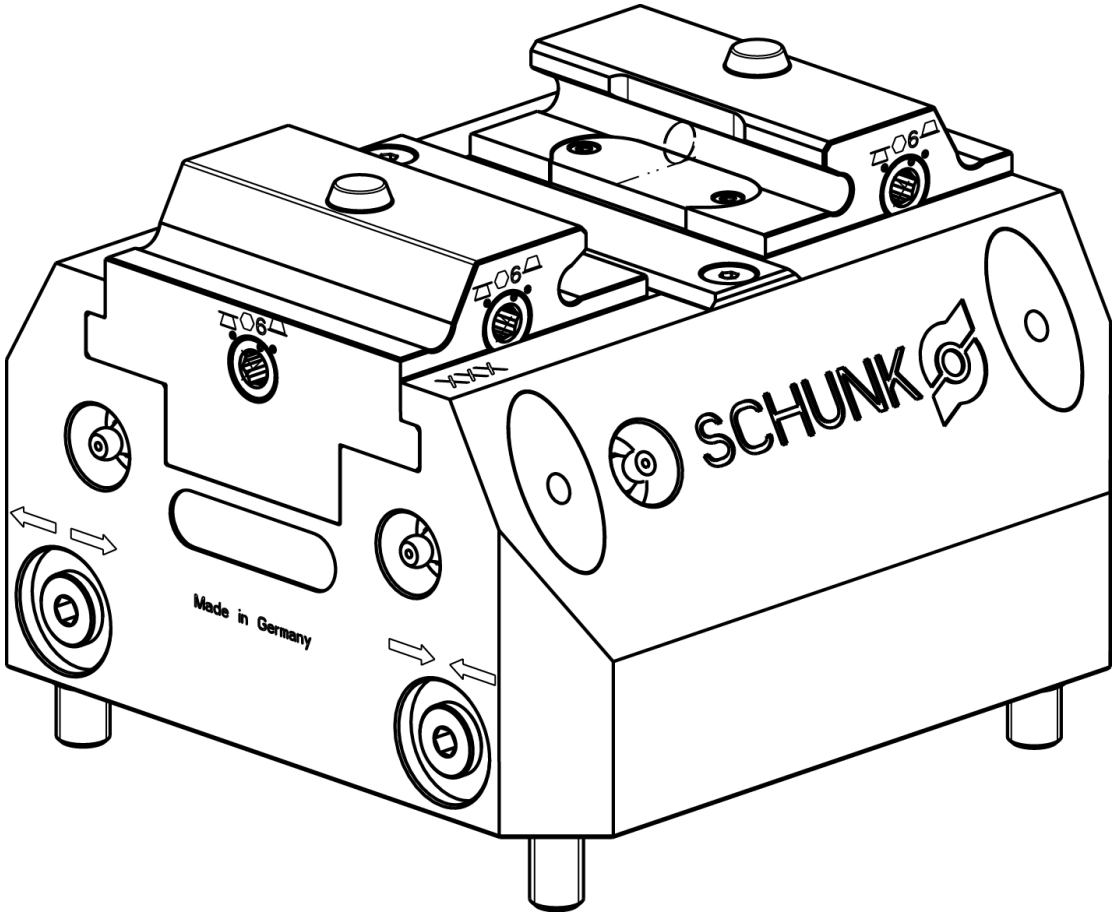
TANDEM Clamping Force Block
KSH plus-BWM KSH-LH plus-BWM
Assembly and Operating Manual



Superior Clamping and Gripping

SCHUNK®

Imprint

Technical changes:

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

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Dear Customer,

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

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

Best regards,

Your SCHUNK team

Customer Management

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

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1 General

This operating manual is an integral component of the product and contains important information on safe and proper assembly, commissioning, operation, care, maintenance and disposal. This manual must be stored in the immediate vicinity of the product where it is accessible to all users at all times.

Before using the product, read and comply with this manual, especially the chapter “Basic safety notes”.▶ 2 [🗋 7]

If the product is passed on to a third party, these instructions must also be passed on.

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

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

1.1 Warnings

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

⚠ DANGER

Danger for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

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

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

⚠ WARNING

Warning about hand injuries

⚠ WARNING

Warning about hot surfaces

1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *

The documents marked with an asterisk (*) can be downloaded on our homepage **www.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

- This product is intended for clamping and holding workpieces on machine tools and other suitable technical devices.
- It is designed to be set up on a machine table or machine pallets.
- The product may only be used within the scope of its technical data, ▶ 6 [🗋 15].
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

- The product is not being used as intended if, for example:
- It is used as lifting equipment, as a press, as a punching tool, as a lathe chuck, as a drill or as a cutting tool.
- It is used in working environments that are not permissible.
- Workpieces are not properly clamped.
- Safety regulations are disregarded and persons are working at this product (for example, to machine clamped workpieces) without additional protective equipment.
- The technical data specified by the manufacturer are exceeded during usage.
- It is used with machines/systems or workpieces that are not designed to be used with it.

2.3 Notes on particular risks

⚠ WARNING

Risk of injury to operating personnel if the clamping block 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 clamping block must never be exceeded.
- The clamping block 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.

⚠ WARNING

Risk of injury from workpiece loss if compressed air or oil pressure fails or is reduced and from improper controlling (operator error)!

- Use pressure maintenance valves.
- Safeguards in user program.

⚠ WARNING

Risk of injury from clamping block or chuck jaws falling during transport, installation or removal!

- Make sure the clamping block and chuck jaws do not fall during transport, installation or removal.
- Use a crane and/or a transport truck for transportation.
- Only install the clamping block on machines with the appropriate connection dimensions.

⚠ CAUTION

Risk of crushing from chuck jaws opening and closing when manually loading and unloading!

- Do not reach between the chuck jaws.
- Wear personal protective equipment.
- Prevent the clamping block from being actuated unintentionally.
- Use automated loading.

⚠ CAUTION

Risk of slipping or falling if the operational environment of the clamping block 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 clamping block, 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.

2.4 Product safety

Observe the care and maintenance instructions.

Assembling the TANDEM clamping block

Make sure the power supply for the clamping block is off during assembly and connection. Make sure the TANDEM clamping block cannot be accidentally operated by the service technician or others during connection, adjustment, start-up and testing.

Disconnect power sources during installation, modification, maintenance, or calibration. Perform maintenance, modifications, or installations outside of the danger zone.

Functional testing

- Test to make sure the TANDEM clamping block is functioning properly before putting it into operation. Make sure there are no leaks in the line system.
- Regularly check the motion kinematics of the jaw change interface locking mechanism to make sure they can be easily moved and return to their original position automatically.
- If the clamping system is involved in a collision, it must be tested to see if it is still functioning properly before using it again. Only use original SCHUNK spare parts when replacing damaged items.
- Visually inspect the clamping block at least once per shift for visible damage and defects.
- Renew the chuck jaw mounting bolts if there are signs of wear or damage. Only use screws with a quality of 12.9.

Maintenance instructions
Clamping force block reliability can only be guaranteed if the maintenance instructions are precisely followed.

Using special chuck jaws
Please observe the following rules when using special changing jaws:

- The chuck jaws should be designed to be as low as possible. The clamping point must be as close as possible to the housing. (clamping points further away cause higher surface pressures in the jaw guides and can significantly reduce clamping force).
- Reduce operating pressure for higher clamping points.
- Do not use welded jaws.
- Mount accessories such as clamping bars or reversible gripping jaws to the changing jaws with the proper torque▸ 4 [🗋 13].

IMPORTANT!

Following a longer shutdown period (more than approx. 6 hours), always re-tension the clamping device in order to compensate for the setting properties of the clamping situation or possible pressure losses and the resulting loss of clamping force.

2.4.1 Constructional changes, attachments or modifications

Modifications and rework (additional threads or bore holes) or attaching fittings that are not offered as accessories by SCHUNK may be performed only with permission of SCHUNK. This also applies to the installation of safety devices.

2.5 Personnel qualification

Only specialist personnel may install or remove, commission or maintain the clamping block. 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. Have personnel trained by the manufacturer if required.

Every person called upon by the operator to work on the clamping block must have read and understood the complete assembly and operating manual, especially chapter 2 "Basic safety notes".

The responsibility for operation, maintenance and repair must be clearly specified. Only allow persons to service or repair parts of the clamping block which are relevant to safety who can be considered to be a specialist, as understood in the safety regulations.

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 block 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 block.

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 clamping block is mounted are clearly legible and are observed.

Faults
If a fault occurs on the clamping block which endangers safety or if a problem is suspected due to production characteristics, the machine where the clamping block 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 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 greases and lubricating oils, pay attention to environmental compatibility, health risks, disposal regulations and to local options for disposal according to regulations.

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 ex-works delivery date under the following conditions:

- Observe the applicable documents, ▶ 1.2 [🗋 6]
- Observe the ambient conditions and operating conditions
- Observe the maximum number of clamping cycles ▶ 6 [🗋 15]
- Observance of the specified care and maintenance instructions ▶ 9 [🗋 35]

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

4 Tightening torques for screws

Tightening torques to mount the clamping system on the machine table (screw quality 10.9)

Screw size	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Admissible torque M_A (Nm)	4.2	7.5	13	28	50	88	120	160	200	290	400	500

Tightening torques to mount top jaws on the TANDEM clamping block (screw quality 12.9)

Screw size	M4	M5	M6	M8	M10	M12	M14	M16	M20	M24
Tightening torques M_A (Nm)	5	9	15	32	62	108	170	262	510	880

Tightening torques to mount the chuck piston onto the cylinder piston (screw quality 12.9)

Variante	Screw size	M5	M8	M10	M12
KSH ….., KSH-F …..	Tightening torques M_A (Nm)	9	32	62	108
KSH-LH …..	Tightening torques M_A (Nm)	9	32	75	140

5 Scope of Delivery

KSH plus-BWM or KSH-LH plus-BWM clamping force block

(changing jaws, reversible gripping inserts and clamping bars not included)

ACCESSORY KIT:
(for contents, see Accessory Kit chapter ▶ 10.2 [🗋 43])

5.1 Accessories

(see catalog or data sheets when ordering separately)

Changing jaw types: WTR, WTG (See "WTR, WTG changing jaws")▶ 7.5 [🗋 28]

Reversible gripping inserts for WTR, WTG

Clamping bars for WTR, WTG

Valves, pneumatic screws

Hexagonal socket screwdriver

6 Technical data

Installation position	any
Operating temperature	5°C – 60°C
Noise emission [dB(A)]	≤ 70
Pressure medium	Hydraulic oil
Requirement for the pressure medium	filtered (10 µm), viscosity 46 mm/s at 40°C in line with ISO VG
Volumetric flow	max. 2 l/min
Towing oil loss	max. 0.5 mg/cycle

KSH plus-BWM		100	160	LH 100	LH 160	LH 250
Stroke per jaw	mm	2	3	6	8	15
Clamping force* at max. pressure	kN	18	45	16	40	50
max. Pressure	bar	60	60	120	120	45
Repeat accuracy**	mm	0.01	0.02	0.01	0.02	0.03
Repeat accuracy	mm	0.01	0.01	0.01	0.01	0.01
max. Jaw height	mm	35	55	35	55	70
Weight	kg	5.3	14	5.3	14.5	37.2

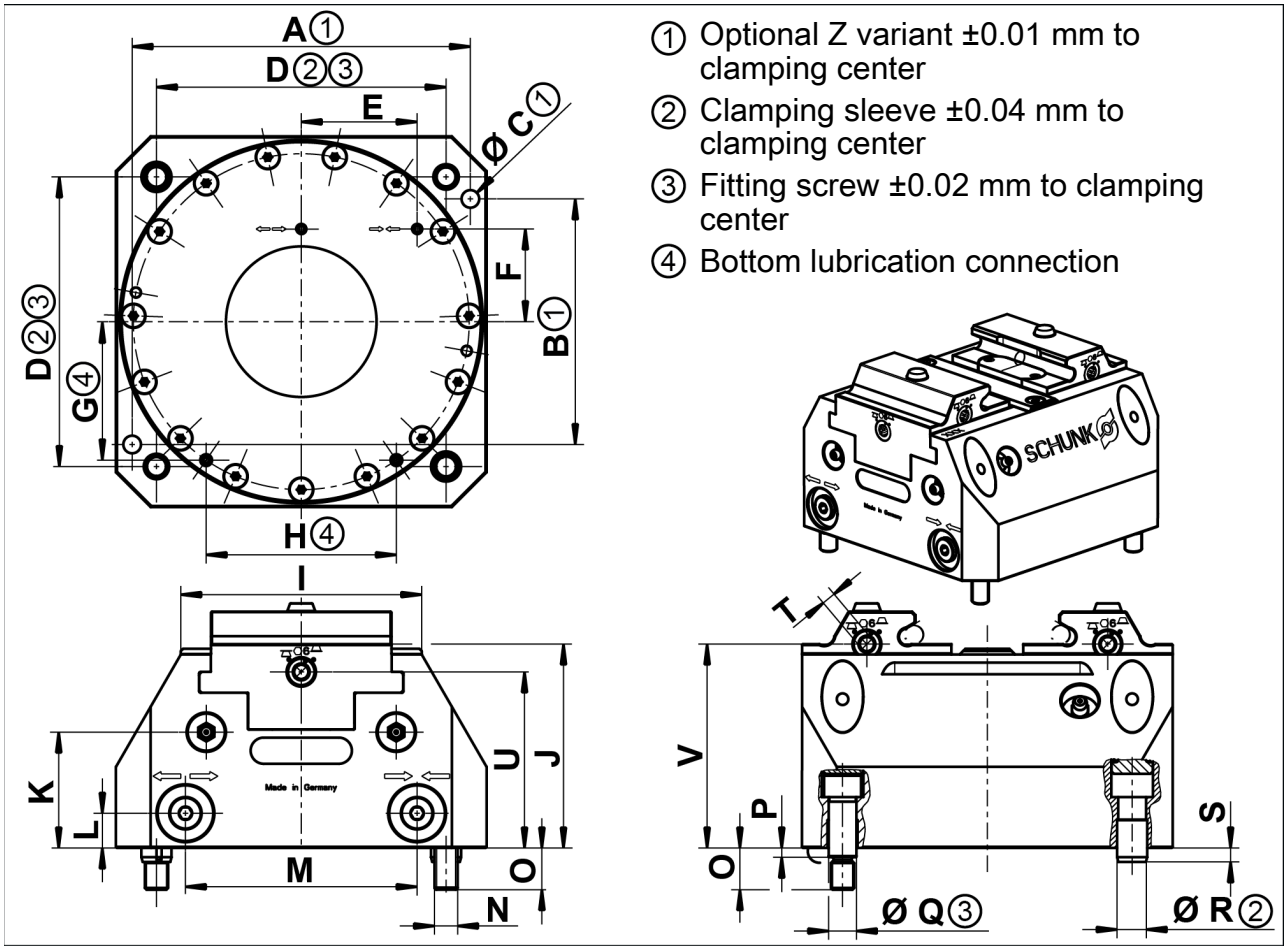
* Clamping force is the arithmetic sum of the individual forces being applied to the chuck jaws at a distance of "H" (see also our catalog ▸ 1.2 [🗋 6]).
** Distribution of the end positions with 100 successive strokes.

Warranty and maximum clamping cycles

Length of warranty	24 Months
Maximum clamping cycle number	500 000 Cycles

Dimension	Size 100	Size 160	Size 250 (LH)
A	90	146	230
B	64	106	154
Ø C	6H7 x 12	8H7 x 14	10H7 x 20
D	80	125	200 x 180
E	29.5	50	45
F	32	40	80
G	34.5	59.7	50
H	55	82	140
I	64	104	170
J	75	88	103
K	47	50	57
L	15	15	20
M	57	100	45 (off-center)
N	M8	M10	M12

Dimension	Size 100	Size 160	Size 250 (LH)
O	15	18	20
P	4	4	5
Ø Q	10f7	12f7	14f7
Ø R	11	13	16
S	4.5	6	6
T	5	6	8
U	64.8	76	88
V	74.3	88	104



Dimensions

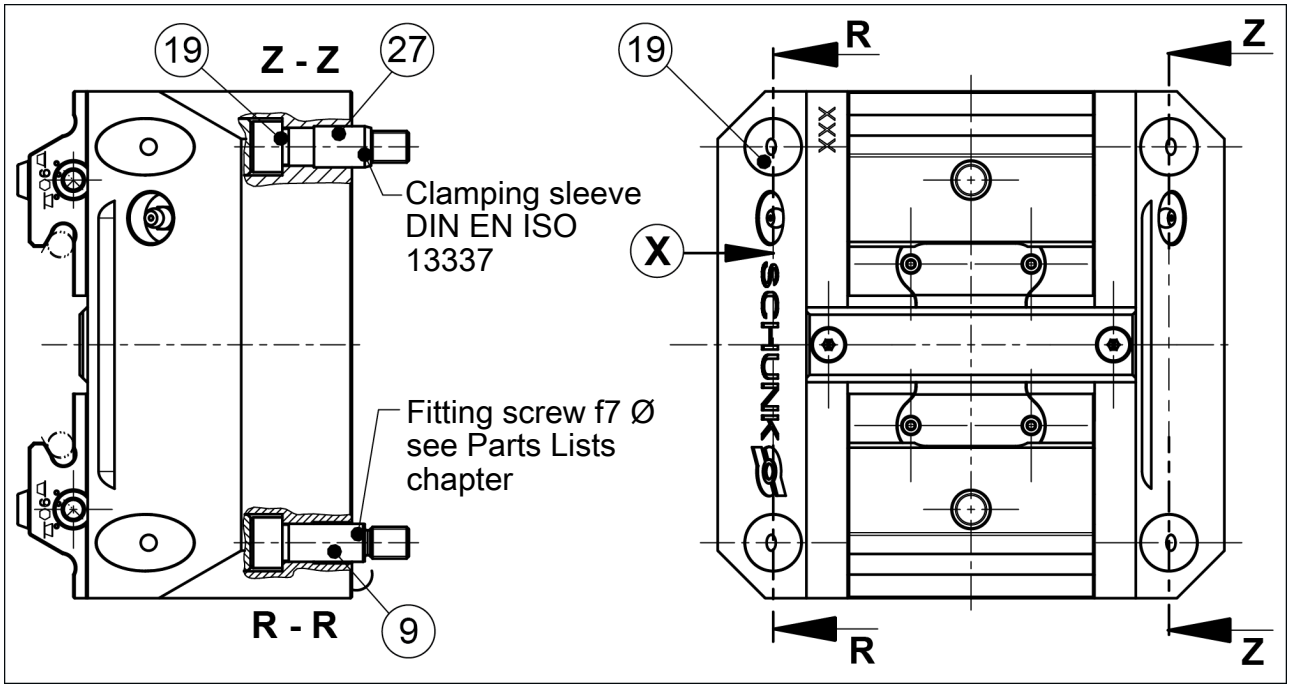
7 Assembly

The item numbers specified for the corresponding individual components relate to chapter drawings ▶ 11 [🗋 49] and the figures "Assembling the clamping block" and "Connecting the clamping block".

Make sure the power supply for the clamping block is off during assembly and connection. See Chapter "Basic Safety Notes". ▶ 2 [🗋 7]

7.1 Assembling the clamping block on the machine table

- For vertical installation, the opening of the coolant drain (item 13) must always face downwards
- Surface **"X"** is parallel to the guideway of the base jaws (item 2) so the clamping block can be aligned on the machine table.



Assembling the clamping block

Assembly with clamping sleeves:
Mount the clamping block on the machine table together with clamping sleeves (item 27) and screws (item 19).

Assembly with fitting screws:
There are two fittings in the housing (item 1) that, along with the optional fitting screws (item 9), are used to center the clamping block on the machine table with repeat accuracy. Do not realign the clamping block after removing it from the machine table (e.g., after replacing the seals). When using fitting screws (item 9), use them instead of the clamping sleeves (item 27) and the two corresponding screws (item 19).

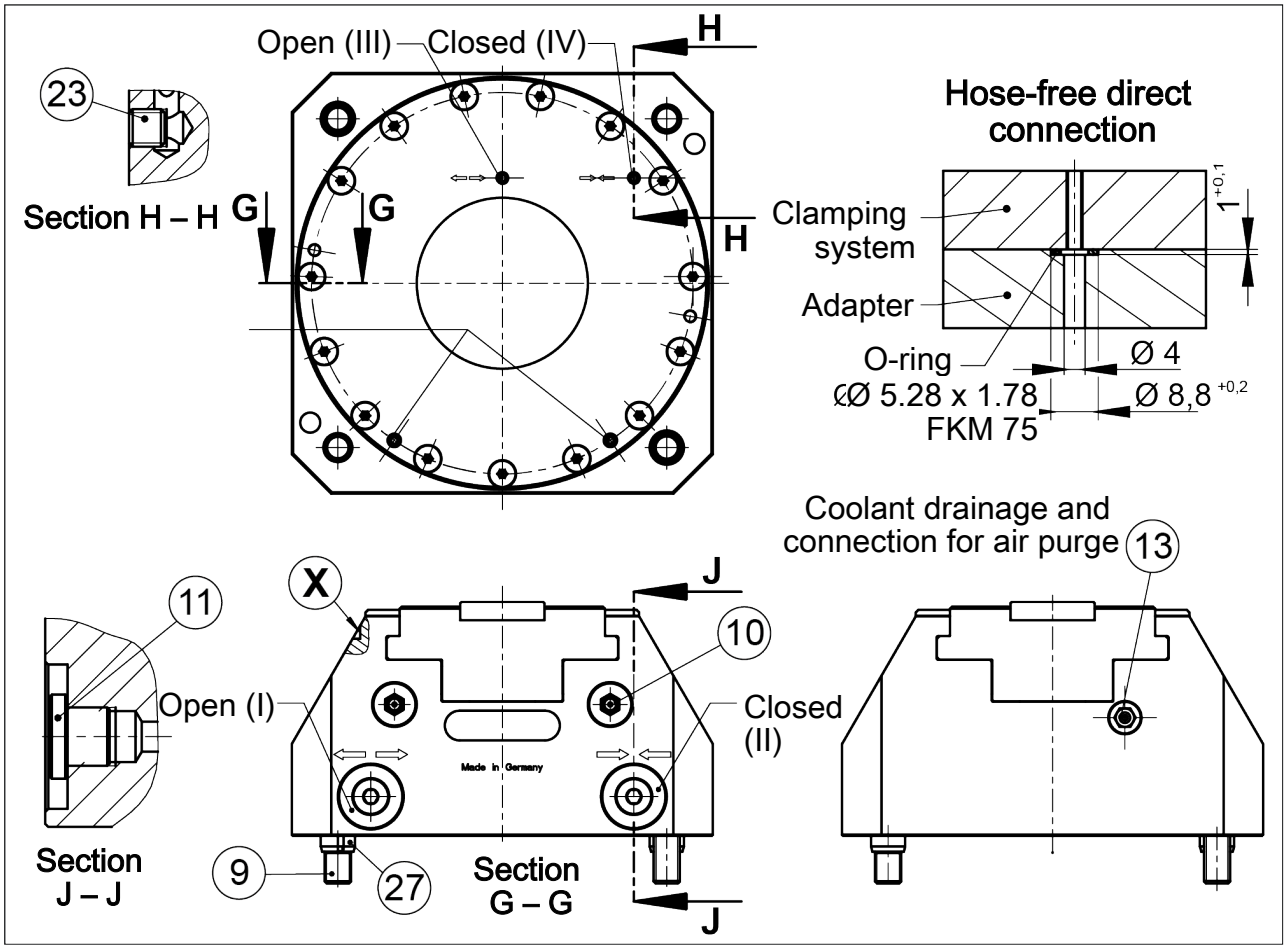
7.2 Connecting the clamping block

Make sure the power supply is off when connecting the clamping force block. Refer to the "Basic safety instructions" chapter ▶ 2 [🗋 7] and the hydraulic wiring diagram ▶ 9.3 [🗋 40]. The hydraulic screw fittings must be assembled in accordance with the installation conditions recommended by the manufacturer.

CAUTION

Risk of work piece losses and damage to the automated system due to loss of hydraulic oil pressure caused by damaged hydraulic lines or control devices.

Always make sure the connections are tight, and protect the hydraulic hoses or lines against hot chips and falling parts with suitable protection covers.



Connecting the clamping force block

The clamping force block has four hydraulic connections: **I, II, III, IV**.

Two connections for OPEN (**I** and **III**) and two connections for CLOSE (**II** and **IV**).

Which of the two hydraulic connections has to be opened for actuation depends on the specific application:

- Connection **I** and **II** for operation with external hydraulic pipes or hose lines. The threads for the hydraulic screw fittings – on the front of the housing (item 1) – are G1/8" for all clamping force blocks.
- Connection **III** and **IV** in the base for hose-free direct connection in the machine table.

The threads for hose-free, direct connection are not designed for hydraulic screw fittings.

NOTE:
With the delivery of the clamping force block, all four hydraulic connections are sealed. The connections on the base are sealed with set-screws (item 23) and those on the front with locking screws for hydraulics (item 11).

Hose-free direct connection

If the clamping system is connected via hose-free direct connections in the machine table, the base side openings in the cover (item 5) must be sealed.

Do not open the front connections **(I, II)** on the clamping system, alternatively seal them airtight with locking screws for hydraulics (G⅛"). ▸ 10 [🗋 42](item 56)

The hydraulic pressure input and output supply to the connections (**III, IV**) is sealed via an O-ring, which is inserted in an O-ring seat in the tabletop.

- The dimensions for the production of the axial-sealing O-ring seat are: **Ø 8.8** $^{+0.2}$ **x 1** $^{+0.1}$**.**

Before assembling the clamping force block on the tabletop, the Torx set-screws (item 23) must be removed from the cover (item 5) of the clamping force block.

NOTE:
When joining together, make sure that the feed-throughs of the input and output feed for the hydraulic pressure supply to the clamping force block and tabletop are precisely aligned above one another, and the O-rings for sealing are inserted.

- Screw the clamping force block to the machine table, observing the tightening torques ▸ 4 [🗋 13]. The assembly parts (screws, clamping sleeves, O-rings) are included in the accessory kit. The different mounting variations of the clamping force block are described in the chapter on "Mounting the clamping force block on the machine table" ▸ 7.1 [🗋 17].
- Before commissioning the clamping force block, make sure that the frontal hydraulic connections are properly sealed.

Automatic lubrication

The clamping force block has two more base connections (**V**) for direct lubrication through the machine table. At the time of delivery, these connections are sealed with set-screws (item 23 and item 24).

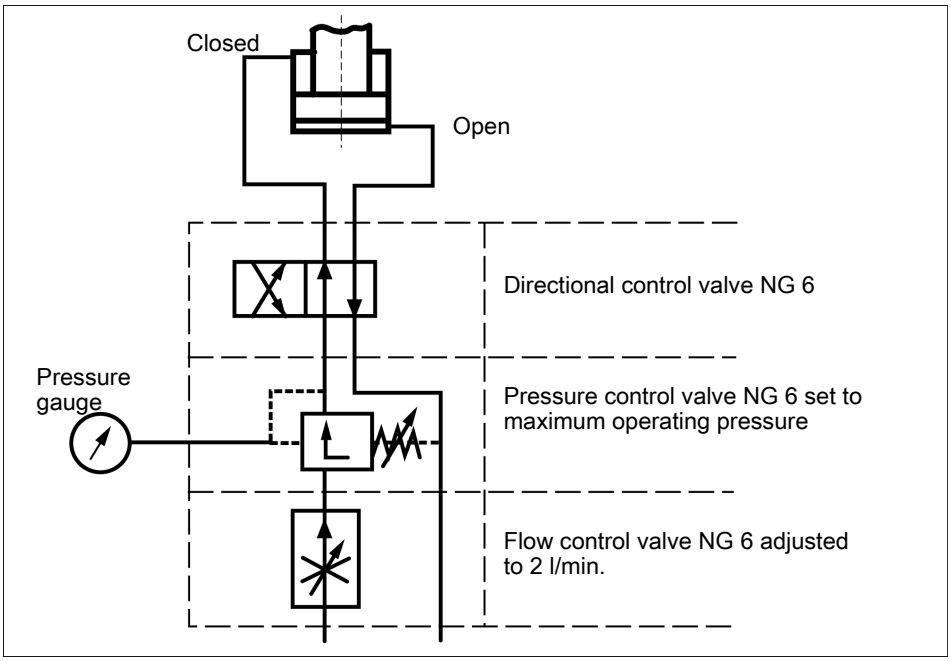
If required, the clamping force block can be automatically supplied with grease through these connections. A bore hole provides the guideway of both base jaws with grease. That is why both lines must be connected. The Torx set-screws (item 23 and item 24) also need to be removed from the cover (item 5). The automatic supply of lubricant should take place intermittently.

Sealing is carried out in each case via an O-ring, which is inserted in an O-ring seat in the tabletop.

- The dimensions for the production of the axial-sealing O-ring seat are: **Ø 8.8** $^{+0.2}$ **x 1** $^{+0.1}$**.**

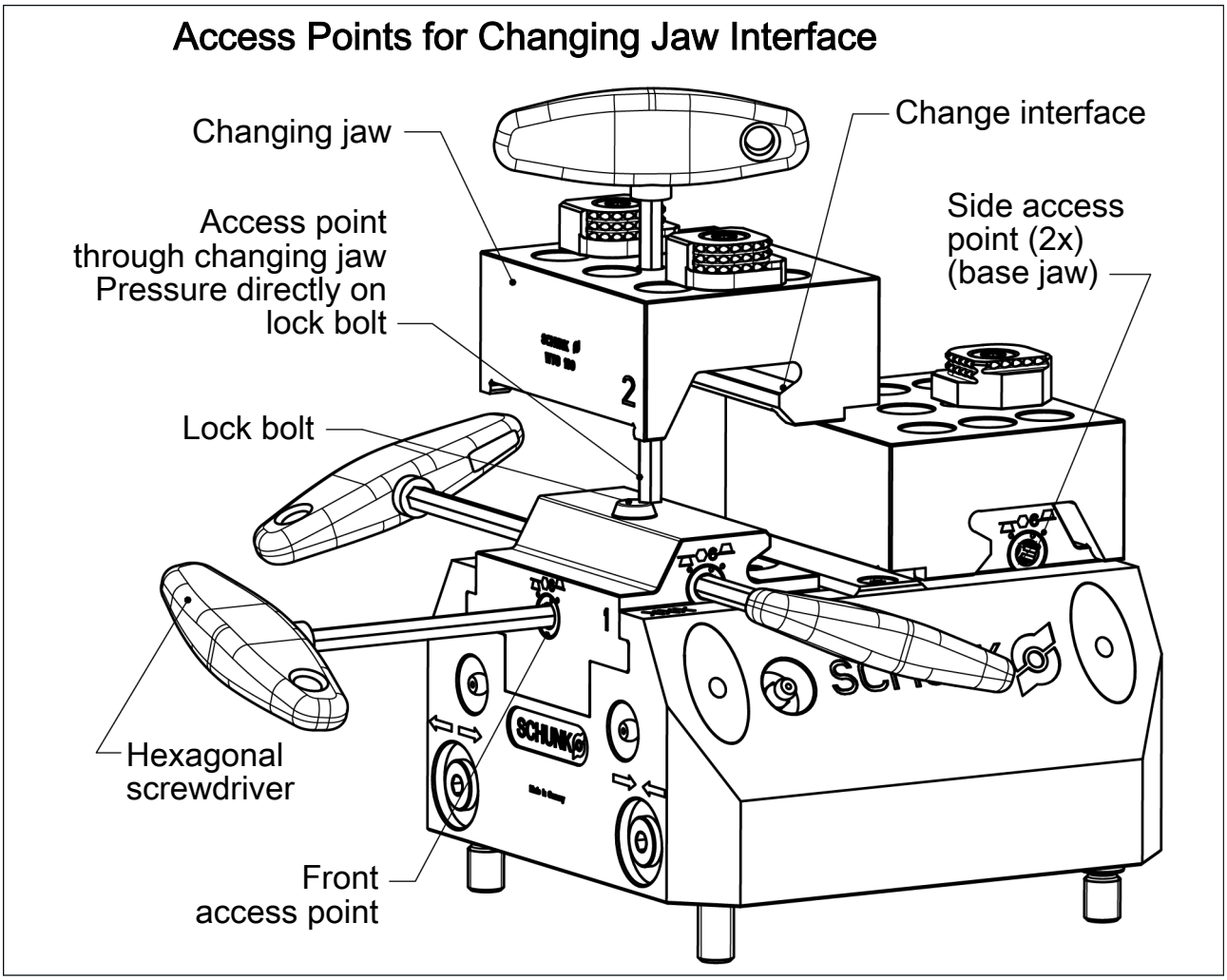
The recommended O-rings for sealing the supply lines Ø 5.28 x 1.78 FKM 75 are not included in the clamping force block's scope of delivery.

7.3 Hydraulic circuit diagram



Hydraulic circuit diagram

7.4 Functional description of quick-change jaw system



Access Points for Changing Jaw Interface

The TANDEM KSH plus-BWM/KSH-LH plus-BWM clamping force blocks come with a semi-automatic jaw quick-change system for external workpiece clamping. Changing jaws can be locked in place with a form-fitting diagonal pull without additional mounting screws on the base jaw. The changing jaw is locked in place by a spring-actuated failsafe mechanism. A conical lock bolt ensures the jaw is always locked in place firmly and at the same location due to its retentive function. Each base jaw has four access points for unlocking the changing jaws (see Fig. "Access points for changing jaw interface"). A hexagonal screwdriver is used to unlock the jaw when the clamping block is in the "OPEN" position.

The changing jaw is unlocked with a one-quarter counter-clockwise turn at one of the three access points on the side, or from the top through a through hole in the changing jaw itself. The changing jaw can then be lifted inward and removed.

The kinematics are automatically moved back into locking position by a spring mechanism. The lock bolt also moves back out.

NOTE
: Be sure to only apply moderate force when turning the hexagonal screwdriver. Do not strengthen the spring-actuated jaw locks with additional force from the screwdriver.

7.4.1 Inserting the changing jaws

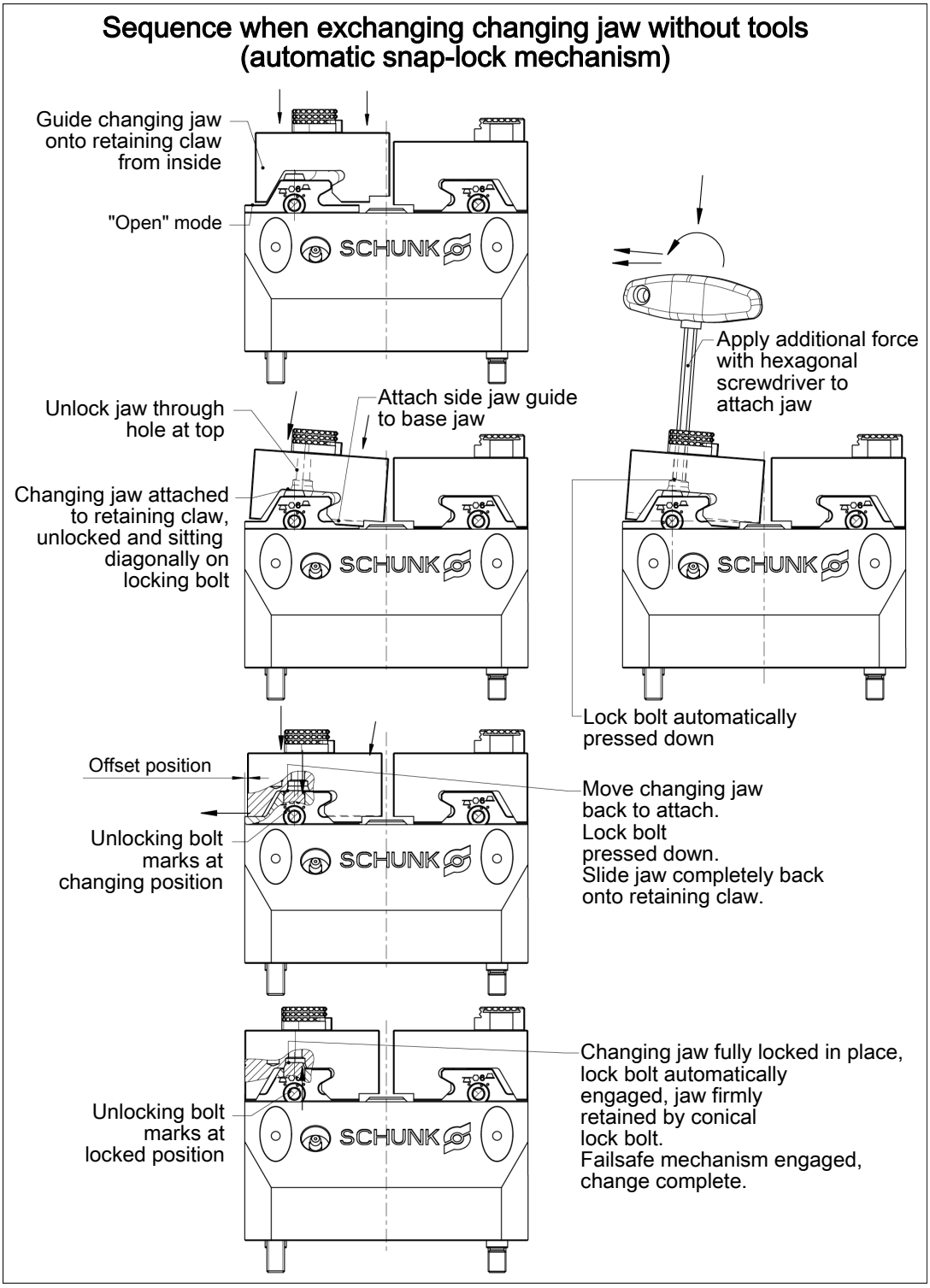
A set of changing jaws consists of two individual jaws designed to fit together. The jaws are marked with numbers "1" and "2". Always insert the changing jaws on the TANDEM clamping block's change interface with the same number in order to ensure maximum repeat clamping accuracy.

NOTE:
Only trigger the actuating mechanism with an appropriate tool. Only change the jaws with manual force. Do not use a hammer to assist in changing the jaws.

The changing jaws can be changed in two ways:

First, hang the changing jaw on the hook attachment. This connects the lateral centering bars to the base jaw.

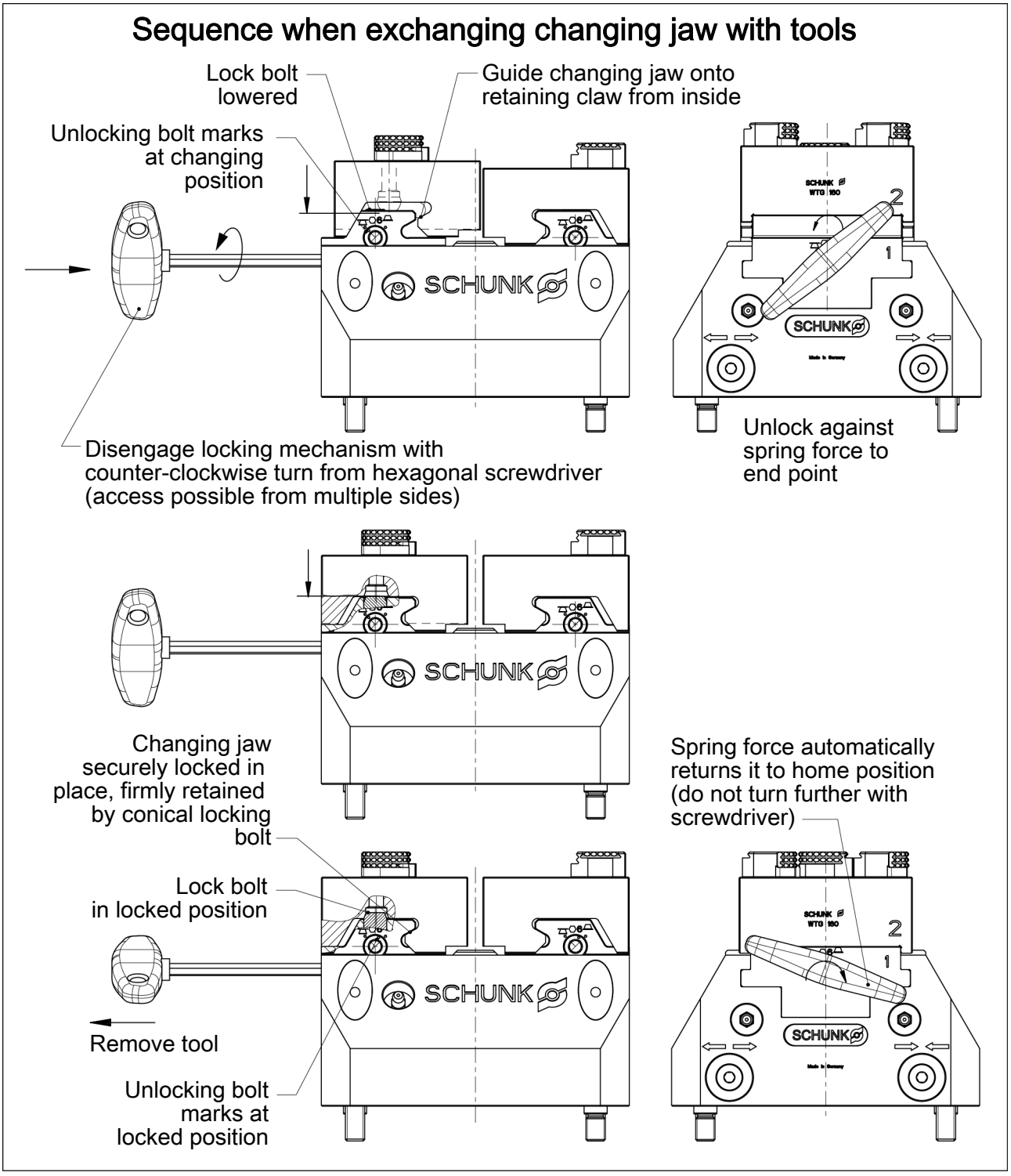
1. Locking in place without tools:
Pull the changing jaw back and press it down to lock it into place without tools. The spring-actuated snap-lock mechanism is automatically triggered, locking the changing jaw to the TANDEM clamping block.



Locking in place without tools

2. Semi-automatic locking:

With semi-automatic locking, the lock bolt is driven down with a hexagonal screwdriver. This is done by applying a one-quarter counter-clockwise turn at one of the side access points. Once the jaw is inserted into the interface and positioned, the locking kinematics return to their original position. This locks the jaw firmly and securely onto the changing interface.

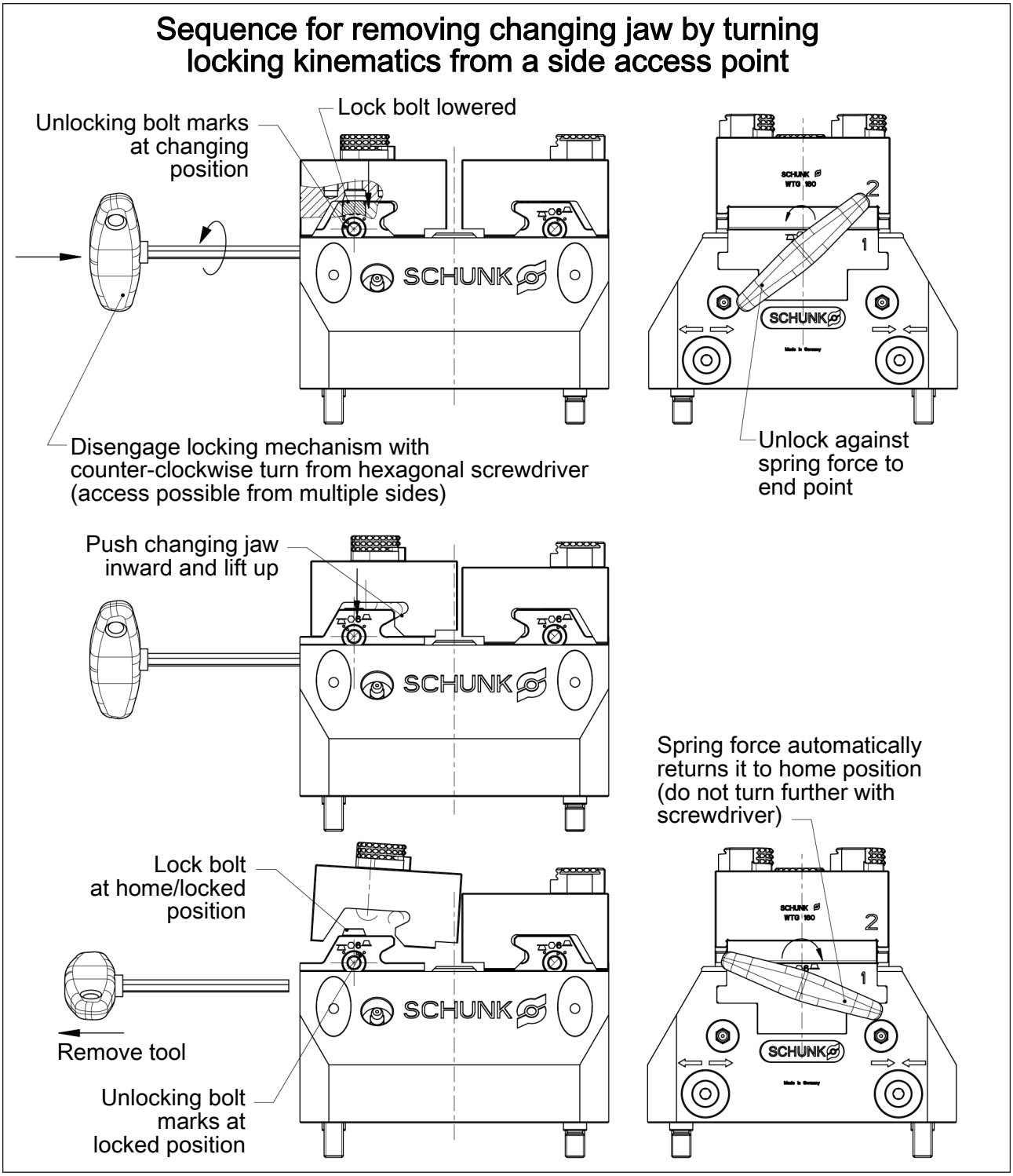


Semi-automatic locking

7.4.2 Removing the changing jaws from the quick-change interface

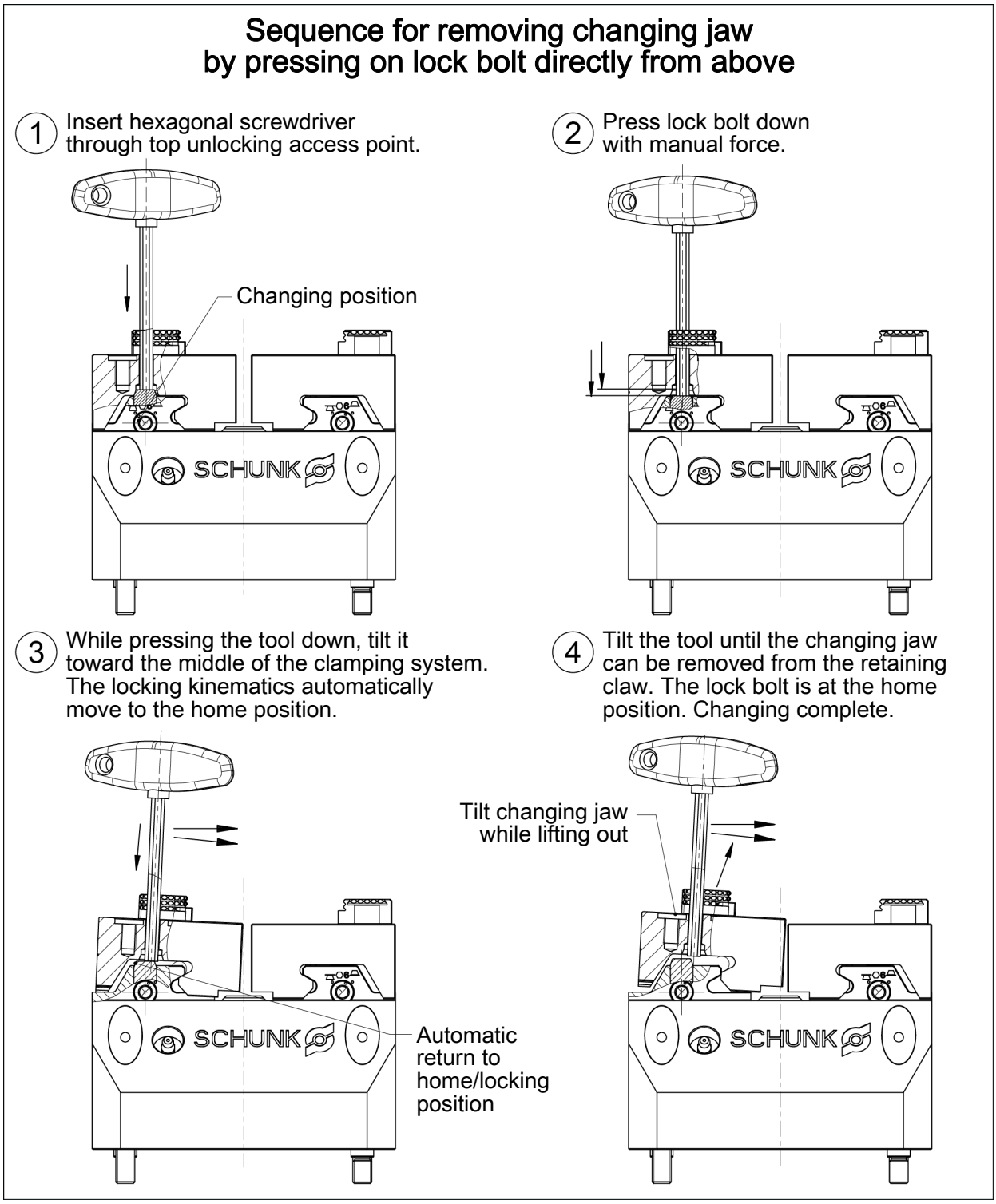
The jaws can be removed from the TANDEM clamping block in two ways:

1. Two-handed:
Unlock the jaws with a one-quarter counter-clockwise turn from the hexagonal screwdriver at one of the side access points. At the same time, lift the jaw diagonally from the center upward and out of the change interface.



Two-handed

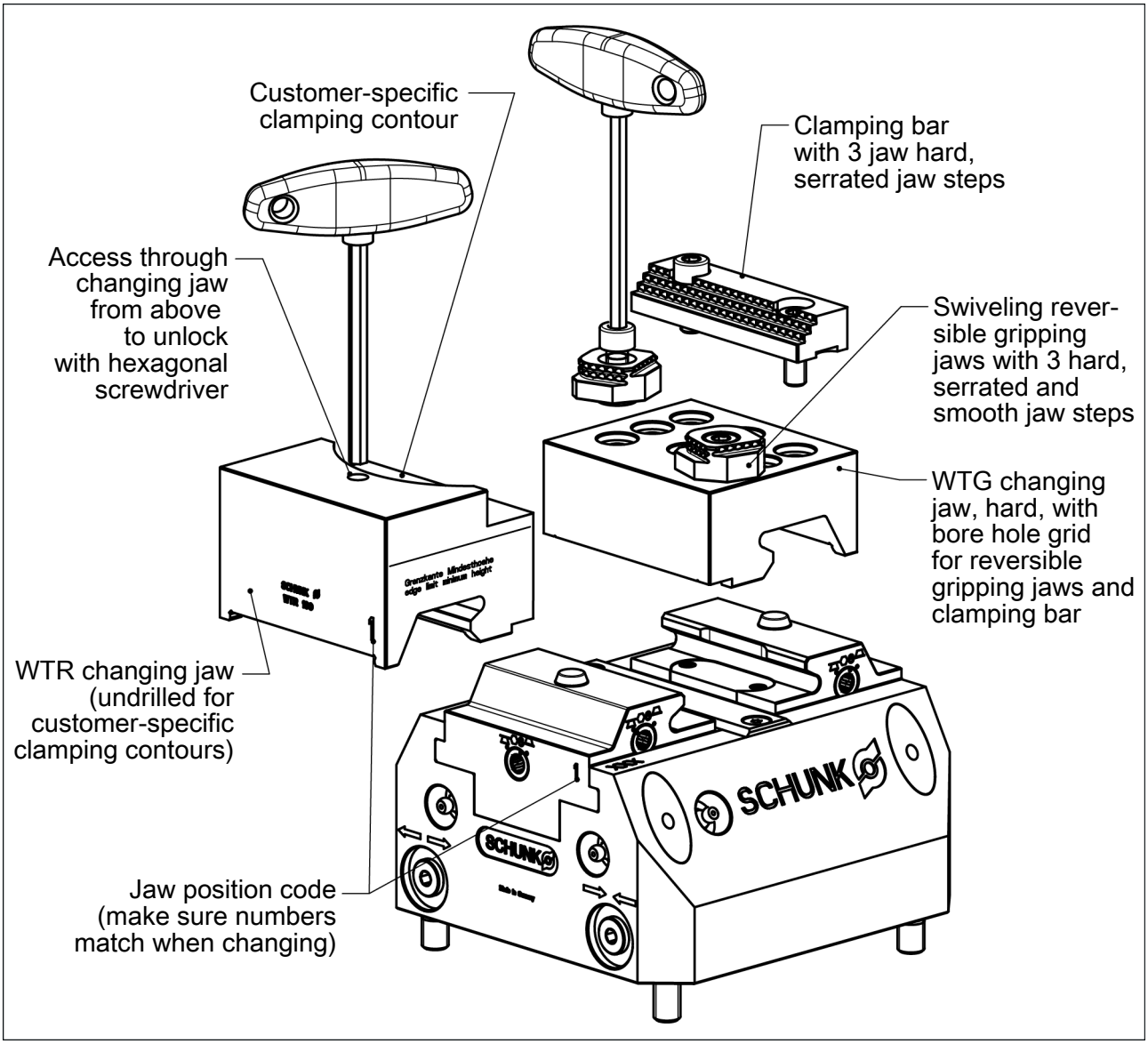
2. One-handed:
Feed the hexagonal screwdriver through the hole in the changing jaw and unlock it directly from above. The tool drives the lock bolt down and simultaneously can be used to tip the jaw out of the change interface.



One-handed

7.4.3 Construction concept and dimensions of BWM system-compatible changing jaws

The TANDEM clamping force block with BWM system can be equipped with various changing jaws. The system is only designed for external workpiece clamping.



Compatible changing jaws

Changing jaw type: WTR

The WTR changing jaw is essentially a top jaw blank. The clamping contour can be individually adjusted. The jaw steps can be milled to a limited extent.

The clamping contour must be placed under clamping pressure. Additionally, a spacer with sufficient clamping stroke reserve must be clamped between the changing jaws.

Changing jaw type: WTG

The WTG changing jaw can be used with clamping bars and reversible gripping jaws to clamp raw parts. The reversible gripping

jaws and clamping bars are suited for three- or four-point clamping of cylindrical and rectangular workpieces (see chuck jaw interface design, ▶ 11 [🗋 49]).

The interface can be individually adjusted to the workpiece dimensions with the WTG grid holes. The various jaw steps combined with the grid hole distances allow virtually all workpiece dimensions within the limited clamping range to be clamped.

7.5 Changing jaws WTR, WTG

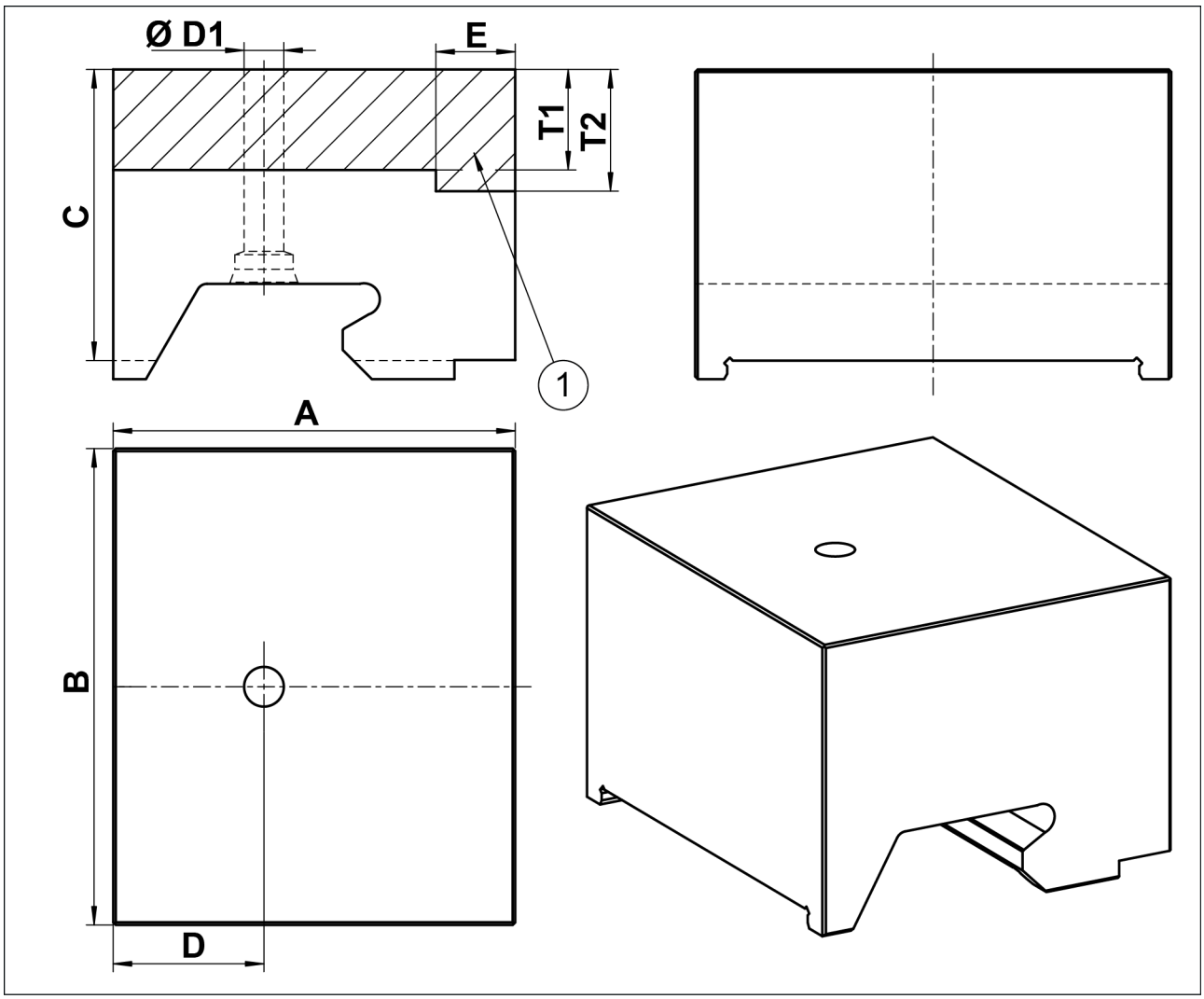
7.5.1 WTR changing jaws

Soft and undrilled.

Mounted to TANDEM KSH plus-BWM standard stroke and long stroke with quick-change interlocking.

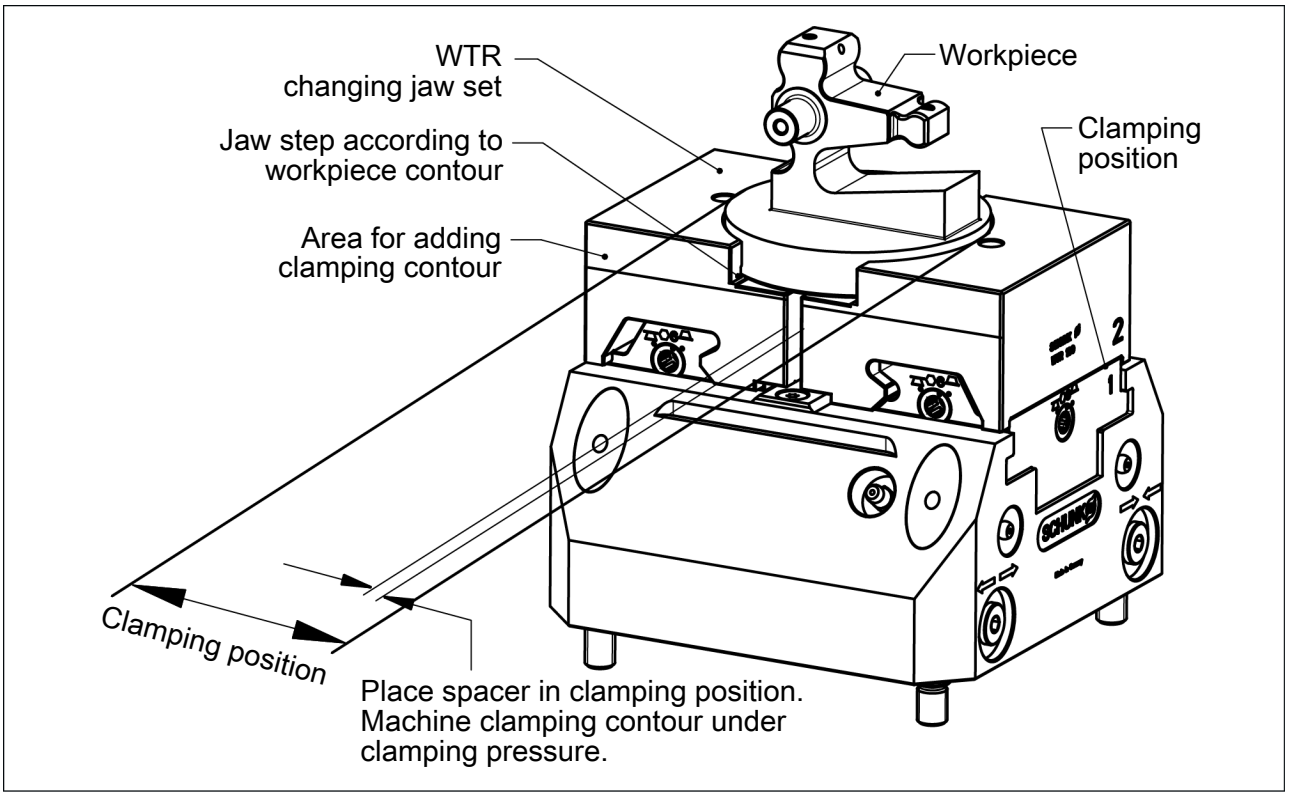
Made out of hardenable 16MnCr5. Workpiece-specific adjusting possible by machining under clamping pressure.

Bore holes and clamping contours can be made to order.



WTR changing jaw

Designation	WTR 100	WTR 160	WTR 250
ID	0402301	0402302	0402303
compatible for sizes	KSH/(-LH) plus 100-BWM	KSH/(-LH) plus 160-BWM	KSH-LH plus 250-BWM
A	47	76	118
B	55	90	140
C	35	55	46
D	18	28.5	46
D1	6	7.5	9.5
E	12	15	20
T1	10	19	28
T2	14	23	32
Weight/set	1.2 kg	5.2 kg	15.9 kg



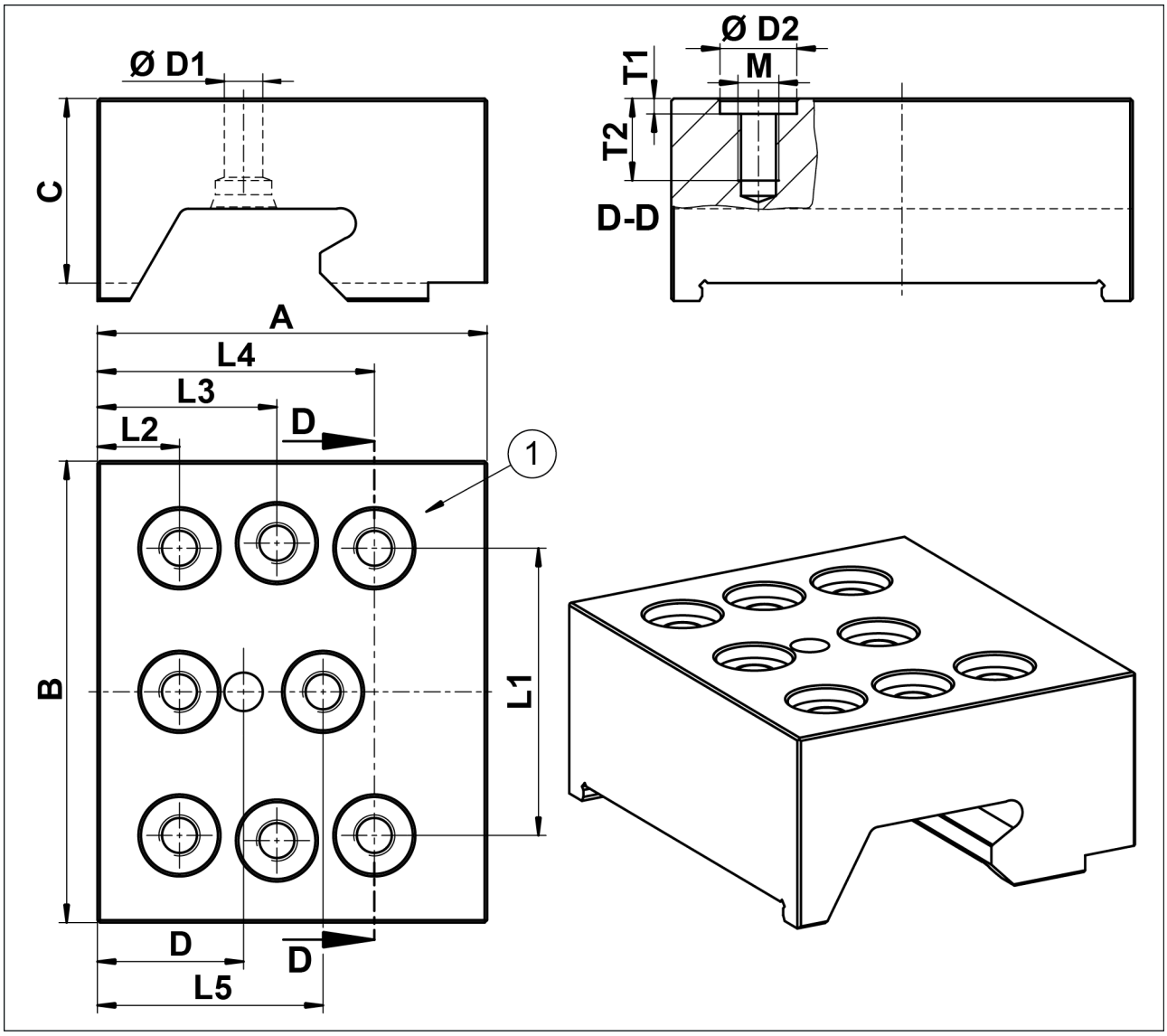
Sample workpiece clamping with WTR changing jaw

7.5.2 WTG changing jaws

Hard and drilled with bore hole grid, as supporting jaw for SEI 6x reversible clamping inserts and STG type clamping bars.

Mounted to TANDEM KSH-BWM standard stroke and long stroke with quick-change interlocking.

Made out of 16 MnCr 5. Bore hole grid can be made to order.



WTG changing jaw

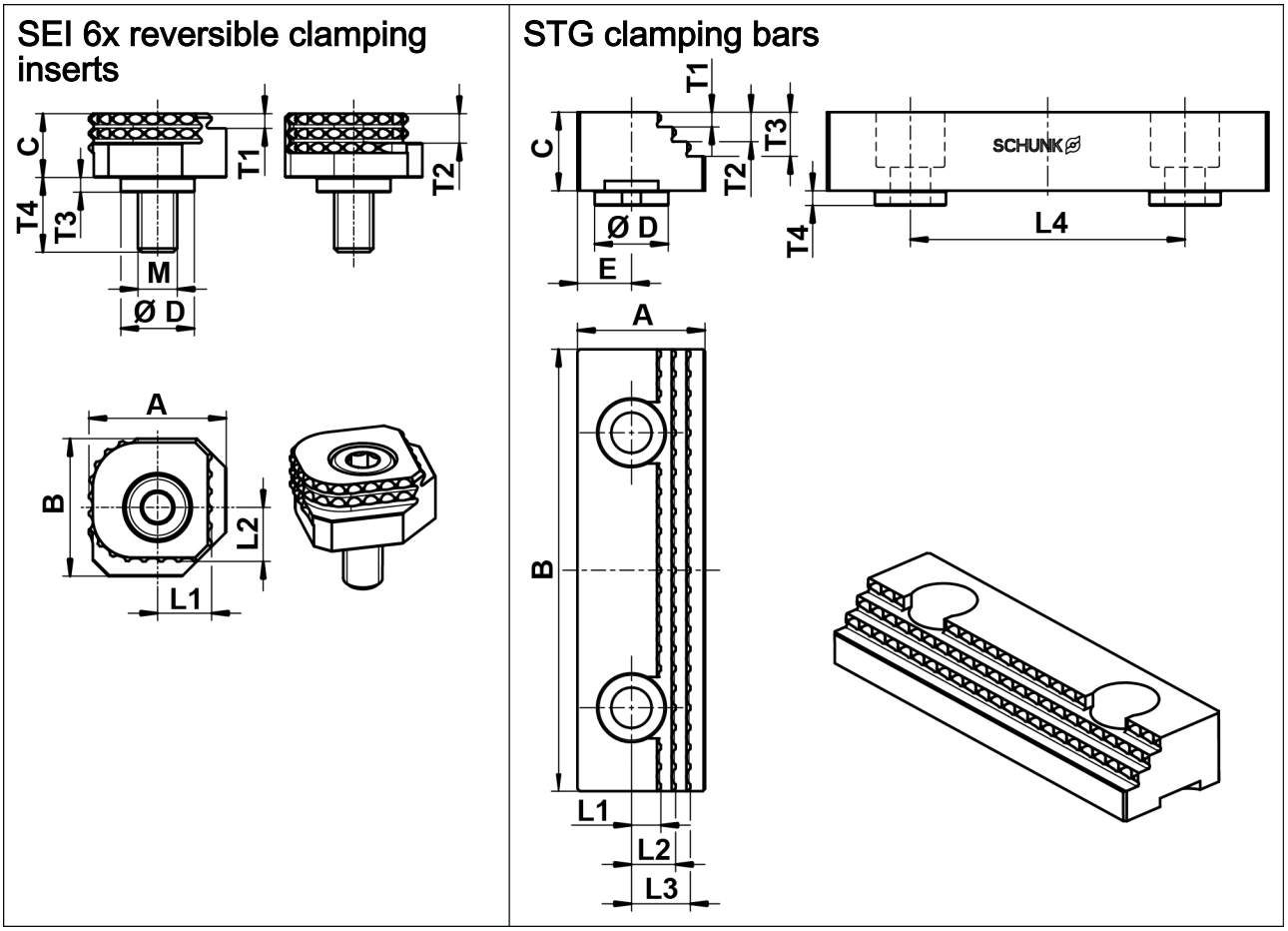
Designation	WTR 100	WTR 160	WTR 250
ID	0402311	0402312	0402313
compatible for sizes	KSH/(-LH) plus 100-BWM	KSH/(-LH) plus 160-BWM	KSP-LH plus 250-BWM
A	47	76	118
B	55	90	140
C	25	36	46
D	18	28.5	46
d D1	6	7.5	9.5
d D2	10	15	20
L1	30	56	96
L2	9	16	21
L3	22	35	51
L4	35	54	81

Designation	WTR 100	WTR 160	WTR 250
L5	29	44	73
M	M6	M8	M10
T1	1	3	4
T2	11	16	21
Weight/set	0.8 kg	3.0 kg	9.2 kg

WTG changing jaw accessories:

- **SEI 6x reversible clamping inserts**
- **STG clamping bars**

NOTE:
6x reversible clamping inserts and clamping bars come with mounting screws. Only use the included mounting screws at the specified torque when assembling ▸ 4 [🗋 13].



WTG changing jaw accessories:

Designation	SEI 100-M6	SEI 160-M8	SEI 250-M10
ID	0402317	0402318	0402319
compatible for sizes	WTG 100	WTG 160	WTG 250
A	18	28	34
B	18	28	34
C	8	13	16
Ø D	10	15	20
M	M6	M8	M10
L1	7.5	11	13
L2	7.5	11	13
T1	2.8	3	3
T2	5	6	9
T3	2	3	4
T4	10	15	19

Designation	STG 100	STG 160	STG 250
ID	0402314	0402315	0402316
compatible for sizes	WTG 100	WTG 160	WTG 250
A	20	26	36
B	55	90	140
C	11.4	16	19
Ø D	10	15	20
E	8	11	16
L1	4.5	6	8
L2	7	9	12
L3	9.5	12	16
L4	30	56	96
T1	2.8	3	3
T2	5.6	6	6
T3	8.4	9	12
T4	2	3	4

8 Trouble shooting

Clamping force block chuck jaws will not move

Possible cause	Solution(s)
Air supply interrupted	Check air supply
System pressure too low	Increase system pressure according to clamping system technical specifications
Connections mixed up	Check connections and functions and connect properly
Unused air connections not sealed	Seal front or base connections using accessories (included in scope of delivery)
Active air connections sealed	Remove set-screws from sealed air connections

Piston will not move

Possible cause	Solution(s)
Air is not oiled	Check maintenance unit, perform maintenance Place oiler closer to clamping system Set required oil level
Chuck piston screw broken (overload)	Send clamping system to SCHUNK for repairs or disassemble clamping system and repair using original SCHUNK spare parts ▶ 9.1 [🗋 36]
Piston rod or piston rod screw connection broken (overload)	Send clamping system to SCHUNK for repairs or disassemble clamping system and repair using original SCHUNK spare parts
Active air connections sealed	Remove set-screws from sealed air connections

Jaw changing function does not operate properly

Possible cause	Solution(s)
Lock bolt at changing interface not resetting and remains depressed	Check if motion kinematics can be easily moved and if they are damaged. To improve movement, apply a few drops of machine oil to the rotating joints until the kinematics automatically reset.
Lock bolt on changing interface not recessing	Check if motion kinematics can be easily moved and if they are damaged. To improve movement, apply a few drops of machine oil to the rotating joints.
Repeat accuracy not achieved during jaw change	Clean change interfaces and check for damage. Replace damaged parts, if necessary. The changing jaws have been switched. Changing and base jaw numbers must match.
Increased changing jaw "rear-up"	Clean interfaces between base and changing jaws. Set changing jaw firmly into change interface by pulling backward.

Clamping block does not complete stroke

Possible cause	Solution(s)
Chips or dirt between covering strip and base jaws	Unscrew the covering strip (item 7) and remove chips and dirt

Clamping force getting weaker

Possible cause	Solution(s)
Clamping block not sealed tightly	Check connection and seal screws; reseal or replace
Seals damaged	Disassemble clamping block ▶ 9.1 [🗋 36] and replace all the seals (see sealing kit lists ▶ 10 [🗋 42])
Inadequate lubrication	Lubricate the lubrication nipples with LINO MAX 200 ▶ 9 [🗋 35]

Clamping block movement jerky

Possible cause	Solution(s)
Steel guide rollers on sliding surfaces not greased	▶ 9 [🗋 35]

9 Maintenance and care

The item numbers specified for the corresponding individual components relate to chapter drawings. ▶ 11 [🗋 49]

Regularly check to see if the motion kinematics of the jaw locking mechanism are working properly. Make sure the turning mechanics are easy to move and automatically reset. The conical lock bolt must smoothly and completely rise up.

The base jaws (item 2), chuck piston (item 3) and housing (item 1) are made to go together. To replace these parts, ship the entire clamping system to SCHUNK along with a repair order.

In order to keep the clamping block in proper working order, observe the following notes:

- Make sure that the bore for the coolant drainage is always kept clear!
- Depending on the load but at least once a month or every 10,000 clampings, lubricate the guides on the two frontal or the two lateral lubricating nipples with LINOMAX 200 or equivalent lubricant. For this purpose the chuck jaws should be in opened position.
- Replace the base jaws and chuck piston at least every three months or more often, if necessary (see ▶ 9.1 [🗋 36]). Clean the housing, base jaws and chuck piston, and lubricate all the guides (housing, base jaws, chuck piston) with LINOMAX 200. Reassemble everything and relubricate the two front or two side lubricating nipples with LINOMAX 200.

(Product information about LINOMAX 200 can be requested by SCHUNK).

⚠ CAUTION

Allergic reactions due to grease in contact with skin!

Wear gloves.

IMPORTANT!

Please regularly check the clamping device for tightness by applying a clamping force tester over a longer period of time (>10 min.). The clamping force should not drop during this period. Please adjust the inspection interval to the operating conditions of the clamping device, however, we do recommend conducting a check every 5,000 clamping cycles at the latest.

9.1 Disassembling and assembling the clamping block

The item numbers specified for the corresponding individual components relate to chapter drawings.▶ 11 [🗋 49]

NOTE:
The base jaws (items 2, 31), the chuck piston (item 3) and the housing (item 1) are specially tuned to one other. These parts cannot be replaced individually. To replace these parts, ship the whole clamping block with a repair order to SCHUNK.

When replacing wearing parts (e.g. seals - ▶ 10 [🗋 42]), adhere to the following order:

1. Apply hydraulic pressure to the clamping block until the jaws are in the OPEN position.
2. Remove the pressure line or shut off the hydraulic system and secure against unauthorized reactivation.
3. Remove the covering strip (item 7) and the guide strips (item 6).
4. Remove the cylindrical screw (item 14) from the chuck piston.

   To ensure that for size **KSH-LH plus-IN 250** the piston does not turn when loosening the screw, it may be necessary to move the clamping block to the CLOSED jaw position for further disassembly. Re-connect the clamping block to the hydraulic system and apply 60 bar hydraulic pressure to bring it to the CLOSED position. Then remove the pressure line again.
5. Pull the plugs (item 8) out of the housing (item 1).
6. Loosen the screws (items 9, 19) and disassemble the clamping system from the machine table.
7. To remove the chuck piston (3) in the
   KSHplus-IN 100, screw in one M10 x > 25 screw in the center bore,
   KSHplus-IN 160, screw one M12 x > 25 screw in the center bore,
   KSHplus-IN 250, screw two M6 x > 25 screws in the lateral threaded holes.
8. Pull the base jaws (item 2) out of the housing (item 1).
9. Before pulling off the cover (item 5), all the screws (item 21) need to be removed. To take off the cover (5), screw two screws into the outer threaded holes:
   for size 100, two M3x >25 screws
   for size 160, two M5x >25 screws
   for size 250, two M5x >25 screws.
10. Remove the seals (items 17, 22, 41).
11. Underlay the clamping block so the cylinder piston (item 4) can be pushed out.

12. Remove the two-part seal (item 20) from the housing (item 1).

13. For signs of wear or damage, remove the two-part seal (item 12) from the cylinder piston (item 4).
If no signs of damage or wear are detected, the seal should remain fitted, as special tools are required for reassembly.

14. Clean all the parts thoroughly and check for damage and wear.
Replace damaged and worn parts with original SCHUNK spare parts.

15. Grease the new seal (item 15) with Renolit HLT 2 or an equivalent grease. Carefully install the seal, it must not be damaged.

16. Disassemble the two-part seal (item 20) and grease with Renolit HLT 2 or an equivalent grease.
- Insert the O-ring of the seal (item 20) into the groove of the housing (item 1). **Do not twist!**
- Press the sealing ring together into a kidney shape. There must be no sharp-edged kinks.
Place the sealing ring in its compressed form into the groove, then press down all around the already inserted O-ring.

17. Grease the two-part seal (item 12) with Renolit HLT 2 or an equivalent grease. Install the seal carefully ▶ 9.2 [🗋 38]).

18. Grease the sliding surfaces of the cylinder and piston with Renolit HLT 2 or equivalent grease.

19. Insert the cylinder piston (item 4) including mounted seal (item 12) into the cylinder of the cover (item 5).

20. When pressing in the cylinder piston (item 4), the seal (item 12) must sit snugly in the cylinder and must not be damaged during assembly.

21. Lubricate the new seals (items 17, 22, 41) with Renolit HLT 2 or an equivalent grease.

22. Place the O-rings (item 22) and (item 41) in the housing (item 1); and the O-ring (item 17) in the cover (item 5). Carefully install the new seals, they must not be damaged.

23. Insert the cover (item 5) into the housing (item 1), making sure that the openings for the hydraulic feed-throughs are aligned.

24. Screw the cover (item 5) onto the housing (item 1). Use a torque wrench ▶ 4 [🗋 13].

25. If using clamping sleeves (item 27) for centering, insert these into the housing (item 1) now.

26. Grease the sliding surfaces of the housing (item 1), base jaws (item 2) and chuck piston (item 3) with LINO MAX 200 grease.

27. Assemble the base jaws (item 2) and the chuck piston (item 3). Be sure to observe the installation position for the base jaws and the chuck piston.

28. Connect the hydraulic clamping block to the air supply with hydraulic oil before operation and put the jaws in the OPEN position. For this purpose, a blow gun for compressed air with rubber nozzle can be used.

29. Screw down the chuck piston (item 3) and cylinder piston (item 4). Tighten the screw (14) with a torque wrench (see Chapter 4).

    To ensure that for size **KSH-LH plus 250** the piston does not turn when tightening the screw, it may be necessary to move the clamping block to the CLOSED jaw position for further assembly. Re-connect the clamping block to the hydraulic system and apply 60 bar hydraulic pressure to bring it to the CLOSED position. Then remove the pressure line again.

30. Fasten the guide strips (item 6) and the covering strip (item 7).

31. Testing the leakage and tightness of the hydraulic system ▶ 9.3 [🗋 40].

Further information

[▶ 49]

9.2 Assembling the piston seal

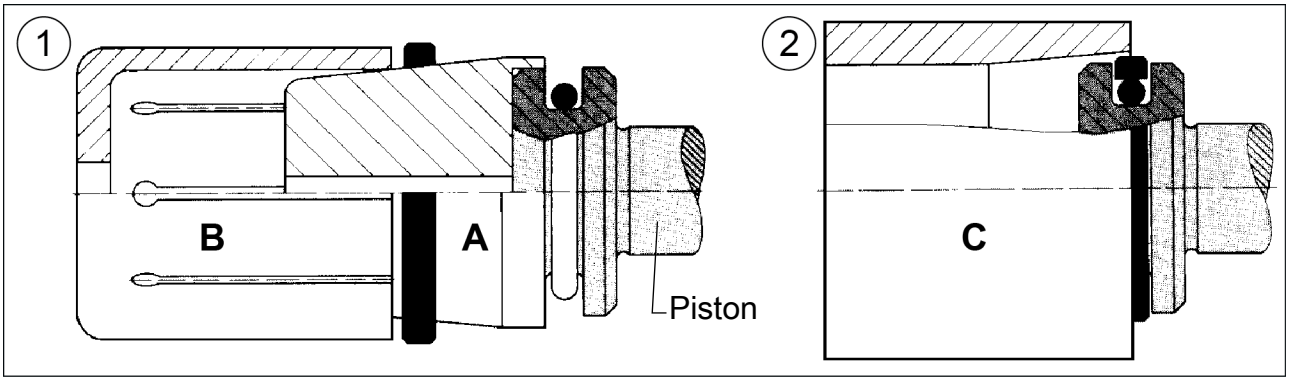
To assemble the seal (item 12), a multi-part assembly tool is required. If no assembly tool is available, repair work on the TANDEM clamping block should be carried out by SCHUNK.

1st Assembling

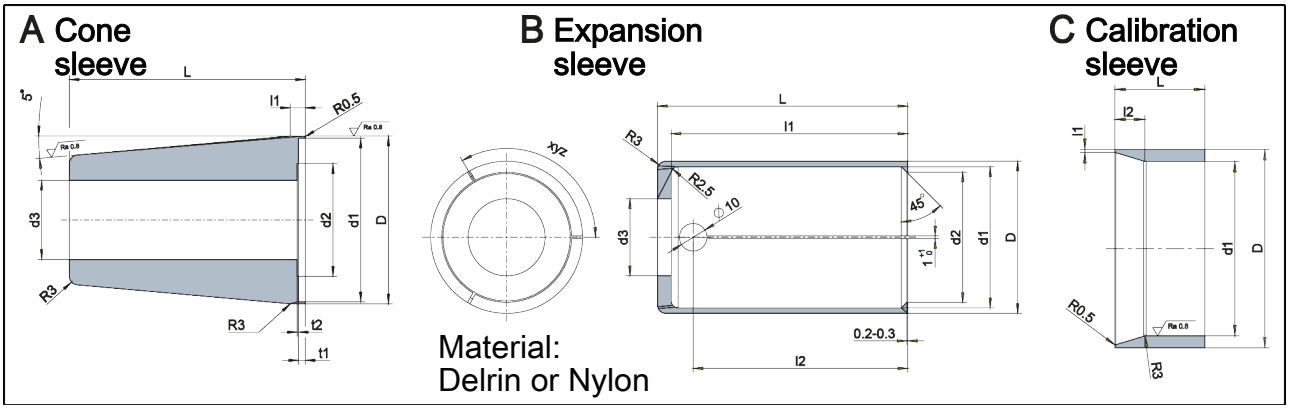
- Disassemble the two-part seal (item 12) and grease with Renolit HLT 2 or an equivalent grease.
- Pull the O-ring of the seal (item 12) over the cylinder piston (item 4) and into the groove. (Do not stretch or tear the O-ring.)
- Stretch the sealing ring with an expansion sleeve over the cone sleeve and slide over the cylinder piston and the O-ring that was previously inserted into the groove.

2. Calibration

After sliding it over, the Turcon-ring snaps into the groove, however, that is not all. The recovery of the stretched ring needs to be carried out with a calibration sleeve.



Assembling the piston seal



Assembly tools for the piston seal

A cone sleeve								
KSH plus	Piston Ø	D	d_1	d_2	L	l_1	t_1	R
100	35	36.2	35	17	37	10	2.7	3
160	58	59.6	58	26	60	10	2.4	4
250	120	122.0	128	50	138	12	8.5	4

B expansion sleeve									
KSH plus	Piston Ø	D	d_1	d_2	d_3	L	t_1	l_1	yxz
100	35	38	34	31.5	37	10	38	12	3 x 120°
160	58	62	57	53.0	60	10	61	12	4 x 90°
250	120	125	119	114.0	138	20	139	24	6 x 60°

C calibration sleeve							
KSH plus	Piston Ø	D	d_1	d_2	L	l_1	R
100	35	$45.6_{\pm 0.1}$	$35.05^{+0.10}$	36.80	30	10	3
160	58	$69.6_{\pm 0.1}$	$58.05^{+0.15}$	61.55	40	20	4
250	120	$136.0_{\pm 0.1}$	$120.05^{+0.20}$	125.30	70	30	4

9.3 Testing the leakage and tightness of the hydraulic system

The TANDEM clamping force block is hydraulically actuated. The clamping force can be regulated via the initiated hydraulic pressure.

- The following is needed to check for leaks: hydraulic unit or manually actuated hydraulic pump, pressure gauge, shut-off valve and quick couplers.
- Check for leaks in the clamping system in the OPEN and CLOSED positions.

Connect the components for the leakage and tightness test on the clamping system in the following order:

1. Adjust the hydraulic unit with pressure gauge and shut-off valve to minimum pressure.
2. Connect the hydraulic screw fittings to the **frontal** OPEN and CLOSED connections.
3. Link the energy line and hydraulic coupling to the hydraulic screw fittings.

⚠ WARNING

Risk of injury due to leaking of high pressure oil

The bottom hydraulic connections must be tightly closed during the leak test!
If a hose-free direct connection is used, the clamping system must remain firmly screwed to the machine table!

The leakage and tightness test is to be performed in the following order:

1. Actuate the clamping force block with reduced hydraulic pressure.
   Check the clamping force block for free movement by opening and closing the jaws several times.
2. Check the clamping force block with the maximum permissible hydraulic pressure.
3. Inspect the outside of the TANDEM clamping force block for visible signs of damage and oil leakage.

Measures in the event of a leaking hydraulic system

If the clamping system is leaking, check the fittings first.
If the locking screw item 11 is leaking, replace it with item 56. ▸ 10 [🗋 42]

Seal any leaking fittings.
Once the fittings are sealed, check for leaks in the clamping force block and replace if necessary (see the chapter "Disassembling and assembling the clamping system" ▸ 9.1 [🗋 36]).

9.4 Testing quick-change jaw function

A function check consists of checking to see if the motion kinematics are easy to move and if the lock bolt (31) automatically resets.

1. Insert the hexagonal socket screwdriver into the hexagonal socket of one of the three access points on each base jaw.
2. With moderate manual force, turn the screwdriver counterclockwise until it stops in order to lower the lock bolt.
3. Release the torque on the screwdriver and see if the kinematics reset automatically and the lock bolt rises completely up. Check the motion kinematics multiple times in alternating fashion.
4. Check the actuating mechanism by pressing on the front of the lock bolt. To do this, insert the changing jaw (accessory, ▶ 5.1 [🗋 14]) into the hook attachment on the change interface and press it down and back. This briefly presses the lock bolt down, and it automatical-ly snaps into the changing jaw's locking bore.
5. Check to see if the changing jaw can be unlocked by pressing on the front of the lock bolt with a hexagonal screwdriver. To do this, position the hexagonal screwdriver on the lock bolt through the access hole on the change jaw. Press the lock bolt down while tilting the tool toward clamping center. The changing jaw should disengage and can now be lifted off the change interface with two hands or tilted toward the middle of the clamping system. Attention: Never press on the lock bolt with the hexagonal screwdriver without a changing jaw in place. Injury may occur if the tool slips while pressing without a lateral guide.

⚠ CAUTION

Risk of injury from screwdriver slipping!

Pressing on the lock bolt with the hexagonal screwdriver without a changing jaw in place can result in injury from the screwdriver slipping.

- **Never press on the lock bolt with the hexagonal screwdriver without a changing jaw in place.**

10 Seal Kit and Parts List

When ordering spare parts, the type, size and, if possible, the serial number of the clamping force block must always be stated to avoid delivery mistakes.
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.

10.1 Seal kit lists

KSHplus 100-BWM, KSH-LH plus 100-BWM (ID 0405239)

Item	Designation	Quantity
12	Turcon Glyd Ring	1
15	Sealing ring	1
17	O-ring, DIN 3771 50 x 2.00	1
18	O-ring DIN 3771	4
20	Turcon Glyd Ring	1
22	Flat gasket	2
26	O-ring DIN 3771	2
50	O-ring DIN 3771	2
56	Locking screw DIN908 with copper sealing ring	2

KSHplus 160-BWM, KSH-LH plus 160-BWM (ID 0405339)

Item	Designation	Quantity
12	Turcon Glyd Ring	1
15	Sealing ring	1
17	O-ring, DIN 3771 76 x 2.00	1
18	O-ring DIN 3771	4
20	Turcon Glyd Ring	1
22	Flat gasket	2
41	O-ring, DIN 3771 5.5 x 1.00	2
50	O-ring DIN 3771	2
56	Locking screw DIN908 with copper sealing ring	2

KSHplus 250-BWM, KSH-LH plus 250-BWM (ID 0405559)

Item	Designation	Quantity
12	Turcon Glyd Ring	1
15	Sealing ring	1
17	O-ring, DIN 3771 238 x 2.00	1
18	O-ring DIN 3771	4
20	Turcon Glyd Ring	1
50	O-ring DIN 3771	2

56	Locking screw DIN908 with copper sealing ring	2

Wear parts – replacement recommended during maintenance
The sealing kit can only be ordered as a compete kit.

10.2 Accessory packs

KSHplus 100-BWM, KSH-LH plus 100-BWM

Item	Designation	Quantity
8	Plug	4
9	Fitting screw, 10f7/M8	2
18	O-ring, DIN 3771 9 x 2.00	4
19	Screw, DEI 4762/10.9 M8 x 30 mm	4
27	Clamping sleeve, DIN EN ISO 13337 DRM. 11 x 16	2
50	O-ring DIN 3771 5.28 x 1.78 FKM 75	4
56	Locking screw DIN908 with copper sealing ring	2

KSHplus 160-BWM, KSH-LH plus 160-BWM

Item	Designation	Quantity
8	Plug	4
9	Fitting screw, 12f7/M10	2
18	O-ring, DIN 3771 12 x 2.00	4
19	Screw, DEI 4762/10.9 M10 x 35 mm	4
27	Clamping sleeve, DIN EN ISO 13337 DRM. 13 x 18	2
50	O-ring DIN 3771 5.28 x 1.78 KFM 75	4
56	Locking screw DIN908 with copper sealing ring	2

KSH-LH plus 250-BWM

Item	Designation	Quantity
8	Plug	4
9	Fitting screw, 14f7/M12	2
18	O-ring, DIN 3771 15 x 1.78	4
19	Screw, DEI 4762/10.9 M12 x 45 mm	4
27	Clamping sleeve, DIN EN ISO 13337 DRM. 16 x 22	2
52	T-handle for KSP M10	2
53	Set-screw, DIN EN ISO 4026 M10 x 30 mm	2
50	O-ring DIN 3771 5.28 x 1.78 KFM 75	4
56	Locking screw DIN908 with copper sealing ring	2

10.3 Parts lists

KSHplus 100-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck piston	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw	2
10	Funnel lubrication nipple	4
11	Locking screw for hydraulics	2
12**	Turcon Glyd Ring	1
13	Sound absorber	1
14	Screw	1
15**	Sealing ring	1
16	Countersunk screw	4
17**	O-ring	1
18***	O-ring	4
19***	Screw	4
20**	Turcon Glyd Ring	1
21	Countersunk screw	10
22**	Flat gasket	2
23	Set-screw	5
24	Set-screw	2
25	Countersunk screw	2
26	O-ring	2
27***	Clamping sleeve	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin	2
50	O-ring	2
56***	Locking screw DIN908 with copper sealing ring	2

KSH-LHplus 100-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck piston	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw	2
10	Funnel lubrication nipple	4
11	Locking screw for hydraulics	2
12**	Turcon Glyd Ring	1
13	Sound absorber	1
14	Screw	1
15**	Sealing ring	1
16	Countersunk screw	4
17**	O-ring	1
18***	O-ring	4
19***	Screw	4
20**	Turcon Glyd Ring	1
21	Countersunk screw	10
22**	Flat gasket	2
23	Set-screw	5
24	Set-screw	2
25	Countersunk screw	2
26	O-ring	2
27***	Clamping sleeve	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin	2
50	O-ring	2
56***	Locking screw DIN908 with copper sealing ring	2

KSHplus 160-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck piston	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw	2
10	Conical lubrication nipple	4
11	Locking screw for hydraulics	2
12**	Turcon Glyd Ring	1
13	Sound absorber	1
14	Screw	1
15**	Sealing ring	1
16	Screw	4
17**	O-ring	1
18***	O-ring	4
19***	Screw	4
20**	Turcon Glyd Ring	1
21	Countersunk screw	15
22**	Flat gasket	2
23	Set-screw	4
25	Countersunk screw	2
26	O-ring	2
27***	Clamping sleeve	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin	1
41**	O-ring	2
50	O-ring	2
56***	Locking screw DIN908 with copper sealing ring	2

KSH-LHplus 160-BWM

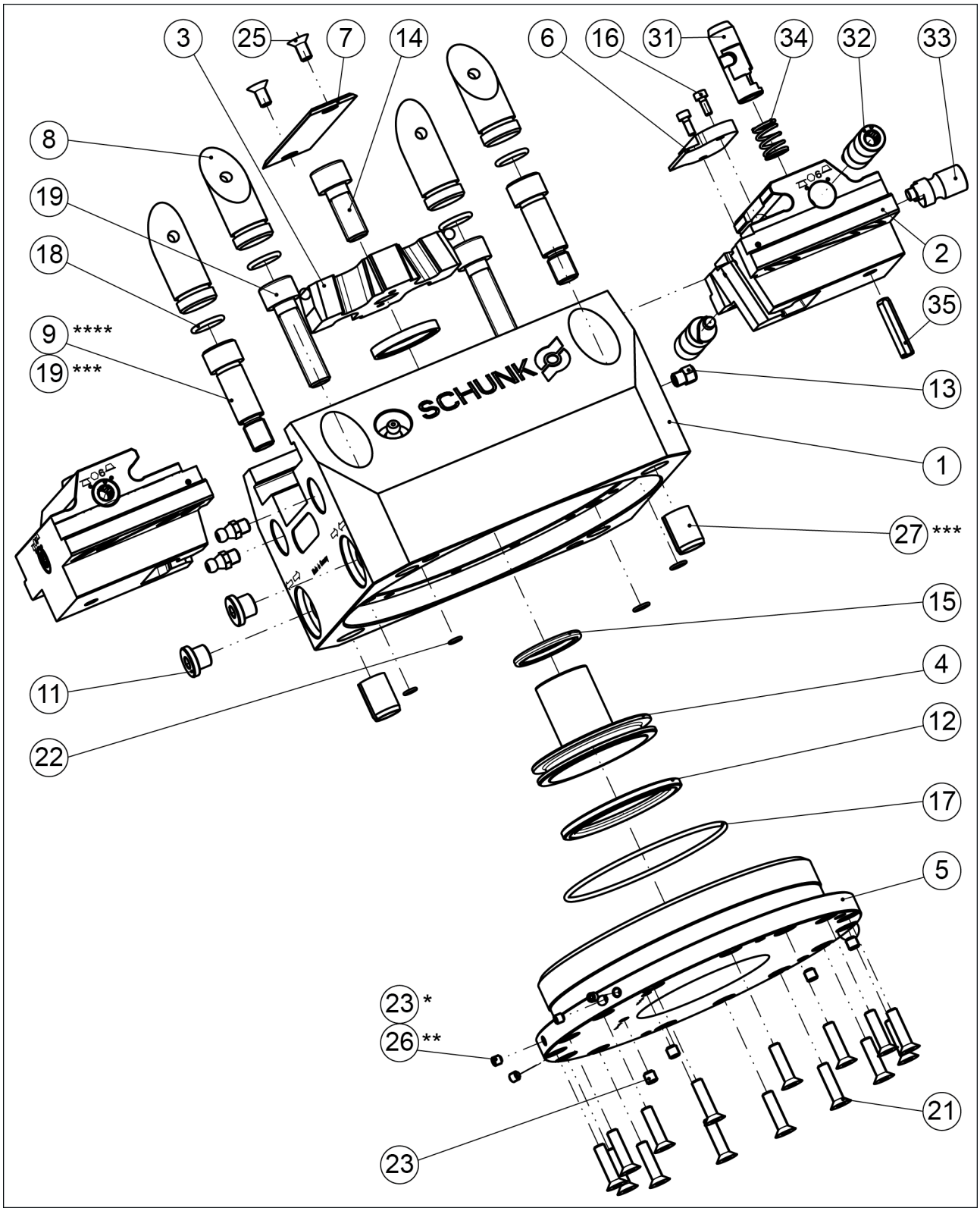
Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck piston	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw	2
10	Conical lubrication nipple	4
11	Locking screw for hydraulics	2
12**	Turcon Glyd Ring	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M10 x 25 mm	1
15**	Sealing ring	1
16	Screw	4
17**	O-ring	1
18***	O-ring	4
19***	Screw	4
20**	Turcon Glyd Ring	1
21	Countersunk screw	15
22**	Flat gasket	2
23	Set-screw	4
25	Countersunk screw	2
26	Set-screw	4
27***	Clamping sleeve	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin	1
41**	O-ring	2
50	O-ring	2
56***	Locking screw DIN908 with copper sealing ring	2

KSH-LHplus 250-BWM

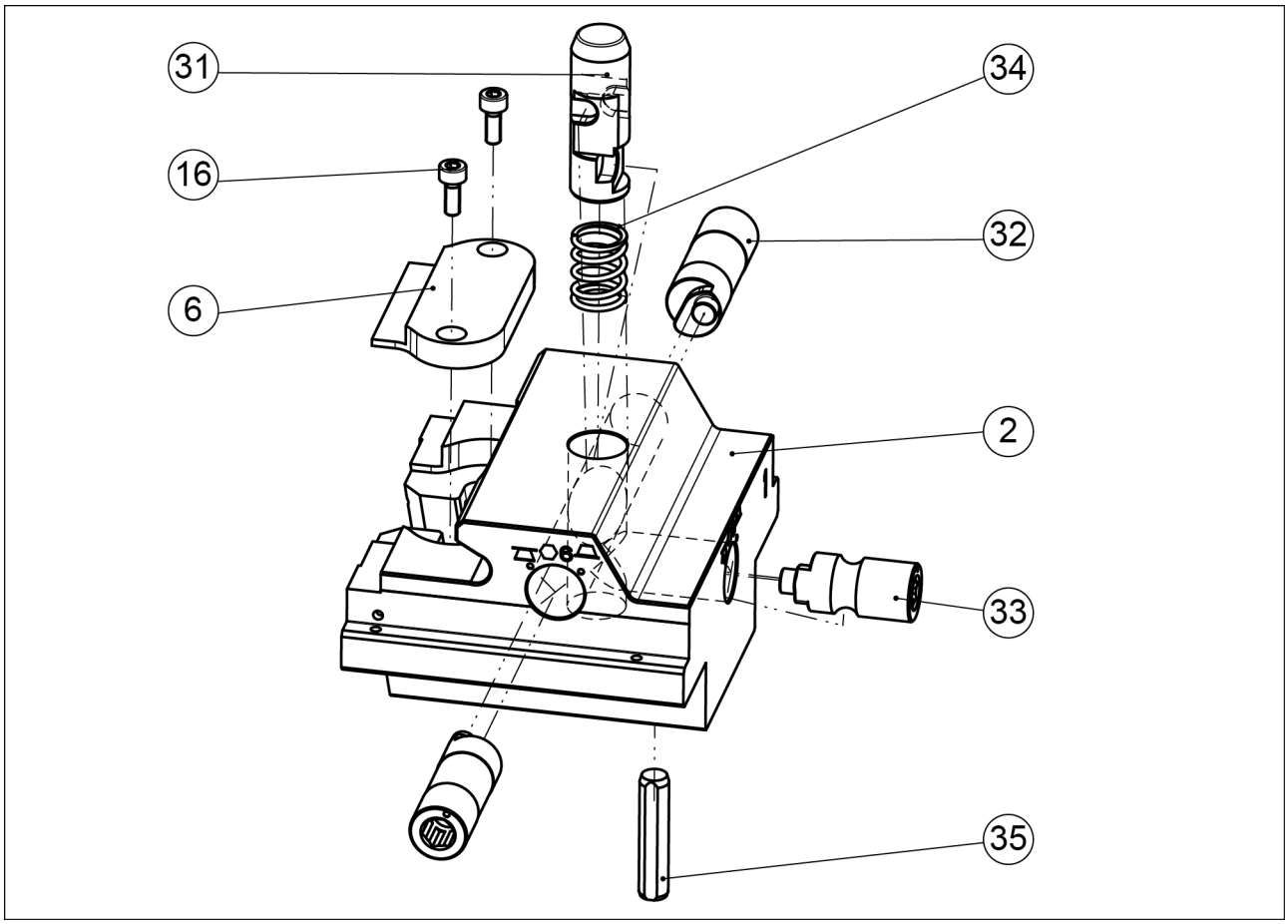
Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck piston	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw	2
10	Conical lubrication nipple	4
11	Locking screw for hydraulics	2
12**	Turcon Glyd Ring	1
13	Sound absorber	1
14	Screw	1
15**	Sealing ring	1
16	Screw	4
17**	O-ring	1
18***	O-ring	4
19***	Screw	4
20**	Turcon Glyd Ring	1
23	Set-screw	2
24	Set-screw	2
25	Countersunk screw	2
27***	Clamping sleeve	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin	1
36	Compression spring	2
50	O-ring	2
56***	Locking screw DIN908 with copper sealing ring	2

* Individual components are made to go together and cannot not be replaced by the customer.
** See seal kit list – parts cannot be ordered individually
*** Included in accessory kit

11 Drawings



*		**	for sizes 160/250
***	Centering with clamping sleeves	****	Centering with fitting screws



Design of the chuck jaw interface

12 Translation of original 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-88512 Mengen

We hereby declare that on the date of the declaration, the following incomplete machine 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:	TANDEM Hydraulic clamping force block (with jaw quick-change system)
Type designation	KSH plus 100-BWM; KSH-LH plus 100-BWM; KSH-Z plus 100-BWM; KSH-LH-Z plus 100-BWM; KSH plus 160-BWM; KSH-LH plus 160-BWM; KSH-Z plus 160-BWM; KSH-LH-Z plus 160-BWM; KSH-LH plus 250-BWM; KSH-LH-Z plus 250-BWM
ID number	0405233; 0405253; 0405234; 0405254; 0405333; 0405353; 0405334; 0405354; 0405526; 0405555

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:

DIN EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN ISO 4413:2010	Hydraulic fluid power – General rules and safety requirements for pneumatic systems and their components

Other related technical standards and specifications:

VDI 3035:2008-05	Design of machine tools, production lines and peripheral equipment for the use of cooling lubricants

The manufacturer agrees to forward on demand the special technical documents for the partly completed machinery 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:
Philipp SchräderAddress: refer to manufacturer's address

Signature: see original declaration

Mengen, March 2015 p.p. Philipp Schräder; Head of Engineering Design

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

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