping.

If an intermediate position can be programmed at the stroke control in the clamping cylinder, it would be possible to move with optimized actuation paths using a special attachment to the vario D. The attachment of the power chuck remains unaffected.

Important:
The actuating pressure must be adapted for the power chuck and for the segmented mandrel when re-equipping the clamping task.

Overview of sizes, vario D

Size	Clamping range of the mandrel	Clamping range of the segmented clamping sleeve
0	from Ø 20 to Ø 28 1 mm increments	±0.25
1	from Ø 26 to Ø 38 1 mm increments	±0.25
2	from Ø 36 to Ø 54 1 mm increments	±0.25
3	from Ø 50 to Ø 80 1 mm increments	±0.35

7.2 Collet chuck ROTA THW vario F

The collet chucks are especially suitable for clamping, where high run-out accuracy is required.

The vario F lathe chuck can be used as a stop chuck for chuck work.

The clamping heads consist of hardened steel segments vulcanized together. These are characterized by "parallel workpiece clamping", high accuracy with minimum deformation of the workpieces, and fast set-up. When using the vario F as a stop chuck, a workpiece stop is screwed into the chuck.

Due to the axial tensile forces during clamping, the workpiece is firmly pulled onto the flexible stop. This results in a very stable clamping of the workpiece even with the shortest clamping lengths. In addition, the entire clamping device is reinforced, which has an extremely positive effect on the service life of the tools.

The vario F is a collet chuck that may only be used in a ROTA THW vario 215-62.

The vario F is screwed onto the face of the power chuck and operated hydraulically via a special adapter. The protective jaws (item 82) move in the power chuck. (☞ 8.3.1, Page 38)
Simultaneous workpiece clamping with the power chuck and the

collet chuck is not possible, as no independent clamping force application is provided.

In the standard version, the vario F is designed in such a way that the stroke control does not have to be changed over to the vario.

If no workpiece is clamped, the end positions of the power chuck are monitored. As the vario F does not require the same actuation stroke, a defined idle stroke is driven over the sliding sleeve for clamping and unclamping.

If an intermediate position can be programmed at the stroke control in the clamping cylinder, it would be possible to move with optimized actuation paths using a special attachment to the vario F. The attachment of the power chuck remains unaffected.

Important:
The actuating pressure must be adapted for the power chuck and for the collet chuck when re-equipping the clamping task.

Overview of sizes, vario F

Size	Clamping range of the chuck	Clamping range of the segmented clamping sleeve
65	from Ø 4 to Ø 65 1 mm increments	±0.5
80	from Ø 5 to Ø 80 1 mm increments	±0.5
100	from Ø 16 to Ø 100 1 mm increments	±1

8 Assembly

8.1 Mounting the lathe chuck onto the machine spindle

Checking the chuck mounting

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

Attaching the THW vario chuck

- Remove the chuck from its packaging and check for damage/completeness.
- Move the draw tube to its foremost position by actuating the clamping cylinder (see Image 6.1).

NOTE
It is important to make sure that the piston can be moved to the foremost (jaw change) position. To do this, ensure compliance with the dimensions for the attachment (Image 6.1).

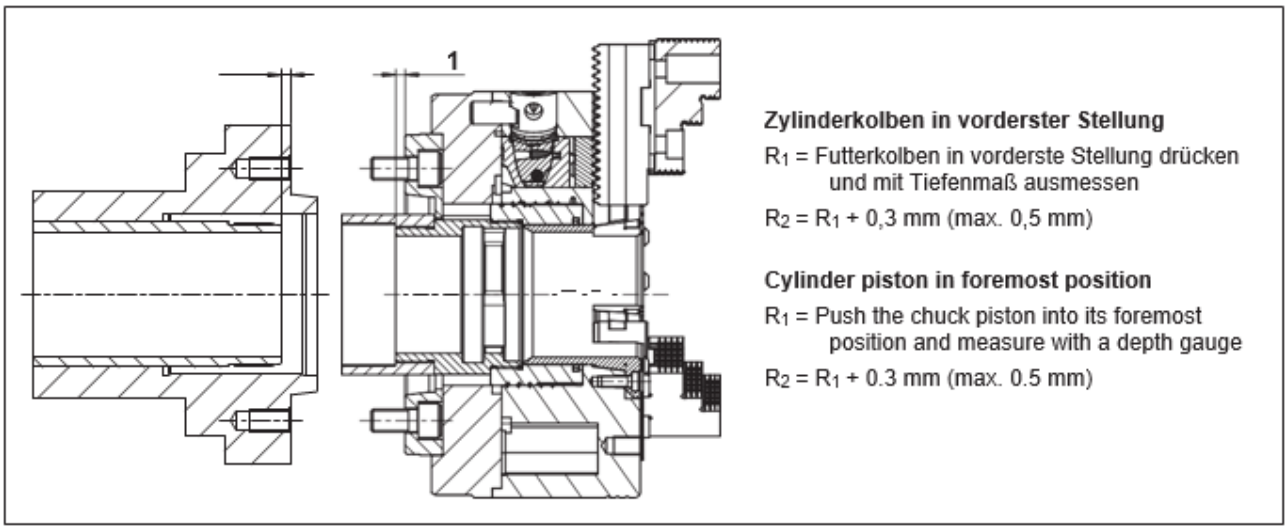


Image 6.1

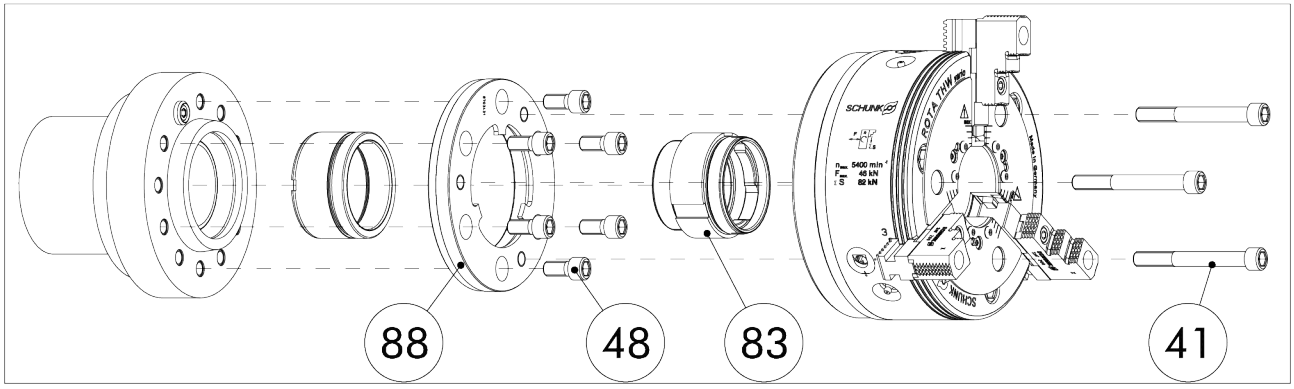


Image 6.2

Attachment to the machine:

The flange and adapter are pre-assembled on the chuck and must be disassembled.

1 Screw the adapter and bayonet adapter completely onto the draw tube of the machine.

2 Insert the flange into the adapter, making sure that the adapter is turned back as little as possible until the screw holes are coaxially aligned, then screw the flange onto the short taper.

NOTE
Do not actuate the clamping cylinder to move the draw tube/draw bar to its rearmost position. The flange could get damaged due to the forward movement.

3 Screw the chuck with the piston thread onto the adapter.

4 Only tighten the lathe chuck slightly on the flange with the supplied screws, as the lathe chuck must be aligned.

5 Move base jaws in the chuck to the maximum position.

6 Remove center sleeve (item 4). To do this, remove the screws (item 43) and screw them into the adjacent threads to press the center sleeve off.

7 Align the lathe chuck according to the ground taper on the front of the chuck with a suitable feeler gauge to a concentricity value of less than 0.005 mm.
Alternatively, the concentricity can be adjusted on the cylindrical inner diameter Ø 74 mm.

8 Screw the lathe chuck tightly to the flange.

9 Check concentricity according to the taper. Alternatively, also possible on the bore diameter Ø 74 mm.

10 Fit the center sleeve.

- ⇨ Check the actuating force is functioning and is sufficiently large.
- ⇨ Move the cylinder into the front position. Unlock the wedge bars with the jaw change key supplied and slide or offset the base jaws into the chuck's jaw guidance as shown on markings 1, 2 and 3.
- ⇨ Check that the base jaw and jaw stroke can easily move.

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

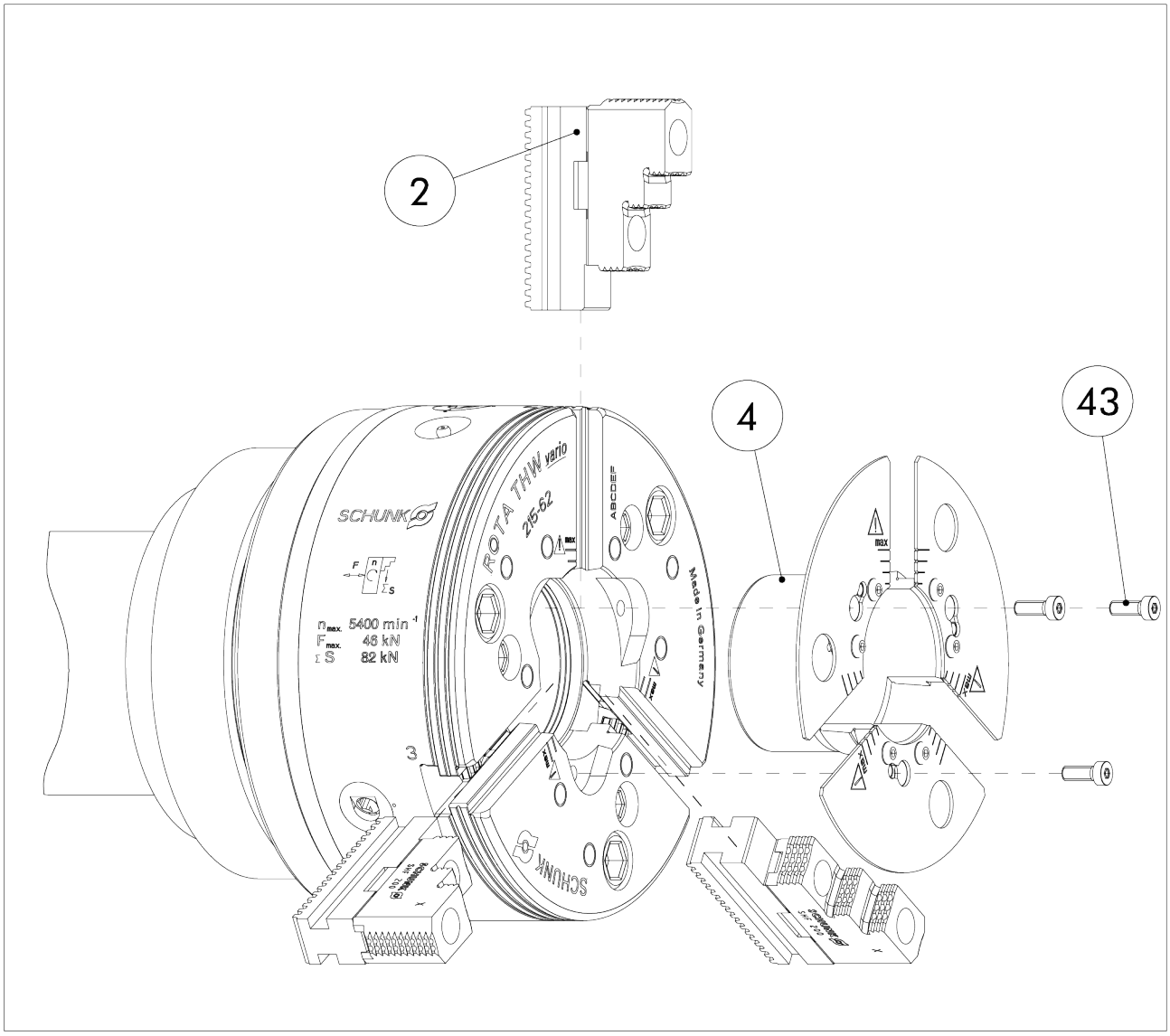
8.2 Segmented mandrel ROTA THW vario D

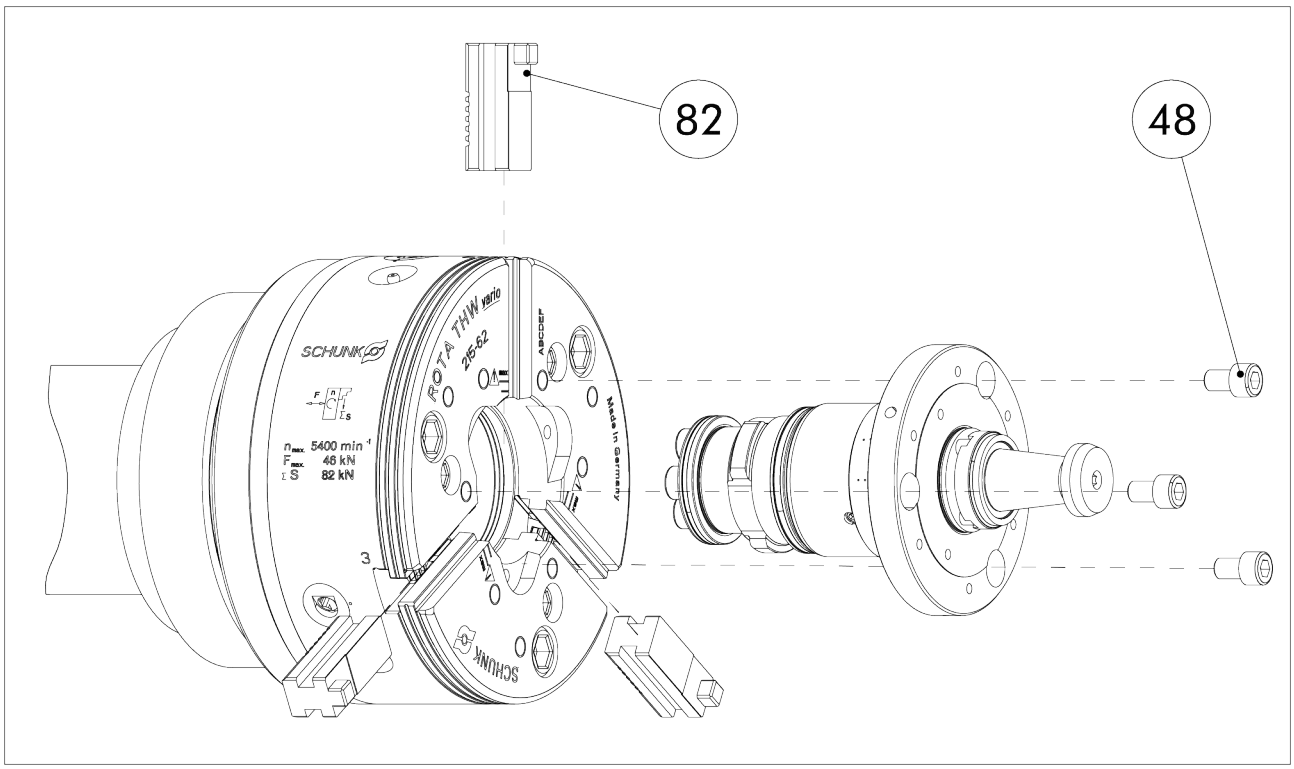
8.2.1 Mounting the segmented mandrel on the power chuck

The segmented mandrel is delivered ready for assembly. Only accessories, such as the segmented clamping sleeve, stop, etc. still need to be fitted.

The segmented mandrel vario D is only prepared for use on a ROTA THW vario 215-62 Any other application must be discussed with SCHUNK.

The attachment between power chuck and lathe must be prepared for the use by the vario D. A suitable bayonet adapter with the corresponding flange must be used between the power chuck and the machine.





1 Remove chuck jaw (item 2) from the chuck and insert protective jaws (item 82) up to the max. position (marking on chuck face).

NOTE
The mechanical system of the chuck is opened when the center sleeve or the vario component are changed. No chips may penetrate into the mechanical system of the chuck.

2 Remove center sleeve (item 4). To do this, remove the screws (item 43) and screw them into the adjacent threads to press the center sleeve off.

3 Clean the taper, the flat surfaces and the bayonet before assembly.

4 Insert the vario component into the lathe chuck so that the marking on the circumference of the vario is aligned with the base jaw guide. The bayonets can be slid into each other in this position.

5 Tighten vario with 3 screws (item 48) on the chuck face (screws: DIN EN ISO 4762 - M10-10.9 tightened to a torque of 53 Nm). The vario component is fixed free from play in the lathe chuck.

6 Change the clamping pressure on the hydraulics to the actuating force of the vario.

Disassembly of the vario D

The lathe chuck is disassembled in the same way but in the reverse order.

After cleaning and oiling, we recommend storage in a closed box.

NOTICE

The maximum axial actuating force must not exceed the following values.

Type	Max. actuating force
Vario D0	10 kN
Vario D1	10 kN
Vario D2	20 kN
Vario D3	25 kN

Checking the concentricity and axial run-out

The achievable accuracy of the vario D depends mainly on the condition of the taper and flat surface in the power chuck. Here, the influence of wear marks and damage is a factor as well as contamination. To check the accuracy, the clamping bolt and the segmented clamping sleeve must be removed.

Unscrew and remove the clamping bolt with a hexagon socket wrench. Pull down the segmented clamping sleeve.

Remove the workpiece stop by removing the screws.

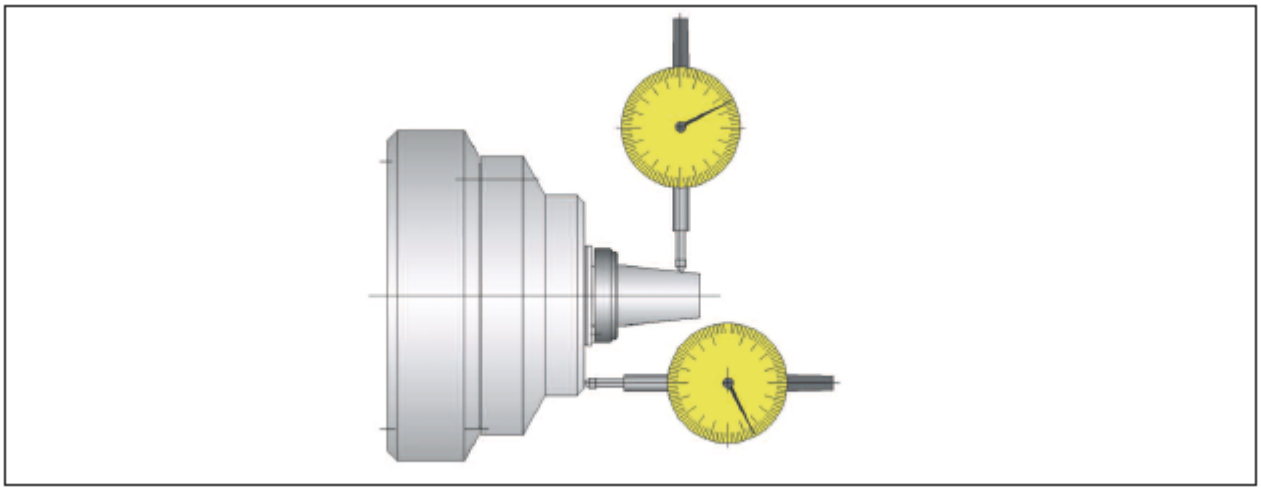
For the axial run-out, place the dial gauge on the axial stop face of the stop.

For the concentricity, place the dial gauge on the outer taper of the mandrel body.

If there is no dirt on the fitting surface, an attempt can be made to obtain an optimum concentricity value by twisting the vario on the lathe chuck by 120° in each case.

Furthermore, concentricity can only be achieved by improved alignment of the power chuck.

If necessary, the mounting position of the vario must be marked to a specific position to achieve optimum repeat clamping accuracy.



8.2.2 Changing the segmented clamping sleeve

Unscrew and remove the clamping bolts with the help of a hexagon socket wrench. Remove the attached segmented clamping sleeve and attach a new one. Make sure that the ejector unit engages in the grooves of the ejector ring. In the case of ejector rings with rotary drive, care must be taken to ensure that the drivers engage in the segmented clamping sleeve. Use the hexagon socket wrench to screw the clamping bolt back in until it reaches the block. The following torque must be observed here:

Mandrel size	Clamping bolt thread	Recommended tightening torque
0	M7 x 1	10 Nm
1	M9 x 1	20 Nm
2	M14 x 1	25 Nm
3	M25 x 1	55 Nm

8.2.3 Changing the stops

The stops are changed by loosening the 3 mounting screws. Depending on the design, the clamping bolts (item 3) and the segmented clamping sleeve (1) must be removed first.

8.2.4 Disassembling and assembling the segmented mandrel

The segmented mandrel can be disassembled only when not installed.

- Unscrew clamping bolt (item 2) and remove segmented clamping sleeve.
- Unscrew and remove the stop (item 3).
- By removing the screws (item 12) the idle stroke bolt (item 6) and the bayonet piece (item 7) can be removed.
- By loosening the radial fixing pin (item 11), the actuating cone (item 5) can be removed from the mandrel body (item 1).
- The bolt (item 15) and ejector pins (item 4) can be removed from the mandrel body (item 1).

Clean the individual components and check all parts for damage and wear.

Only use original SCHUNK spare parts when replacing damaged parts.

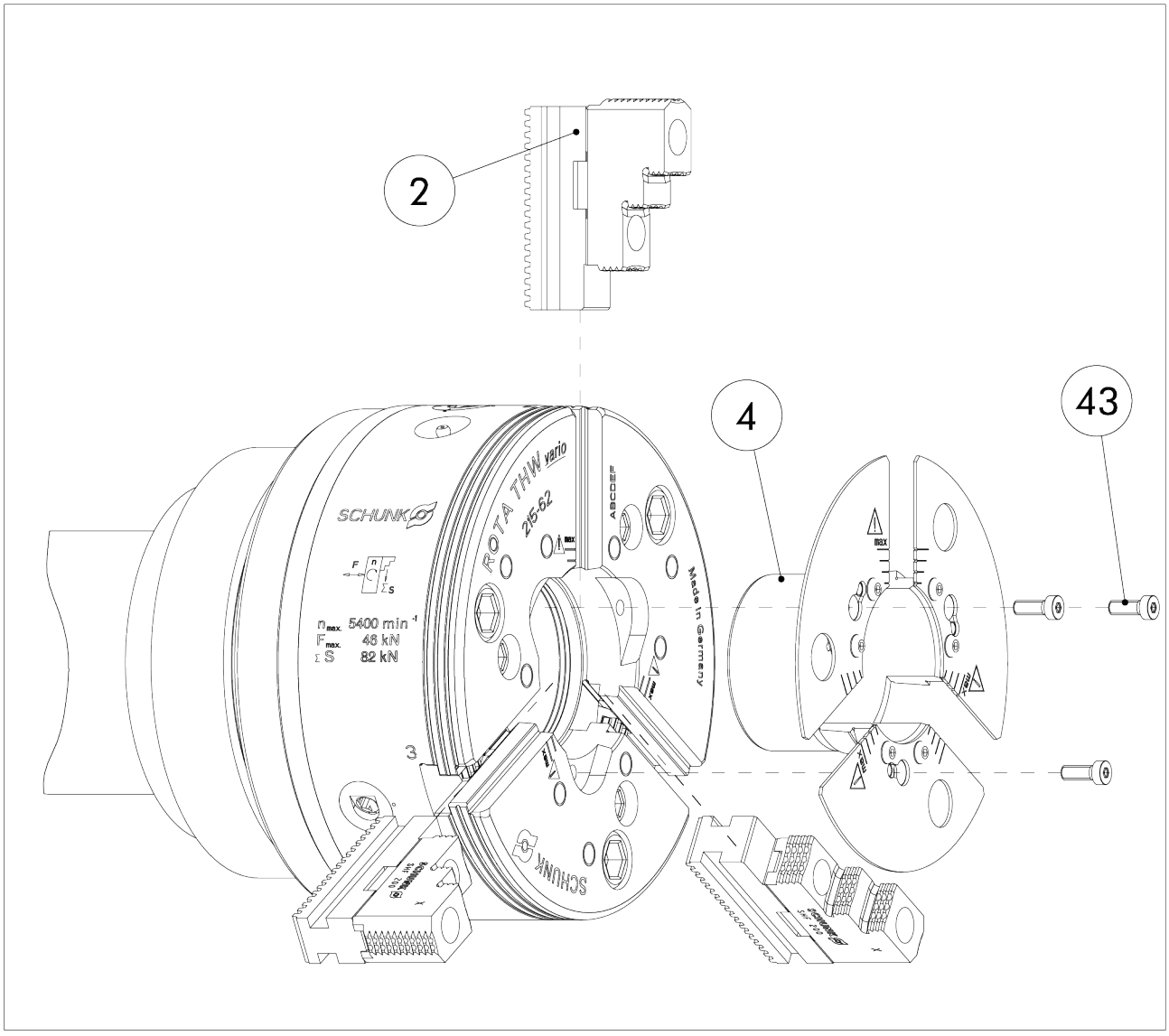
The segmented mandrel is assembled in the same way, but in reverse order.

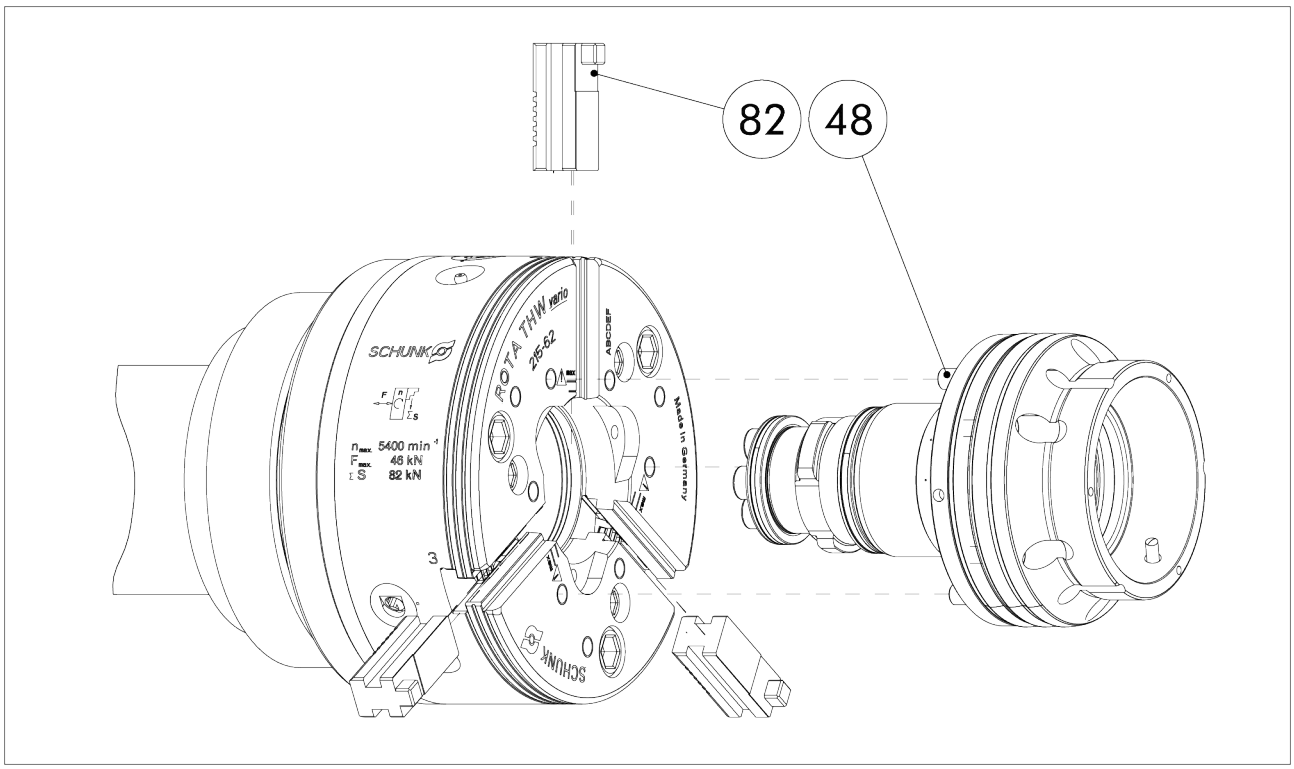
8.3 Collet chuck ROTA THW vario F

8.3.1 Mounting the segmented mandrel on the power chuck

The collet chuck is delivered ready for assembly. Only accessories, such as the clamping heads, stop, etc. still need to be fitted.

The collet chuck vario F is only prepared for use on a ROTA THW vario 215-62. Any other application must be discussed with SCHUNK.





The attachment between power chuck and lathe must be prepared for the use by the vario F. A suitable bayonet adapter with the corresponding flange must be used between the power chuck and the machine. For this, see the operating manual of the ROTA THW vario 215-62.

1 Remove chuck jaw (item 2) from the chuck and insert protective jaws (item 82) up to the max. position (marking on chuck face).

NOTE
The mechanical system of the chuck is opened when the center sleeve or the vario component are changed. No chips may penetrate into the mechanical system of the chuck.

2 Remove center sleeve (item 4). To do this, remove the screws (item 43) and screw them into the adjacent threads to press the center sleeve off.

3 Clean the taper, the flat surface and the bayonet before assembly.

4 Insert the vario component into the lathe chuck so that the marking on the circumference of the vario is aligned with the base jaw guide. The bayonets can be slid into each other in this position.

5 Turn the vario approx. 60° until the screw threads are positioned coaxially one above the other.

6 Tighten vario F with 3 screws (item 48) on the chuck face (screws: DIN EN ISO 4762 - M10-10.9 tightened to a torque of 53 Nm). The vario component is fixed free from play in the lathe chuck.

7 Change the clamping pressure on the hydraulics to the actuating force of the vario.

Disassembly of the vario F

The lathe chuck is disassembled in the same way but in the reverse order.

After cleaning and oiling, we recommend storage in a closed box.

NOTICE

The maximum axial actuating force must not exceed the following values.

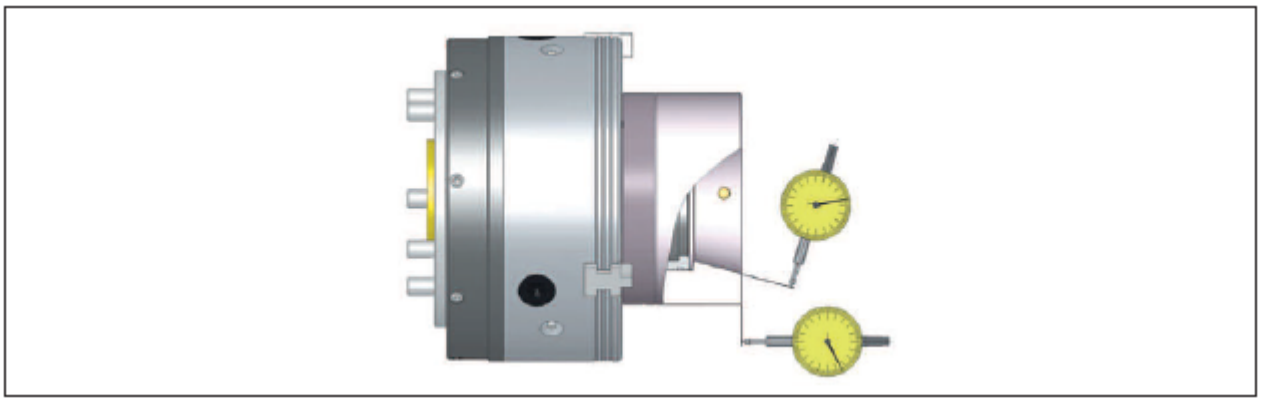
Type	Max. actuating force
Vario F 65 / Vario F 65-51	45 kN
Vario F 80	50 kN
Vario F 100	50 kN

Checking the concentricity and axial run-out

The achievable accuracy of the vario F depends mainly on the condition of the taper and flat surface in the power chuck. Here, the influence of wear marks and damage is a factor as well as contamination. To check the accuracy, the clamping head must be removed.
It may be necessary to align the clamping device holder. To do this, place a dial gauge in the taper and turn the spindle. If the concentricity error is greater than 0.01 mm, the clamping taper can be aligned. With the spindle stationary, loosen the 6 M10 screws on the face side, use a rubber mallet to ensure exact concentricity and tighten the screws crosswise with a torque wrench according to Table 1.
To check the axial run-out, place a dial gauge on the flat surface of the Vario F chuck and turn the spindle. If the axial run-out is greater than 0.005 mm, the vario F chuck should be disassembled with the spindle stationary and all contact surfaces checked for damage or dirt.
If there is no dirt on the fitting surface, an attempt can be made to obtain an optimum concentricity value by twisting the vario on the lathe chuck by 120° in each case.

Furthermore, concentricity can only be achieved by improved alignment of the power chuck.

If necessary, the mounting position of the vario F must be marked to a specific position to achieve optimum repeat clamping accuracy.



8.3.2 Replacing vario F clamping head

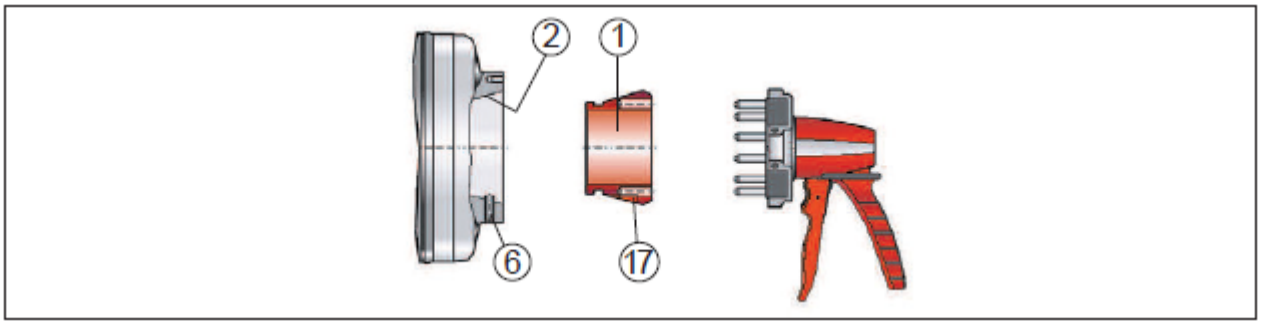
The clamping head can only be changed in the release position of the power chuck. Before replacing a clamping head (item 1), clean the clamping taper in the chuck body (item 2). Place the changing device on the clamping head. Insert the axis-parallel pins of the changing device completely into the frontal changing bores of the clamping head. By actuating the changing device, the clamping head (item 1) is compressed in the coupling area. Insert the clamping head into the chuck body with the fixing bolts (item 6) engaging in the milled fixing grooves (item 17) in the segment centers (never in the vulcanized slots).
Use slight pressure to loosen and pull out the changing device in the spindle direction.

⚠ WARNING

When operating the changing device, do not reach into the moving parts due to the risk of crushing.

Remove the SPANNTOP clamping head

The clamping head can only be removed in the release position of the chuck. Place the changing device on the clamping head. Insert the axis-parallel pins of the changing device completely into the front changing bores of the clamping head. By actuating the changing device, the clamping head (item 1) is compressed in the coupling area. Remove the changing device with the clamping head from the lathe chuck, loosen the changing device and remove the clamping head.



8.3.3 Back stops

A stop washer for the axial stop is pre-assembled in the collet chuck.
A workpiece-specific intermediate piece can be mounted in this washer. M12 for vario F 65 and vario F 80 and M20 x 1.5 for vario F100. Additionally, the stop washer can be unscrewed and reworked. When reworking, care must be taken to ensure that the interior is not penetrated. The openings can cause the collet chuck to become dirty and thus impair its function.
If no axial stop is required, the bore should be closed with a locking screw.

8.3.4 Disassembling and assembling the collet chuck

The vario F can only be disassembled once it has been removed.

- Remove collet chuck with change head.
- Remove base stop (item 5).
- By removing the screws (item 12) the idle stroke bolt (item 6) and the bayonet piece (item 7) can be removed.
- Remove screws (item 11) and remove the chuck body (item 1) from the mount (item 2).
- Expand the fixing taper and pull it down over the mount (item 2).

The lathe chuck is disassembled in the same way but in the reverse order.

After cleaning and oiling, we recommend storage in a closed box.

Clean the individual components and check all parts for damage and wear.

Only use original SCHUNK spare parts when replacing damaged parts.

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

9 Function

9.1 Function and handling

The wedge-bar power chuck type THW vario is actuated using a rotating closed or open-center hydraulic cylinder. The axial tensile or pressure forces are converted to the radial jaw clamping force via wedge bars positioned tangentially to the chuck body.
The clamping and opening path of the chuck jaws is determined by the clamping cylinder. The base jaws with screwed-on top jaws are moved or changed in the open clamping position. For safety reasons, the serration for the base jaws is still engaged in this chuck piston position. The base jaws are unlocked mechanically.
For each jaw guidance, a jaw-change bolt with hexagon socket (which can be turned using the chuck key) is arranged on the chuck perimeter. Turning the jaw-change bolt moves the serration for the wedge bar against spring pressure to the rear and out of the serration for the base jaw. In this position, the base jaws can be changed or moved radially inwards or outwards. It is not possible to pull out the chuck key in this position.

⚠ WARNING

The chuck key (item 90) is locked so long as the chuck jaws have not been moved into the functional area! The functional area means that the base jaw is engaged by the serration of the angle.
The chuck piston (item 3) must not be moved as long as the chuck key (item 90) is located in one of the jaw-change bolts (item 8) for the chuck.

9.2 Base jaw position

A marking line between the jaw guidances is milled on the face side of the chuck. This marking line is the positioning aid for the base jaws or monoblock jaw. The outermost base jaw or monoblock position is reached when the front face of the base jaw or the unsplit monoblock jaw matches up with the marking line in the jaw change position (lathe chuck open).

⚠ WARNING

It is vital that this jaw position is adhered to so that all teeth are engaged for the force transmission from the wedge bars to the base jaws or monoblock jaws.

9.3 Replacement or enlargement of jaws

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

- When turning or grinding, the jaw turning ring or turning pin must be clamped by the top jaws and not by the base jaws.
- Keep the base jaws and top jaws screwed in place for recurring work. Tighten the jaw mounting screws to the specified torque.

⚠ WARNING

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

9.4 Center sleeve range

Different center sleeve variants can be inserted into the chuck.

See catalog for order numbers and detailed information.

- You can leave the base jaws (item 2) in the chuck. Move them to the outermost permissible position. To do this, push the piston (item 3) to its front end position.
- Remove the screws (item 43) and use the threaded extraction hole to push off the center sleeve (item 4) away from the chuck body (item 1), and then pull it out completely.

⚠ WARNING

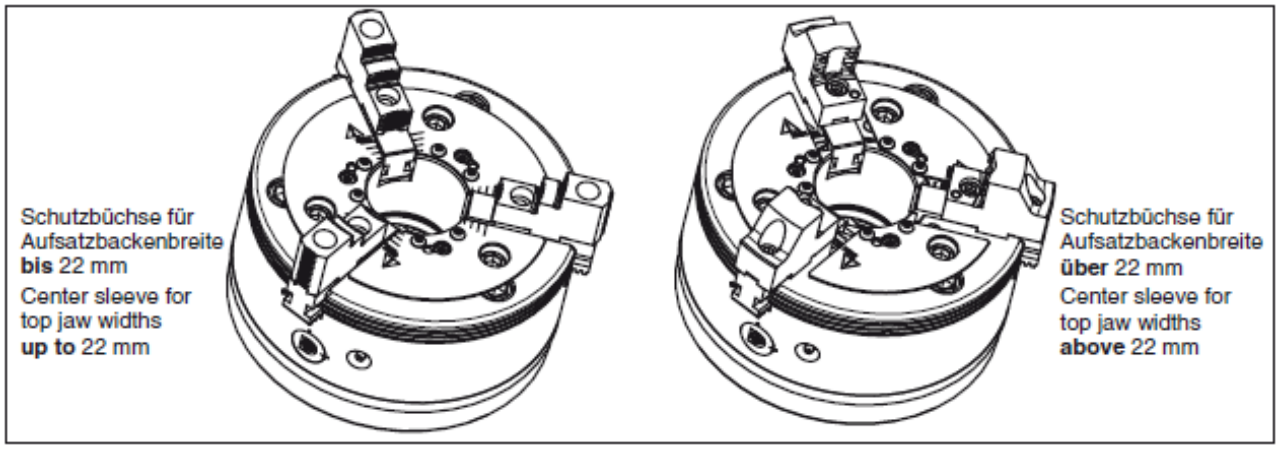
The mechanical system of the chuck is opened when the center sleeve is changed. No chips may penetrate into the mechanical system of the chuck. If no center sleeve is installed in the lathe chuck, then the lathe chuck must not be actuated and the chuck piston must not be moved!
Do not reach into the open mechanical system of the chuck!

If top jaws should be used which are wider than 22 mm, the center sleeve with narrow cover plates must be used.

The plates are nondetachable and fixed to the center sleeve. They must not be unscrewed for safety reasons.

Identification number for complete center sleeve

Center sleeve design	For a top jaw width up to 22 mm	For a top jaw width over 22 mm
Standard (with through-hole)	8703734	88020753
With adjustable stop	8703640	88021182
With ejector	8703637	88021184
With spray nozzle	8703638	88021168
Closed	8703639	88021185



9.5 Disassembling and assembling the chuck

⚠ WARNING

The lathe chuck may only be disassembled once it has been uninstalled (see Mounting the lathe chuck).

- You can leave the base jaws (item 2) in the chuck. Move them to the outermost permissible position. To do this, push the piston (item 3) to its front end position.
- Remove the screws (item 43) and use the threaded extraction hole to push off the center sleeve (item 4) away from the chuck body (item 1), and then pull it out completely.
- Remove the screws (item 42/44) from the mount (item 7).
- Mark the position of the mount (item 7) in relation to the chuck body (item 1).
- Loosen the screws (item 40/41) several thread turns and hammer gently on the screw heads using a rubber mallet. This allows the mount (item 7) to be released from the centering for the chuck body (item 1). Remove the screws and take off the mount.
- Remove the safety bolt (item 14) with compression spring (item 35) and spring bolt (item 13).
- Use a suitable tool to push out and remove the jaw-change bolt (item 8) with the balls (item 37) through the bore hole for the safety bolt. Check the seal (item 33) for damage and wear, and replace it if necessary.
- Pull the piston (item 3) together with the wedge bar set (item 9) out of the chuck body (item 1). The individual wedge bars (item 9) are identified in position in the chuck body (item 1) in accordance with the numbering on the perimeter. The piston has a point marking at the radial front side on the piston diagonal pull. This is assigned to base jaw guide 1 during assembly.
- Push the base jaws (item 2) out of the chuck body (item 1).
- Check the seal (item 31) in the piston (item 3) for the center sleeve (item 4) and the sealing ring (item 32) for the draw tube for damage and wear, and replace it if necessary.

A wedge bar (item 9) consists of nine parts in total. Spring tension pre-loads the pressure bolt (item 12) and the pressure pieces (item

16). Disassemble the wedge bar (item 9) using the appropriate safety measures and using safety goggles.

With its slot for the jaw-change bolt (item 8), the eccentric bolt (item 10) is joined to the wedge bar in extension of the groove. This is the position for operation and assembly of the chuck. For disassembly, the eccentric bolt (item 10) has to be turned clockwise by approx. 15° using a suitable tool.

Push out the eccentric bolt (item 10) from the diagonal pull side of the wedge bar (item 9) approx. 6 mm. The pressure bolt (item 12) then becomes visible. The displacement force is reduced through slight pressure on the serration.

Secure the pressure bolt (item 12) against flying off and then completely remove the eccentric bolt (item 10) out of the wedge bar (item 9).

Take the angle with plunger pin (item 15) and pressure piece (item 16) with compression spring (item 34) off the wedge bar.

The pin (item 11) is securely glued into the eccentric bolt (item 10).

Clean the individual components and check all parts for damage and wear.

⚠ WARNING

Only use original SCHUNK spare parts when replacing damaged parts!

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

10 Troubleshooting

10.1 Segmented mandrel ROTA THW vario D

Problem	Possible causes	Remedy
Eccentric dimensional deviation on the workpiece	Concentricity error of the segmented mandrel	Check concentricity at the outer taper of the mandrel and correct if necessary
Not enough clamping force	Oversized workpiece Insufficient hydraulic pressure at clamping cylinder Defective clamping cylinder or blocked clamping tube	Replace with suitable segmented clamping sleeve Check the machine-side hydraulic unit Contact the machine manufacturer
Dimensional deviations on the workpiece	Dirt between segmented clamping sleeve and mandrel taper Dirt between clamping bolt and segmented clamping sleeve	Remove and clean clamping bolt and segmented clamping sleeve
Error in shape of the workpiece	Shaped starting material has been elastically deformed during clamping. After machining, the workpiece relaxes and returns to its original shape	Use of starting material with a reduced shape error
Impressions on the clamping face	Pointed or linear workpiece clamping	Dimensional difference between clamping diameter and workpiece bore too large. Swap in suitable segmented clamping sleeve
Axial run-out error on workpiece	Dirt on the mounting surfaces	Clean the dirty surfaces
Workpiece is not clamped	Clamping bolt is not turned on block Dirt between mandrel body and ejector ring The rotary drivers of the ejector ring do not engage in the grooves	Rotate clamping bolt on block Clean mandrel body and ejector ring Reposition segmented clamping sleeve

10.2 Collet chuck ROTA THW vario F

Problem	Possible cause	Remedy
Chuck head cannot be changed	Insufficient changeover gap between clamping head coupling and workpiece stop	Workpiece-specific stop must be reworked
Eccentric dimensional deviation on the workpiece	Concentricity error of the SPANNTOP chuck	Check concentricity of the clamping taper and correct if necessary
Dimensional deviations on the workpiece	Dirty coupling area Dirty clamping taper	Remove clamping head (1) and clean coupling area Remove clamping head (1) and clean clamping taper
Insufficient release stroke or chuck does not open	Dirt between the pull mechanism (4) and the chuck body (2) Dimensional deviations of the draw tube thread adapter (10) or the pull mechanism (4)	Remove the clamping head, retract the clamping tube and clean the gap in the coupling area Check the design of the draw tube thread adapter (10) or the pull mechanism (4) and correct if necessary
Error in shape of the workpiece	Starting material with a shape error has been elastically deformed during clamping. After machining, the workpiece relaxes and returns to its original shape	Use of starting material with a reduced shape error; a few pointed teeth in the clamping face can also be effective
Impressions on clamping face	Pointed or linear workpiece clamping Wrong type of clamping head	Dimensional difference too large between clamping bore and workpiece diameter Change from grooved to smooth clamping head
Not enough clamping force	Undersized workpiece Insufficient hydraulic pressure at clamping cylinder Defective clamping cylinder or blocked clamping tube	Replace with suitable clamping head (1) Check the machine-side hydraulic unit Contact the machine manufacturer

11 Maintenance

11.1 General information

To comply with the concentricity and axial run-out tolerances, the corresponding back stop and guide diameters must be clean. Clean these surfaces with an appropriate cleaner.

NOTICE

Dirt can lead to a considerable loss of clamping force of the clamping device.

- The maintenance and cleaning intervals of the clamping device must be observed without fail.
- Within the scope of these maintenance intervals, a regular check of the maintenance condition of the clamping device by means of static clamping force measuring devices is absolutely necessary!

⚠ WARNING

Risk of injury due to stored energy!
The clamping device can be designed with springs. These springs are under permanent tension! The release of the stored energy can lead to injuries.

- The screws secured with sealing wax must not be opened.
- When loosening the corresponding screws, they must be engaged alternately to reduce the tension to a minimum!
- A particularly cautious approach is required!
- Always wear personal protective equipment.

11.2 Cleaning

	***NOTICE*** **Material damage due to cleaning with compressed air!** Cleaning the adaptation clamping device with compressed air can cause metal chips to settle in threads and grooves. This can damage or even destroy the clamping device. • Never clean adaptation clamping devices with compressed air.

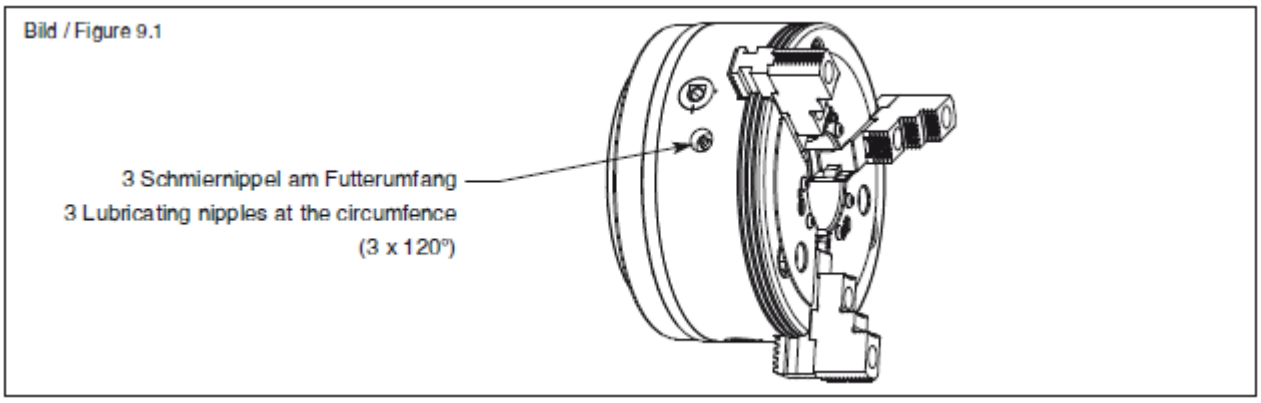
Required supplies:

- ester-free, non-polar detergent
- soft, lint-free cloth

Clean all components with detergent and cloth to remove all oil and grease residues.

11.3 Lubrication

	**⚠ WARNING** **To maintain the safe function of the lathe chuck, it has to be regularly lubricated.**



- Move the lathe chuck into the open position. Lubricate the chuck at the three lubrication nipples (Fig. 9.1 Arrow) using a high-pressure grease gun with six strokes of SCHUNK LINOMAX special grease at each nipple.
- For optimum grease distribution, the clamping piston must travel the entire clamping stroke several times after lubrication.
- Check clamping force, repeat procedure, if necessary.

NOTICE

During this procedure, all three segments should be lubricated evenly in order to avoid large imbalances.

⚠ WARNING

Slipping when lubricating with a piston grease gun can cause serious cuts!

11.4 Maintenance plan

The previous sections describe the maintenance work required for optimum and trouble-free operation.

If increased wear and tear can be detected during regular checks, shorten the required maintenance intervals according to the actual signs of wear and tear.

Contact SCHUNK if you have any questions about maintenance work and intervals.

Cleaning interval	Maintenance work
daily	Visual inspection and complete cleaning in case of heavy dirt (☞ 11.2, Page 52)
weekly	Cleaning adaptation clamping device (☞ 11.2, Page 52)

Lubrication interval	Demands
every 20 hours	normal / use of coolant (☞ 11.3, Page 52)
every 8 hours	high / use of coolant (☞ 11.3, Page 52)
1000 - 1500 hours	Full cleaning with disassembly of chuck depending on type of contamination and quantity

NOTE
Pre-filtering with double switch filter (machine width 100 µm, PI 3754) is necessary for proper functioning of the coolant supply. The double switch filter is mounted on the coolant cleaning system.

When using the clamping device in 3-shift operation, it should be maintained as follows:

- **After every 22 operating hours,** the clamping element must be removed and the taper, coupling and clamping element (clamping head, segmented clamping sleeve) cleaned and lubricated.
  Special attention must be paid to the coupling area!
- A general visual inspection, especially of the clamping and stop surfaces, must also be carried out to detect damage to the clamping device and the rubber of the clamping element at an early stage.
- The seals in the segmented clamping sleeve must be checked for damage during the maintenance and cleaning intervals and replaced if necessary.
  Only use original SCHUNK spare parts.
- Depending on the amount of dirt, a complete cleaning of all moving parts should be carried out.
- Approx. **2 times a year** the clamping device must be cleaned of coolant and the surface must be protected against rust with a preserving agent.
- Clean the coupling area of dirt **daily or more if necessary** .

11.5 Technical condition

With the smallest possible actuating pressure (hydraulic cylinder), the base jaws should move evenly. This method only provides a limited indication and is not a substitute for measuring the clamping force.

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

NOTE
Only use original SCHUNK spare parts when replacing damaged parts.

11.6 Changing the stepped jaws

When changing the base or stepped jaws, the serration has to be cleaned and greased with SCHUNK LINOMAX special grease.

12 Spare parts

When ordering spare parts, it imperative to state the type, size, and, above all, the manufacturing no. of the chuck.

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

12.1 ROTA THW vario 215-62

Item	Designation	Quantity
1	Chuck body	1
2	Base jaws	3
3	Piston	1
7	Mount	1
8	Jaw-change bolt	3
9	Complete wedge bar	3
10	Eccentric bolt	3
11	Pin	3
12	Pressure bolt	3
13	Spring bolt	3
14	Safety bolt	3
15	Plunger pin	3
16	Pressure piece	6
31	Rod seal kit	1
32	O-ring DIN 3771 NBR 70 76.00 x 2.00 mm	1
33	O-ring DIN 3771 NBR 70 20.00 x 2.00 mm	3
34	Compression spring for pressure piece	3
35	Compression spring for safety bolt	3
36	Compression spring for pressure bolt	3
37	Steel ball for jaw-change bolt	3
39	Conical lubrication nipple	3
40	Screws, DIN EN ISO 4762-10.9	3
41	Screws, DIN EN ISO 4762-10.9	3
42	Screws, DIN EN ISO 4762-10.9	3
43	Screws, DIN EN ISO 4762-10.9	3
44	Screws, DIN EN ISO 4762-10.9	6

Item	Designation	Quantity
45	Pan-head screw	6
48	Screws, DIN EN ISO 4762-10.9	6
82	Vario protective jaw	1
83	Adapter for bayonet	1
84	Standard center sleeve	1
88	Flange	1
89	Cover	1
90	Jaw change key	1

12.1.1 Versions and spare parts, segmented mandrel ROTA THW vario D

SCHUNK TYPE	Chuck mount	ID
Vario D 0	with idle stroke without idle stroke	800 701 800 700
Vario D 1	with idle stroke without idle stroke	800 703 800 702
Vario D 2	with idle stroke without idle stroke	800 705 800 704
Vario D 3	with idle stroke without idle stroke	800 707 800 706

Item	Designation	Quantity
1	Mandrel body	1
2	Clamping bolt	1
3	Ejector ring	1
4	Ejector pins	3
5	Actuating cone	1
6	Idle stroke bolt	1
7	Bayonet piece	1
9	Fixation cone	1
10	Mounting screws	1
11	Radial fixing pin	1
12	Mounting screws	6
13	Seal	1
14	Seal	1
15	Bolt	3
16	Cylindrical pin	1

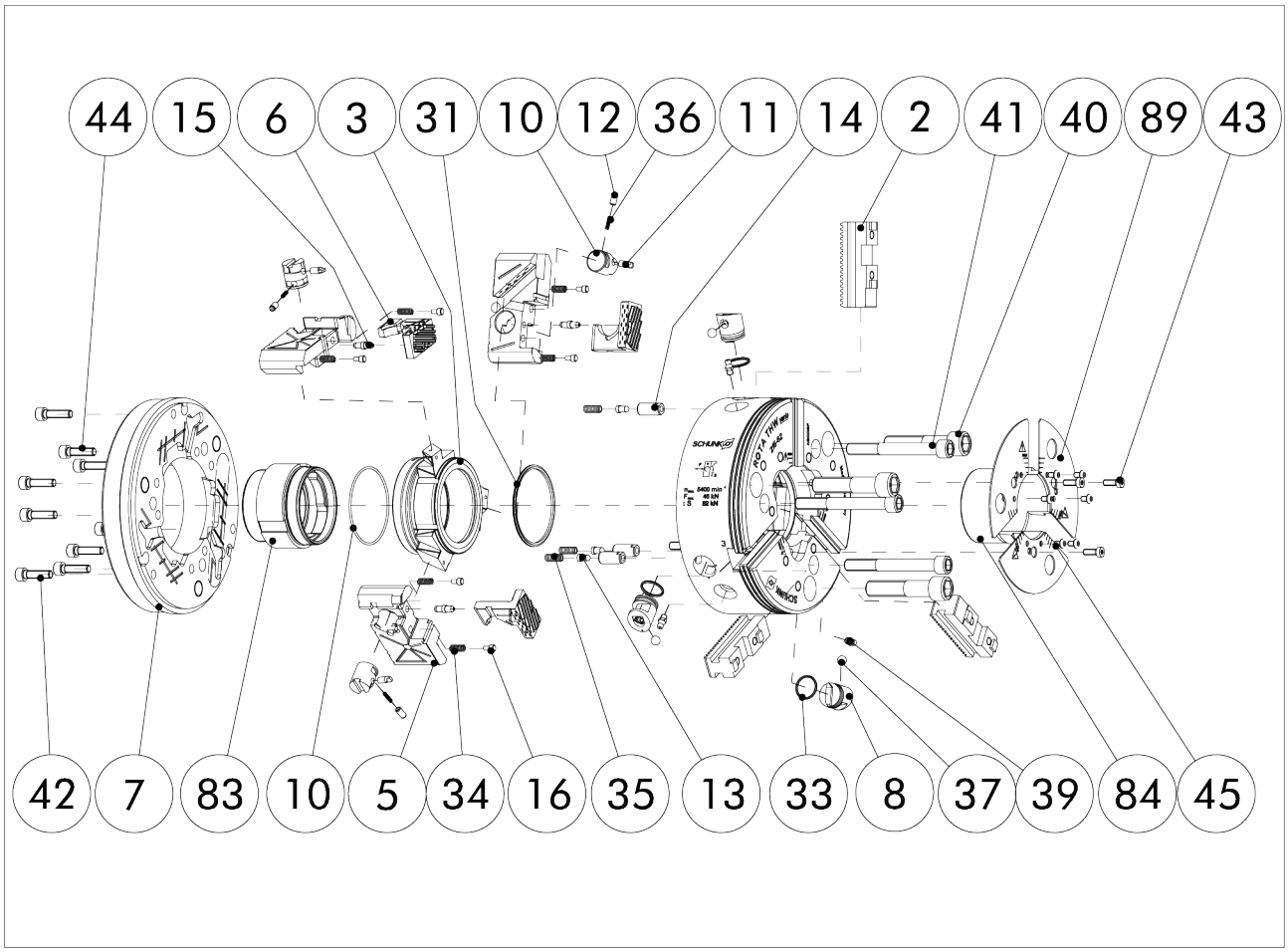
12.1.2 Design and spare parts, collet chucks ROTA THW vario F

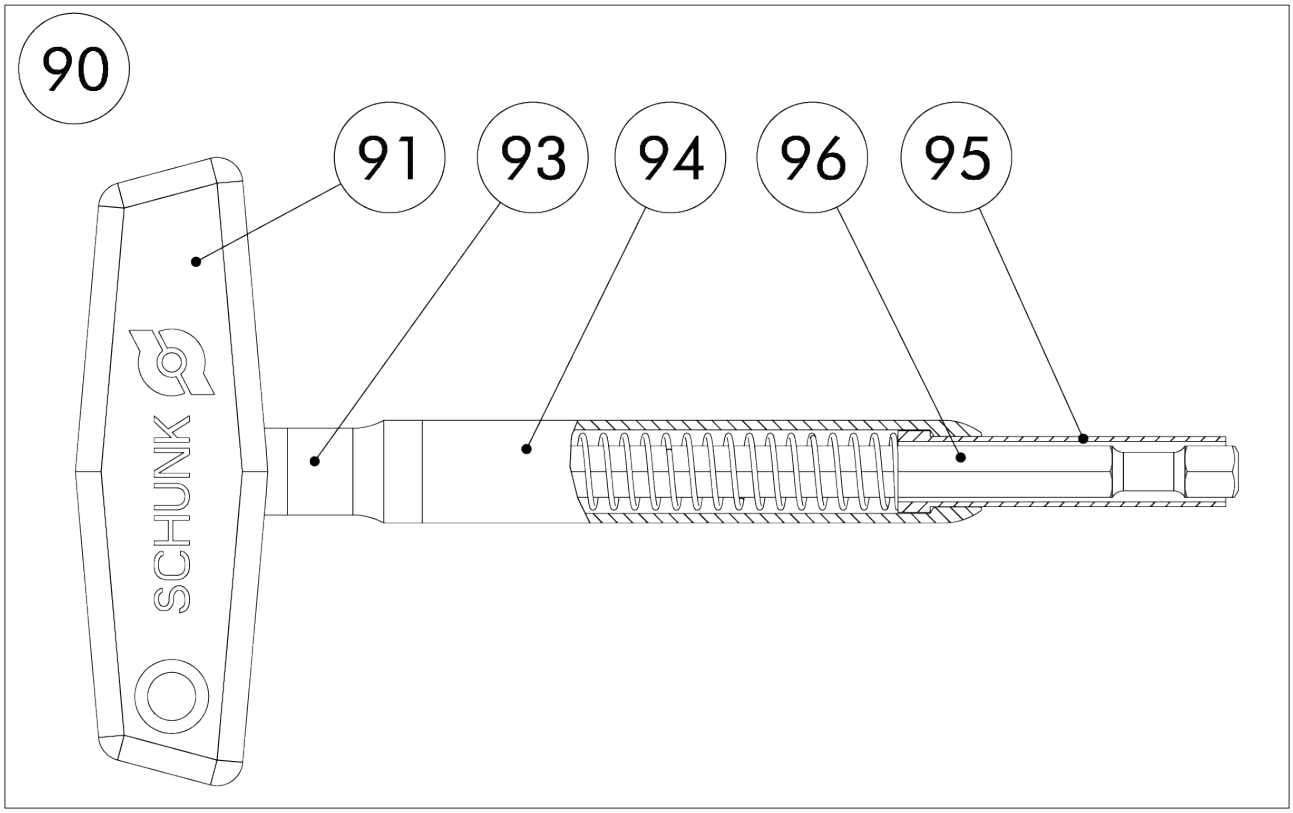
SCHUNK type	Chuck mount	ID
Vario F 65	with idle stroke without idle stroke	800 711 800 710
Vario F 65-51	with idle stroke	800 716
Vario F 80	with idle stroke without idle stroke	800 713 800 712
Vario F 100	with idle stroke without idle stroke	800 715 800 714

Item	Designation	Quantity
1	Chuck body	1
2	Mount	1
3	Pull mechanism	1
5	Base stop	1
6	Idle stroke bolt	1
7	Bayonet piece	1
9	Fixation cone	1
10	Mounting screws	3
11	Mounting screws	6
12	Mounting screws	6
13	Seal	1
14	Seal	1

13 Assembly drawing

13.1 ROTA THW vario 215-62

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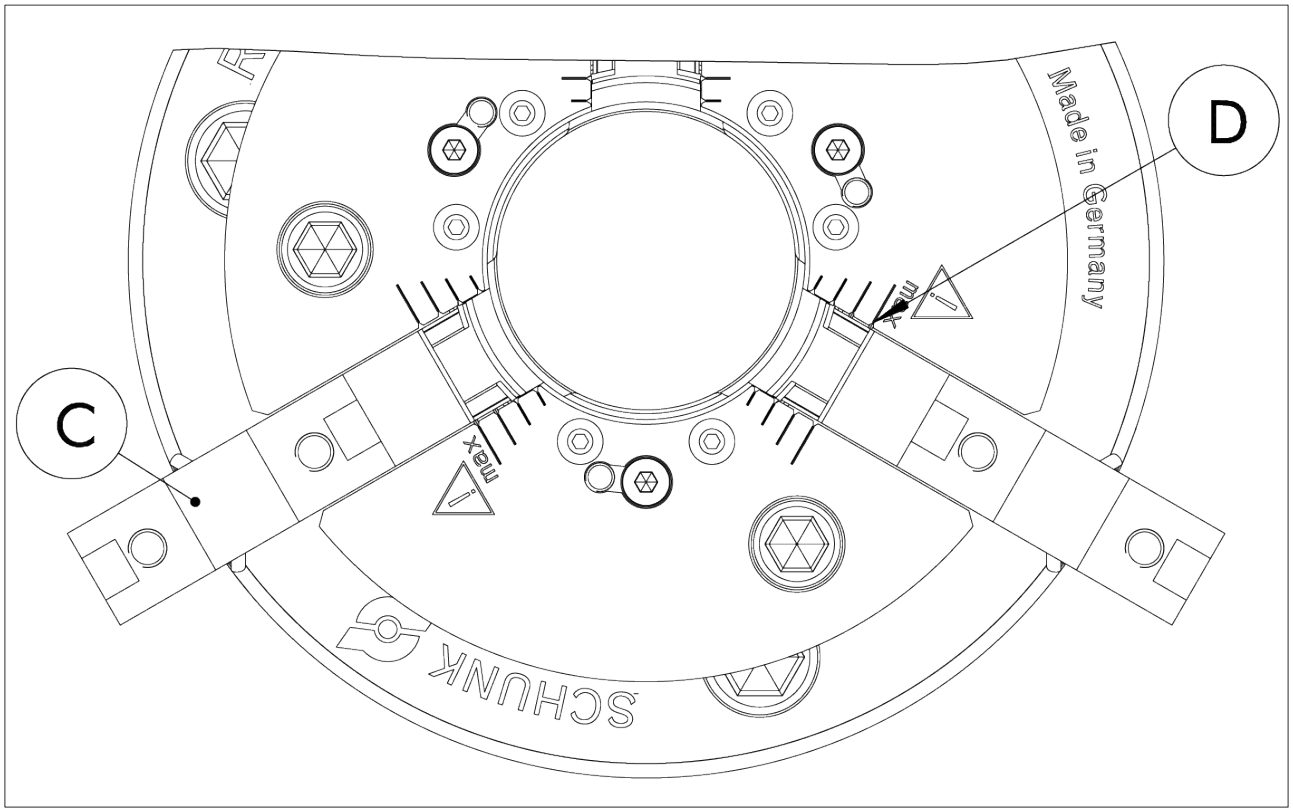
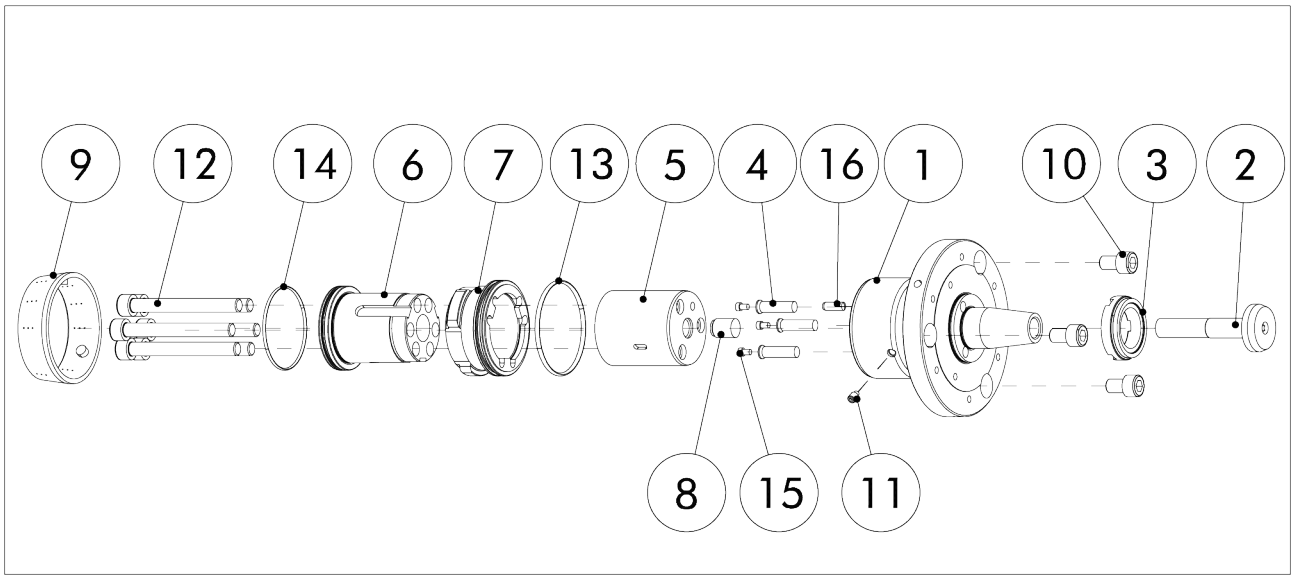
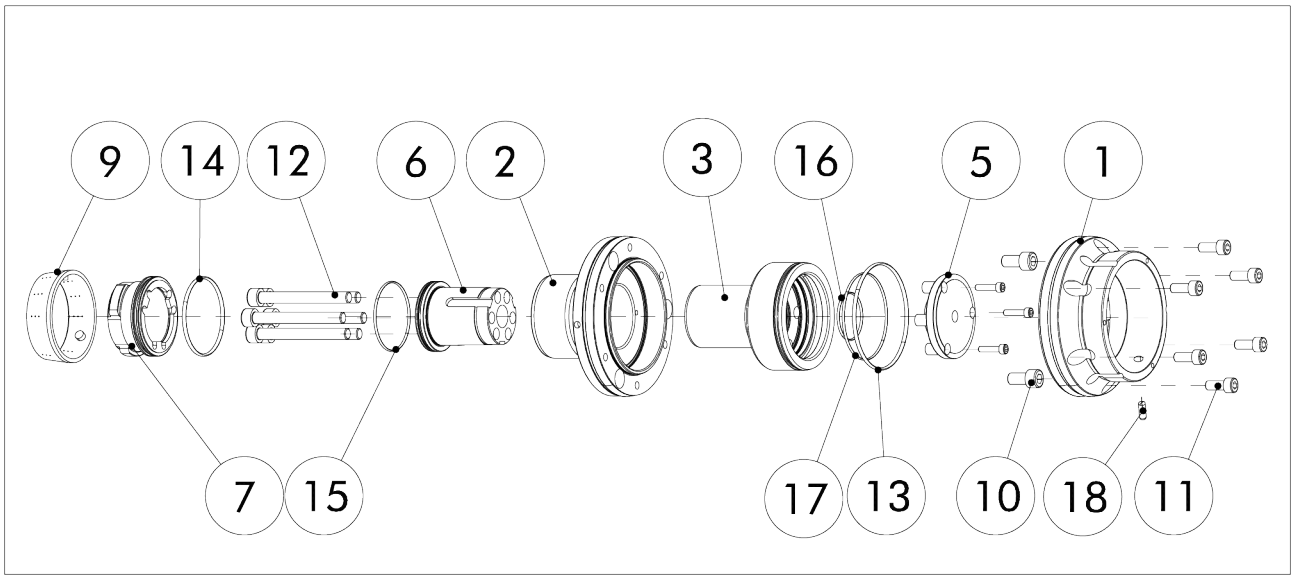
SCHUNK


D
C
Made in Germany
max
max
SCHUNK

13.1.1 Segmented mandrel ROTA THW vario D



13.1.2 Collet chuck ROTA THW vario F



14 Accessories

(with separate order, see catalog)

- Proximity switch

14.1 Segmented clamping sleeve ROTA THW vario D

14.1.1 SAD segmented clamping sleeve

The SAD segmented clamping sleeves are made of hardened steel and have a Rockwell hardness of approximately 55 HRC. These segmented clamping sleeves can, if necessary, be turned to the desired clamping diameter. The segmented clamping sleeve is turned to the desired dimension by putting on the turning ring (included in the scope of delivery) and clamping it. The turning ring must be placed straight onto the segmented clamping sleeve.

The segmented clamping sleeve can now be turned to the required dimension.

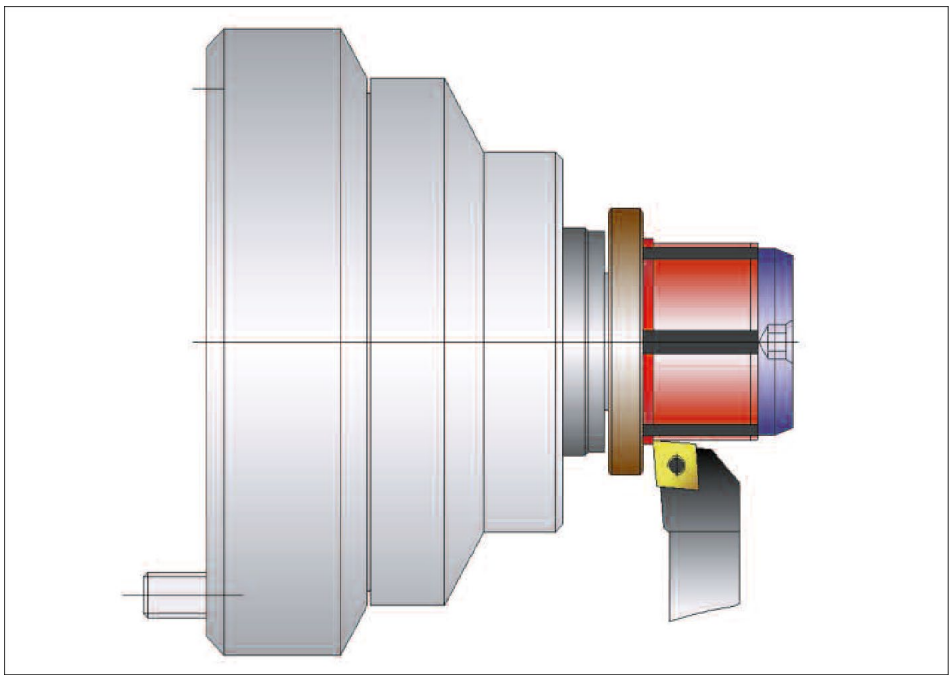
NOTE
Be careful when turning the
SAD segmented clamping sleeve!

The diameter of the SAD sleeve may be turned to the rubber at most, but the rubber itself must not be machined.

- For safety reasons, the SAD segmented clamping sleeve may only be turned on a machine with closed protective cover.
- SAD segmented clamping sleeves may only be turned by skilled workers with the appropriate training.

ABR turning ring

The turning ring is used to simulate a clamping procedure, as it is only possible to turn the segmented clamping sleeve in this state.

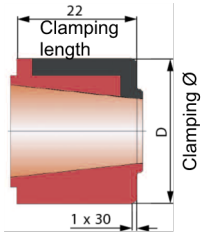
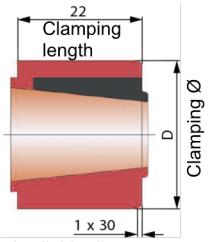
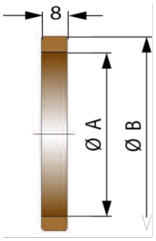
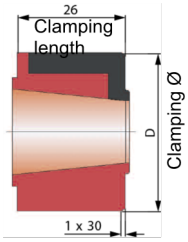
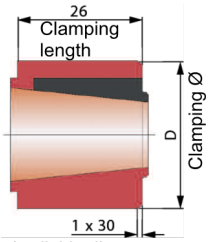
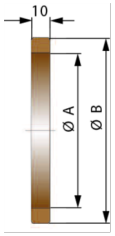
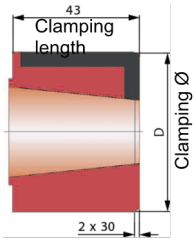
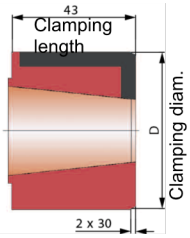
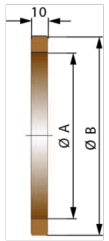
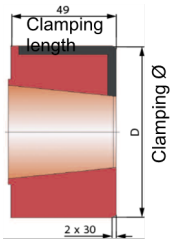
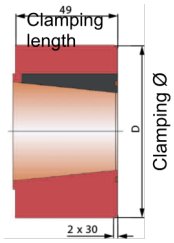
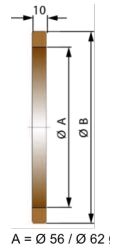


Actuation moments when turning SAD sleeves

Recommended tensile forces for the use of turning rings with SAD sleeves.

ROTA-S vario	Max. actuation moment	
	200-52	200-62
M0	15 Nm	15 Nm
M1	15 Nm	15 Nm
M2	30 Nm	30 Nm
M3	—	45 Nm

The data on max. speed of rotation refer exclusively to the use of segmented clamping sleeves in standard design.

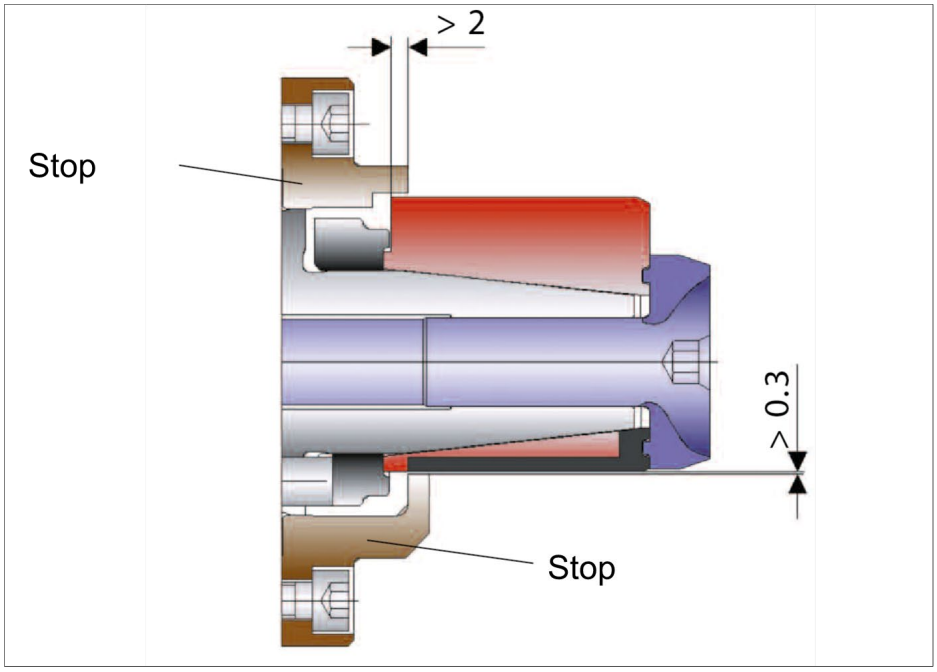
Size	Segmented clamping sleeve	SAD segmented clamping sleeve	Turning ring for SAD
Size 0 Clamping area: Ø 20 mm – Ø 28 mm max. speed of rotation: 4800 RPM max. axial tensile force: 10 kN Taper angle: 6° 3x slotted	SB 100RØD 	SAD 100RØD  Available diameters Ø 24 / Ø 28	ABR Ø  A = Ø 24 / Ø 28
Size 1 Clamping area: Ø 26 mm – Ø 38 mm max. speed of rotation: 4800 RPM max. axial tensile force: 10 kN Taper angle: 6° 3x slotted	SB 110RØD 	SAD 110RØD  Available diameters Ø 32 / Ø 38	ABR Ø  A = Ø 32 / Ø 38
Size 2 Clamping area: Ø 36 mm – Ø 54 mm max. speed of rotation: 4800 RPM max. axial tensile force: 20 kN Taper angle: 6° 6x slotted	SB 120RØD 	SAD 120RØD  Available diameters Ø 42 / Ø 48 / Ø 54	ABR Ø  A = Ø 42 / Ø 48 / Ø 54
Size 3 Clamping area: Ø 50 mm – Ø 80 mm max. speed of rotation: 4200 RPM max. axial tensile force: 25 kN Taper angle: 6° 6x slotted	SB 130RØD 	SAD 130RØD  Available diameters Ø 56 / Ø 62 / Ø 70 / Ø 80	ABR Ø  A = Ø 56 / Ø 62

14.1.2 Back stops

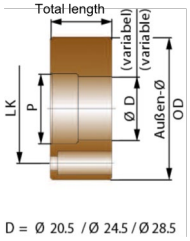
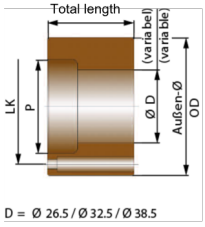
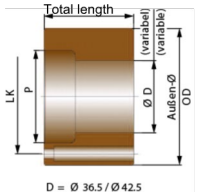
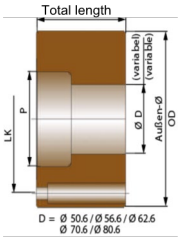
Standard stops

The stops are available as accessories and are not part of the segmented mandrel.

The stops are designed for a quick stop solution. They are made of through hardened steel, have a Rockwell hardness of approx. 55 HRC and can be brought to the desired stop contour if required. It must be ensured that there is an overlap of at least 2 mm between the stop and the segmented clamping sleeve. It must also be ensured that the inner Ø of the stop is always at least 0.6 mm larger in Ø than the largest Ø of the segmented clamping sleeve.



Standard stops To change the stops, see the chapter "Changing the stops" Link Koppelschnittstelle

Connection data Size 0 Inside pass Ø: 32 H7 Total length: 30 mm Outside Ø: 65 mm Pitch circle Ø: 50 mm	
Connection data Size 1 Inside pass Ø: 41 H7 Total length: 37 mm Outside Ø: 69 mm Pitch circle Ø: 55 mm	
Connection data Size 2 Inside pass Ø: 50 H7 Total length: 55 mm Outside Ø: 93 mm Pitch circle Ø: 78 mm	
Connection data Size 3 Inside pass Ø: 65 H7 Total length: 63 mm Outside Ø: 96 mm Pitch circle Ø: 80 mm	

14.1.3 Mandrex

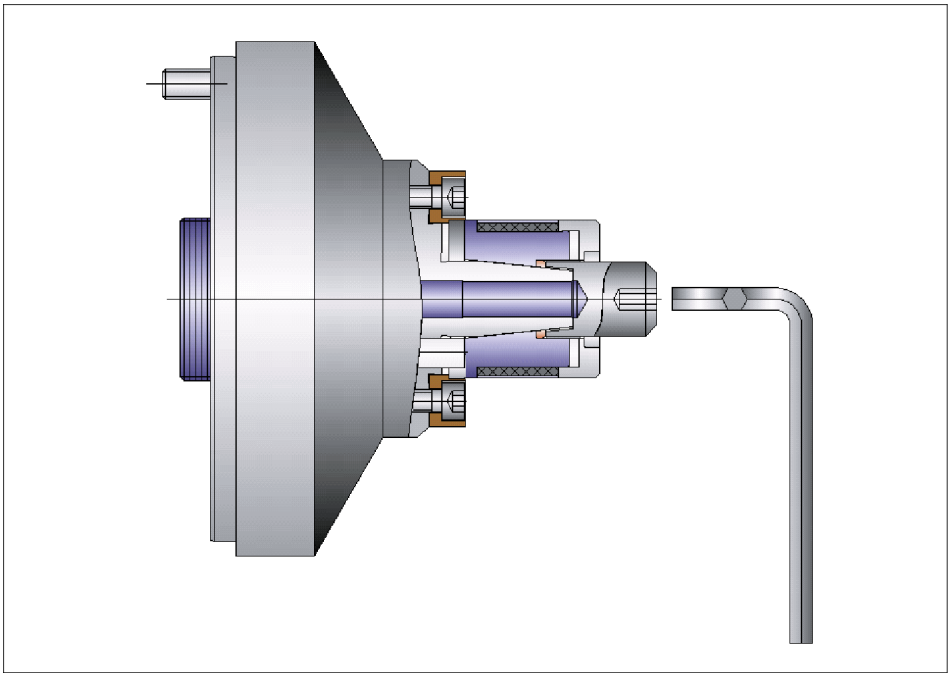
The MANDREX cartridge is for compensating clamping of non-round workpieces.

Prerequisite for the use of MANDREX:

- The bore to be clamped must not have a groove or recess.
- The bore tolerance should not exceed 0.3 mm.
- The ideal situation is for the workpiece bore to fully cover the MANDREX clamping face. If the workpiece bore is shorter (minimum 1/3 of the clamping face) please inquire.

Disassembly of the MANDREX cartridge

- Disassemble the clamping bolt as previously described.
- Screw the supplied extractor into the MANDREX cartridge using an Allen key until the cartridge can be removed from the mandrel body.
- Turn the extractor back out of the MANDREX cartridge.



14.2 Collet chuck ROTA THW vario F

14.2.1 HSW clamping heads for self-turning

Vario F clamping heads of type HSW are used for superfinishing. Only the taper of these clamping heads is hardened. However, the heads are soft at the front and in the bore and can be turned individually. Exchange the HSW clamping heads for turning in the lathe chuck and reduce the pressure of the hydraulic clamping cylinder of the machine to a minimum.

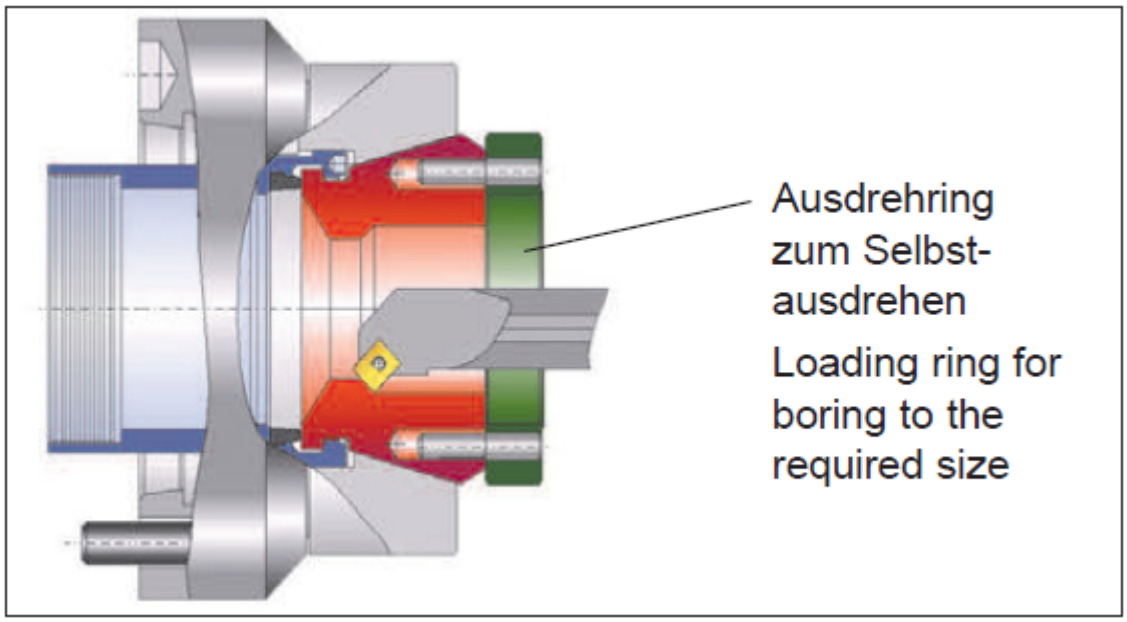
The AR jaw turning ring inserted in the changing bores of the Vario F clamping head limits the clamping head to the nominal dimension. After actuating the clamping cylinder or "sensitive" manual clamping, the clamping bore can be turned to the desired dimension.

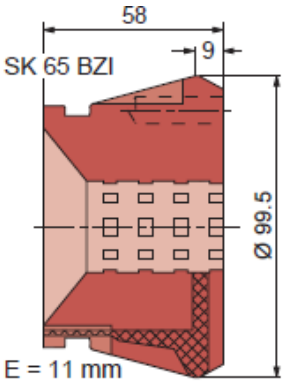
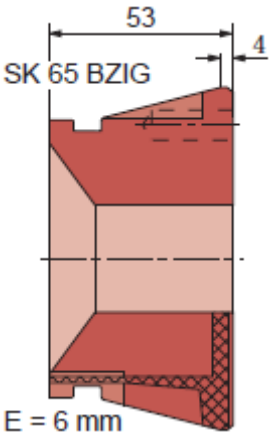
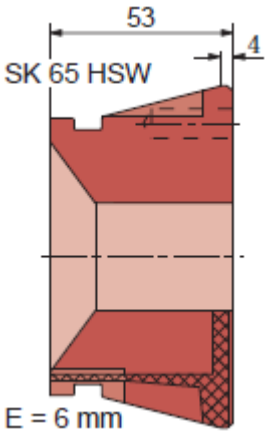
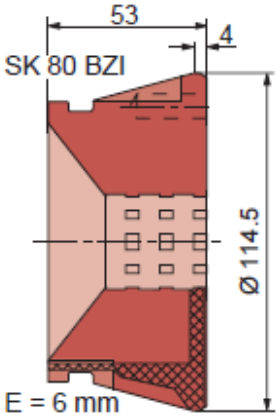
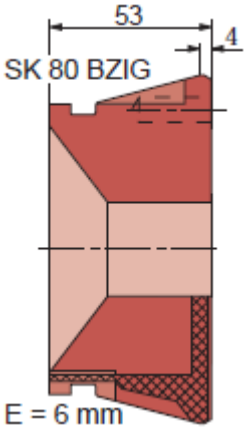
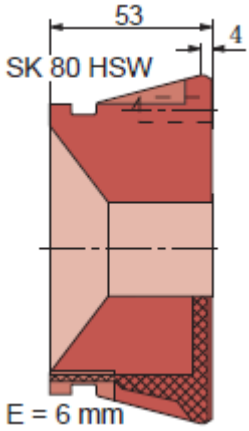
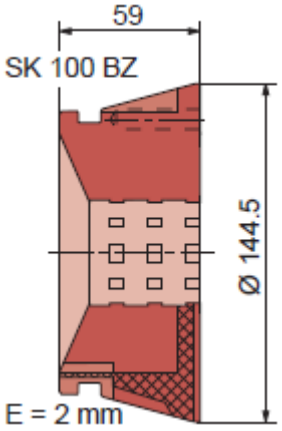
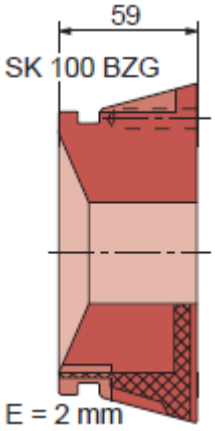
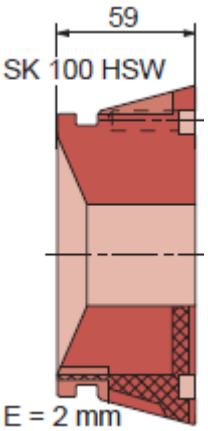
In order to turn head bores, a bolt is clamped into the existing cylindrical bore. The actual dimension of the bolt must not be larger, but may be up to 0.3 mm smaller, than the clamping bore.

Caution when turning!

If the rubber is degraded by large bores, this weakens the cohesion of the segments. Please note the round supplementary sheet in the packaging of the HSW clamping heads. It shows the permissible turning dimensions.

- The minimum depth of the head bore should not be less than the dimension of the front end, otherwise the clamping head could tilt.
- For safety reasons, the HSW head may only be turned on a machine with closed protective cover.
- HSW heads may only be turned by skilled workers with the appropriate training.



	With fluting	With smooth bore	For self-turning
Size 65 Taper angle=15° max. speed of rotation=6000 RPM Max. tensile force=45,000 N Max. radial force=105,000 N 3x slotted			
Size 60 Taper angle=15° max. speed of rotation=5500 RPM max. tensile force=50,000 N max. redial force=115,000 N 3x slotted			
Size 100 Taper angle=15° max. speed of rotation=5000 RPM max. tensile force=65,000 N max. radial force=150,000 N 6x slotted			

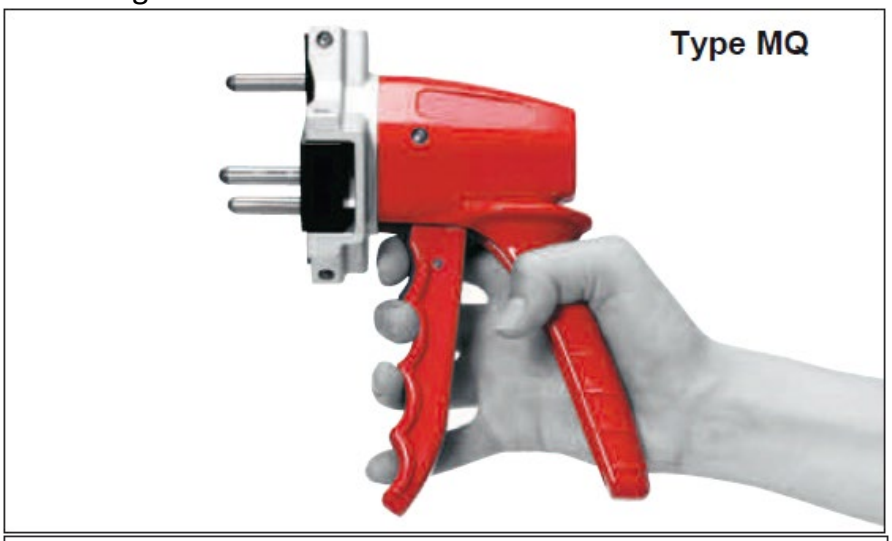
E = Minimum workpiece clamping length

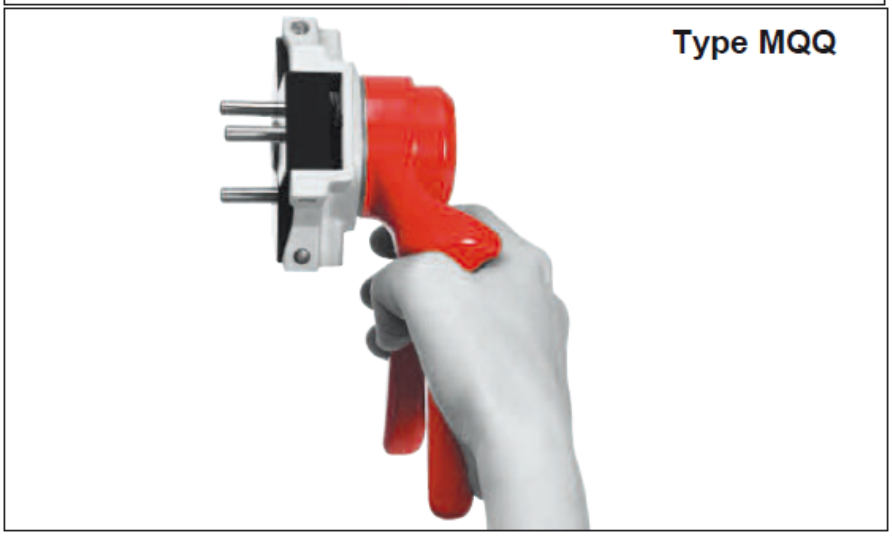
The data on max. speed of rotation refer exclusively to the use of clamping heads in standard design.

14.2.2 Changing device

Due to the simple handling of the changing devices you can quickly convert your clamping device to a new clamping diameter. You have 3 different options for this:

1 **Manual changing**
The manual changing device EasyGrip **type MQ** is the simplest conversion method.
The manual changing device EasyGrip **type MQQ** for narrow machining areas.

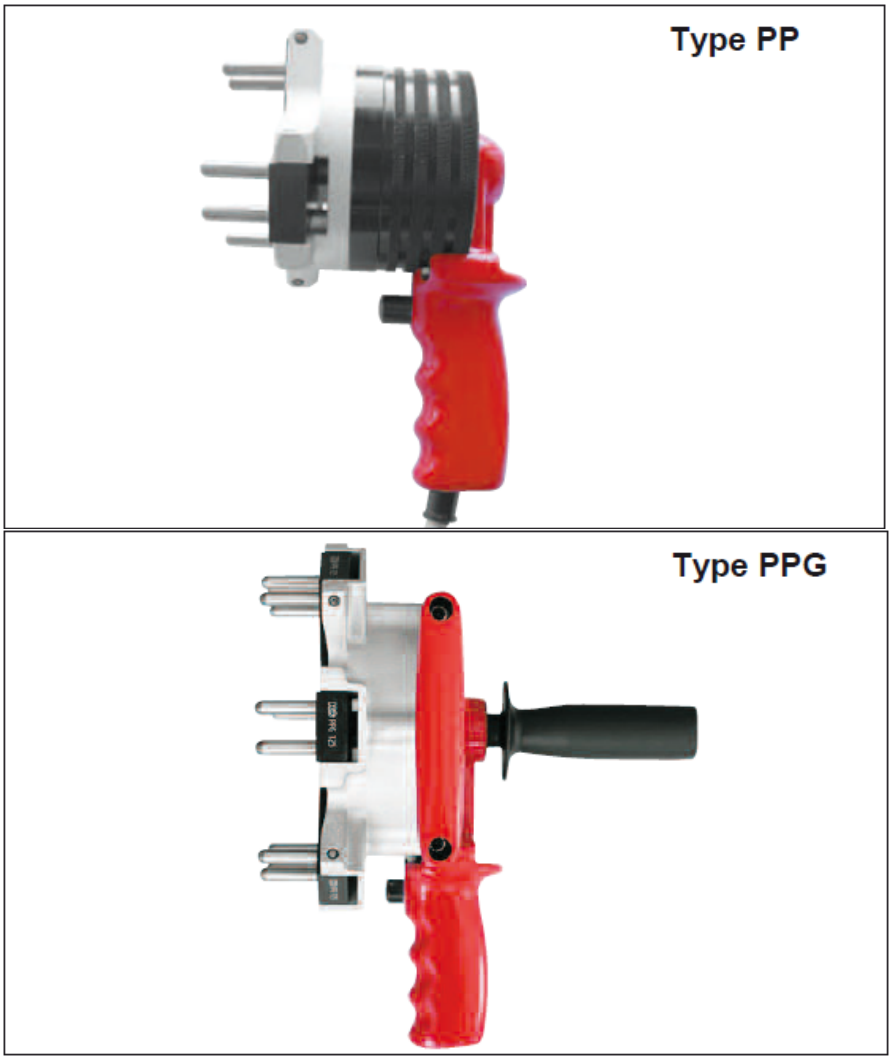




2 **Pneumatic changing**

The pneumatic changing device **type PP** is the ultimate choice in terms of handling, with a comfortable handle and integrated valve head.

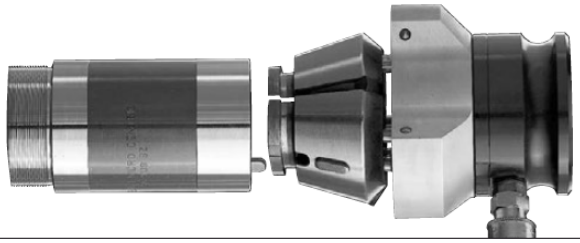
The pneumatic changing device **type PPG** [size 100-160] has 2 additional handles.



3 **Pneumatic-hydraulic changing**
For the multi-spindle unit, the space-saving changing device **type WP** with pneumatic-hydraulic pressure converter is usually used.

⚠ WARNING

When operating the changing device, do not reach into the moving parts due to the danger of crushing.



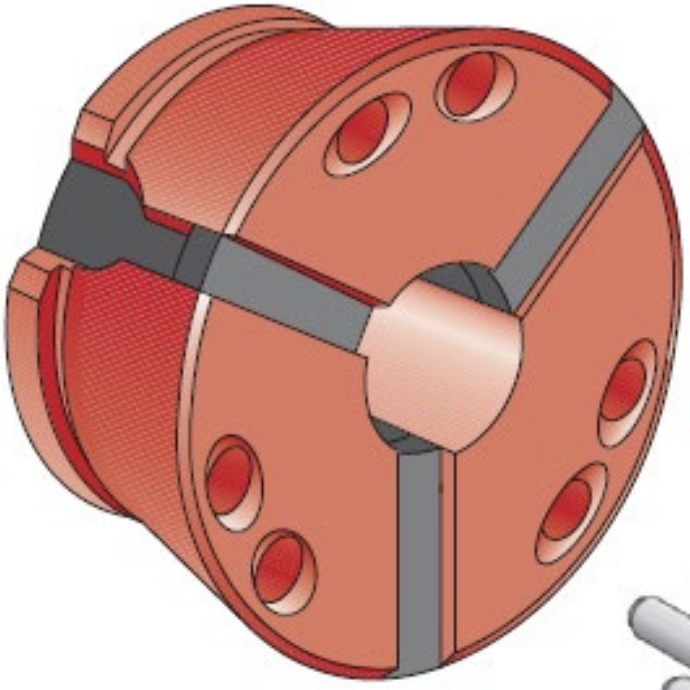
14.2.3 Jaw turning rings

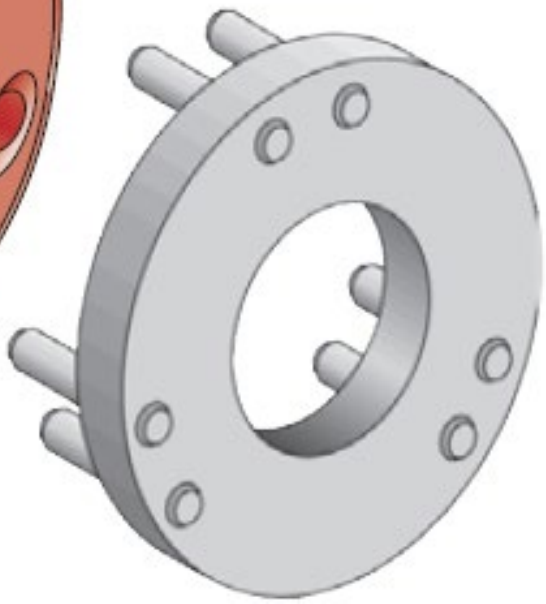
Clamping head HSW 65 BZI
Standard bores:
Ø 8 mm, 20 mm, 40 mm
- for self-turning
- front side and soft bore
The clamping length should be at least 6 mm.

Clamping head HSW 80 BZI
Standard bores:
Ø 20 mm, 30 mm, 40 mm, 60 mm
- for self-turning
- front side and soft bore
The clamping length should be at least 6 mm.

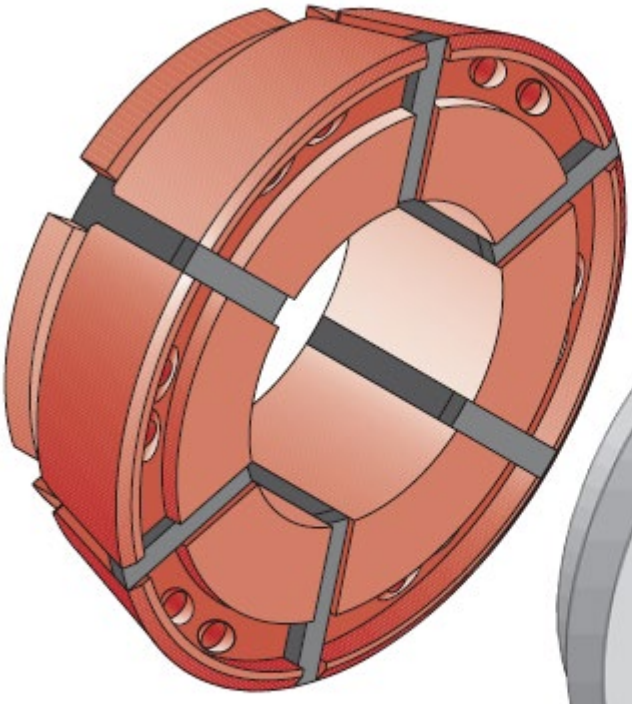
Clamping head HSW 100 BZ
Standard bores:
Ø 30 mm, 45 mm, 65 mm, 90 mm
- for self-turning
- front side and soft bore
The clamping length should be at least 2 mm.

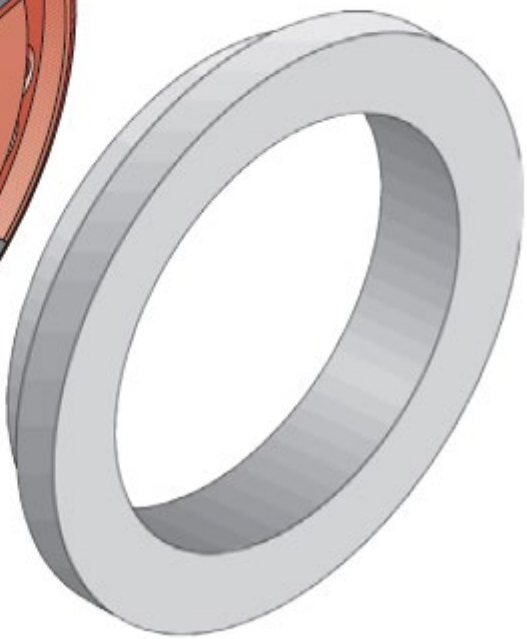
Ausdrehringe
Turning rings
AR 65, AR 80





Ausdrehringe
Turning rings
AR 100





15 Declaration of Incorporation

in accordance with Directive 2006/42/EC, 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-88512 Mengen

We hereby declare that on the date of the declaration the following partly completed machinery complied with all
basic safety and health regulations found in 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:	Jaw quick-change chuck with arbor or collet chuck adapter
Type designation	ROTA THW plus, ROTA THW, ROTA THW-B, ROTA THW vario, ROTA NCW, ROTA NCWF
ID no.	0800000, 0800699, 0800100, 0800199, 0800400, 0800500, 0800600, 0800699, 0850000, 0850099

The partly completed machinery may not be put into operation until it has been confirmed that the machine into which the partly completed machinery is to be installed complies with the provisions of the Machinery Directive (2006/42/EC).

Applied harmonized standards, especially:

EN 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 work holding chucks

Other related technical standards and specifications:

DIN ISO 702-1:2010-04	Machine tools - Connecting dimensions of spindle noses and work holding chucks - Part 1: front short-taper mount with screws
DIN ISO 702-4:2010-04	Machine tools - Connecting dimensions of spindle noses and work holding chucks - Part 4: 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 in electronic form to national authorities.

The relevant technical documentation according to Annex VII, Part B, belonging to the incomplete machine, has been created.

Person authorized to compile the technical documentation:
Alexander Koch Address: refer to manufacturer's address

Signature: see original declaration

Mengen, January 2012 p.p. Alexander Koch; Head of Engineering Design