TANDEM Clamping Block KSP3, KSP3-LH, KSP3-F

Assembly and Operating Manual

Translation of Original Operating Manual

Hand in hand for tomorrow

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.

Table of Contents

1 General

1.1 About this manual

This manual contains important information for the safe, correct use of the product.

It is an integral part of the product and must be kept accessible for personnel at all times.

Personnel must have read and understood this manual before beginning any work. The observance of all safety notes in this manual is a prerequisite to ensure safe work processes.

The illustrations are intended to provide a basic understanding and may deviate from the actual version.

Besides this manual, other documents which apply are those listed under ▸ 1.1.2 [🗋 6]

1.1.1 Illustration of warning notices

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

⚠ DANGER

Denotes a hazard with a high degree of risk that, if not avoided, will result in death or serious injury.

⚠ WARNING

Denotes a hazard with a medium degree of risk that, if not avoided, could result in death or serious injury.

⚠ CAUTION

Denotes a hazard with a low degree of risk that, if not avoided, could result in a minor or moderate injury.

CAUTION

Information about avoiding material damage.

1.1.2 Applicable documents

- General Terms and Conditions *
- Catalog data sheet for the attached product *
- Technical data sheet for optional attachments *
- Approval drawings

Documents marked with a star (*) can be downloaded at **schunk.com**.

1.2 Warranty

The warranty for standard products is 24 months from the date of delivery from the factory, or 50,000 cycles* for manually operated clamping devices and 500,000 cycles* for power operated clamping devices. For special clamping devices, it is 12 months from the date of delivery from the factory, assuming appropriate use in accordance with the following conditions:

- Observe the applicable documents, ▸ 1.1.2 [🗋 6]
- Observance of the ambient conditions and operating conditions, ▸ 2.5 [🗋 8]
- Observance of maintenance and lubrication intervals, ▸ 6.2 [🗋 27]

Parts touching the workpiece and wearing parts are not covered by the warranty.

* One cycle comprises one complete clamping procedure ("opening" and "closing").

1.3 Sizes

This operating manual applies to the following sizes:

- KSP3 64, 100, 140, 160, 200, 250, 315
- KSP3-LH 64, 100, 140, 160, 200, 250, 315
- KSP3-F 64, 100, 140, 160, 200, 250, 315

1.4 Variants

This manual applies to the following variants:

- Clamping force amplification for O.D. clamping (AS)
- Pneumatic monitoring (PM)
- Jig-machined positioning bores (Z)

1.5 Scope of Delivery

Clamping force block
KSP3 or KSP3-LH or KSP3-F
(without top jaws)

ACCESSORY KIT:
(for contents, see sealing kit list and parts list) ▸ 8.1 [🗋 37]

2 Basic safety notes

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

2.1 Appropriate use

- The product is used for clamping metal and plastic workpieces on machine tools.
- The product may only be used within the scope of its technical data.
- The product is designed to be set up on a machine table or machine pallets.
- The product is intended for industrial and commercial use.
- Appropriate use of the product includes compliance with all instructions in this manual.
- Use suitable top jaws with a suitable interface.
- Clamping workpieces with temperatures between 0°C and 100°C.
- The outer dimensions of the workpiece must be smaller than or at most equal to the outer diameter of the clamping device.
- The workpiece must not undergo plastic deformation while under clamping force (clamping indentations are permissible).

2.2 Inappropriate use

The product is not being used appropriately if:

- the product is used as a press or a punch, as a toolholder, as a lathe chuck, as a drill or as a cutting tool.
- the technical data specified are exceeded during usage.
- workpieces are not properly clamped, paying particular attention to the specified clamping forces.
- the top jaws are not mounted properly.
- the product is not being operated properly.
- the product is operated in the stroke end positions.
- the guideways are overloaded due to the chuck jaws being too high or the selected clamping point being too high.
- the product has been insufficiently maintained.
- the product is used for turning applications over 100 RPM without consulting SCHUNK.
- the product is brought into contact with aggressive media, especially acids.
- the product is used in abrasive blasting processes, especially sandblasting.

2.3 Structural changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Only use original spare parts and spares authorized by SCHUNK.

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction in the service life of the product

- Make sure that the product is only used within its defined application parameters.
- Ensure that the product is of a sufficient size for the application.
- Ensure that maintenance and lubricating intervals are observed.
- When machining, use only coolant emulsions with anti-rust properties.
- Depending on the operating conditions, the function must be checked after a certain period of operation.

2.6 Material limitations

The product is made of steel alloys, elastomers, aluminum alloys and brass. In addition, Microgleit LP 410 grease, Branotect anti-rust oil and Renolit HLT2 are incorporated into the product as auxiliary and operating materials. The safety data sheet for Microgleit LP 410 can be found at **www.schunk.com**.

2.7 Chuck Jaws

Requirements of the chuck jaws

When using chuck jaws, please observe the following rules:

- Change chuck jaws at a standstill and without a clamped workpiece.
- Do not use welded jaws.
- Design the chuck jaws to be as low as possible. The clamping point must be as close as possible to the housing. (clamping points at a greater distance cause higher surface pressures in the jaw guides and can significantly reduce the clamping force.)
- If the clamping point is at a greater distance from the housing, the operating pressure must be reduced.
- After a collision, the clamping device and the chuck jaws must be subjected to a crack detection test before being used again. Replace damaged parts with original SCHUNK spare parts.
- The chuck jaw mounting screws and if present, the T-nuts, must be replaced if there are signs of wear or damage. Only use screws of quality grade 12.9 in compliance with the specified tightening torques. For clamping devices with fine serration, the jaw mounting screws must be screwed into the holes closest to the clamping point.

2.8 Personnel qualifications

Inadequate qualification of personnel

Any work on the product by inadequately qualified personnel can lead to serious injuries and considerable material damage.

- All work must be performed by appropriately qualified personnel.
- Personnel must have read and understood the complete manual before beginning any work on the product.
- Observe country-specific accident prevention regulations and the general safety notes.

The following personnel qualifications are required for the various activities on the product:

Qualified electrician Qualified electricians have the professional training, knowledge, and experience to work on electrical systems, to recognize and avoid potential dangers, and know the relevant standards and regulations.

Specialist personnel Specialist personnel have the specialized training, knowledge, and experience to perform the tasks entrusted to them, to recognize and avoid potential dangers, and know the relevant standards and regulations.

Instructed person

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

Manufacturer's service personnel

The manufacturer's service personnel have the specialized training, knowledge, and experience to perform the work entrusted to them and to recognize and avoid potential dangers.

2.9 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff in the event of a danger that may interfere with their health or safety at work.

2.10 Transport

Handling during transport

Incorrect handling during transport can make the product unsafe and risks the danger of serious injuries and considerable material damage.

- During transport and handling, secure the product to prevent it from falling.
- Use the transport thread on the clamping device.

2.11 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly can make the product unsafe and can risk the danger of serious injuries and considerable material damage.

- All work must only be performed by appropriately qualified personnel.
- Secure the system against accidental operation during all work.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

2.12 Protection during commissioning and operation

Falling or violently ejected components

Falling and ejected components can lead to serious injury or death.

- Take suitable protective measures to secure the danger zone.

2.13 Notes on safe operation

Incorrect manner of working by personnel

An incorrect manner of working can make the product unsafe and risks serious injuries and considerable material damage.

- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. Products for special ambient conditions are excluded.
- Rectify malfunctions as soon as they occur.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention, and environmental protection regulations for the application field of the product.
- Do not start the machine spindle until the force has built up in the chuck jaw and clamping is complete in the permissible operating range.
- Unclamping may only occur once the machine spindle has come to a standstill.

IMPORTANT!

Following a longer shutdown period (more than 8 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.

2.14 Disposal

Handling of disposal

Incorrect handling during disposal can make the product unsafe and risks serious injuries and considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.15 Fundamental dangers

General

- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- Do not reach into the open mechanism or movement area of the product during operation.

2.16 Protection against dangerous movements

Safe condition

1. Clamping force block with workpiece:
   Workpiece clamped outside the end positions of the clamping force block with clamping pressure applied.
2. Clamping force block without workpiece, without clamping or release pressure applied.
3. Clamping force block with spring force:
   Clamped without energy without workpiece.
   Special feature: Due to the built-in spring, an opened clamping force block clamps without release pressure.
   Unexpected clamping movements could result if the release pressure fails. Take suitable measures, e.g. a pilot-controlled check valve with manual venting.

Unexpected movements

If the system still retains residual energy, serious injuries can be caused while working on the product.

- Establish a safe state, switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.

2.17 Notes on particular risks

⚠ WARNING

Risk of injury in the event of workpiece loss due to component failure on the product as a result of exceeding the technical data.

- The product is only allowed to be used within the scope of its technical data.

⚠ WARNING

Risk of injury due to immediate closing of the product with high spring force in the event of pneumatic pressure failure (AS variant).

- Wait for the system to come to a complete standstill in the safe state.
- Do not reach into the clamping force block.

⚠ WARNING

Danger of crushing due to the chuck jaws moving to the workpiece during the clamping procedure when loading and unloading manually.

- Do not reach between the workpiece and the chuck jaw during the clamping procedure.
- Implement the safety functions according to the integrator's risk assessment.

⚠ WARNING

Risk of injury in the event of workpiece loss due to failure or pressure reduction.

- Implementing safety functions according to the integrator's risk assessment.
- Ensure stable pressure supply.
- Use pressure maintenance valves.

⚠ WARNING

Risk of injury from falling parts during transport, assembly and disassembly of the product and its accessories.

- Use suitable load handling equipment for transport.
- Do not linger in the danger zone.
- Wear protective equipment (protective shoes).

⚠ CAUTION

Ergonomic risk to the musculoskeletal system when lifting and transporting the product using manual force.

- Use load handling equipment for lifting and transporting.

⚠ CAUTION

Allergic reactions or irritation due to skin or eye contact with lubricants on the product.

- In case of foreseeable contact with lubricants on the product (e.g. when lubricating or cleaning),
- wear protective equipment (protective gloves, protective goggles).

⚠ CAUTION

Danger for the operating personnel in case of insufficient clamping force due to ejection or falling of the workpiece!

Due to settling behavior, the clamping force may decrease over time.

- Ensure that the clamping pressure is applied to the clamping force block while the workpiece is being machined.
- Re-clamping of the workpiece with manual or pneumatic clamping force blocks.

3 Technical data

Installation position	any
Operating temperature [°C]	+5 to +60
Noise emission [dB(A)]	≤ 70
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]
Max. speed of rotation [RPM]	100

KSP3	64	100	140	160	200	250	315
Stroke/jaw [mm]	2	2	3	3	4	5	6.5
Clamping force at max. pressure* [kN]	4.5	18	30	45	55	55	100
Additional clamping force from spring assembly** (AS) [kN]	0.5 – 1.5	2.5 – 6.5	4.5 – 9	5.5 – 11	8.5 – 16	10.5 – 20	16 – 32.5
Standard/AS operating pressure [bar]	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 6 / 3 – 6	2 – 6 / 3 – 6
Repeat accuracy *** [mm]	0.01	0.01	0.01	0.01	0.02	0.02	0.02
max. jaw height [mm]	60	60	60	60	100	150	200
Weight [kg]	1.5	4	7.5	11	19	32	70

KSP3-LH	64	100	140	160	200	250	315
Stroke/jaw [mm]	4	6	7	8	10	15	18
Clamping force at max. pressure* [kN]	2.3	8	15	20	25	20	40
Additional clamping force from spring assembly** (AS) [kN]	0.4 – 0.8	1 – 2.5	2 – 4	2 – 4.5	3.5 – 7	3.5 – 7	6.5 – 12.5
Standard/AS operating pressure [bar]	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 9 / 3 – 9	2 – 6 / 3 – 6	2 – 6 / 3 – 6
Repeat accuracy *** [mm]	0.01	0.01	0.01	0.01	0.02	0.02	0.02
max. jaw height [mm]	120	150	120	200	200	500	500
Weight [kg]	1.5	4	7.5	11	19	32	70

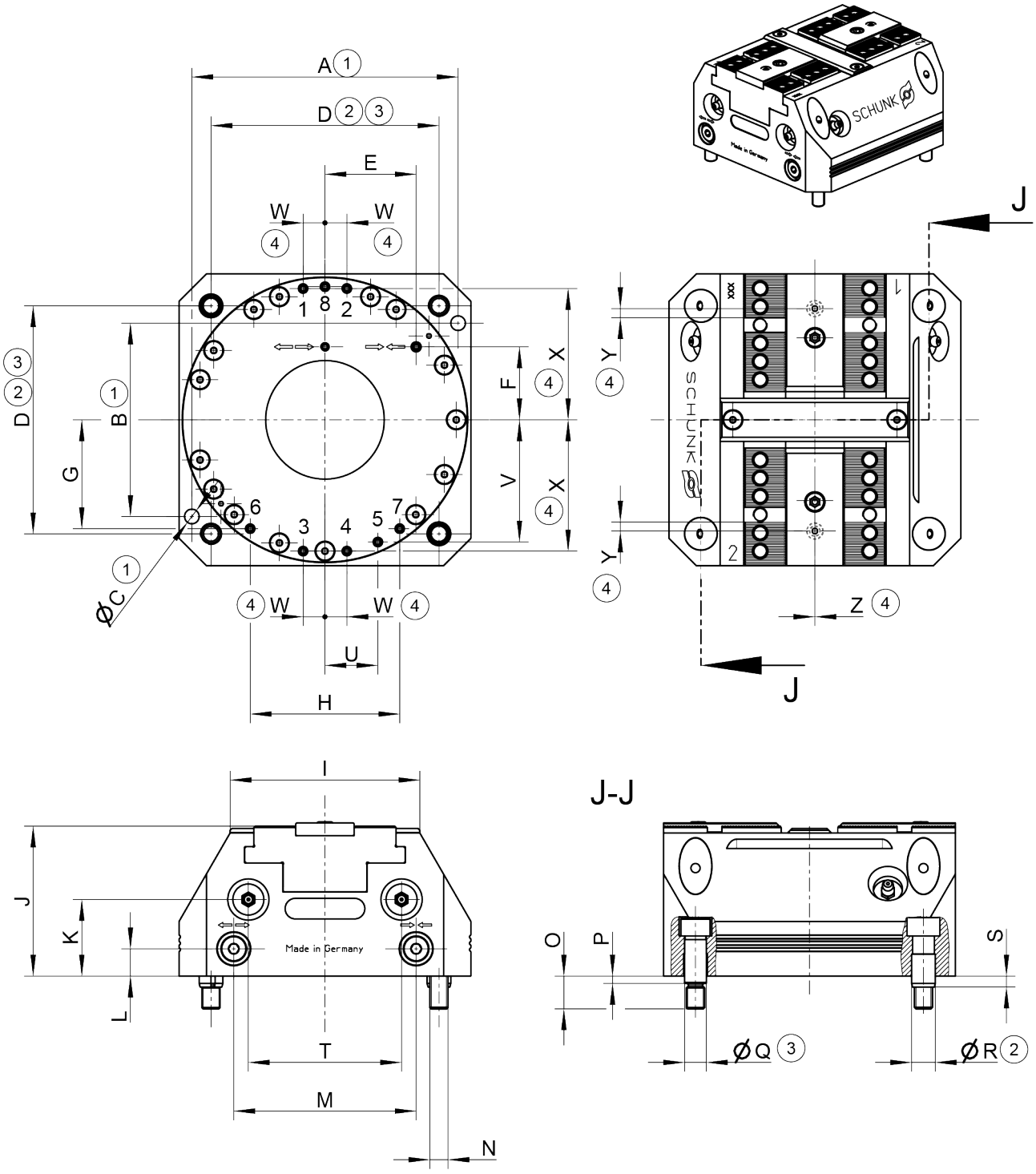
KSP3-F	64	100	140	160	200	250	315
Stroke/jaw [mm]	4	4	6	6	8	10	13
Clamping force at max. pressure* [kN]	4.5 / 3.5	18 / 14	30 / 23	45 / 35	55 / 41	55 / 42	100 / 67
Additional clamping force from spring assembly** (AS) [kN]	0.5 – 1.5	2.5 – 6.5	4.5 – 9	5.5 – 11	8.5 – 16	10.5 – 20	16 – 32.5
Standard/AS operating pressure [bar]	2 – 9 / 3 – 7	2 – 9 / 3 – 7	2 – 9 / 3 – 7	2 – 9 / 3 – 7	2 – 9 / 3 – 7	2 – 6 / 3 – 4	2 – 6 / 3 – 4
Repeat accuracy *** [mm]	0.01	0.01	0.01	0.01	0.02	0.02	0.02
max. jaw height [mm]	60	60	60	60	100	150	200
Weight [kg]	1.5	4	7.5	11	19	32	70

* Clamping force is the arithmetic sum of the individual forces occurring at the chuck jaws at distance "H" (see also catalog).

** The increase in clamping caused by the spring assembly depends on the stroke due to the spring tension. The maximum spring force is reached in the "open" state, the minimum spring force in the "closed" state.

*** Distribution of the clamping position with 100 consecutive clamping operations.

	KSP3 / KSP3-LH / KSP3-F						
Dimension	**64**	**100**	**140**	**160**	**200**	**250**	**315**
A [mm]	36	90	126	146	184	230	290
B [mm]	56	64	92	106	146	154	230
Ø C [mm]	4H7 x 7.5	6H7 x 12	8H7 x 14	8H7 x 14	8H7 x 14	10H7 x 20	10H7 x 20
D [mm]	50	80	110	125	160	200	250
E [mm]	17	29.5	44	50	64.5	75	100
F [mm]	17	32	45.5	40	64.5	64	108
G [mm]	21	34.5	51.8	59.7	72	92.6	112
H [mm]	33.6	55	74	82	116	139.6	192
I [mm]	41	64	91	104	138	170	220
J [mm]	50.7	69.2	72.7	82.2	90.2	98.2	136
K [mm]	26	36	38	42	48	52	73
L [mm]	12	10	13.5	15	17.5	20	20
M [mm]	34	59	88	100	129	150	200
N [mm]	M6	M8	M8	M10	M12	M12	M16
O [mm]	12	15	15.5	18	21	20	26
P [mm]	2.5	4	3.5	4	6	5	5
Ø Q [mm]	8f7	10f7	10f7	12f7	14f7	14f7	18f7
Ø R [mm]	8	11	11	13	16	16	21
S [mm]	4	4.5	5.5	6	6	6	6
T [mm]	28	54	76	84	110	140	180
U [mm]	0	18.7	26	29	41	54	65
V [mm]	27	40	58.5	67	83	104	132
W [mm]	6	9.5	12	12	17	18	25
X [mm]	26.5	43	63	72	91	115	146
Y [mm]	7.3	6	6	5	9	20	37.5
Z [mm]	2.5	4.5	0	0	0	0	0



1	Optional Z variant ±0.01 mm to clamping center
2	Clamping sleeve ±0.04 mm to clamping center
3	Fitting screw ±0.02 mm to clamping center
4	Only with variant "PM"

4 Assembly and connection

The numbers shown for individual components refer to the illustrations for assembly or connections of the clamping force block and to the "Assembly Drawings" chapter, ▶ 9 [🗋 41].

⚠ WARNING

Danger of crushing due to the product approaching the machine table during assembly.

- Do not reach between the product and machine table during assembly

⚠ CAUTION

Danger of abrasions due to rough components of the product and its accessories, which may slip out of your hands during assembly.

- Wear protective equipment (protective gloves) when working on the product and when handling its accessories

4.1 Tightening torques for screws

Tightening torques for mounting 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
Tightening torque M_A (Nm)	4.2	7.5	13	28	50	88	120	160	200	290	400	500

Tightening torques for mounting top jaws on the TANDEM clamping force block (screw quality 12.9)

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

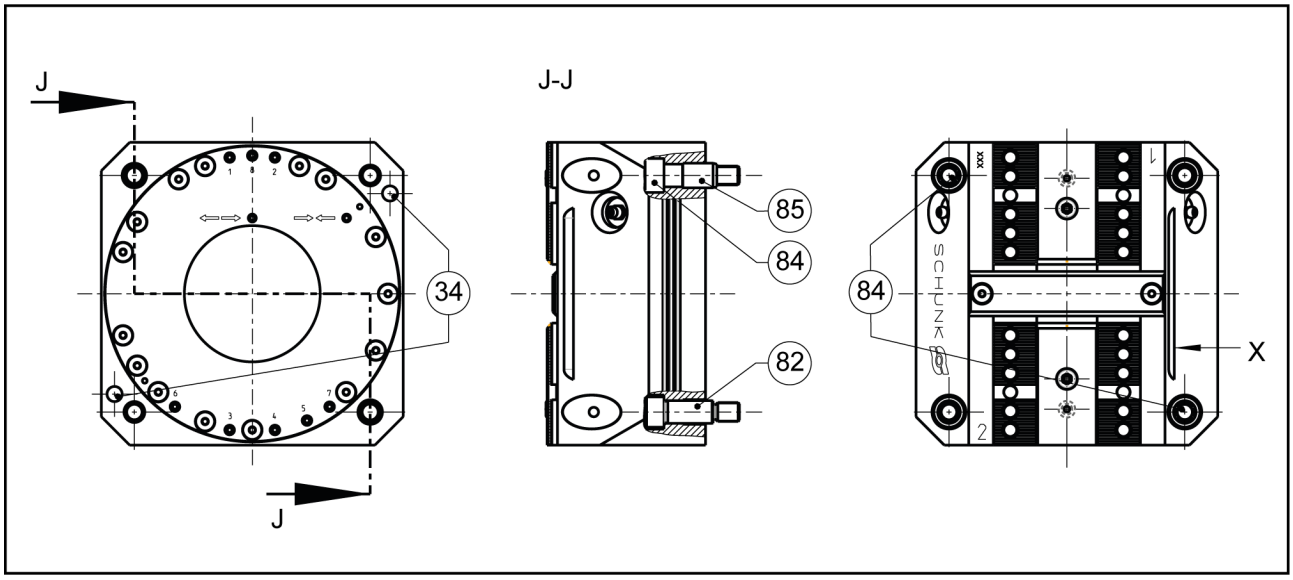
Tightening torques for mounting the chuck piston onto the cylinder piston (screw quality 12.9)

Description	Screw size	M5	M8	M10	M12	M20
KSP3 / KSP3-LH	Tightening torque M_A (Nm)	9	32	62	108	510
KSP3-F	Tightening torque M_A (Nm)	4	25	50	90	290

Tightening torques for mounting the cover on the body (screw quality A2-70)

Size	64	100	140	160	200	250	315
Screw size	M3	M5	M5	M5	M6	M6	M8
Tightening torque M_A (Nm)	1	4.5	4.5	4.5	7	7	16

4.2 Assembly of the Clamping Block on the machine table



34	Cylindrical pins Ø m6 (▸ 8.3 [🗋 39])
82	Fitting screw Ø f7 (▸ 8.3 [🗋 39])
84	Screw DIN EN ISO 4762
85	Clamping sleeve DIN EN ISO 13337

NOTE

- For vertical installation, the openings of the coolant drain (V) must always face downwards
- Surface **"X"** is parallel to the guideway of the base jaws (item 2) in order to be able to align the clamping force block on the machine table or check the positioning.

Assembly with clamping sleeves:
Mount the clamping force block on the machine table together with clamping sleeves (item 85) and screws (item 84).

Assembly with fitting screws:
There are two fittings in the housing (item 1) that, along with the fitting screws (item 82), are used to center the clamping force block on the machine table with repeat accuracy. Do not realign the clamping force block after removing it from the machine table (e.g. after replacing the seals). When using fitting screws (item 82), these are used instead of the clamping sleeves (item 85) and two of the four screws (item 84).

Mounting with cylindrical pins (Z variant):
The clamping force block is fastened to the machine table with 4 screws (item 84). The two cylindrical pins (item 34) are used for alignment with repeat accuracy. Do not realign the clamping force block after removing it from the machine table (e.g. after replacing the seals).

4.3 Mounting the clamping block on the base plate

(If the two parts are delivered separately)

When mounting TANDEM clamping force blocks on **ABP-h plus** TANDEM base plates, use the shorter mounting screws included in the base plate accessory kit instead of the standard mounting screws (item 19) that come with the clamping force block.

For **KSP3 100, KSP3-LH 100 and KSP3-F 100:**
Use the **M8 x 30** screws from the base plate accessory kit instead of the M8 x 35 screws (item 84).

For **KSP3 160, KSP3-LH 160 and KSP3-F 160:**
Use the **M10 x 35** screws from the base plate accessory kit instead of the M10 x 40 screws (item 84).

For **KSP3 250, KSP3-LH 250 and KSP3-F 250:**
Use the **M12 x 40** screws from the base plate accessory kit instead of the M12 x 45 screws (item 84).

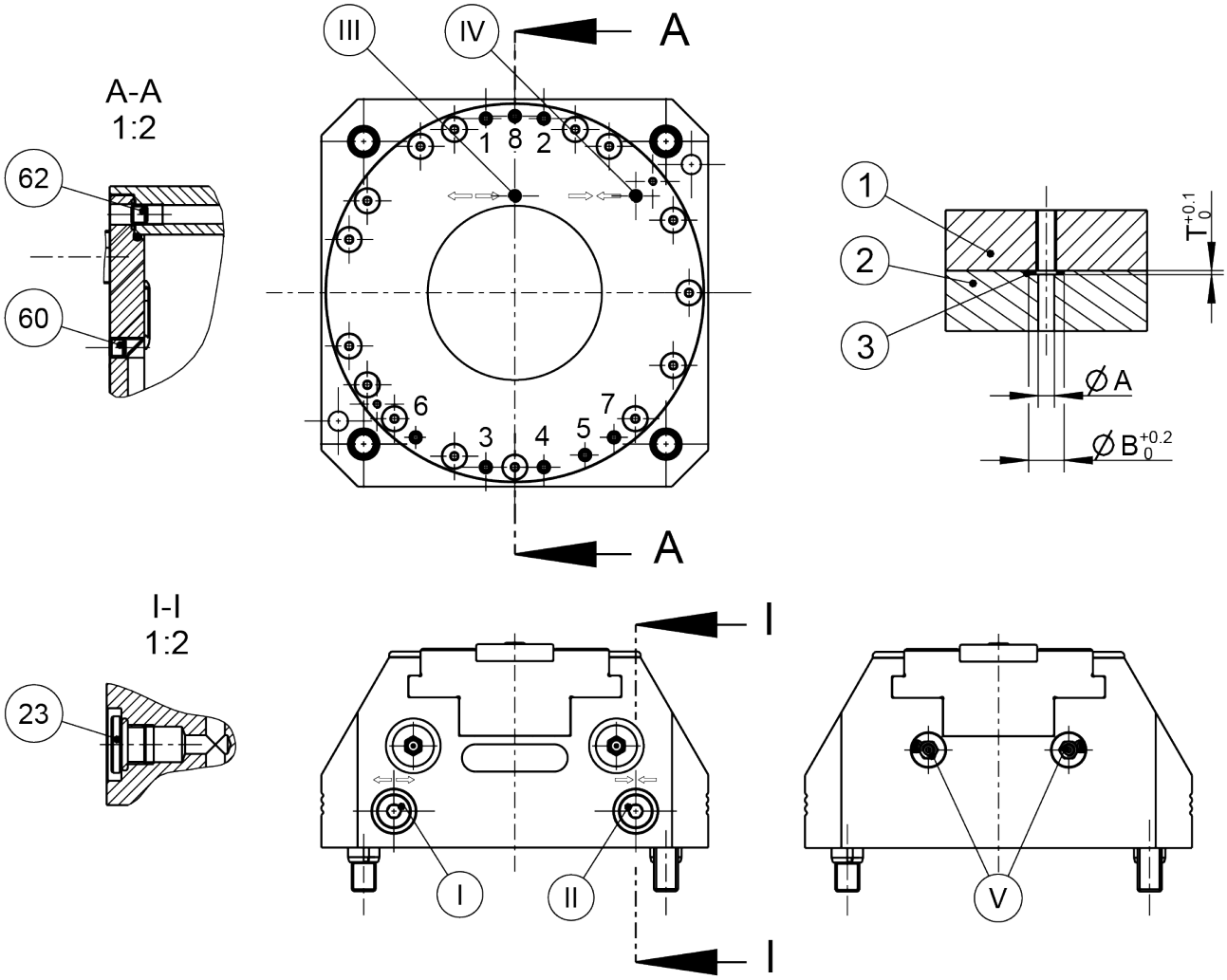
NOTE:
If the clamping force block and base plate are ordered separately, the screws, 0-rings and clamping sleeves for assembling the parts are included in the accessory kit that comes with the clamping force block.

- Do not open the connections on the front of the clamping force 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 0-rings from the accessory pack into the recesses for the air feed-throughs.
- Mount the clamping force block onto the base plate.

NOTE:
The TANDEM base plates do not have a connection possibility for the inductive proximity switches on the TANDEM clamping force blocks.
The function for monitoring the jaw position can only be connected externally. When joining, make sure the air feed-throughs for the clamping system and the base plate are precisely aligned.

- Screw the two parts together using the four screws (item 84) from the accessory kit. In doing so, observe tightening torques, ▸ 4.1 [🗋 17].
- Remove the locking screws from the pneumatic connections on the base plate.
- Connect the diaphragm pressure switch and set the switch to the required minimum pressure.

4.4 Connecting the clamping force block



I	OPEN (front)
II	CLOSED (front)
III	OPEN (bottom)
IV	CLOSED (bottom)
V	Coolant drainage / connection for air purge (front)
1	Dynamic pressure monitoring for jaw end position "open"
2	Air coupling in top jaw 1
3	Air coupling in top jaw 2
4	Dynamic pressure monitoring for jaw end position "closed"
5	Bottom connection for coolant drain or use for air purge
6	Bottom connection for lubrication (one-sided supply, left)
7	Bottom connection for lubrication (one-sided supply, right)
8	No use

Tab.: Hose-free direct connection

①	Clamping system
②	Adapter
③	Sealing element

4.4.1 Supply lines

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

The application determines which of the two air connections must be opened for actuation:

- 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.

Thread for pneumatic fitting (front):

KSP3, KSP3-LH, KSP3-F 64 and 100	M5
KSP3, KSP3-LH, KSP3-F 140, 160, 200 and 250	G 1/8"
KSP3, KSP3-LH, KSP3-F 315	G 1/4"

Hose-free direct connection		Size						
		64	100	140	160	200	250	315
Connection III - IV	Ø A [mm]	4						7
	Ø B [mm]	8.8						12.8
	T [mm]	1.0						1.4
	O-ring* [mm]	Ø 6x1.5						Ø 9x2
Connection 1-8	Ø A [mm]	3	4					7
	Ø B [mm]	5.3	8.8					12.8
	T [mm]	0.6	1.0					1.4
	O-ring* [mm]	Ø 3.5x1	Ø 6x1.5					Ø 9x2

*included in accessory kit and sealing kit

NOTE:
All four air connections come sealed on delivery of the clamping force block. On the base side with set-screws (item 60) and on the front with locking screws (item 23).

When using the air purge via connection 5, the two sound absorbers (V) must be removed and replaced by set-screws (item 93), ▸ 8.2 [🗋 39].

Requirements for compressed air supply: Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]

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

The clamping force block has two more base connections (**6/7**) for direct lubrication through the machine table. These connections come sealed on delivery with set-screws (item 62).

4.4.2 Dynamic pressure monitoring of the jaw end positions (variant "PM")

Dynamic pressure monitoring for the jaw end positions is integrated via connections 1 and 4 on the bottom.

Connection 1 → monitoring outer end jaw position.

Connection 4 → monitoring inner end jaw position.

The max. pressure for the monitoring functions is 2 bar.

Limit volumetric flow to 10 l/min.

Pressure difference between stroke end positions min. 1 bar.

Circuit diagram for external workpiece clamping:

	Circuit diagram			
Connection	1		4	
Signal output	0	1	0	1
Jaw end position open				
Clamping position				
Jaw end position CLOSED				

Connection	1	4
Jaw end position open clamping force block open	1	0
Clamping position	0	0
Jaw end position closed Clamping force block closed	0	1

Circuit diagram for internal workpiece clamping:

	Circuit diagram			
Connection	1		4	
Signal output	0	1	0	1
Jaw end position open				
Clamping position				
Jaw end position closed				

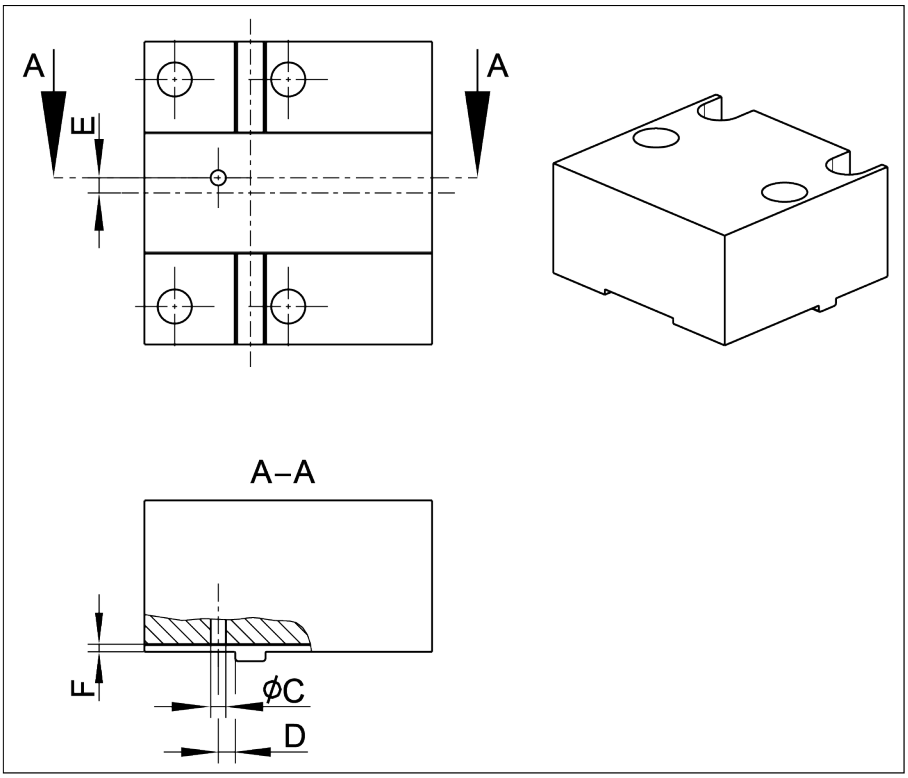
Connection	1	4
Jaw end position open clamping force block closed	0	1
Clamping position	0	0
Jaw end position closed clamping force block open	1	0

NOTES:

- For variants with a fixed jaw, only the outer jaw end position can be monitored at connection 1 (see circuit diagram for external workpiece clamping).
- It is not possible to monitor the clamping position with the "PM" variant. The "IM" variant (inductive proximity switches) is required for monitoring the clamping position.

4.4.3 Air coupling in top jaw (variant "PM")

An air coupling in top jaw 1 is integrated via connection 2 on the bottom and an air coupling in top jaw 2 via connection 3.



Dimension	Size						
	64	100	140	160	200	250	315
ØC [mm]	2	2	2	2	2	2	4
D [mm]	7.3	6	6	5	9	20	37.5
E [mm]	3.5	5.5	1	1	1	1	3
F [mm]	2+0.1	2+0.1	2+0.1	2+0.1	2.5+0.1	2.5+0.1	2.5+0.1

Non-tolerated dimensions according to DIN ISO 2768mH.

When using top jaws type STR / STR-H / STR-S, it is essential to observe dimension E.

Use for cleaning the clamping surfaces

The customer can create channels in the top jaw in order to clean the clamping and bearing surfaces by means of compressed air.

In doing so, the transfer dimensions ØC, D, E and F must be observed.

Dynamic pressure monitoring of the workpiece flat work surface

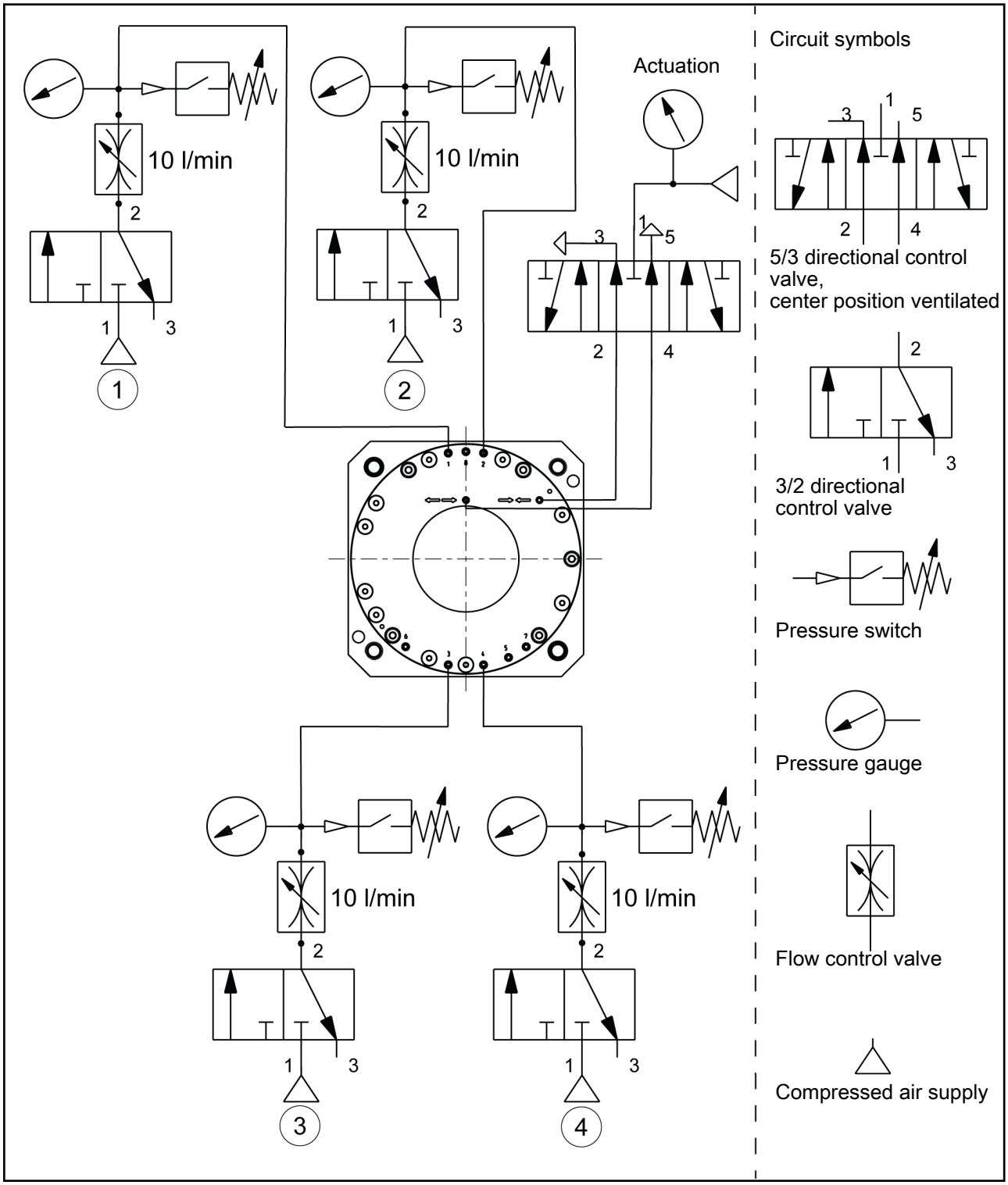
For this purpose, the customer must provide the top jaw with a Ø2 mm monitoring hole on the workpiece flat work surface. This ensures that the escaping air purge can be released up to where contact is made with the mounted workpiece and that a differential pressure measurement can be carried out via a differential pressure switch.

In doing so, the transfer dimensions ØC, D, E and F must be observed.

Max. pressure 2 bar.

Limit volumetric flow to 10 l/min.

4.4.4 Pneumatic circuit diagram



← →	Jaw stroke "open"
→ ←	Jaw stroke "close"
1	Dynamic pressure monitoring for jaw end position "open" (2 bar)
2	Air coupling in top jaw 1
3	Air coupling in top jaw 2
4	Dynamic pressure monitoring jaw stroke "closed" (2 bar)

5 Troubleshooting

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 work. Place the oiler closer to the clamping system; adjust the necessary oil quantity
Chuck piston screw broken (overload)	Send clamping system to SCHUNK for repairs or disassemble clamping system and repair using original SCHUNK spare parts
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

Clamping force block does not complete stroke

Possible cause	Solution(s)
Chips or dirt between covering strip and base jaws	Unscrew the covering strip (item 8) and remove chips and dirt

Clamping force getting weaker

Possible cause	Solution(s)
Clamping force block not sealed tightly	Check connection and seal screws; reseal or replace
Seals damaged	Disassemble clamping force block ▶ 6.4.2 [🗋 34] and replace all the seals (see sealing kit lists ▶ 8.1 [🗋 37])
Inadequate lubrication	Lubricate the lubrication nipples with microGLEIT LP410 ▶ 6 [🗋 27]

Clamping force block movement jerky

Possible cause	Solution(s)
Steel guide rollers on sliding surfaces not greased	See chapter "Maintenance and Care" ▸ 6 [🗋 27]
The monitoring piece in a base jaw is pressed too tightly against the housing	Loosen the adjustment screws and readjust the monitoring piece ▸ 6 [🗋 27]

Monitoring functions of the jaw stroke positions do not work properly

Possible cause	Solution(s)
Monitoring pieces in the base jaws not positioned exactly	Readjust monitoring piece for the required function ▸ 6 [🗋 27]
Pressure change due to clamping stroke too low	Adjust clamping stroke to the workpiece to >0.3 mm/jaw
Seals damaged	Replace seals in cover and adapter plate ▸ 8.1 [🗋 37]

6 Maintenance and care

6.1 Notes

Original spare parts

Only use original spare parts from SCHUNK when replacing wearing parts/spare parts.

Replacement of the housing and base jaws

The base jaws and the guides in the housing are matched to each other. To replace these parts, send the entire product to SCHUNK with a repair order.

Maintenance variant with clamping force maintenance (AS)

The cylinder piston must be disassembled or assembled using a disassembly and assembly device. We therefore recommend you have maintenance work and change of seals performed at SCHUNK.

6.2 Maintenance and lubrication intervals

The following maintenance work should be carried out after the specified cycle numbers or at the latest after the monthly data.

Maintenance work	Interval [cycles/month]
Lubricate	10,000 / 1
Basic cleaning	- / 6
Leak test	5,000 / 1

6.3 Greasing areas / lubricants

Greasing areas	Lubricant
Sliding surfaces body – base jaw	microGLEIT LP 410
Sliding surfaces base jaws – chuck piston	microGLEIT LP 410
Lubrication nipple	microGLEIT LP 410
Central lubrication	microGLEIT LP 410
All seals	RENOLIT HLT 2
Sliding surfaces cylinder piston – housing	RENOLIT HLT 2

(Product information about microGLEIT LP 410 can be requested from SCHUNK).

Alternative lubricant

LINOMAX plus can also be used as an alternative to microGLEIT LP 410. However, the specified clamping forces exclusively refer to the microGLEIT LP 410 used by SCHUNK. When using LINOMAX plus, the clamping forces can be lower.

6.4 Maintenance work

6.4.1 Lubricate

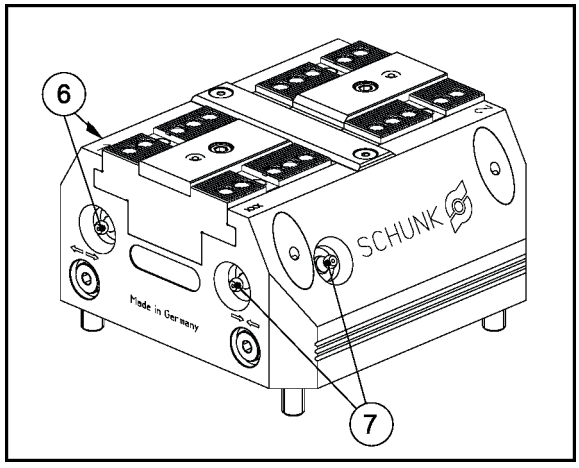
⚠ CAUTION

Allergic reactions or irritation due to skin or eye contact with lubricants on the product.

- Wear protective equipment (protective gloves, protective goggles) in case of foreseeable contact with lubricants on the product (e.g. when lubricating or cleaning)

To maintain reliable function and high quality of the product, it has to be regularly lubricated. This can be done with a hand lever press for greases or by means of central lubrication.

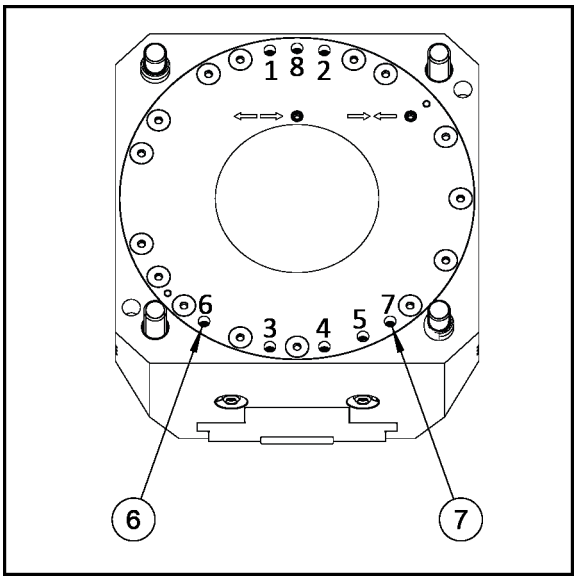
Manual lubrication



- Press grease either into the grease nipples at the side or front of the respective supply line (6/7).
- Only lubricate in the open position.
- After greasing, run through the complete stroke several times.
- Grease to be used and lubrication intervals, ▶ 6.3 [🗋 27].

Size	Grease quantity (strokes per grease nipple)
64	1
100	2
140	2
160	2
200	2
250	3
315	4

Central lubrication



- To use central lubrication, the set-screws of the factory sealed connections (6, 7) must be removed.
- For proper lubrication, both supply lines must be connected.
- The central lubrication system must be suitable for greases of NLGI 2 classification.
- Only lubricate in the open position.
- After greasing, run through the complete stroke several times.
- Grease to be used and lubrication intervals, ▸ 6.3 [🗋 27].

Size	Grease quantity (per connection) [cm³]
64	2
100	4
140	4
160	4
200	4
250	4
315	6

6.4.2 Basic cleaning

⚠ WARNING

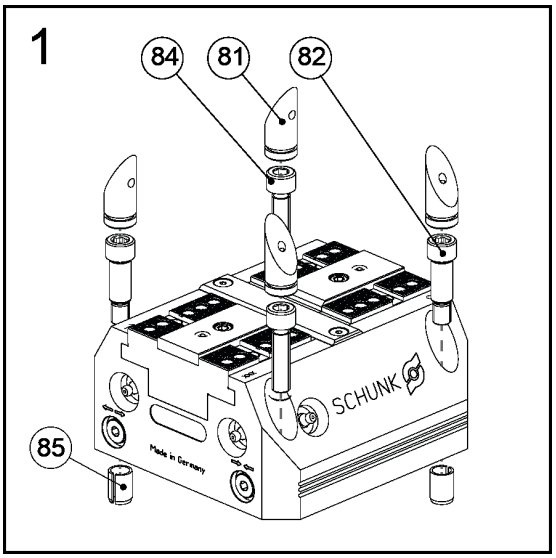
Risk of injury during disassembly of the product because of the high spring pressure in the cover and the cylinder pistons (AS variant).

- Only trained specialist personnel may disassemble the clamping force block!
- The cover may only be removed with the aid of a suitable disassembly device!

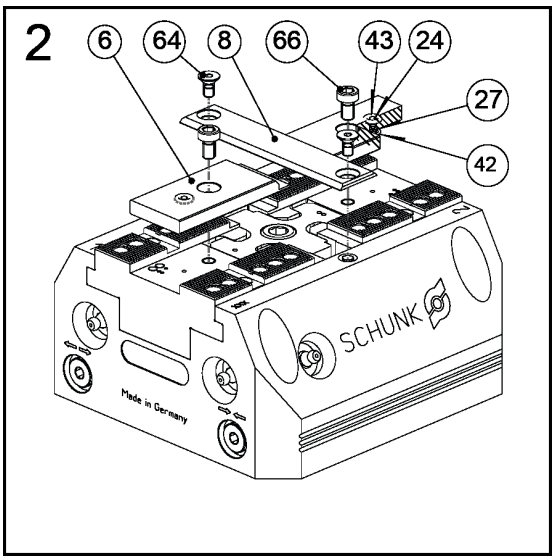
For basic cleaning, the product must be disassembled, cleaned and reassembled. With the "PM" variant, the pneumatic jaw end position control must also be set.

Disassembly

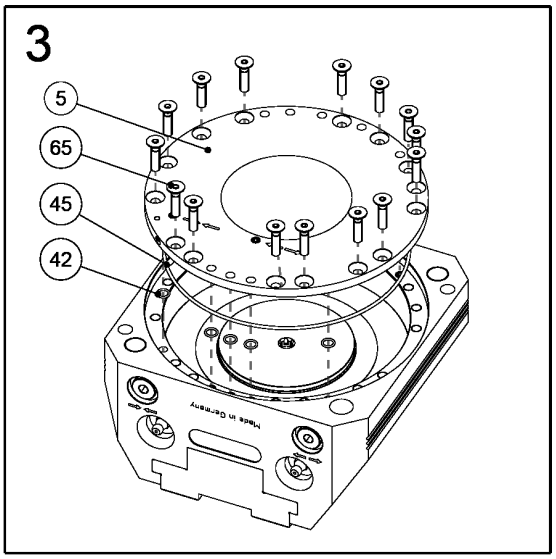
Before disassembling the product, switch off the machine and secure it against being switched on again. Then remove all compressed air lines. No residual energy may be left in the product.



- Pull out the plug (81).
- Unscrew the screws (84) and the fitting screws (82) and disassemble the clamping system from the machine table.
- If using clamping sleeves (85), remove them from the housing.



- Remove screws (64) and take off the cover strip (8).
- Remove screws (66) and take off the guide strip (6).
- Variant "PM" also includes a compression spring (27), 0-ring (43), sphere (24) and 0-ring (42).



Remove screws (65) and pull out cover (5) together with 0-ring (45) and flat gaskets (48) out of the housing. To do this, screw two screws into the threaded holes as an extraction tool

for size 64: M3 x L>25

for size 100: M3 x L>25

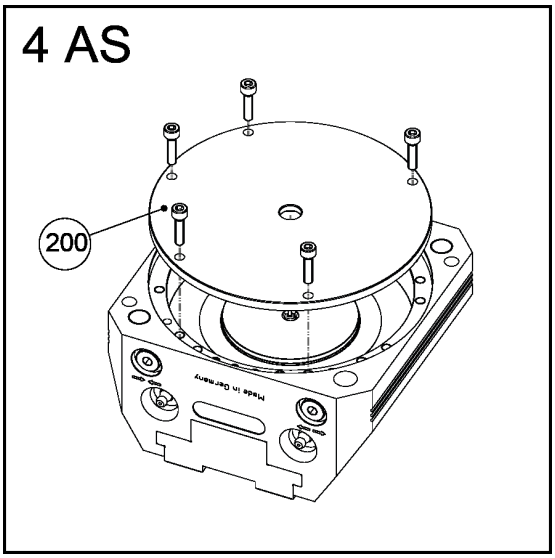
for size 140: M4 x L>25

for size 160: M3 x L>25

for size 200: M5 x L > 25

for size 250: M5 x L>25

for size 315: M6 x L>25



Variant with clamping force maintenance (AS)

Fasten mounting cover (200) with cheese-head screws DIN EN ISO 4762. Mounting cover ▶ 6.4.4 [🗋 35]

for size 64: M3 x 12

for size 100: M5 x 8 -14

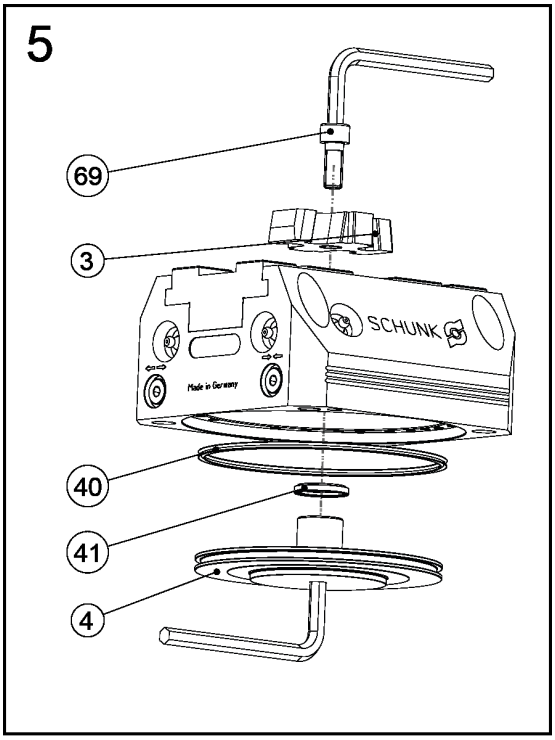
for size 140: M5 x 12 - 16

for size 160: M5 x 16 - 20

for size 200: M5 x 16 - 20

for size 250: M6 x 20 - 25

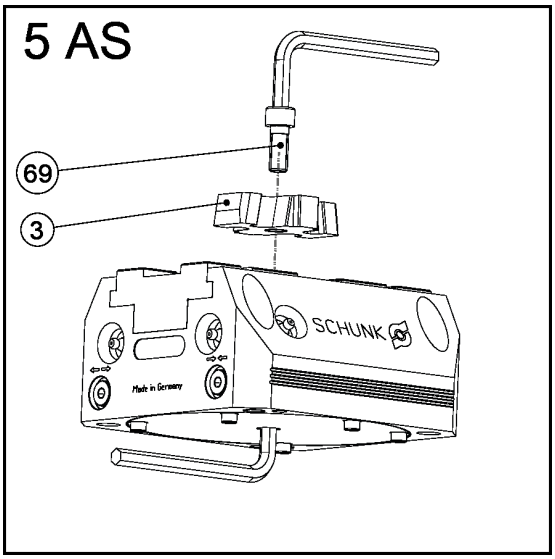
for size 315: M8 x 25



Variant without clamping force maintenance

Unscrew the screw (69) by holding it against the cylinder piston (4).

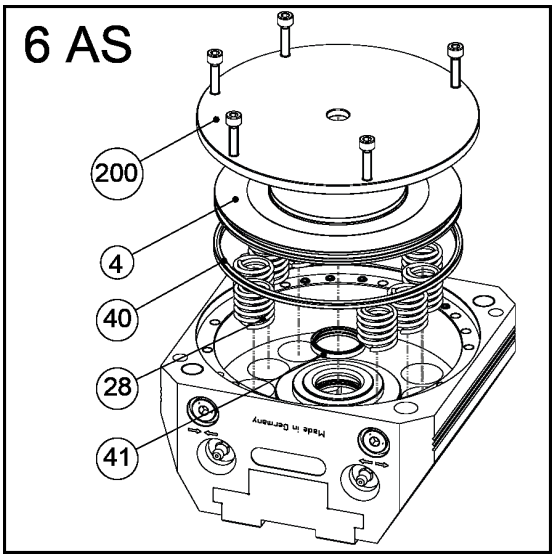
Then pull the chuck piston (3) out of the housing via its extraction thread. Then push the cylinder piston together with the quad ring (40) out of the housing. Remove the combination sealing ring (41) from the housing.



Variant with clamping force maintenance (AS)

Unscrew the screw (69) by holding it against the cylinder piston (4).

Then pull the chuck piston (3) out of the housing via its extraction thread.



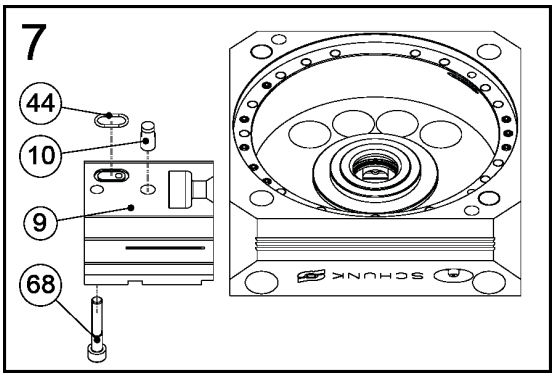
Variant with clamping force maintenance (AS)

Warning! Risk of injury due to spring forces! The cylinder piston and cover are under spring tension!

Clamp the product between the base jaws (2) and the mounting cover (200) using a suitable device (e.g. press, vise) so that the screws in the cover can still be removed.

Remove screws (65) and slowly open device until compression springs are released.

Remove the mounting cover (200), compression springs (28), combination sealing ring (41) and cylinder piston (4) together with the quad ring (40) from the housing.

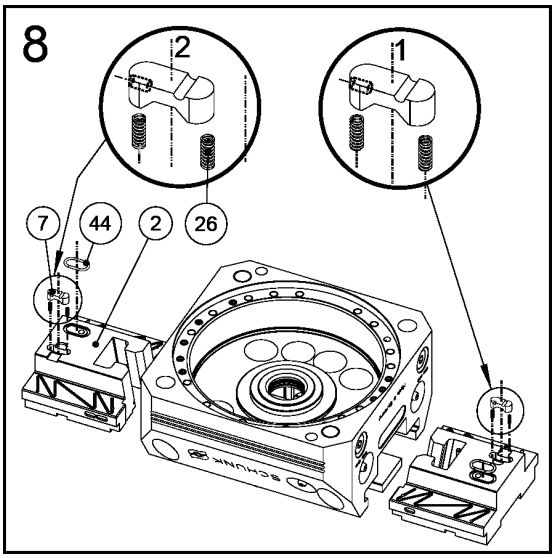


Additionally for the KSP3-F variant:

Remove screw (68). Pull out the positioning bolt (10) via its extraction thread with a screw as far as the stop.

Pull the base jaw (9) out of the housing.

Variant "PM" also includes the 0-ring (44).



Pull the base jaws (2) out of the housing.

Variant "PM" also includes 0-ring (44), monitoring piece (7) and compression springs (26).

Caution! The monitoring piece is under spring pre-load and is installed directionally oriented for each base jaw! See detail views for jaw 1 and jaw 2!

Maintenance

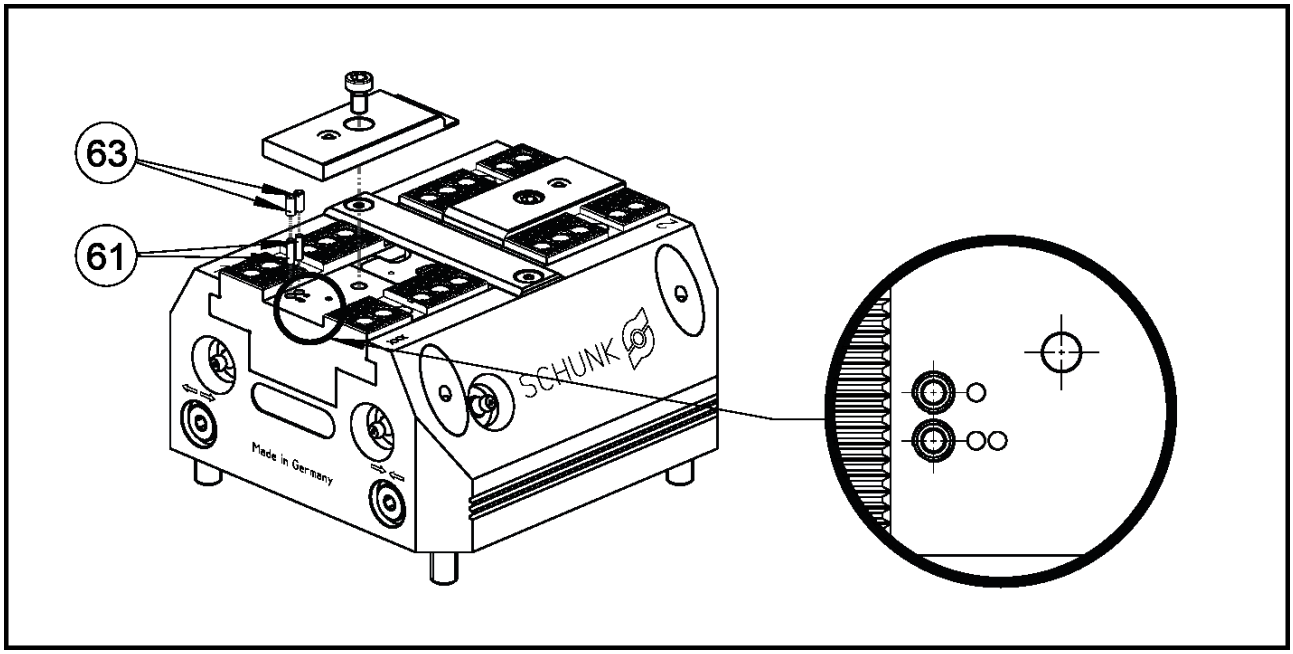
- Clean all parts thoroughly and check for damage and wear.
- Treat all greasing areas with lubricant ▸ 6.3 [🗋 27].
- Replace all wearing parts and seals if necessary ▸ 8.1 [🗋 37].

Assembly

Assembly is done in the reverse order of disassembly. In doing so, observe the following.

- Pay attention to the mounting position of the base jaws (item 2) and the chuck piston (item 3).
- Observe the tightening torques for the screws ▸ 4.1 [🗋 17].
- After completion of the assembly, carry out a leak test and a function test ▸ 6.4.3 [🗋 35].
- For variants with clamping force maintenance (AS), mount the cylinder piston using an assembly device ▸ 6.4.4 [🗋 35].
- Variant "PM": Pay attention to the correct alignment of the monitoring pieces! Readjust the pneumatic jaw end position control before mounting the guide rails (6).

Adjustment of pneumatic jaw end position monitoring



Jaw 1: monitoring open jaw position

- Move base jaws to OPEN position.
- Screw the set-screw (61) into the bore hole o up to the stop and then unscrew it again by a few turns.
- Slowly screw the set-screw (61) into the bore hole oo until the differential pressure sensor emits a switching signal.
- Hand-tighten set-screw (61) in bore hole o.
- Screw set-screw (63) in both bore holes and hand-tighten.

Jaw 2: monitoring closed jaw position

- Move base jaws to CLOSED position.
- Screw the set-screw (61) into the bore hole oo up to the stop and then unscrew it again by a few turns.
- Slowly screw the set-screw (61) into the bore hole o until the differential pressure sensor emits a switching signal.
- Hand-tighten set-screw (61) in bore hole oo.
- Screw set-screw (63) in both bore holes and hand-tighten.

6.4.3 Leak test

The following components are required to check for leaks: pressure gauge, shut-off valve, supply line and quick coupler.

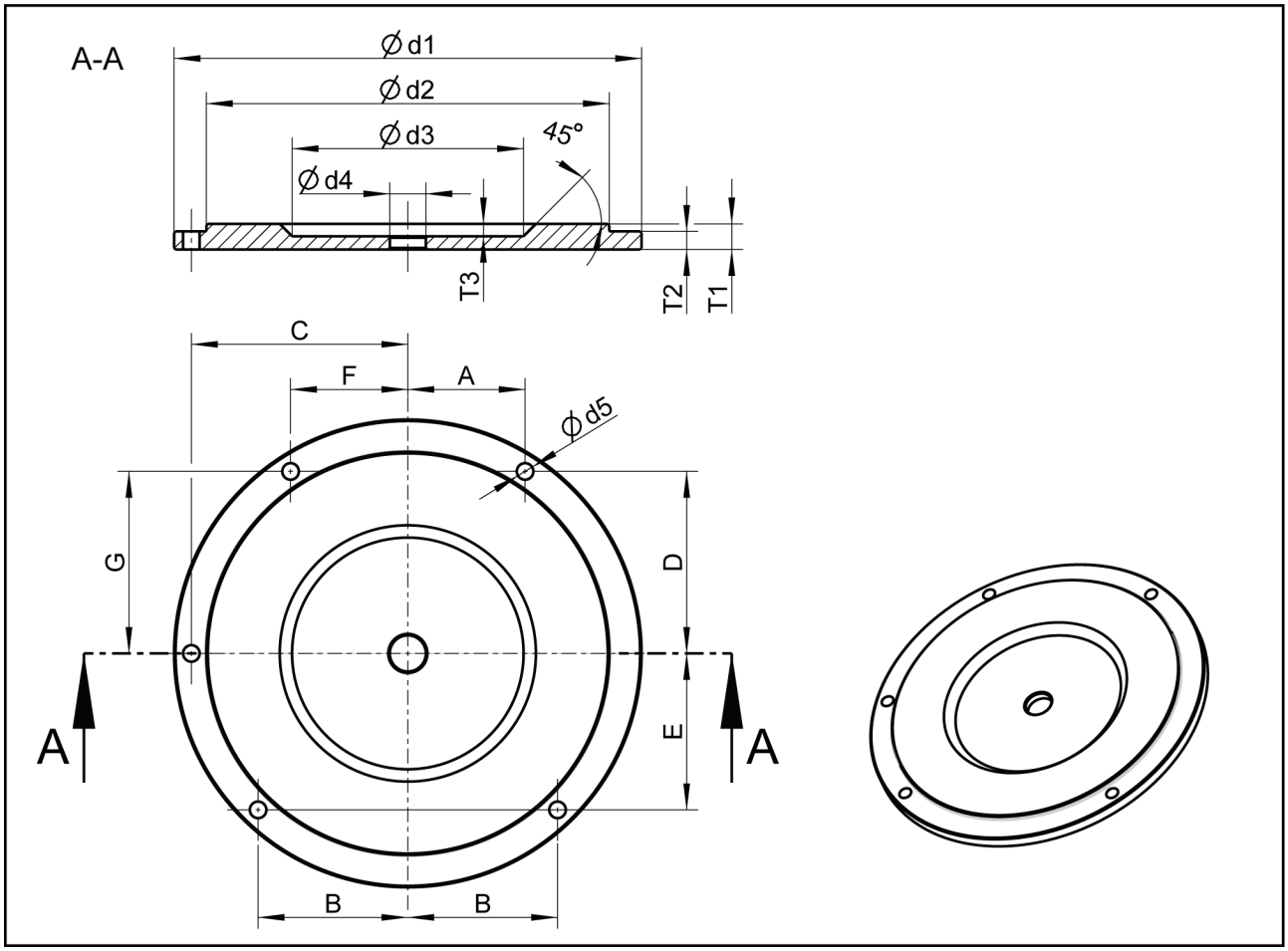
- Check for leaks in the clamping system in the OPEN and CLOSED positions.

1. Connect the components to the open CLOSED connection in the following order:
   pressure gauge – shut-off valve – quick coupler – supply line.
2. Pressurize the clamping force block.
3. Close the shut-off valve and remove the supply line.
4. Let the clamping force block sit clamped for 24 hours.
5. After 24 hours, the clamping force 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 fittings are sealed, check for leaks and replace if necessary (see Disassembling and Assembling the Clamping Force Block), ▸ 6.4.2 [🗋 34].

6.4.4 Assembly device



	Sizes					
Dimension	**64**	**100**	**140**	**160**	**200**	**250**
Ø d1	60.5	97.5	137.5	155.5	195.5	245
Ø d2	47	79	118	135	171	219
Ø d3	28	40	57	77	90	123
Ø d4	10	10	12	12	12	12
Ø d5	3.4	5.5	5.5	5.5	6.6	6.6
T1	7.4	5	6.5	8.5	10	10.5
T2	5.4	3	3.5	6	6.5	7.5
T3	2.7	1.8	3	4.1	3.5	5
A	11.8	38.9	45.5	39	50	93.8
B	11.8	38.9	36	49.8	50	93.8
C	27	43.5	63.5	72	91.5	116
D	24.5	19.4	44	60.5	76.5	68.3
E	24.5	19.4	52	52	76.5	68.3
F	11.8	34.3	45.5	39	55	93.8
G	24.5	26.8	44	60.5	73	68.3

7 Storage

When storing the product for a longer period of time, observe the following points:

- Clean the product and lubricate it lightly.
- Store the product in a suitable transport container.
- Only store the product in dry rooms.
- Protect the product from major temperature fluctuations.

NOTE: Before recommissioning, clean the product and all attachments, check for damage, functionality and leaks.

8 Sealing kits, accessory kits and parts lists

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, fittings, springs, bearings, screws, wiper bars and parts that come into contact with the workpiece are not covered by the warranty.

8.1 Sealing kit lists

There are two sealing kits. One for the piston chamber (piston chamber sealing kit) and one for the pneumatic monitoring (monitoring sealing kit). The sealing elements for the bottom connections are included in both sealing kits.

8.1.1 Piston chamber sealing kit

The sealing kit for the piston chamber contains all seals for the parts installed inside (e.g. cylinder pistons), as well as the O-rings of the bottom-sided connections.

Sealing kit *	ID
Size 64	1463219
Size 100	1470645
Size 140	1470642
Size 160	1470647
Size 200	1508677
Size 250	1470648
Size 315	1508678

* For included items, see note **X** in the Parts List chapter below. Seals are wearing parts and are recommended to be replaced during maintenance. The sealing kit can only be ordered as a complete kit.

8.1.2 Monitoring sealing kit / connection

The sealing kit for monitoring includes all seals and wear parts for the pneumatic monitoring of the PM variants, as well as the O-rings of the bottom connections.

Sealing kit *	ID
Size 64	1470480
Size 100	1470390
Size 100-LH	1470468
Size 140/160	1470397
Size 200	1508679
Size 250	1470398
Size 315	1508720

* For included items, see note **Y** in the Parts List chapter below.
Seals are wearing parts and are recommended to be replaced during maintenance. The sealing kit can only be ordered as a complete kit.

8.2 Accessory kits

Accessory kit *	ID
Size 64	1432277
Size 100	1428583
Size 140	1428599
Size 160	1428591
Size 200/250	1428597
Size 315	1496737

* For included items, see note **Z** in the Parts List chapter below.

8.3 Parts lists

Item	Designation	Quantity	Note
1	Body >Housing<	1	*
2	Base jaw	1	F*
	Base jaw	2	*
3	Chuck piston	1	
4	Cylinder piston	1	
5	Cover	1	
6	Guide strip	1	64 / 140 / F
	Guide strip	2	
7	Monitoring piece	1	F
	Monitoring piece	2	
8	Covering strip	1	
9	Base jaw	1	F
10	Pin	1	F
11	Guide strip	1	64 / 140 / F
21	Cupped-type lubrication nipples	4	64 / 100
	Conical lubrication nipple	4	140 / 160 / 200 / 250 / 315
22	Sound absorber	2	
23	Locking screw	2	
24	Steel ball	2	**Y**
26	Compression spring	2	F / **Y**
	Compression spring	4	**Y**
27	Compression spring	2	**Y**
28	Compression spring set	4	64
	Compression spring set	6	315
	Compression spring set	8	100 / 140 / 160 / 200 / 250
34	Cylindrical pin	2	
40	Quad ring	1	**X**
41	Combined sealing ring	1	**X**
42	O-ring	2	**Y**
43	O-ring	1	**Y**
	O-ring	2	F / **Y**
44	O-ring	2	**Y**
45	O-ring	1	**X**
48	Flat gasket	9	64 / **X**
	Flat gasket	10	100 / 140 / 160 / 200 / 250 / 315 /**X**
60	Set-screw	2	

Item	Designation	Quantity	Note
61	Set-screw	2	F
	Set-screw	4	
62	Set-screw	9	64
	Set-screw	10	100 / 140 / 160 / 250 / 315
63	Set-screw	2	F
	Set-screw	4	
64	Countersunk screw	2	64 / 100 / 140 / 160 / 200 / 250
	Countersunk screw	4	315
65	Countersunk screw	9	64 / 100
	Countersunk screw	13	140
	Countersunk screw	15	160
	Countersunk screw	16	200
	Countersunk screw	17	315
	Countersunk screw	18	250
66	Cylindrical screw	1	F
	Cylindrical screw	2	
67	Cylindrical screw	1	F
68	Cylindrical screw	1	F
69	Screw	1	
70	Set-screw	1	64 / 160 / 250
81	Plug	4	**Z**
82	Fitting screw	2	**Z**
83	O-ring	4	**X** / **Z**
84	Screw	4	**Z**
85	Clamping sleeve	2	**Z**
86	Screw	8	**Z**
87	O-ring	2	64 / **X** / **Y** / **Z**
	O-ring	10	100 / 140 / 160 / 200 / 250 / 315 / **X** / **Y** / **Z**
88	O-ring	7	64 / **X** / **Y** / **Z**
93	Set-screw	2	**Z**
100	Eye bolt	2	200 / 250 / 315 / **Z**

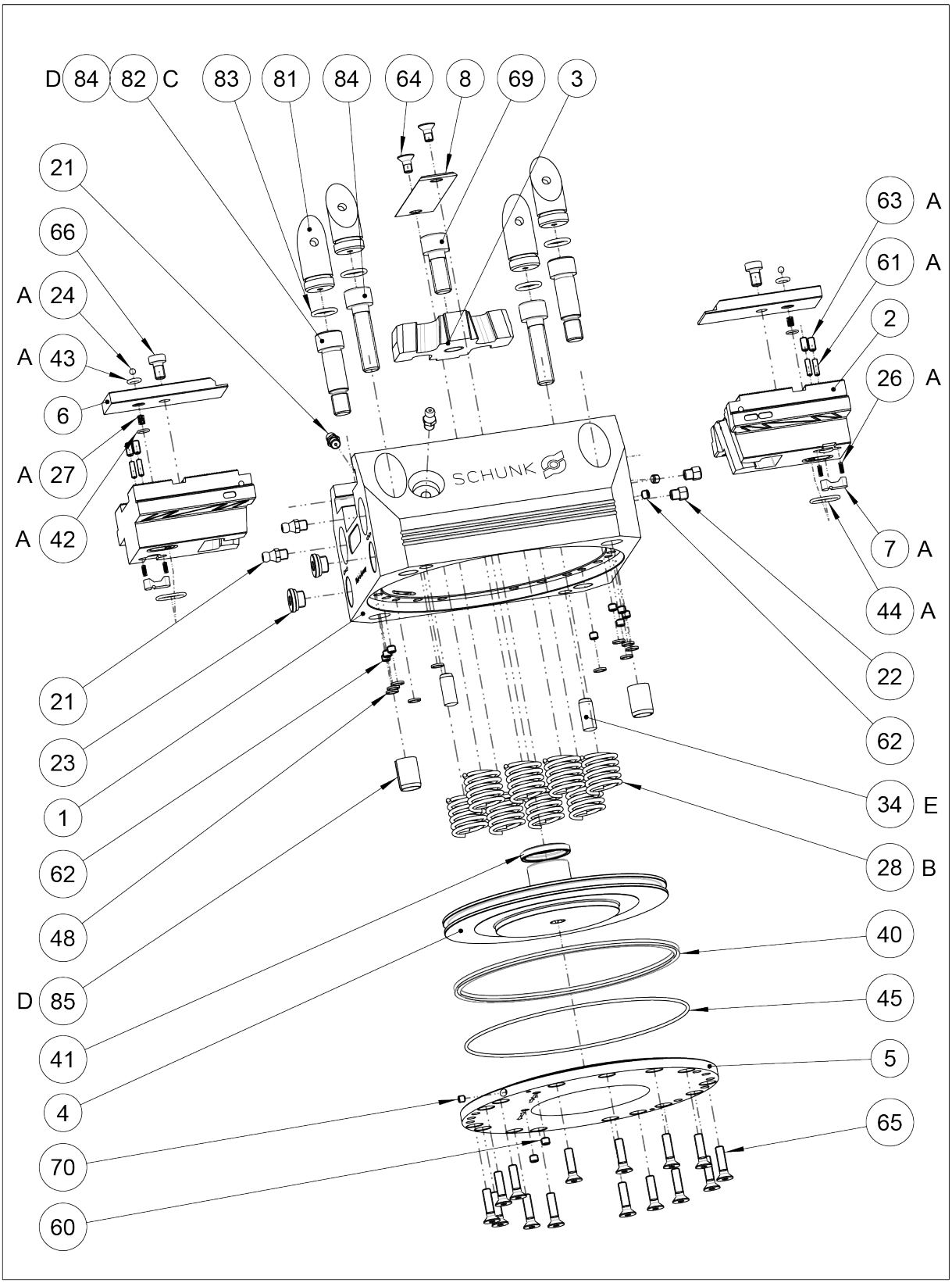
Parts list key

64	for size 64	315	for size 315
100	for size 100	F	for KSP3-F
140	for size 140	V	wearing part
160	for size 160	**X**	included in the piston chamber sealing kit
200	for size 200	**Y**	included in the monitoring sealing kit
250	for size 250	**Z**	included in accessory kit

* Individual components are specially tuned to one another and cannot be replaced by the customer.

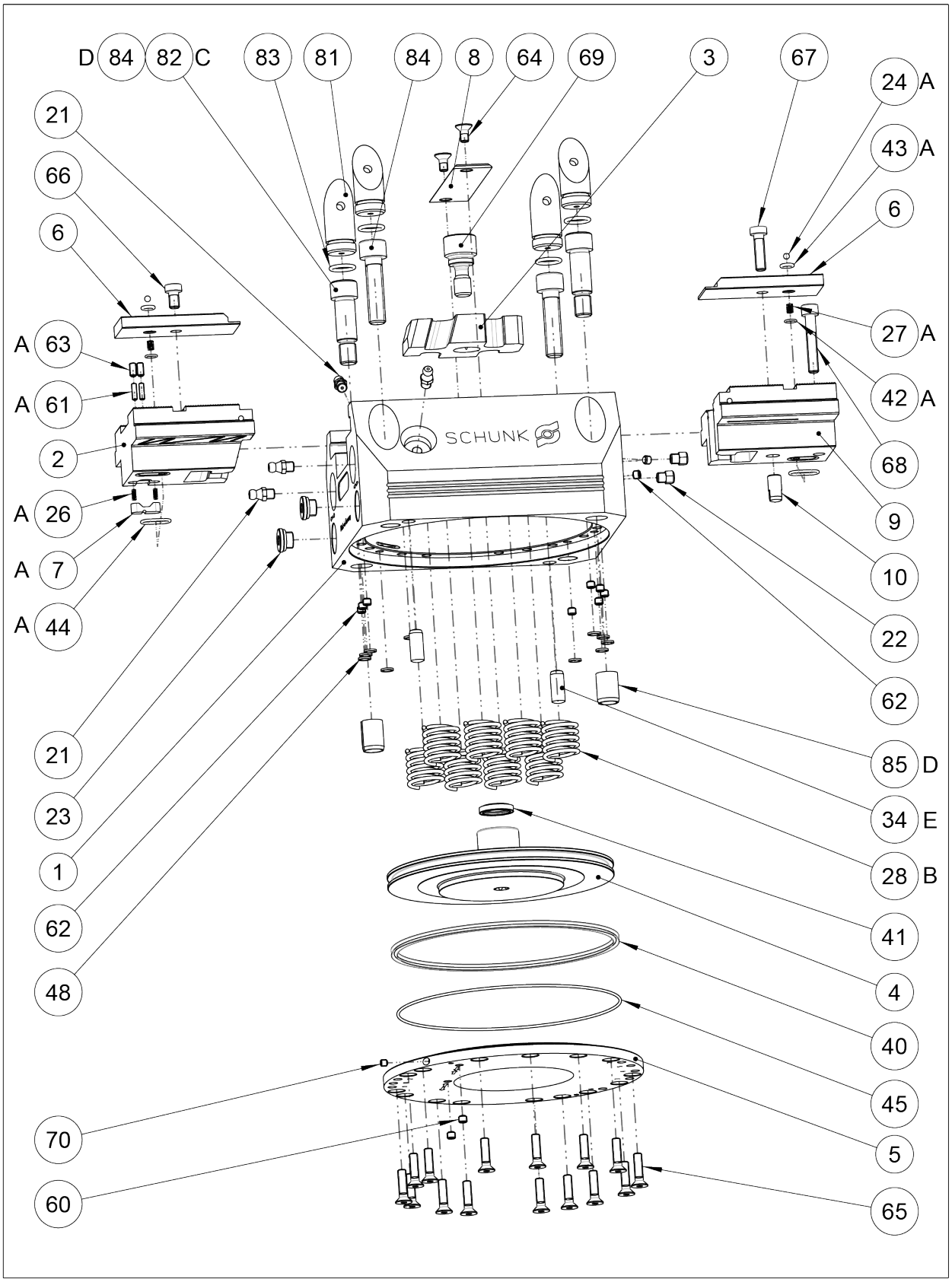
9 Assembly drawings

9.1 KSP3, KSP3-LH



A	with variant "PM"	B	with variant "AS"
C	Centering with fitting screws	D	Centering with clamping sleeves
E	Centering with cylindrical pins (Z variant)		

9.2 KSP3-F



A	with variant "PM"	B	with variant "AS"
C	Centering with fitting screws	D	Centering with clamping sleeves
E	Centering with cylindrical pins (Z variant)		

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11-2023 05.00 | KSP3, KSP3-LH, KSP3-F | TANDEM Clamping Block | en | 1463318

Manufacturer certificate

Manufacturer / Distributor:	Heinz-Dieter SCHUNK GmbH & Co. Spanntechnik KG. Lothringer Str. 23 D-88512 Mengen
Product:	**Clamping force block**
Description:	**TANDEM**
Type designation:	KSP, KRP, PZS, PZS-D, PGS

Heinz-Dieter SCHUNK GmbH & Co. Spanntechnik KG certifies that the above-mentioned products, when used as intended and in compliance with the operating manual and the warnings on the product, are safe according to the national regulations and:

- a **risk assessment** has been carried out in accordance with ISO 12100:2010.
- an **operating manual** for the assembly instructions has been created in accordance with the contents of the Machinery Directive 2006/42/EC Annex I No. 1.7.4.2. and the contents of the provisions of Annex VI of the Machinery Directive 2006/42/EC.
- **Markings** have been made in accordance with EN 1550:1997+A1:2008 Section 6.3.1, VDMA 34192:2019 Section 6.3 or ISO 16156:2004 Section 6.3. The requirements of Annex I No. 1.7.3. of the Machinery Directive 2006/42/EC have been complied with.
- the relevant basic and proven safety principles of the Annexes of **ISO 13849-2:2012**, taking into account the requirements of the documentation have been observed for the component. The parameters, limitations, ambient conditions, characteristic values, etc. for proper operation are defined in the operating manual.
- an $MTTF_D$ value of 150 years can be estimated for mechanical components using the informative procedure in Table C.1 of ISO 13849-1:2015.
- the **fault exclusion** against the fault "Unexpected release without applied pending signal".
- the **fault exclusion** against the fault "Breakage during operation" in compliance with the parameters, limitations, ambient conditions, characteristic values and maintenance intervals, etc., specified in the operating manual.
- that internal bore diameters in the **pipe or control lines** are at least 2 mm for pneumatic clamping systems and at least 3 mm for hydraulic clamping systems.

Harmonized standards applied:

- **ISO 12100:2010** Safety of machinery - General principles for design - Risk assessment and risk reduction

Other related technical standards and specifications:

- **VDMA 34192:2019** Safety requirements for clamping devices for use on machines

Mengen, 25. Apr. 2023

i. V. Philipp Schräder

p.p. Philipp Schräder / Head of Development standard products

i.V. Alexander Koch

p.p. Alexander Koch / Head of Engineering Design special products

Reviewed and approved / Date: A. Koch /07/07/2022

Modified/date: P. Schräder/ 07/07/2022;

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