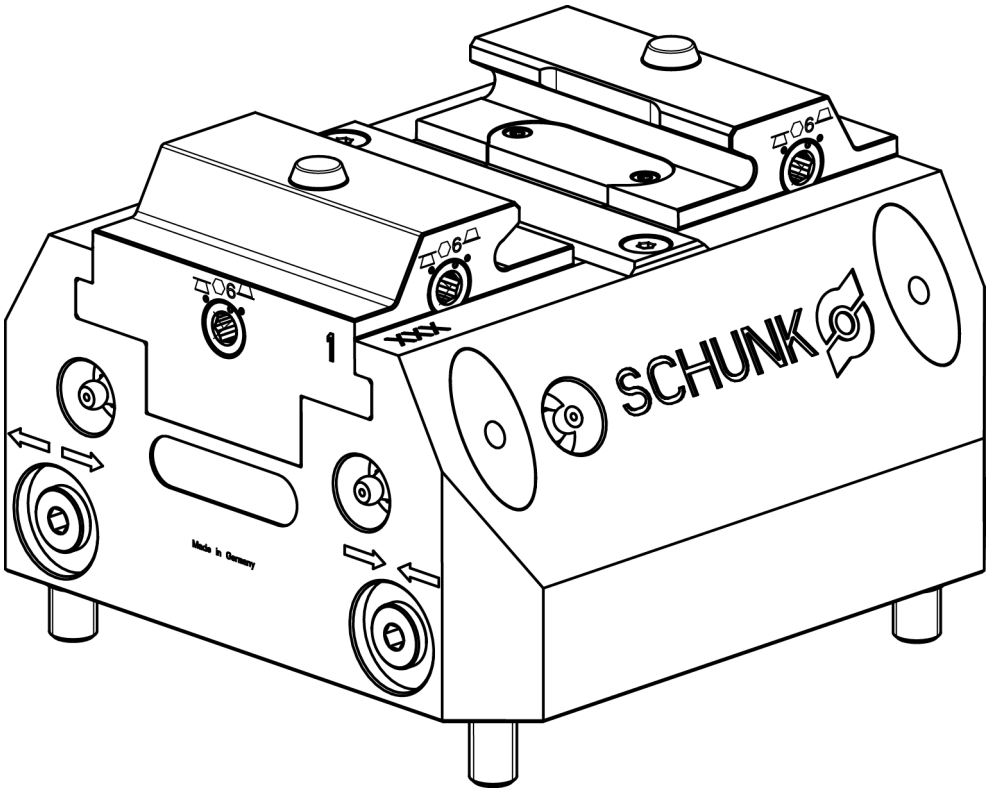
TANDEM clamping block KSPplus-BWM KSP-LHplus-BWM

Assembly and Operating Manual



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

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Table of Contents

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, Page 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.

	***NOTICE*** **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, (☞ 5, Page 14).
- 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

The TANDEM clamping block can cause injury for persons and material damage, for example:

- it is used other than as intended;
- it is not installed or maintained properly;
- the safety and installation instructions, the safety and accident prevention regulations valid at the usage site or the EC Machinery Directive are not observed.

⚠ 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 the workpiece being lost if the air pressure or oil pressure fails or is reduced or from an incorrect control operation (operator error)

- Use pressure maintenance valves.
- Checks in the user's 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 transport.
- 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 clamping block'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 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

Follow 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.
- Replace the chuck jaw mounting screws if there are signs of wear or damage. Only use screws with a quality of 12.9.

Maintenance instructions

Clamping 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 (☞ 6, Page 16).

2.4.1 Constructional changes, attachments, or modifications

Additional threads, bore holes or attachments which are not supplied as accessories by SCHUNK may affect safety. They may only be applied after obtaining the prior consent of SCHUNK.

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

The warranty period is 24 months after delivery date from factory or 500 000 cycles*, if it is used as intended, under the following conditions:

- Observe the applicable documents (☞ 1.2, Page 6)
- Observe the ambient conditions and operating conditions
- Observance of the specified care and maintenance instructions (☞ 9, Page 34)

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

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

4 Scope of Delivery

KSP plus-BWM or KSP-LH plus-BWM clamping block

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

ACCESSORY PACK:
(for contents, see chapter accessory packs (☞ 10.2, Page 40))

4.1 Accessories

(see catalog or data sheets when ordering separately)

Changing jaw type: WTR, WTG (see chapter "WTR, WTG changing jaws" (☞ 7.5, Page 27))

Reversible gripping inserts for WTR, WTG

Clamping bars for WTR, WTG

TANDEM base plates

Valves, pneumatic screws

Hexagonal socket screwdriver

5 Technical data

Installation position	variable
Operating temperature	5 °C – 60 °C
Noise emission [dB(A)]	≤ 70
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:7 4 4

Designation	KSP plus-BWM KSP-LH plus-BWM					
	100	160	250	LH 100	LH 160	LH 250
Stroke per jaw [mm]	2	3	5	6	8	15
Clamping force* at max. pressure [kN]	18	45	55	8	20	20
max. pressure**	9	9	9	9	9	9
Repeatability [mm]***	0.01	0.02	0.03	0.01	0.02	0.03
Repeat accuracy [mm]	0.02	0.02	0.02	0.02	0.02	0.02
max. jaw height [mm]	35	55	70	35	55	70
Weight [kg]	4	11.6	34.5	4	11.7	34.6

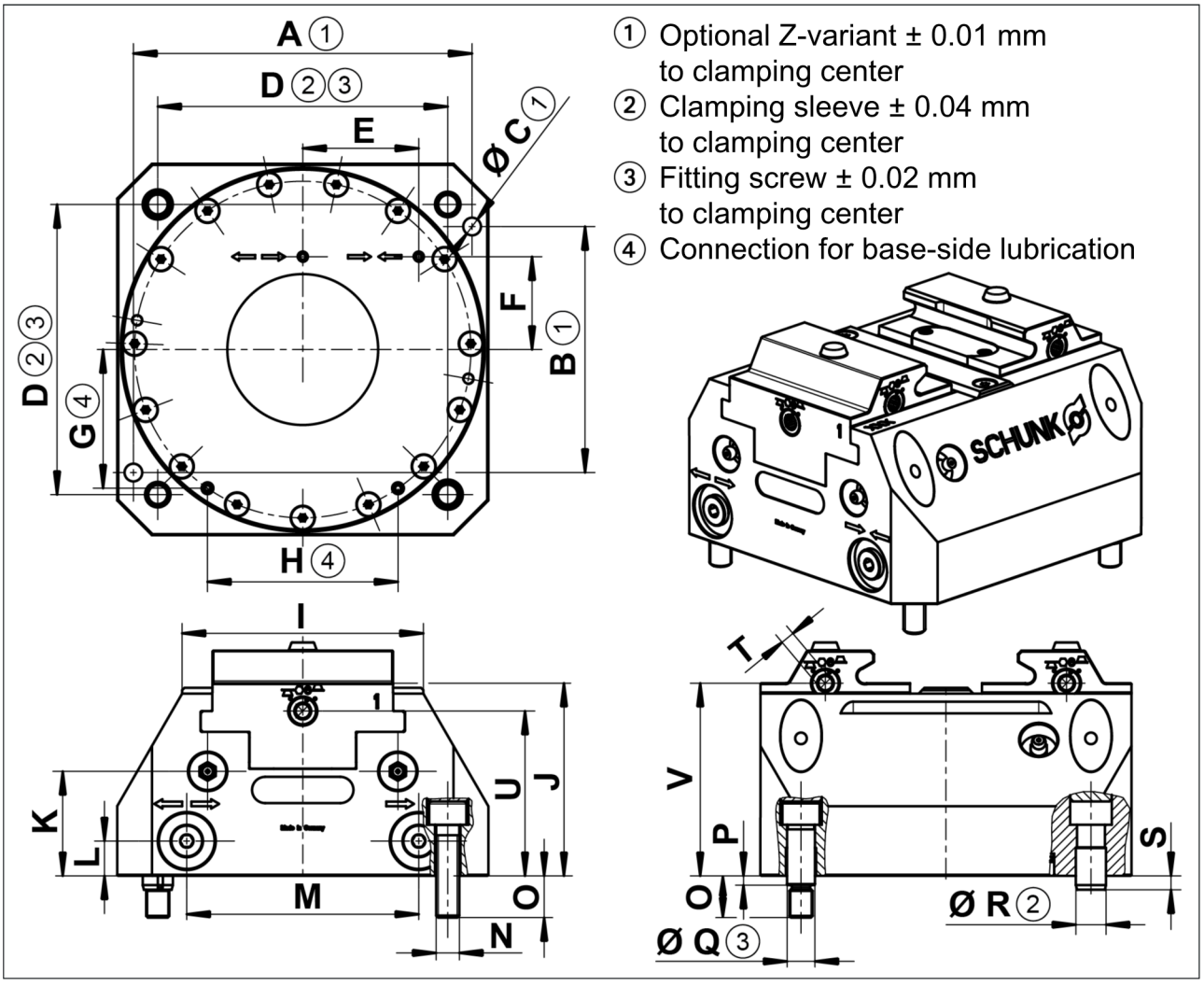
* Clamping force is the arithmetic sum of the individual forces occuring at the jaw, distance “H” (see catalog (☞ 1.2, Page 6)).

** When using an ABP-A base plate, the maximum pressure must be limited to **7 bar**.

*** After 100 consecutive strokes to end positions.

Dimension	KSP plus-BWM KSP-LH plus-BWM		
	100	160	250
A	90	146	230
B	64	106	154
Ø C	6H7 x 12	8H7 x 14	10H7 x 20
D	80	125	200
E	29.5	50	75
F	32	40	64
G	34.5	59.7	92.6
H	55	82	139.6
I	64	104	170
J	70	83	98
K	42	45	52
L	10	15	20
M	59	100	150

Dimension	KSP plus-BWM KSP-LH plus-BWM		
	100	160	250
N	M8	M10	M12
O	15	18	20
P	4	4	5
Ø Q	10 f7	12 f7	14f7
Ø R	11	13	16
S	4.5	6	6
T	5	6	8
U	59.8	71	83
V	69.3	83	99



Dimensions

6 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)

Screw size	M5	M8	M10	M12
Tightening torques M_A (Nm)	9	32	62	108

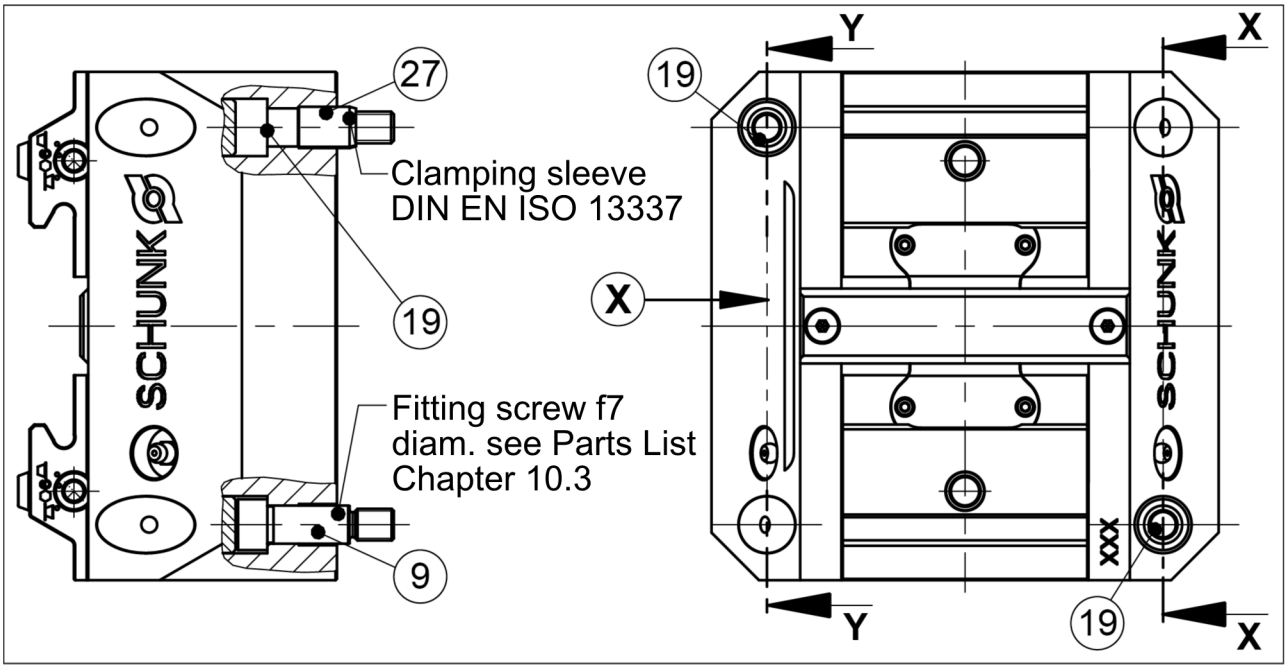
7 Assembly/Function

The item numbers specified for the corresponding individual components relate to chapter drawings(☞ 11, Page 47) 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, Page 7)

7.1 Assembling the clamping block on the machine table

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



Assembling the clamping block

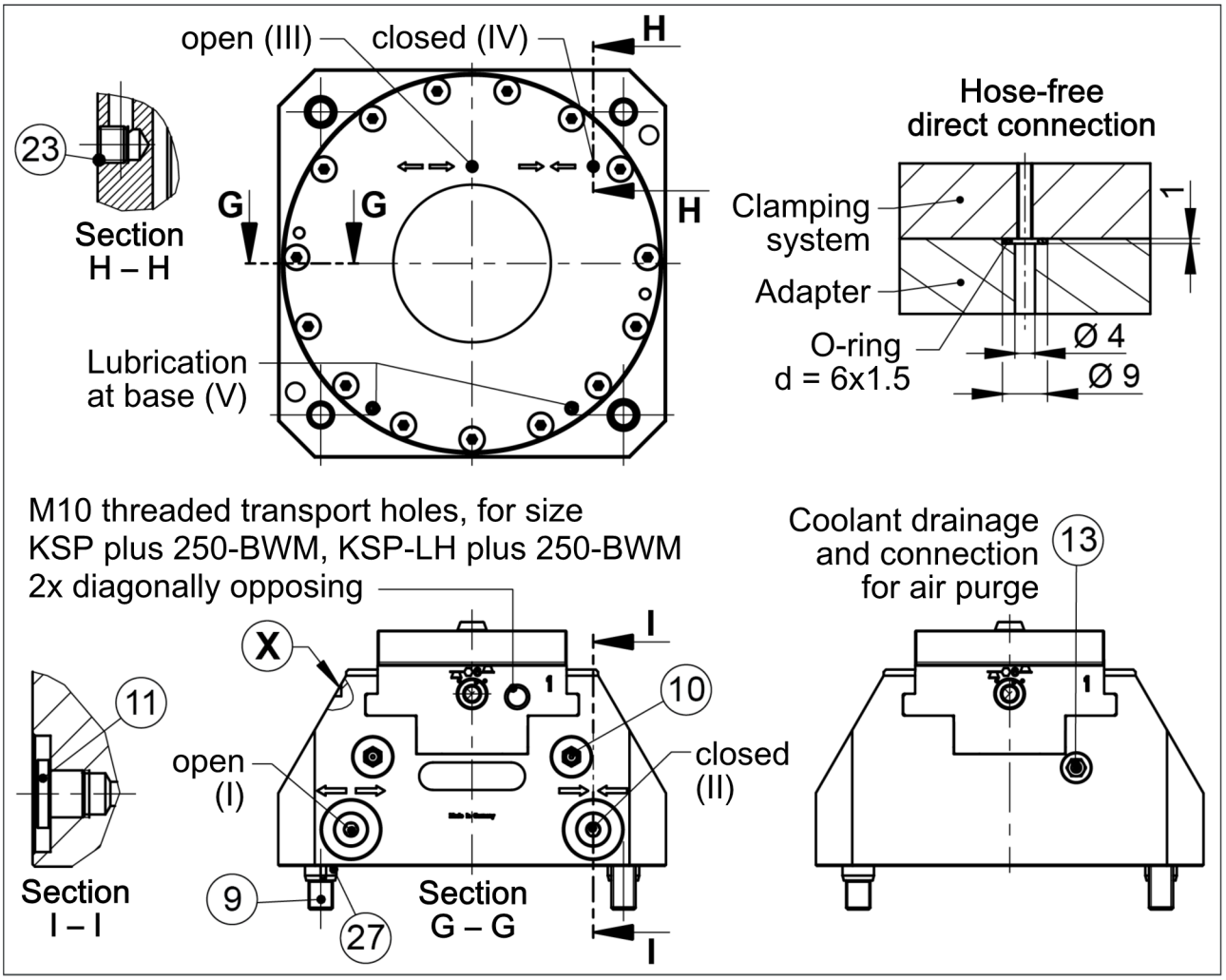
Assembly with clamping sleeves:
Assemble the clamping block on the machine table together with clamping sleeves (27) and screws (19).

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

7.2 Connecting the clamping block

Make sure, that the power supply is off when connecting the clamping block. See Chapter "Basic Safety Notes" (☞ 2, Page 7).

	NOTICE
	Risk of workpiece loss and damage to system from loss of air pressure caused by damaged pneumatic lines! Always make sure the connections are tight, and use appropriate protective covers to protect the pneumatic hoses or lines from hot chips.



Connecting the clamping block

The clamping block has four air connections: **I, II, III, IV**.
Two connections for OPEN (**I** and **III**) and two connections for CLOSED (**II** and **IV**).

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

- Connections **I** and **II** for operation without a base plate

- Connections **III** and **IV** in the base for hose-free, direct connection to the machine table or on the base plate

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

Threads for pneumatic fittings (front):
KSPplus 100-BWM, KSP-LH plus 100-BWM: M5
KSPplus 100-BWM, KSP-LH plus 160-BWM: G1/8"
KSPplus 250-BWM, KSP-LH plus 250-BWM: G1/8"

NOTE:
All four air connections come sealed on delivery of the clamping block. At base with set-screws (23) and on front with locking screws (11).

Requirements for the compressed air supply: Compressed air, compressed air quality according to ISO 8573-1:7 4 4

Unconditioned compressed air contains moisture and dust and oil particles that can lead to malfunctions or premature wear in the clamping block. The oiler should be no more than 2 meters from the coupling point.

The clamping block has two more base connections (**V**) for direct lubrication through the machine table. These connections come sealed on delivery with set-screws (24).

7.3 Assembling the clamping block on the base plate

(If the two parts are delivered separately)

When assembling PLUS series TANDEM clamping blocks onto **ABP-h, ABP-a** or **SBP** TANDEM base plates, use the shorter mounting screws included in the base plate accessory pack instead of the standard mounting screws (19) that come with the clamping block.

For **KSPplus 100-BWM:** Use the **M8x30** screws from the base plate accessory pack instead of the M8x35 screws (19).

For **KSPplus 160-BWM:** Use the **M10x35** screws from the base plate accessory pack instead of the M10x40 screws (19).

For **KSPplus 250-BWM:** Use the **M12x40** screws from the base plate accessory pack instead of the M12x45 screws (19).

NOTE:
If the clamping system and base plate are ordered separately, the screws, O-rings and clamping sleeves for assembling the parts are included in the accessory pack that comes with the clamping block.

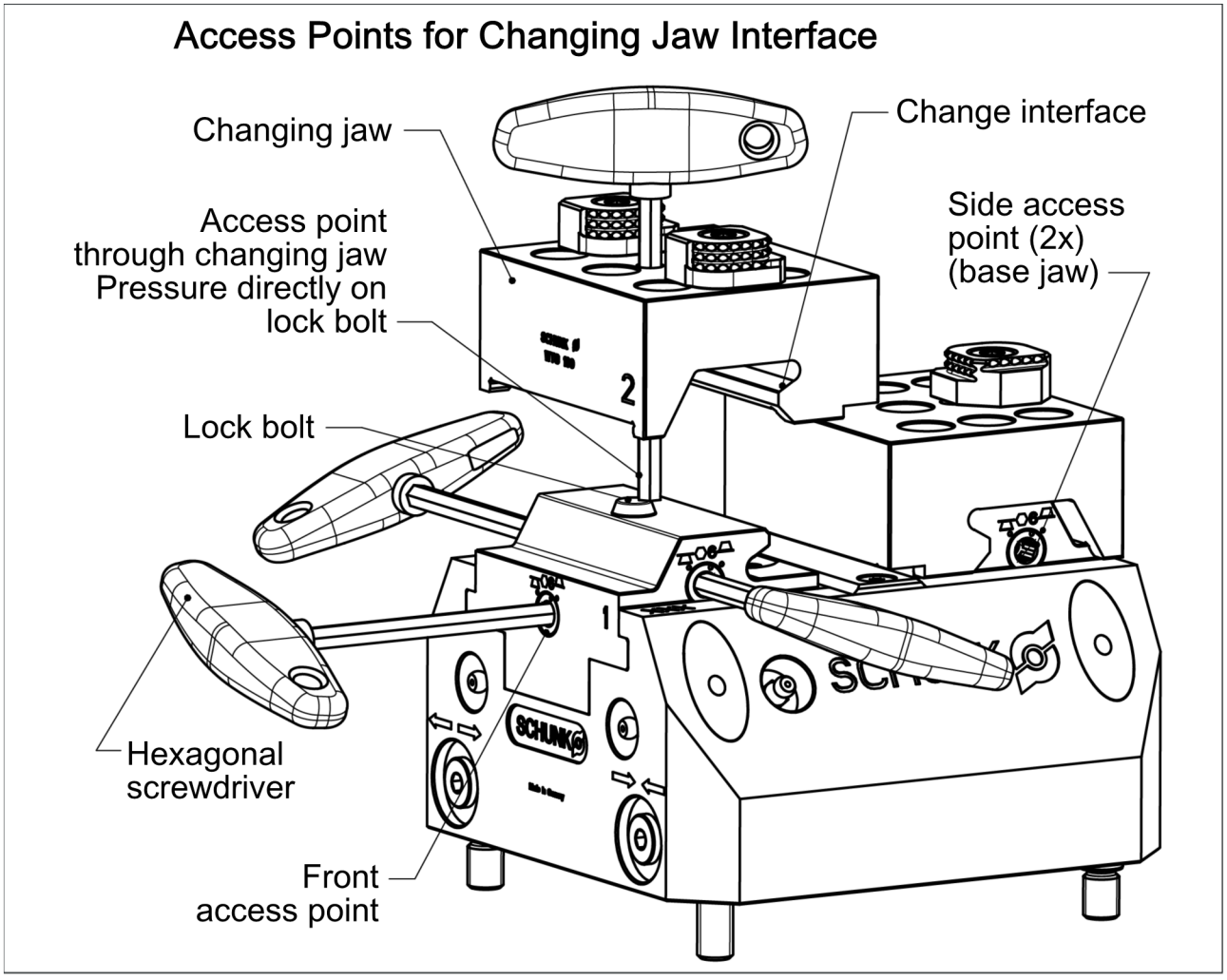
- Do not open the connections on the front of the clamping block (**I, II**) or seal them with suitable dummy plugs (M5 or G1/8").

- Insert the clamping sleeves from the accessory pack into the centering holes on the base plate.
- Remove the seal plugs from the base plate (internal air feed-through **III, IV**) and insert the O-rings from the accessory pack into the counterbores for the air feed-through.
- Mount the clamping block onto the base plate.

NOTE:
When joining, make sure the air feed-throughs for the clamping system and the base plate are precisely aligned.

- Screw both parts together with the four screws (19) from the accessory pack. Be sure to observe the tightening torques (☞ 6, Page 16).
- Remove the locking screws from the pneumatic connections on the base plate.
- Connect the diaphragm pressure switch and set the switch to the desired minimum pressure.

7.4 Functional description of quick-change jaw system



Access Points for Changing Jaw Interface

The TANDEM KSP plus-BWM/KSP-LH plus-BWM clamping blocks come with a semi-automatic quick-change jaw system for external workpiece clamping. Changing jaws (see Chapter 7.4.2) 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 thanks 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

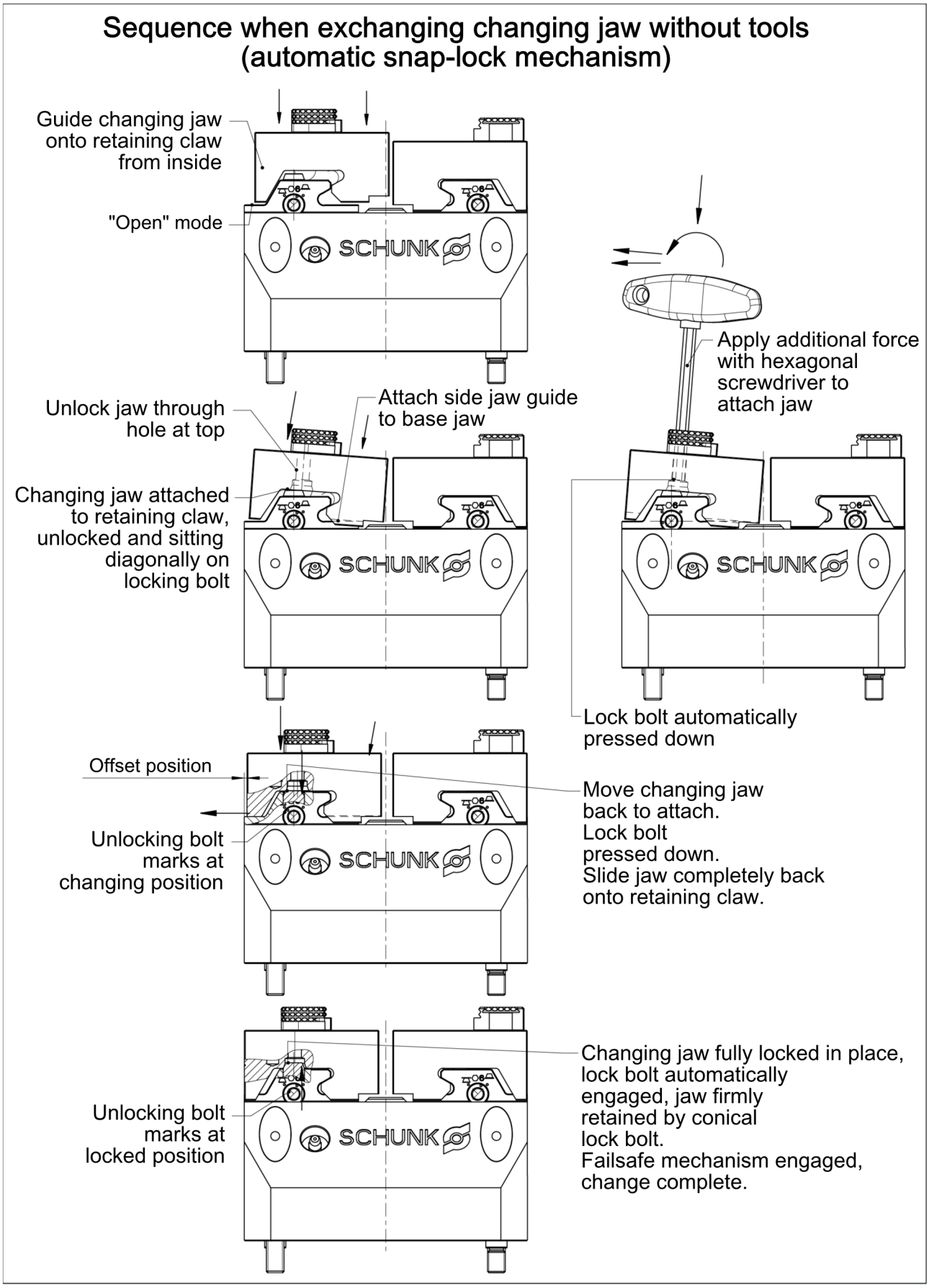
A set of changing jaws consists of two individual jaws designed to fit together. The jaws are marked with numbers "1" and "2". Always insert the changing jaws on the TANDEM clamping block's change interface with the same number in order to ensure maximum repeat clamping accuracy.

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.

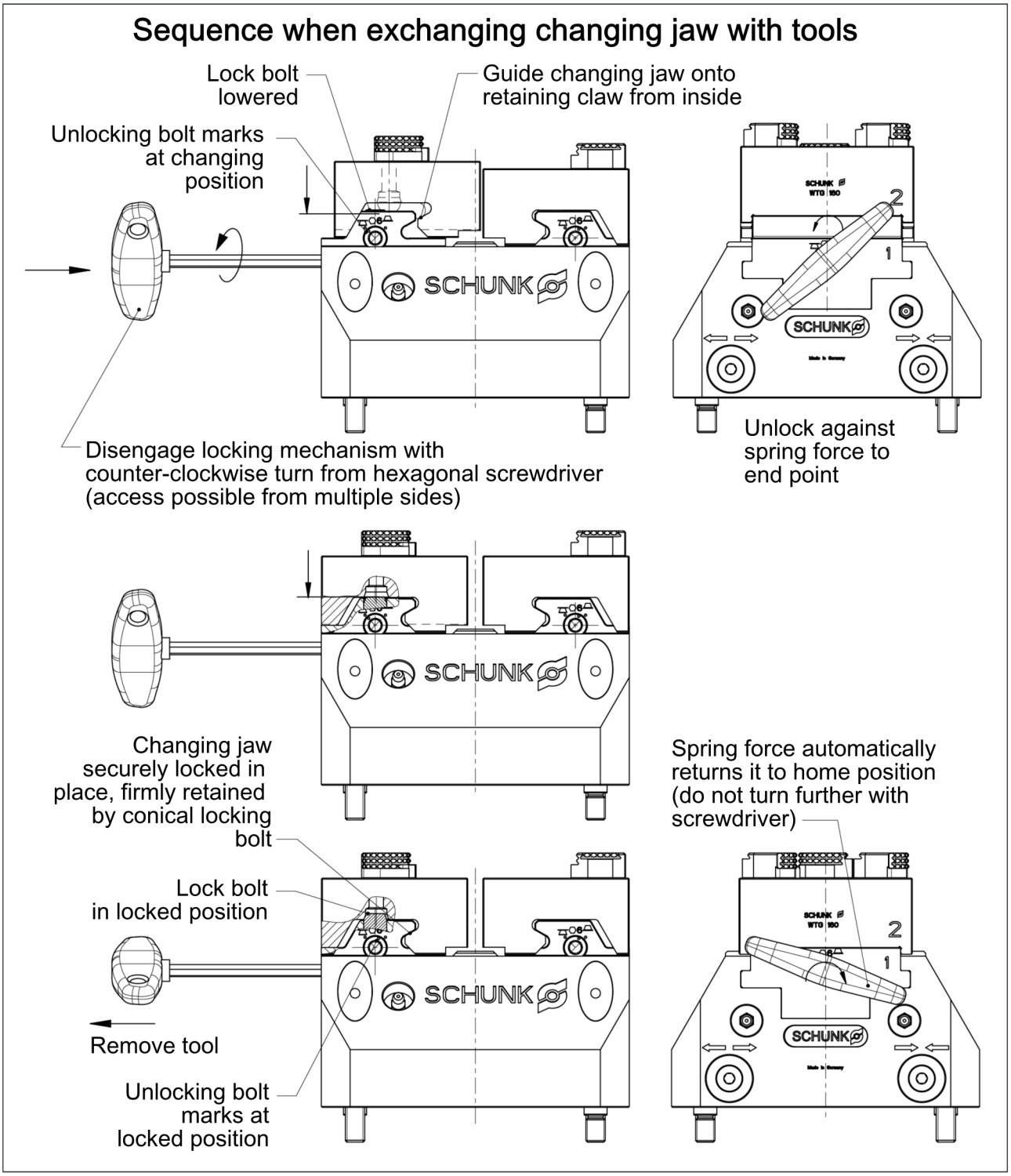
1. Locking in place without tools:
Pull the changing jaw back and press it down to lock it into place without tools. The spring-actuated snap-lock mechanism is automatically triggered, locking the changing jaw to the TANDEM clamping block.



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.



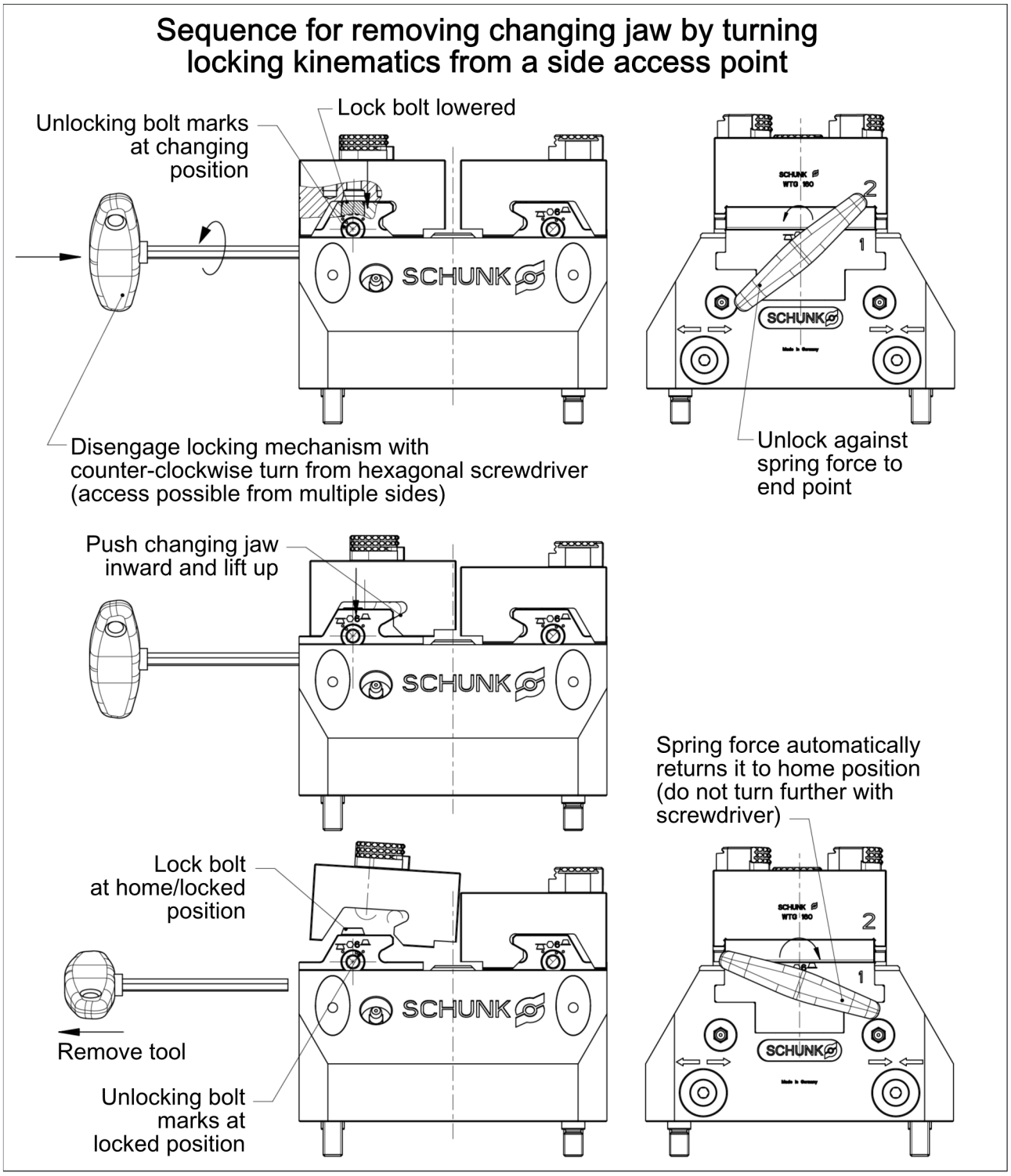
Semi-automatic locking

7.4.2 Removing the changing jaws from the quick-change interface

The jaws can be removed in two ways:

1. Two-handed:

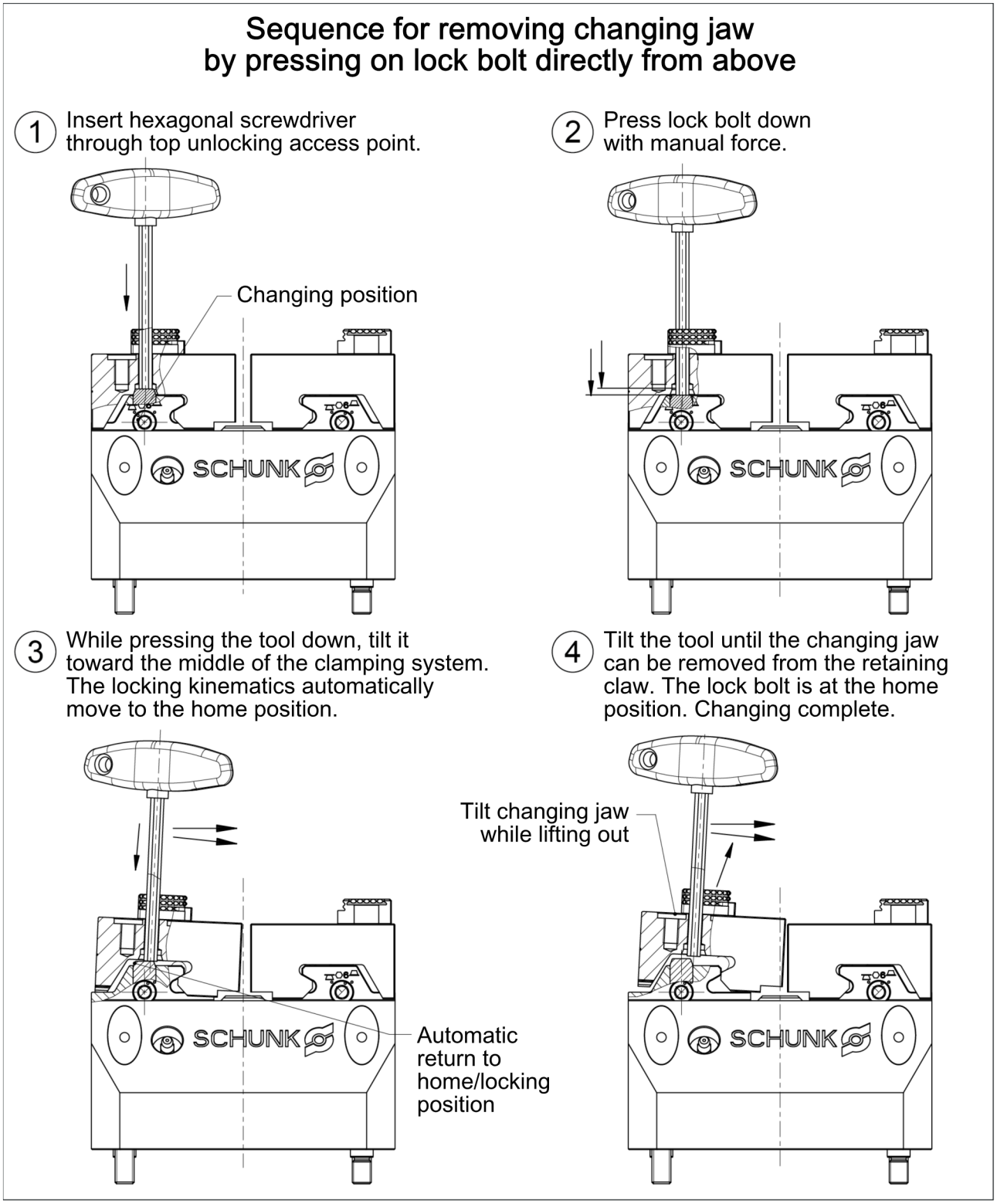
Unlock the jaws with a one-quarter counter-clockwise turn from the hexagonal screwdriver at one of the side access points. At the same time, lift the jaw diagonally from the center upward and out of the change interface.



Two-handed

2. One-handed:

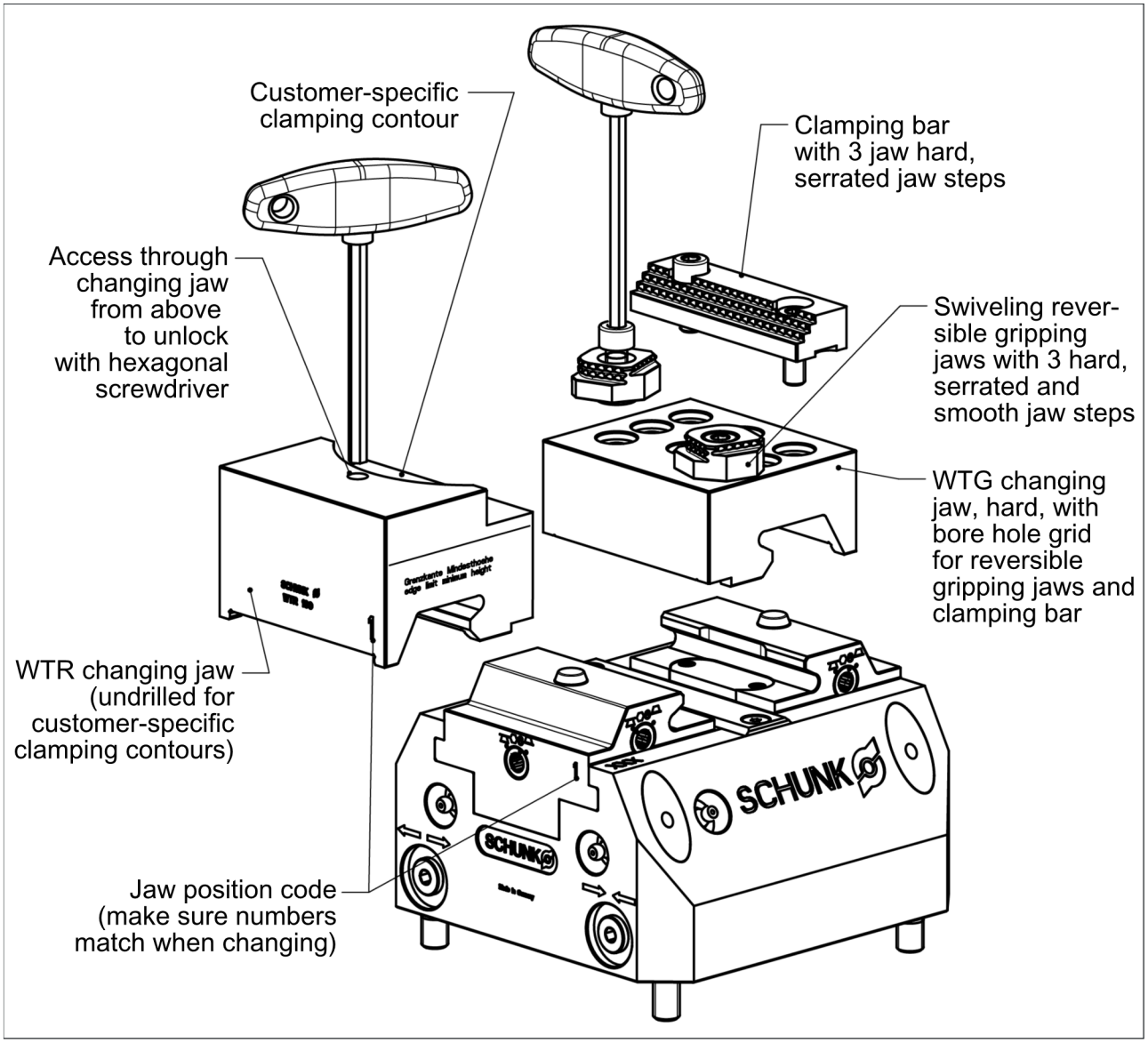
Feed the hexagonal screwdriver through the hole in the changing jaw and unlock it directly from above. The tool drives the lock bolt down and simultaneously can be used to tip the jaw out of the change interface.



One-handed

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

The TANDEM KSPplus-BWM clamping block 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 clamping jaw interface design (☞ 11, Page 47)).

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

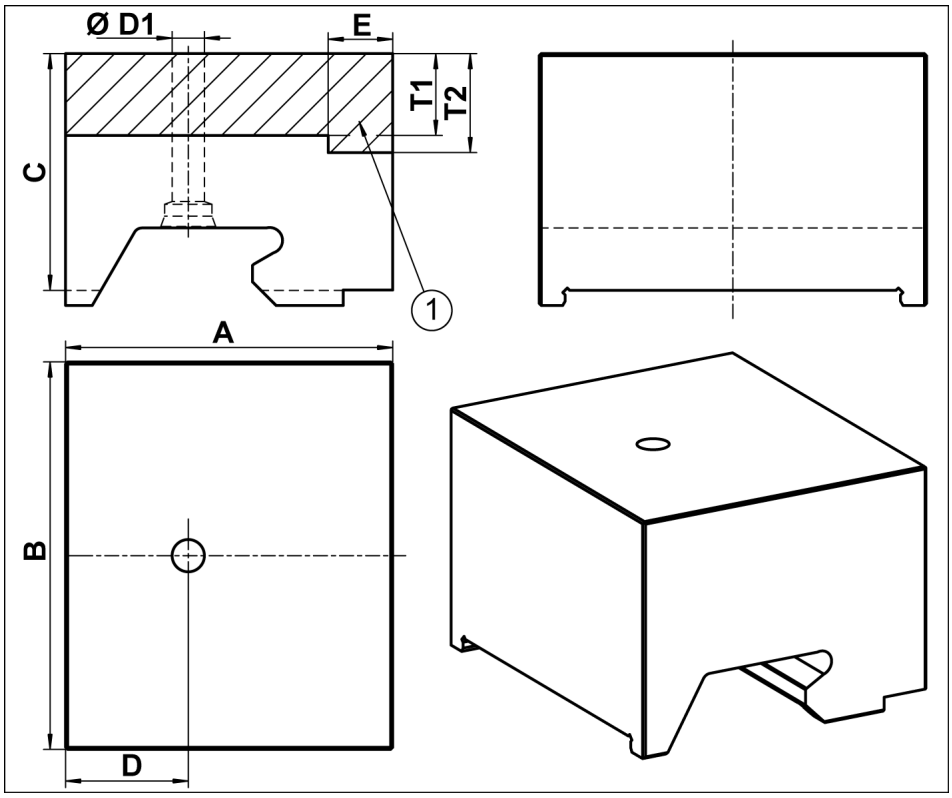
7.5.1 WTR changing jaws

Soft and undrilled.

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

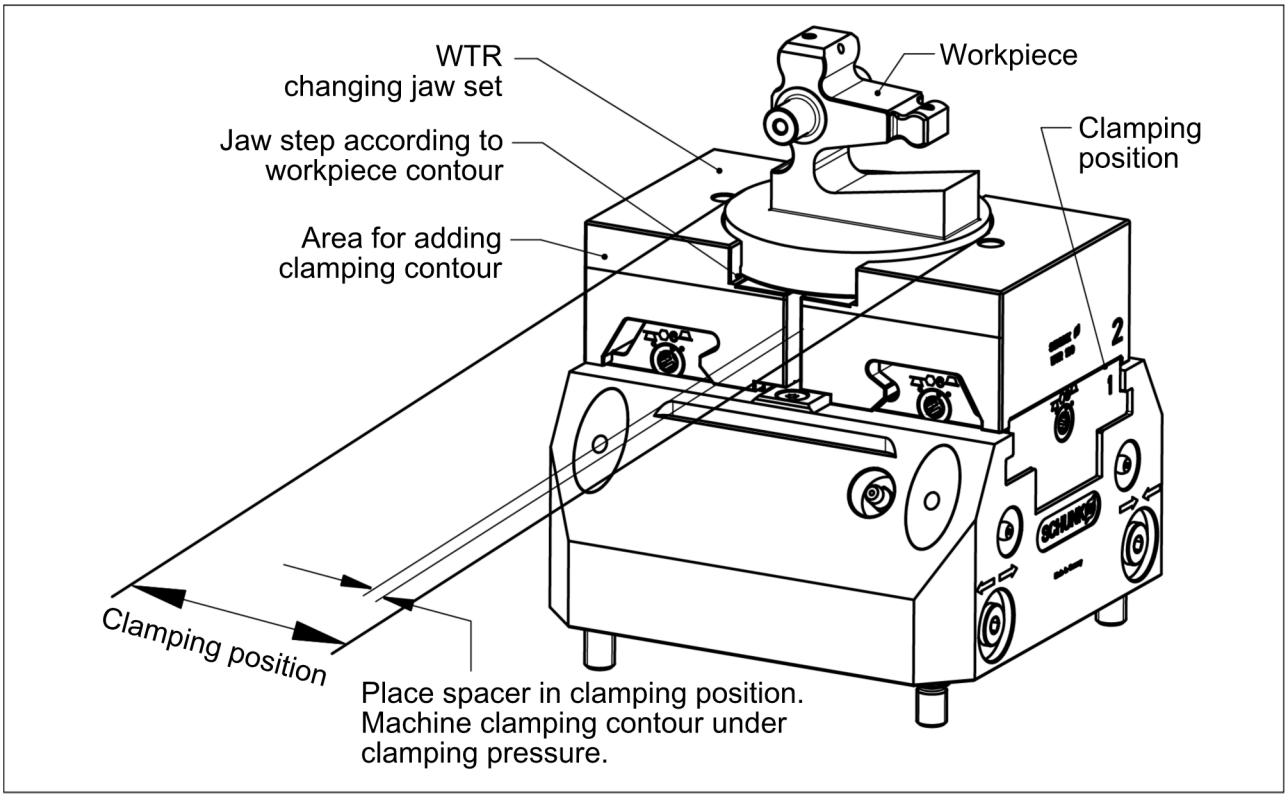
Made out of hardenable 16MnCr5. Workpiece-specific adjusting possible by machining under clamping pressure.

Bore holes and clamping contours can be made to order.



WTR changing jaw

Designation	WTR 100	WTR 160	WTR 250
ID no.	0.402.301	0.402.302	0.402.303
compatible for sizes	KSP/(-LH) plus 100-BWM	KSP/(-LH) plus 160-BWM	KSP/(-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



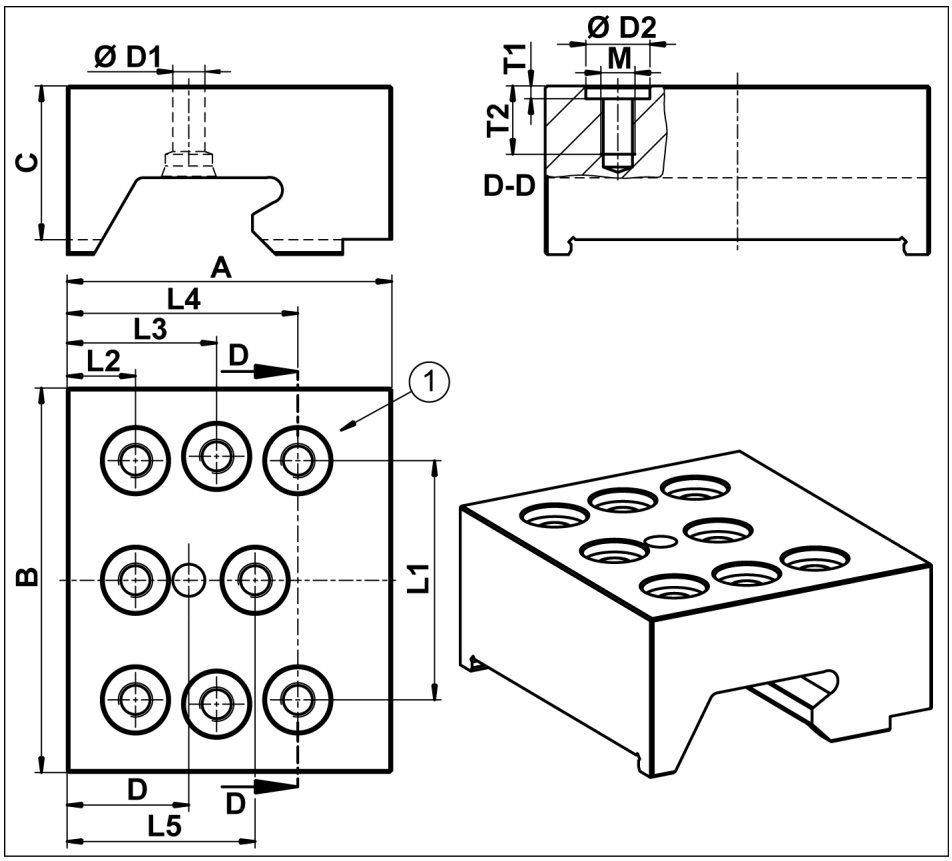
Sample workpiece clamping with WTR changing jaw

7.5.2 WTG changing jaws

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

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

Made out of 16MnCr5. Bore hole grid can be made to order.



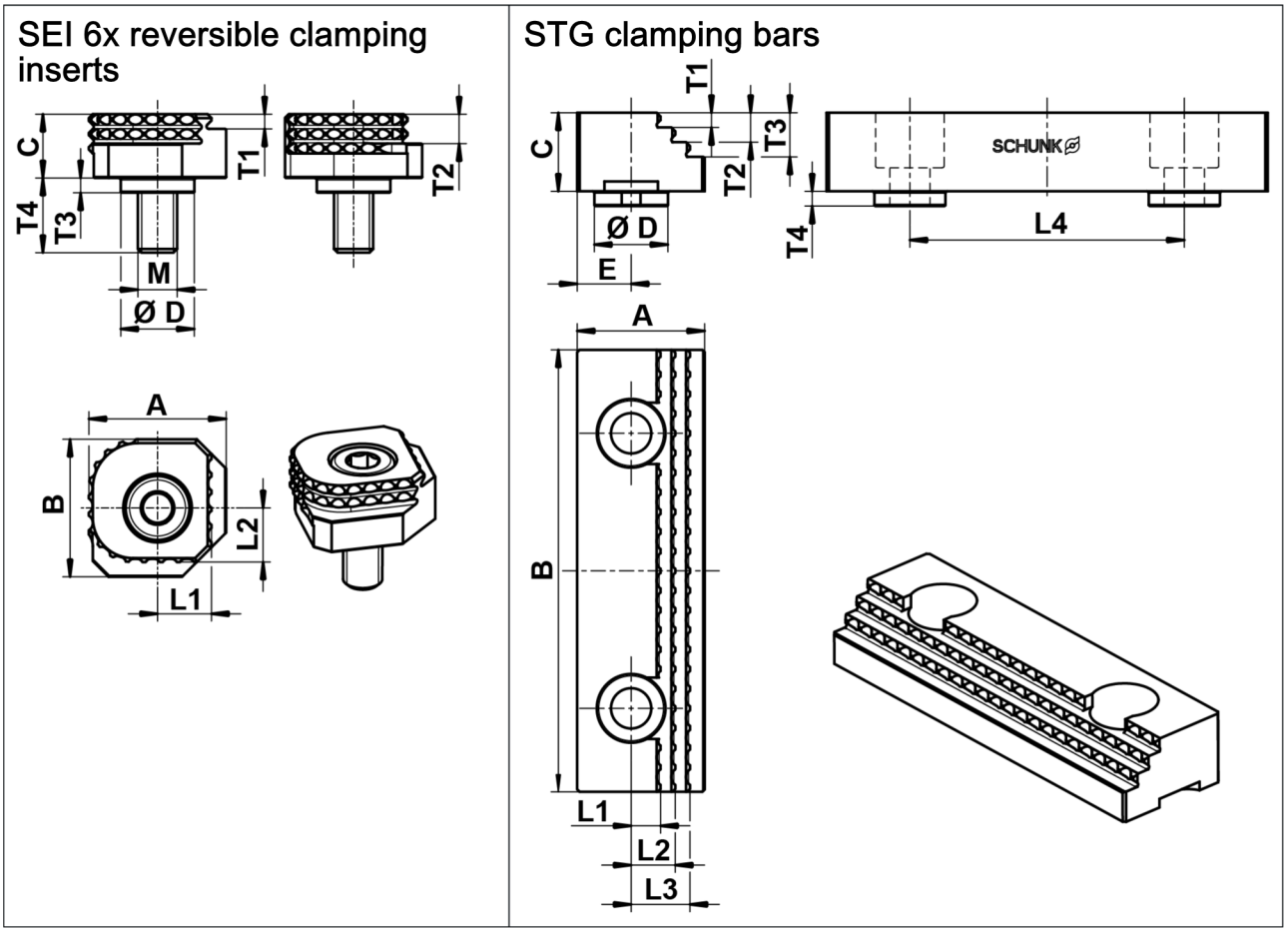
WTG changing jaw

Designation	WTR 100	WTR 160	WTR 250
ID no.	0402311	0402312	0402313
compatible for sizes	KSP/(-LH) plus 100-BWM	KSP/(-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
Ø D1	6	7.5	9.5
Ø D2	10	15	20
L1	30	56	96
L2	9	16	21
L3	22	35	51
L4	35	54	81
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 (☞ 6, Page 16).



WTG changing jaw accessories

Designation	SEI 100-M6	SEI 160-M8	SEI 250-M10
ID no.	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

Designation	SEI 100-M6	SEI 160-M8	SEI 250-M10
T2	5	6	9
T3	2	3	4
T4	10	15	19

Designation	STG 100	STG 160	STG 250
ID no.	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 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 incorrect	Connections incorrect Check connections and functions and connect properly
Unused air connections are not sealed	Seal front or base connections with accessories (included in delivery)
Air connections in use are 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 with original SCHUNK replacement parts (☞ 9.1, Page 34)
Piston rod or piston rod screw broken (overload)	Send clamping system to SCHUNK for repairs or Disassemble clamping system and repair with original SCHUNK replacement parts
Air connections in use are 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 re-setting 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 ma-chine 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 make a complete stroke

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

Drop of clamping force

Possible cause	Solution(s)
Clamping block not tightly sealed	Check connection and seal screws and reseal or replace
Seals damaged	Disassemble clamping block (☞ 9.1, Page 34) and re-place all the seals (see seal kit list (☞ 10, Page 39))
Inadequate lubrication	Lubricate the lubrication nipples with LINOMAX 200 (☞ 9, Page 34)

Clamping block jerky

Possible cause	Solution(s)
Steel guide rollers on sliding surfaces not lubricated	(☞ 9, Page 34)

9 Maintenance and care

The item numbers specified for the corresponding individual components relate to chapter drawings.(☞ 11, Page 47)

The item numbers to the corresponding individual parts refer to the drawing in chapter 11.

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 (2), chuck piston (3) and housing (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. 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, Page 34)). 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.

9.1 Disassembling and assembling the clamping block

NOTE:
The base jaws (2), chuck piston (3) and housing (1) are made to go together. These parts cannot be replaced individually. To replace these parts, ship the entire clamping block to SCHUNK along with a repair order.

Always transport the clamping block without changing jaws. The KSP plus 250-BWM and KSP-LG plus 250-BWM have an M10 threaded transport hole on the front of each base jaw for mounting the T-handles with the set-screws included in the accessory pack. Remove the T-handles before operating.

Observe the following sequence when replacing wear parts (e.g. seals - see seal kit list (☞ 10, Page 39)):

1 Pressurize the clamping block at 6 bar until the jaws are in the OPEN position.

2 Actuate the disengaging mechanics on the quick-change jaw system and remove both changing jaws (WTR or WTG).

3 Remove the covering strip (7).

4 Remove the cylindrical screw (14) from the chuck piston.

5 Remove the pressure line.

6 Pull the plug (8) out of the housing (1).

7 Loosen the screws (9, 19) and remove the clamping system from the base plate or machine table. Air may escape at this point.

8 To remove the chuck piston (3)
for size 100-BMW: screw one M10x >25 screw in the center bore,
for size 160-BMW: screw one M12x >25 screw in the center bore,
for size 250-BMW: screw two M6x >25 screws in the lateral threaded holes.

9 Pull the base jaws (2) out of the housing (1).
The base jaws are multi-part assemblies that can be further disassembled as needed (see assembly drawing (☞ 11, Page 47)). *Attention:* Components may fall out.

- To disassemble a base jaw unit, remove the screws (16) and covering strip (6).
- Pull the cylindrical pin (35) out of the base jaw (2).
  Screw a suitable pulling tool into the internal thread of the cylindrical pin and carefully pull it out.
- Remove the unlocking bolts (32 and 33) from the base jaw.
  Gently press on the lock bolt (31) and hold the base jaw to each side so the three front unlocking bolts fall out.
- Remove the lock bolt (31) and pressure spring (34).

– When assembling the base jaw unit, apply LINO MAX (white) special grease to all sliding surfaces of any moving components.

10 To take off the cover (5), all the screws (21) need to be removed first. To take off the cover (5), screw two screws into the outer threaded holes:
for size 100-BMW, two M3x >25 screws
for size 160-BMW, two M5x >25 screws
for size 250-BMW, two M5x >25 screws.

11 Remove the seals (20, 22).

12 Underlay the clamping block so the cylinder piston (4) can be pushed out.

13 Remove the seals (12, 15, 17).

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

15 Lubricate the new seals (12, 15, 17, 20, 22) with Renolit HLT 2 or requivalent grease.

16 Carefully install the new seals without damaging them.

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

18 Place the cylinder piston (4) into the cylinder. Make sure the cylinder piston (4) is level and not tilted.

19 Gently press the quad ring (12) inward from all sides, so that it goes more easily over the edge of the housing (1).

20 Press the cylinder piston (4) into the cylinder of the housing (1). Do not tilt the cylinder piston (4).

21 Place the O-rings (20, 22) in the housing (1) and the O-ring (17) around the cover (5).

22 Insert the cover (5) into the housing (1), making sure the openings for the pneumatic feed-throughs are aligned.

23 Screw the cover (5) onto the housing (1). Use a torque wrench at the values specified in the table (☞ 6, Page 16).

24 If using clamping sleeves (27) for centering, insert them into the housing (1) at this time.

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

26 Assemble the complete base jaws (2) and the chuck piston (3). Be sure to observe the installation position for the base jaws and the chuck piston. Make sure no parts fall out when installing the base jaw units.

27 Connect the clamping system to the air supply and move the jaws to the OPEN position.

28 Screw down the chuck piston (3) and cylinder piston (4). Tighten the screw (14) with a torque wrench (☞ 6, Page 16).

29 Attach the covering strip (7).

30 Check for leaks (see Chapter 9.2).

31 Check to see that the clamping block is functioning properly. This requires the changing jaws (as WTR or WTG accessories).

9.2 Leak test

The following is needed to check for leaks:
pressure gauge, shut-off valve and quick coupler.

Check for leaks in the clamping block in the CLOSED position.

- 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.

1 Connect the components to the open CLOSED connection in the following order:
pressure gauge, shut-off valve, coupling, supply line.

2 Pressurize the clamping block.

3 Close the shut-off valve and remove the supply line.

4 Let the clamping block sit clamped for 24 hours.

5 After 24 hours, the clamping block is:
- sealed if the pressure gauge indicates a drop in pressure of less than 0.5 bar
- leaking if the pressure gauge indicates a drop in pressure of more than 0.5 bar.

If the clamping system is leaking, check the screws first (e.g., with Metaflux leak detection spray). Seal any leaking screws.

Once the screws are sealed, check for leaks and replace if necessary (see Chapter (☞ 9.1, Page 34)).

9.3 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, (☞ 4.1, Page 13)) into the hook attachment on the change interface and press it down and back. This briefly presses the lock bolt down, and it automatically 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 chang-ing 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 replacement parts, it is essential to indicate the type, size and, if possible, the serial number of the clamping block to avoid incorrect deliveries.
Seals, sealing elements, fittings, springs, bearings, screws and wiper bars, plus parts coming into contact with the workpiece, are not covered by warranty.

10.1 Seal kit lists

KSPplus 100-BWM, KSP-LH plus 100-BWM (ID no. 0405219)

Item	Designation	Quantity
12	Quad ring, 72.62 x 3.53	1
15	Combined sealing element	1
17	O-ring, DIN 3771 93 x 2.00	1
18	O-ring, DIN 3771 9 x 2.00	4
20	O-ring, DIN 3771 4.5 x 1.00	13
22	O-ring, DIN 3771 3.5 x 1.00	2
50	O-ring, DIN 3771 6 x 1.50	2

KSPplus 160-BWM, KSP-LH plus 160-BWM (ID no. 0405319)

Item	Designation	Quantity
12	Quad ring 126.59 x 3.53	1
15	Combined sealing ring	1
17	O-ring, DIN 3771 150 x 2.00	1
18	O-ring, DIN 3771 12 x 2.00	4
20	O-ring, DIN 3771 5.5 x 1.00	17
22	O-ring, DIN 3771 4.5 x 1.00	2
50	O-ring, DIN 3771 6 x 1.50	2

KSPplus 250-BWM, KSP-LH plus 250-BWM (ID no. 0405519)

Item	Designation	Quantity
12	Quad ring, 209.14 x 3.53	1
15	Combined sealing ring	1
17	O-ring, DIN 3771 238 x 2.00	1
18	O-ring, DIN 3771 15 x 1.78	4
20	O-ring, DIN 3771 7.0 x 1.00	21

22	O-ring, DIN 3771 5.5 x 1.00	2
50	O-ring, DIN 3771 6 x 1.50	2

Wear parts - recommend replacing when maintenance is performed

The seal kit can only be ordered as a compete kit.

10.2 Accessory packs

KSPplus 100-BWM, KSP-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 M8x30 mm	4
27	Clamping sleeve, DIN EN ISO 13337 11 x 16	2
50	O-ring, DIN 3771 6 x 1.50	2

KSPplus 160-BWM, KSP-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 13 x 18	2
50	O-ring, DIN 3771 6 x 1.50	2

KSPplus 250-BWM, KSP-LH plus 250-BWM

Item	Designation	Quantity
8	Plug	4
9	Fitting screw, 114f7/M12	2
18	O-ring, DIN 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 16 x 22	2
50	O-ring, DIN 3771 6 x 1.50	2
52	T-handle for KSP M10	2
53	Set-screw DIN EN ISO 4026 M10 x 30 mm	2

10.3 Parts lists

KSPplus 100-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck body	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw 10f7/M8	2
10	Lubrication nipple	4
11	Locking screw	2
12**	Quad ring, 72.62 x 3.53	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M8x20 mm	1
15**	Combined sealing element	1
16	Countersink screw, DIN EN ISO 4026 M3x6 mm	4
17**	O-ring, DIN 3771 93 x 2.00	1
18***	O-ring, DIN 3771 9 x 2.00	4
19***	Screw, DEI 4762/10.9 M8x35 mm	4
20**	O-ring, DIN 3771 4.5 x 1.00	13
21	Countersink screw, DIN EN ISO 10642/10.9 M4x12 mm	11
22**	O-ring, DIN 3771 3.5 x 1.00	2
23	Set-screw, similar to DIN EN ISO 4026/45H M3x3 mm	2
24	Set-screw, similar to DIN EN ISO 4026/45H M4x4 mm IN6RD/VZ/PA	2
25	Countersink screw, DIN EN ISO 10642/10.9 M4x8 mm	2
27***	Clamping sleeve, DIN EN ISO 13337 11 x 16	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin, DEI 7979 - 5 M6x24 mm	2

KSH-LHplus 100-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck body	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw, 10f7/M8	2
10	Lubrication nipple	4
11	Locking screw	2
12**	Quad ring, 72.62 x 3.53	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M8x20 mm	1
15**	Combined sealing element	1
16	Countersink screw, DIN EN ISO 4026 M3x6 mm	4
17**	O-ring, DIN 3771 93 x 2.00	1
18***	O-ring, DIN 3771 9 x 2.00	4
19***	Screw, DEI 4762/10.9 M8x35 mm	4
20**	O-ring, DIN 3771 4.5 x 1.00	13
21	Countersink screw, DIN EN ISO 10642/10.9 M4x12 mm	11
22**	O-ring, DIN 3771 3.5 x 1.00	2
23	Set-screw, similar to DIN EN ISO 4026/45H M3x3 mm	2
24	Set-screw, similar to DIN EN ISO 4026/45H M4x4 mm IN6RD/VZ/PA	2
25	Countersink screw, DIN EN ISO 10642/10.9 M4x8 mm	2
27***	Clamping sleeve, DIN EN ISO 13337 11 x 16	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin, DEI 7979 - 5 M6x28 mm	2

KSPplus 160-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck body	1

4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw, 12f7/M10	2
10	Lubrication nipple	4
11	Locking screw	2
12**	Quad ring, 126.59 x 3.53	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M10x25 mm	1
15**	Combined sealing ring	1
16	Countersink screw, DIN EN ISO 4026 M3x6 mm	4
17**	O-ring, DIN 3771 150 x 2.00	1
18***	O-ring, DIN 3771 12 x 2.00	4
19***	Screw, DEI 4762/10.9 M10x40 mm	4
20**	O-ring, DIN 3771 5.5 x 1.00	17
21	Countersink screw, DIN EN ISO 10642/10.9 M5x20 mm	15
22**	O-ring, DIN 3771 4.5 x 1.00	2
23	Set-screw, similar to DIN EN ISO 4026/45H M5x4 mm	4
25	Countersink screw, DIN EN ISO 10642/10.9 M5x10 mm	2
26	Set-screw, DIN EN ISO 4026/45H M4x4 mm IN6RD/VZ/PA	1
27***	Clamping sleeve, DIN EN ISO 13337 13 x 18	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin, DEI 7979 - 5 M6x24 mm	1

KSH-LHplus 160-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck body	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw, 12f7/M10	2

10	Lubrication nipple	4
11	Locking screw	2
12**	Quad ring, 126.59 x 3.53	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M10x25 mm	1
15**	Combined sealing ring	1
16	Countersink screw, DIN EN ISO 4026 M3x6 mm	4
17**	O-ring, DIN 3771 150 x 2.00	1
18***	O-ring, DIN 3771 12 x 2.00	4
19***	Screw, DEI 4762/10.9 M10x40 mm	4
20**	O-ring, DIN 3771 5.5 x 1.00	17
21	Countersink screw, DIN EN ISO 10642/10.9 M5x20 mm	15
22**	O-ring, DIN 3771 4.5 x 1.00	2
23	Set-screw, similar to DIN EN ISO 4026/45H M5x4 mm	4
25	Countersink screw, DIN EN ISO 10642/10.9 M5x10 mm	2
26	Set-screw, DIN EN ISO 4026/45H M4x4 mm IN6RD/VZ/PA	1
27***	Clamping sleeve, DIN EN ISO 13337 13 x 18	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin, DEI 7979 - 5 M6x28 mm	1

KSPplus 250-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck body	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw, 14f7/M12	2
10	Lubrication nipple	4
11	Locking screw	2
12**	Quad ring, 209.14 x 3.53	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M12 x 30 mm	1
15**	Combined sealing ring	1

16	Countersink screw, DIN EN ISO 7984 M4x8 mm	4
17**	O-ring, DIN 3771 238 x 2.00	1
18***	O-ring, DIN 3771 15 x 1.78	4
19***	Screw, DEI 4762/10.9 M12x45 mm	4
20**	O-ring, DIN 3771 7.0 x 1.00	21
21	Countersink screw, DIN EN ISO 10642/10.9 M5x20 mm	19
22**	O-ring, DIN 3771 5.5 x 1.00	2
23	Set-screw, similar to DIN EN ISO 4026/45H M5x4 mm	2
24	Set-screw, similar to DIN EN ISO 4026/45H M6x6 mm IN6RD/VZ/PA	2
25	Countersink screw, DIN EN ISO 10642/10.9 M6x12 mm	2
26	Set-screw, similar to DIN EN ISO 4026/45H M5x5 mm IN6RD/VZ/PA	1
27***	Clamping sleeve, DIN EN ISO 13337 16 x 22	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin, DEI 7979 - 6 M6x32 mm	1

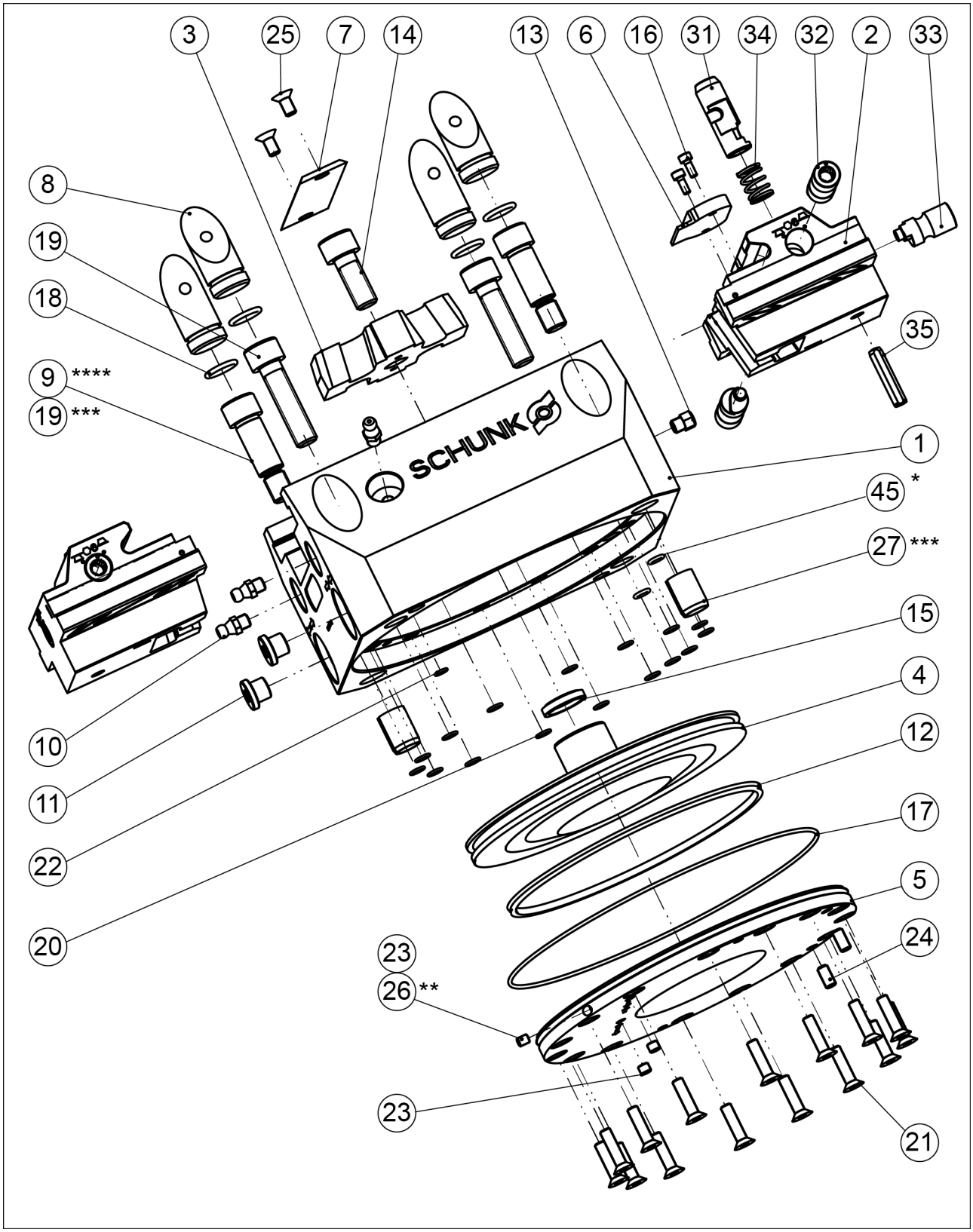
KSH-LHplus 250-BWM

Item	Designation	Quantity
1*	Body	1
2*	Base jaw	2
3*	Chuck body	1
4	Cylinder piston	1
5	Cover	1
6	Covering strip	2
7	Covering strip	1
8***	Plug	4
9***	Fitting screw, 14f7/M12	2
10	Lubrication nipple	4
11	Locking screw	2
12**	Quad ring, 209.14 x 3.53	1
13	Sound absorber	1
14	Screw, DEI 4762/10.9 M12x30 mm	1
15**	Combined sealing ring	1
16	Countersink screw, DIN EN ISO 7984 M4x8 mm	4
17**	O-ring, DIN 3771 238 x 2.00	1
18***	O-ring, DIN 3771 15 x 1.78	4

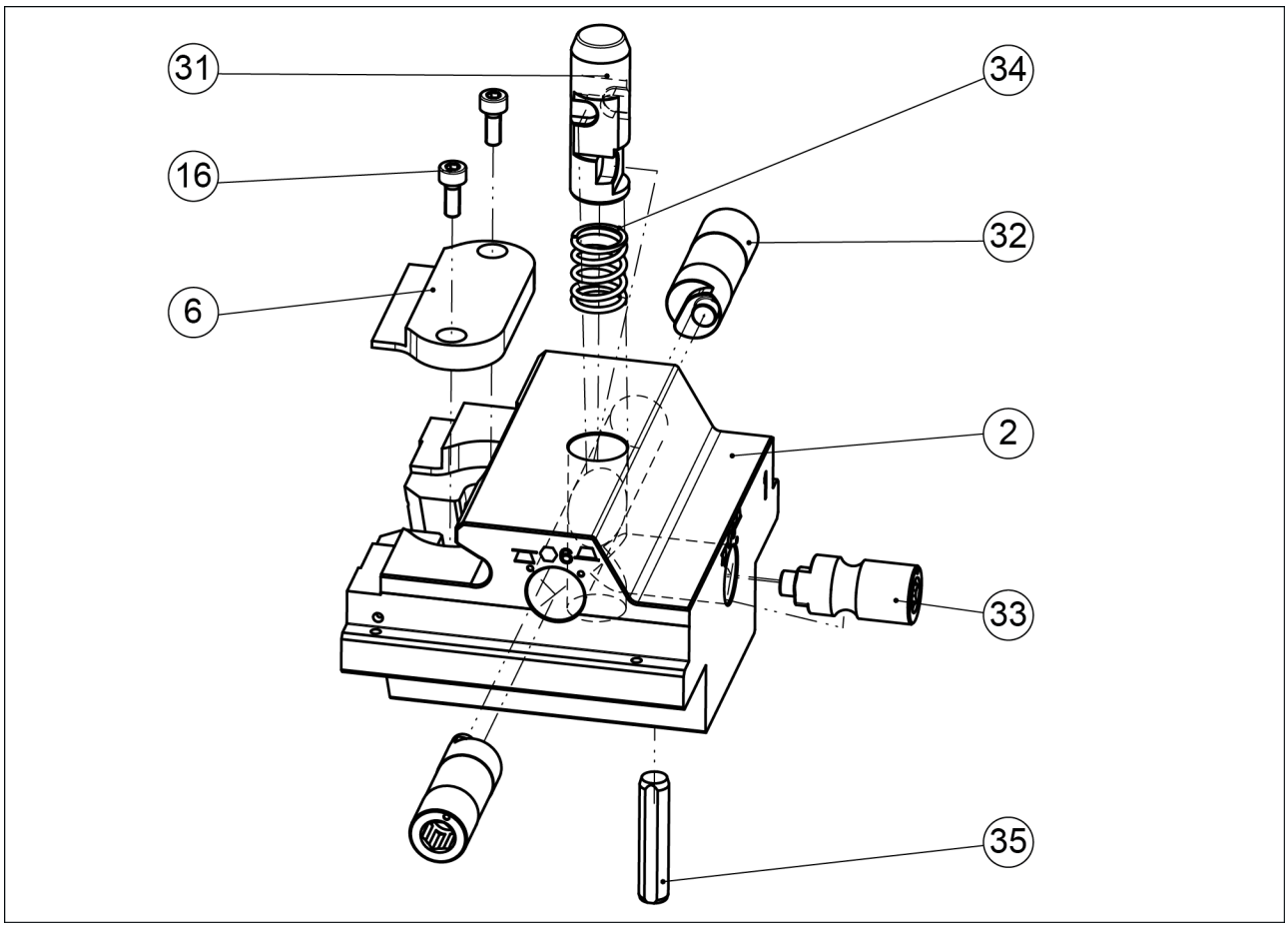
19***	Screw, DEI 4762/10.9 M12x45 mm	4
20**	O-ring, DIN 3771 7.0 x 1.00	21
21	Countersink screw, DIN EN ISO 10642/10.9 M5x20 mm	19
22**	O-ring, DIN 3771 5.5 x 1.00	2
23	Set-screw, similar to DIN EN ISO 4026/45H M5x4 mm	2
24	Set-screw, similar to DIN EN ISO 4026/45H M6x6 mm IN6RD/VZ/PA	2
25	Countersink screw, DIN EN ISO 10642/10.9 M6x12 mm	2
26	Set-screw, similar to DIN EN ISO 4026/45H M5x5 mm IN6RD/VZ/PA	1
27***	Clamping sleeve, DIN EN ISO 13337 16 x 22	2
31	Lock bolt	2
32	Unlocking bolt	4
33	Unlocking bolt 2	2
34	Compression spring	2
35	Cylindrical pin, DEI 7979 - 6 M6x32 mm	1

* 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 pack

11 Drawings



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



Clamping jaw interface design

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 partly completed machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Product designation:	TANDEM Clamping force block pneumatic KSP plus 100-BWM; KSP-LH plus 100-BWM; KSP-Z plus 100-BWM; KSP-LH-Z plus 100-BWM; KSP plus 160-BWM; KSP-LH plus 160-BWM; KSP-Z plus 160-BWM; KSP-LH-Z plus 160-BWM; KSP plus 250-BWM; KSP-LH plus 250-BWM; KSP-Z plus 250-BWM; KSP-LH-Z plus 250-BWM
ID number	0405203; 0405223; 0405205; 0405225; 0405303; 0405323; 0405305; 0405325; 0405503; 0405523; 0405505; 0405525

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

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 4414:2010	Pneumatic fluid power – General rules and safety requirements for 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 metalworking fluids

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 partly completed machinery, has been created.

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

Signature: see original declaration

Mengen, November 2017 p.p. Philipp Schräder; Head of Engineering Design

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

1. Description of the basic safety and health protection requirements, as per 2006/42/EC, Annex I, that apply to and are fulfilled for the scope of the partly completed machinery:

Product designation	TANDEM Clamping force block pneumatic
Type designation	KSP plus 100-BWM; KSP-LH plus 100-BWM; KSP-Z plus 100-BWM; KSP-LH-Z plus 100-BWM; KSP plus 160-BWM; KSP-LH plus 160-BWM; KSP-Z plus 160-BWM; KSP-LH-Z plus 160-BWM; KSP plus 250-BWM; KSP-LH plus 250-BWM; KSP-Z plus 250-BWM; KSP-LH-Z plus 250-BWM
ID number	0405203; 0405223; 0405205; 0405225; 0405303; 0405323; 0405305; 0405325; 0405503; 0405523; 0405505; 0405525

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

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