Clamping force block, spring-loaded
TANDEM KRF3, KRF3-LH
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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cmm@de.schunk.com

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**.

1.1.3 Sizes

This operating manual applies to the following sizes:

- KRF3 100, 160, 200, 250
- KRF3-LH 100, 160, 200, 250

1.1.4 Variants

This manual applies to the following variants:

- Pneumatic monitoring (PM)
- Jig-machined positioning bores (Z)

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 [🗋 26]

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 Scope of Delivery

Clamping force block
KRF3 or KRF3-LH
(without top jaws)

ACCESSORY KIT:
(for contents, see sealing kit list and parts list) ▸ 9.1 [🗋 36]

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

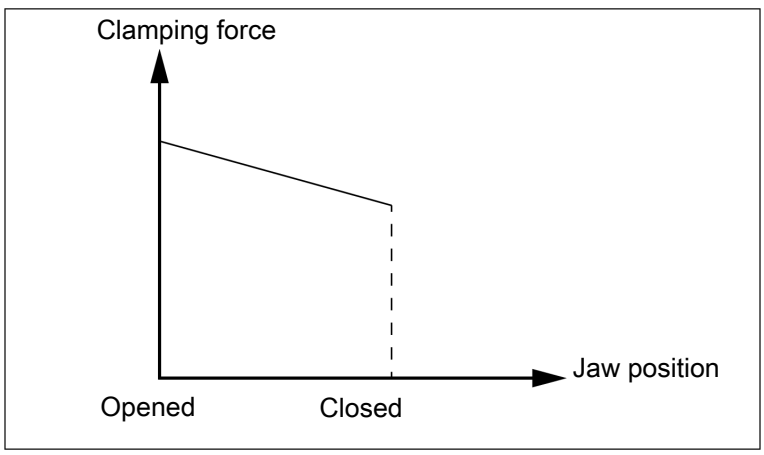
	KRF3			
Description	**100**	**160**	**200**	**250**
Stroke per jaw [mm]	2	3	4	5
Clamping force range* [kN]	7 – 12	20 – 30	26 – 35	37 – 50
Opening pressure [bar]	6 – 9	6 – 9	6 – 9	6 – 9
Repeat accuracy** [mm]	0.01	0.01	0.02	0.02
max. jaw height [mm]	60	60	100	150
Weight [kg]	4.2	12.3	22.1	38.7

	KRF3-LH			
Description	**100**	**160**	**200**	**250**
Stroke per jaw [mm]	6	8	10	15
Clamping force range without turbo* [kN]	3 – 5	10 – 15	12 – 17	15 – 21
Clamping force range with turbo (6 bar)* [kN]	9 – 11	29 – 34	31 – 36	40 – 46
Opening pressure [bar]	6	6	6	6
Max. turbo pressure [bar]	6	6	6	6
Repeat accuracy** [mm]	0.01	0.01	0.02	0.02
Max. jaw height [mm]	150	200	500	500
Weight [kg]	4.2	12.4	22.2	38.9

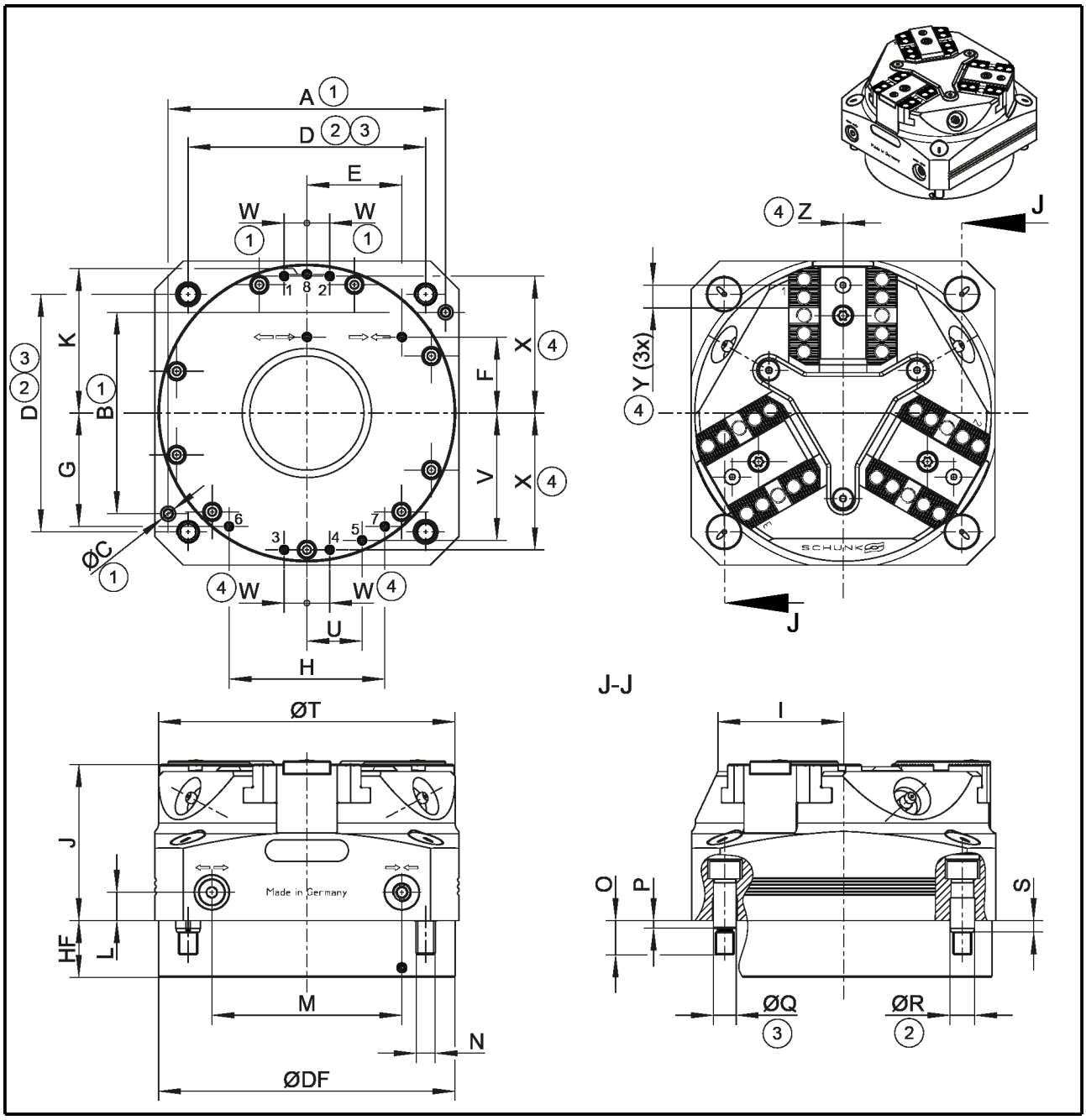
* Clamping force is the arithmetic sum of the individual forces occurring at the chuck jaws at distance "H" (see also catalog).

The maximum clamping force is achieved in the open position.
The min. clamping force is applied shortly before the closed position.

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



Dependency clamping force to jaw stroke



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"

	KRF3 / KRF3-LH			
Dimension	**100**	**160**	**200**	**250**
A [mm]	90	146	184	230
W [mm]	64	106	146	154
Ø C [mm]	6H7 x 12	8H7 x 14	8H7 x 14	10H7 x 20
D [mm]	80	125	160	200
E [mm]	29.5	50	64.5	75
F [mm]	32	40	64.5	64
G [mm]	34.5	59.7	72	92.6
H [mm]	55	82	116	139.6
I [mm]	41.5	66	84.5	106
J [mm]	69.2	82.2	90.2	98.2
K [mm]	44	73	92	116
L [mm]	10	15	17.5	20
M [mm]	59	100	129	150
N [mm]	M8	M10	M12	M12
O [mm]	15	18	18	20
P [mm]	4	4	6	5
Ø Q [mm]	10f7	12f7	14f7	14f7
Ø R [mm]	11	13	16	16
S [mm]	4.5	6	6	6
Ø T [mm]	97.5	156	196	244
U [mm]	18.7	29	41	54
V [mm]	40	67	83	104
W [mm]	9.5	12	17	18
X [mm]	43	72	91	115
Y [mm]	7	12	10.5	18.5
Z [mm]	0	0	0	0
HF [mm]	19.8	29.8	34.8	39.8
Ø DF [mm]	97.7	156	196	246

4 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)

Size		100	160	200	250
Description	Screw size	M5	M8	M10	M12
KRF3	Tightening torque M_A (Nm)	9	32	62	108
KRF3-LH	Tightening torque M_A (Nm)	9	32	62	108

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

Size	100	160	200	250
Screw size	M5	M5	M6	M6
Tightening torque M_A (Nm)	4.5	4.5	7	7

5 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, ▸ 10 [🗋 39].

⚠ WARNING

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

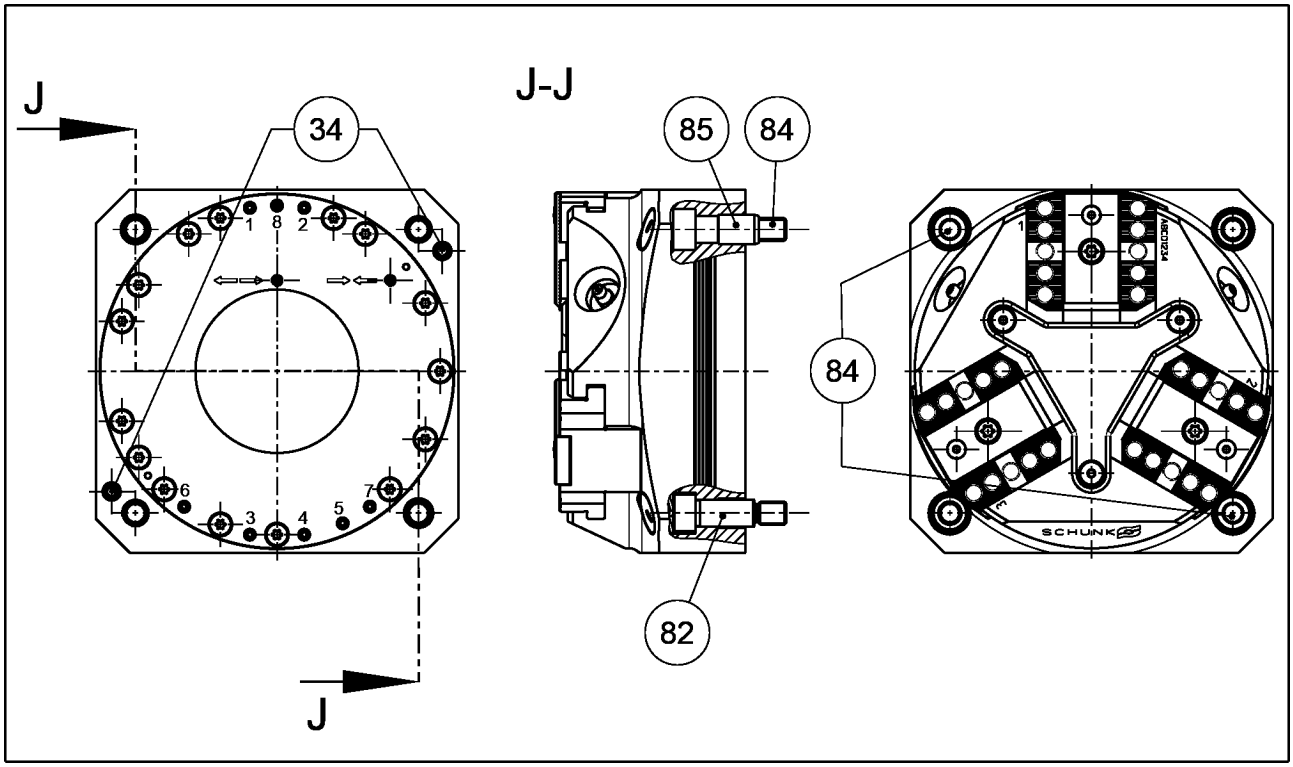
- Do not reach between the product and machine table during assembly

⚠ 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

5.1 Assembly of the Clamping Block on the machine table



34	Cylindrical pins Ø M6 (▸ 9.3 [🗋 37])
82	Fitting screw Ø f7 (▸ 9.3 [🗋 37])
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

Assembly with clamping sleeves:

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

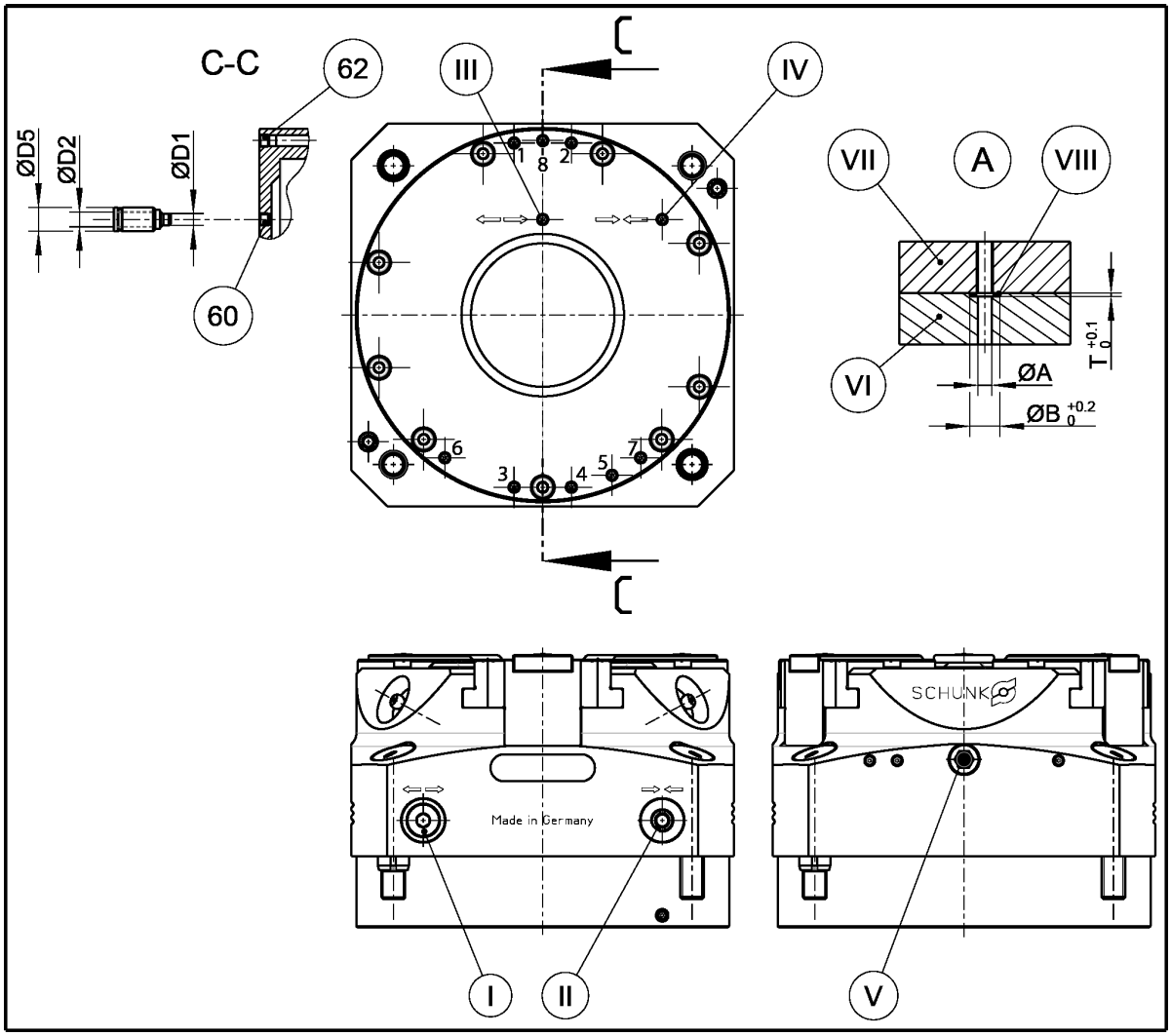
Assembly with fitting screws:

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).

5.2 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)
VI	Adapter
VII	Clamping system
VIII	O-ring Ø 6 x 1.5
A	Hose-free direct connection
1	Dynamic pressure monitoring for outer jaw end position "open"
2	Dynamic pressure monitoring for inner jaw end position "closed"
3	Air coupling in top jaw 2
4	Air coupling in top jaw 3
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	Air coupling in top jaw 1

5.2.1 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 an adapter plate or for hose fittings.

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

Thread for pneumatic fitting (front):

KRF3, KRF3-LH 100	M5
KRF3, KRF3-LH 160, 200 and 250	G1/8"

Hose-free direct connection		Size			
		100	160	200	250
Connection III - IV	Ø A [mm]	4			
	Ø B [mm]	8.8			
	T [mm]	1.0			
	O-ring* [mm]	Ø 6 x 1.5			
Connection 1-8	Ø A [mm]	4			
	Ø B [mm]	8.8			
	T [mm]	1.0			
	O-ring* [mm]	Ø 6 x 1.5			

*included in accessory kit and sealing kit

Hose fitting		Size			
		100	160	200	250
Connection III - IV	Ø D1	M5			
	Ø D5 max. [mm]	10	12		
	Ø D2 recommended [mm]	6			
Connection 1-8	Ø D1	M5			
	Ø D5 max. [mm]	9	10		12
	Ø D2 recommended [mm]	4	6		
	I max. Ø D2 [m]	8	-		

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 sound absorber (V) must be removed and replaced by a set-screw (item 93), ▸ 9.2 [🗋 37].

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).

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

Dynamic pressure monitoring for the jaw end positions is integrated via connections 1 and 2 on the bottom.

Connection 1 → monitoring outer end jaw position.

Connection 2 → 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		2	
Signal output	0	1	0	1
Jaw end position open				
Clamping position				
Jaw end position Closed				

Connection	1	2
Jaw end position open clamping force block open	1	0
Clamping position	0	0
Jaw end position closed Clamping force block closed	0	1

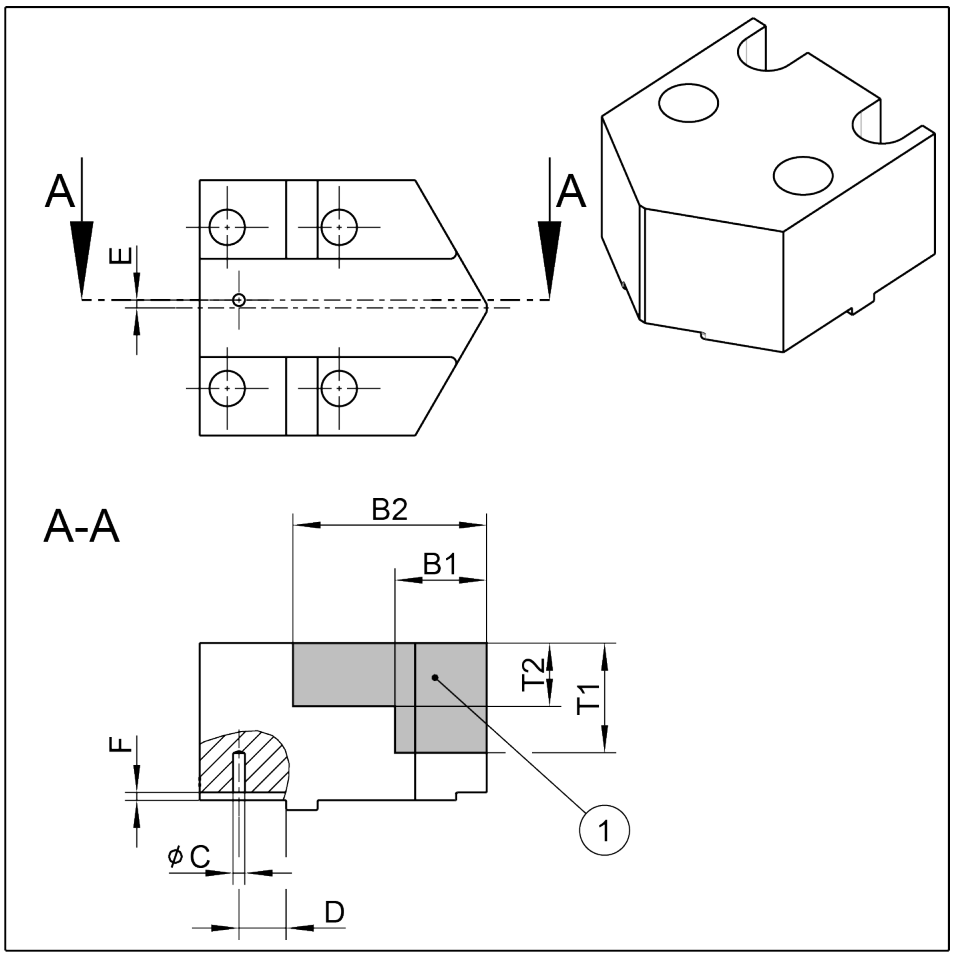
Circuit diagram for internal workpiece clamping:

	Circuit diagram			
Connection	1		2	
Signal output	0	1	0	1
Jaw end position open				
Clamping position				
Jaw end position closed				

Connection	1	2
Jaw end position closed clamping force block open	0	1
Clamping position	0	0
Jaw end position open clamping force block closed	1	0

5.2.3 Air coupling in top jaws (variant "PM")

The top jaws can be controlled with compressed air via the pneumatic connections on the bottom. The respective connection assignment can be found in the chapter "Connecting the clamping force block", ▶ 5.2 [🗋 20].



1 Work surface

	Size							
	100/3		160/3		200/3		250/3	
Dimension	KTR	KTR-H	KTR	KTR-H	KTR	KTR-H	KTR	KTR-H
B1 [mm]	14	14	28	28	34	34	43	43
B2 [mm]	34	34	56	56	70	70	91	91
T1 [mm]	19	44	31	71	36	89	36	88.5
T2 [mm]	10	35	20	60	22	75	22	74.5
Ø C [mm]	2		2		2		2	
D [mm]	7		12		10.5		18.5	
E [mm]	1.2 ± 0.2		1.2 ± 0.2		1.2 ± 0.2		1.2 ± 0.2	
F [mm]	2 + 0.1		2 + 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, define the bore position according to the clamping position. Always 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

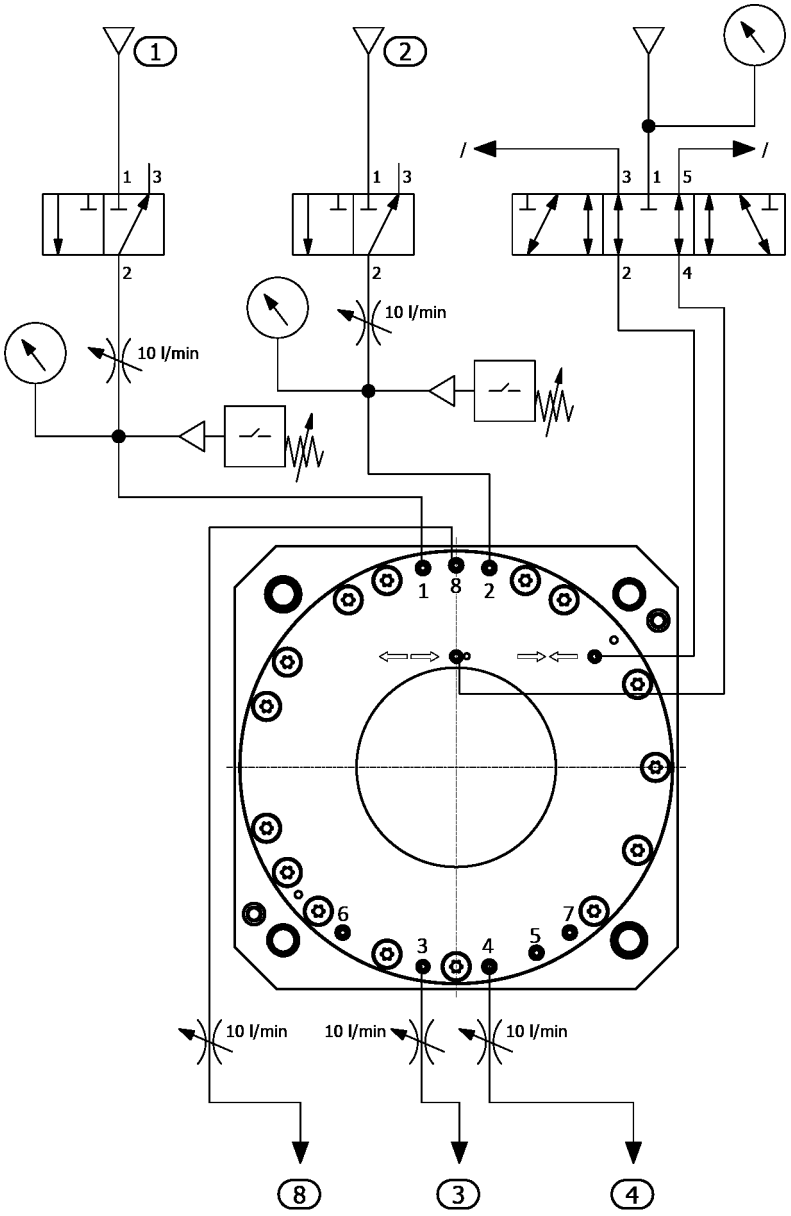
For this purpose, the customer must provide the top jaw with a Ø2 mm monitoring hole on the workpiece flat work surface. This ensures that the escaping air purge can be released up to where contact is made with the mounted workpiece and that a differential pressure measurement can be carried out via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

5.2.4 Pneumatic circuit diagram



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

6 Maintenance and care

⚠ DANGER

Danger to life in case of improper disassembly. The cylinder piston and the cover are under tremendous spring force, which can eject the parts.

- Any work requiring disassembly of the cover or cylinder piston is only allowed to be performed by SCHUNK.

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.

6.2 Maintenance and lubrication intervals

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

Maintenance work	Interval [cycles/month]
Lubrication	10,000 / 1
Basic cleaning	– / 12
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. The specified clamping forces are however based exclusively on microGLEIT LP 410 as used by SCHUNK.

When using LINOMAX plus, the clamping forces can be lower.

6.4 Maintenance work

6.4.1 Lubricate

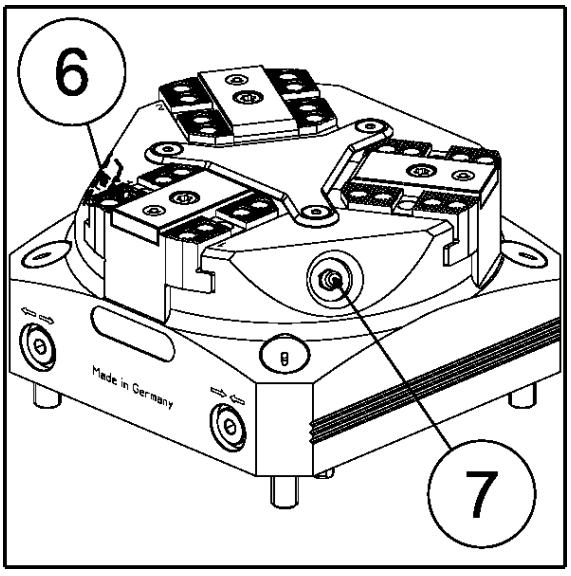
⚠ CAUTION

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.

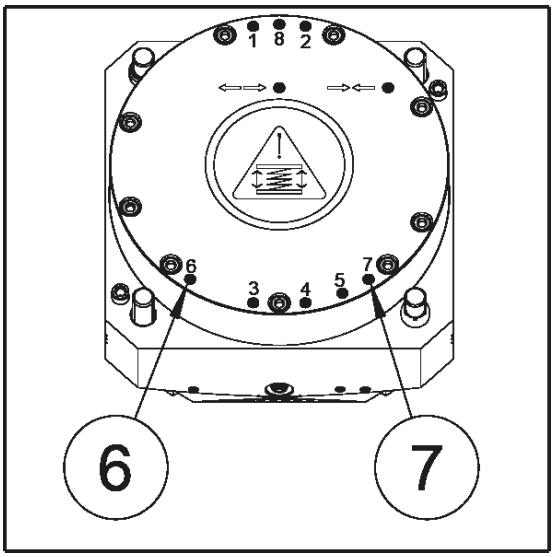
Manual lubrication



- Press grease into the lateral supply lines (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)
100	2
160	2
200	2
250	3

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]
100	4
160	4
200	4
250	4

6.4.2 Basic cleaning

⚠ DANGER

Danger to life in case of improper disassembly. The cylinder piston and the cover are under tremendous spring force, which can eject the parts.

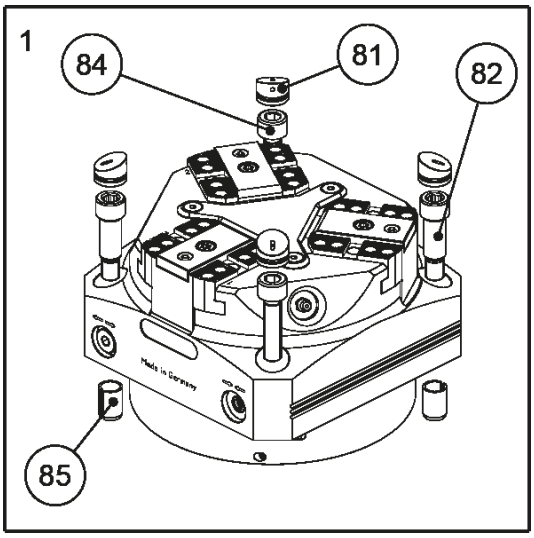
- Any work requiring disassembly of the cover or cylinder piston is only allowed to be performed by SCHUNK.

For basic cleaning, the upper part of the product (base jaws with attachments, cover strip and chuck piston) must be disassembled, cleaned and reassembled.

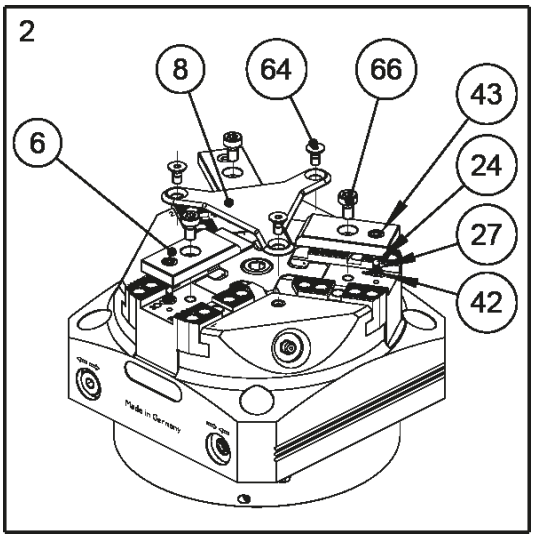
With the "PM" variant, the pneumatic jaw end position control must also be set.

Disassembly

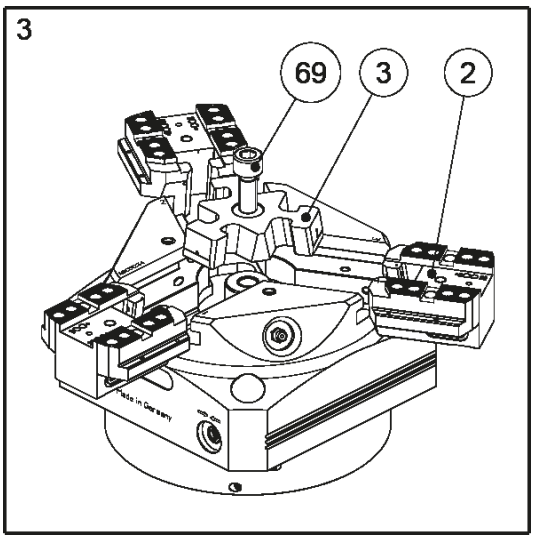
Before disassembling the product, switch off the machine and secure it against being switched on again. Then remove all compressed air lines. No residual energy may be left in the product.



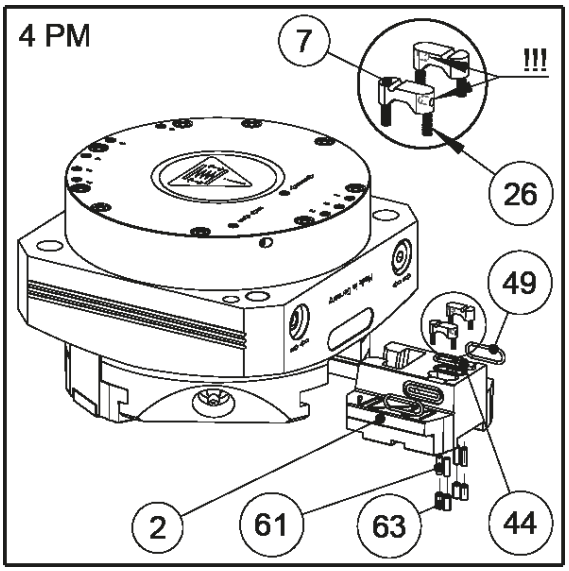
- Pull out the plug (81).
- Unscrew the screws (84) and the fitting screws (82) and disassemble the clamping system from the machine table.
- If using clamping sleeves (85), remove them from the housing.



- 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 the screw (69).
- Remove chuck piston (3) and base jaws (2). In the case of the PM variant, note that the monitoring elements can fall off when the base jaws are removed.



Variant "PM" also includes 0-ring (44), 0-ring (49), monitoring piece (7) and pressure springs (26).

The monitoring element is adjusted and secured with the set-screws (61, 63).

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

Maintenance

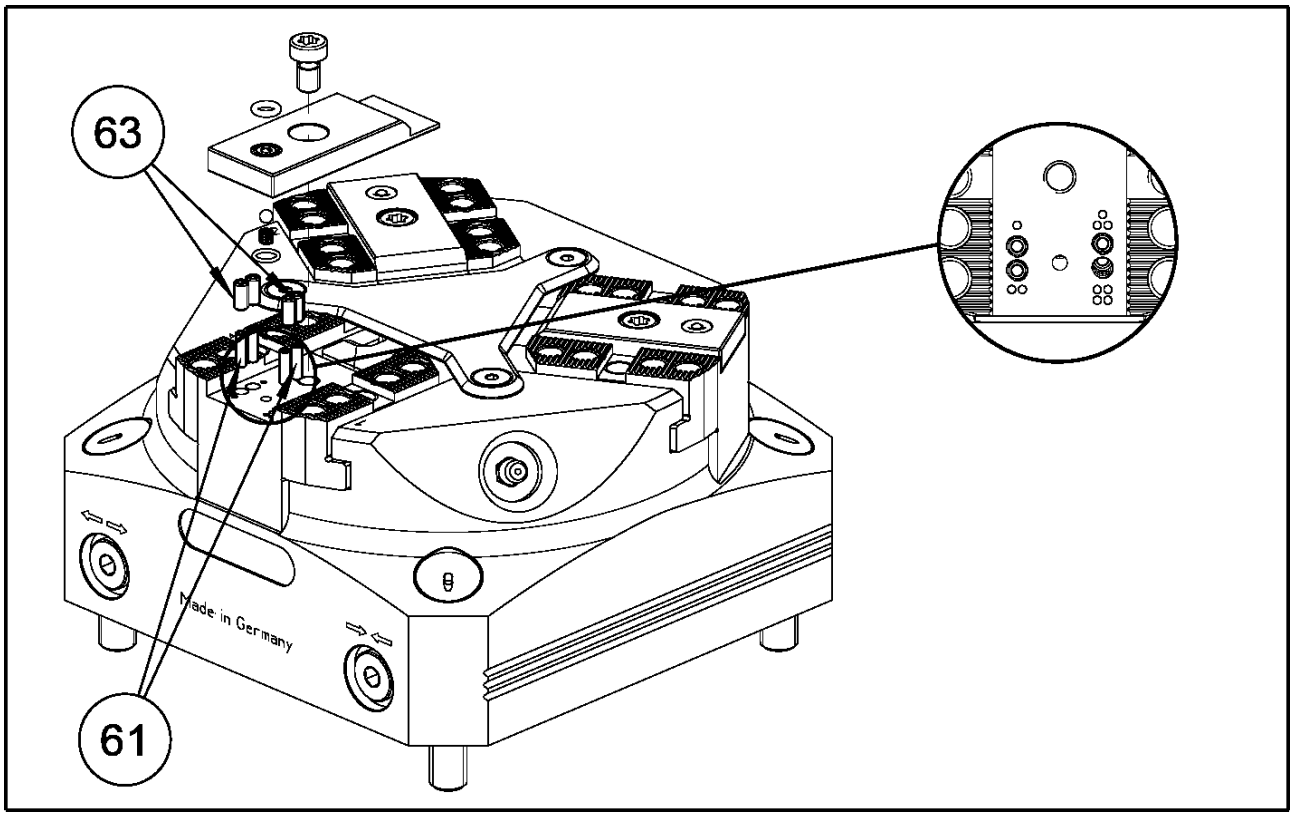
- Clean all parts thoroughly and check for damage and wear.
- Treat all greasing areas with lubricant ▸ 6.3 [🗋 27].
- Replace all wearing parts and seals if necessary ▸ 9.1 [🗋 36].

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 [🗋 17].
- After completion of the assembly, carry out a leak test and a function test, ▸ 6.4.3 [🗋 32].
- 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 the pneumatic jaw end position monitoring (PM)



Size 100

Jaw 1: monitoring outer jaw end position (open)

- Move base jaws to OPEN 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 the set-screw (61) in the bore hole **oo**.
- Screw set-screw (63) in both bore holes and hand-tighten.

Jaw 1: monitoring inner jaw end position (closed)

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

Size 160, 200 and 250

Jaw 1: monitoring outer jaw end position (open)

- 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 the set-screw (61) in the bore hole **o**.
- Screw set-screw (63) in both bore holes and hand-tighten.

Jaw 1: monitoring inner jaw end position (closed)

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

- 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 coupling – 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 pneumatic screw connections first (e.g. with Metaflux leak detection spray). Leaking pneumatic screw connections must be sealed.

If the cause of the leak is not the pneumatic screw connections, send the product to SCHUNK for repair.

7 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 [🗋 32] and replace all the seals (see sealing kit lists ▶ 9.1 [🗋 36])
Inadequate lubrication	Lubricate the lubrication nipples with microGLEIT LP 410 ▶ 6 [🗋 26]

Clamping force block movement jerky

Possible cause	Solution(s)
Steel guide rollers on sliding surfaces not greased	See ▸ 6 [🗋 26]
The monitoring piece in a base jaw is pressed too tightly against the housing	Loosen the adjustment screws and readjust the monitoring piece ▸ 6 [🗋 26]

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 [🗋 26]
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 ▸ 9.1 [🗋 36]

8 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.

9 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.

9.1 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.

For spring-actuated clamping force blocks (KRF3), only the monitoring/ connection sealing kit provided by the customer is relevant.

9.1.1 Piston chamber sealing kit

The piston chamber seals should only be replaced by SCHUNK! Danger to life in case of improper disassembly.

The sealing kit for the piston chamber contains all seals and wearing parts for the parts installed inside (e.g. cylinder pistons).

Sealing kit*	ID
Size 100	1470645
Size 160	1470647
Size 200	1508677
Size 250	1470648

* 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.

9.1.2 Monitoring sealing kit / connection

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

Customers can carry out the basic cleaning themselves with this.

Sealing kit*	ID
Size 100	1515131
Size 160	1515136
Size 200	1515137
Size 250	1515138

* 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.

9.2 Accessory kits

Accessory kit *	ID
Size 100	1496867
Size 160	1502963
Size 200	1510500
Size 250	1506773

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

9.3 Parts lists

Parts list "Standard stroke" and "Long stroke" variants

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

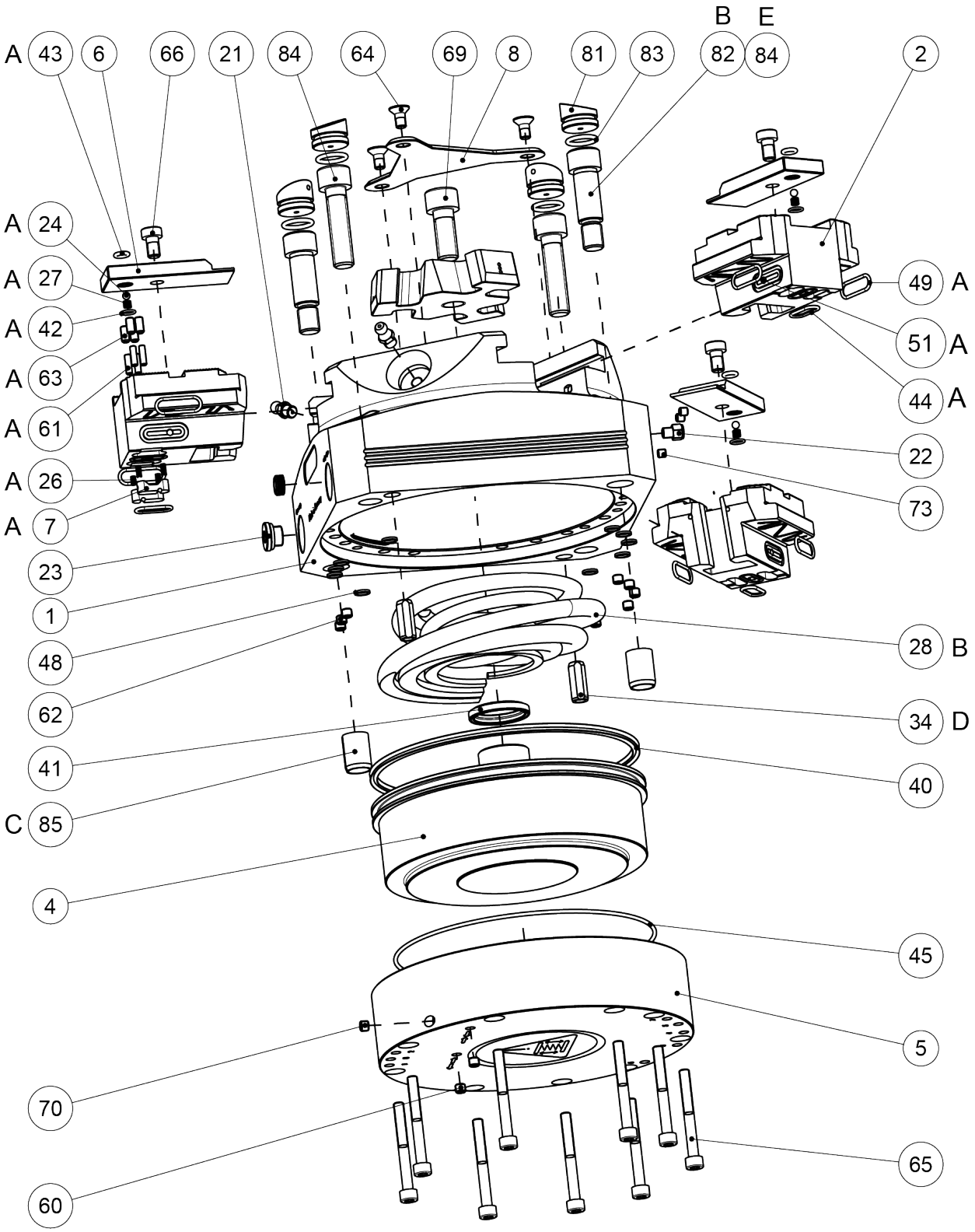
Item	Description	Quantity	Note
49	O-ring	6	**Y**
51	Steel ball	4	
60	Set-screw	2	
62	Set-screw	8	
64	Countersunk screw	3	
65	Countersunk screw	9	100 / 160 / 200
	Countersunk screw	13	250
66	Cylindrical screw	3	
69	Screw	1	
70	Set-screw	1	200
73	Set-screw	3	
81	Plug	4	**Z**
82	Fitting screw	2	**Z**
83	O-ring	4	**X / Z**
84	Screw	4	**Z**
85	Clamping sleeve	2	**Z**
86	Screw	12	**Z**
87	O-ring	10	**X / Y**
93	Set-screw	1	**Z**
100	Eye bolt	3	200 / 250

Parts list key			
100	for size 100	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.

10 Assembly drawings

10.1 KRF3, KRF3-LH



A	with variant "PM"	B	Centering with fitting screws
C	Centering with clamping sleeves	D	Centering with cylindrical pins (Z variant)
E	Norm screw, if centering with clamping sleeves or cylindrical pins (Z variant)		

11 Manufacturer certificate

Manufacturer / Distributor:	H.-D. SCHUNK GmbH & Co. Spanntechnik KG Lothringer Str. 23 D-88512 Mengen
Product:	Clamping force block
Designation:	TANDEM
Type designation:	KSF, KRF

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.
- **fault exclusion** against the fault "Unexpected release without pending release 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, 25th of April 2023

Signature: see original declaration

p.p. Philipp Schräder
Head of Development standard products

Signature: see original declaration

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

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03.00 | TANDEM KRF3, KRF3-LH | Clamping force block, spring-loaded | en | 152473