



# **TANDEM Clamping Block**

## **KSH3, KSH3-LH, KSH3-F**

### **Assembly and Operating Manual**

Translation of Original Operating  
Manual

## Imprint

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### 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

Tel. +49-7572-7614-1300

Fax +49-7572-7614-1039

customercentermengen@de.schunk.com



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

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# 1 General

## 1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

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

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

**NOTE:** The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

In addition to these instructions, the documents listed under ▶ 1.1.2 [ 6 ] are applicable.

### 1.1.1 Presentation of Warning Labels

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



#### **⚠ DANGER**

**Dangers for persons!**

Non-observance will inevitably cause irreversible injury or death.



#### **⚠ WARNING**

**Dangers for persons!**

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



#### **⚠ CAUTION**

**Dangers for persons!**

Non-observance can cause minor injuries.

#### **NOTICE**

**Material damage!**

Information about avoiding material damage.

### 1.1.2 Applicable documents

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

The documents labeled with an asterisk (\*) can be downloaded from [schunk.com](https://www.schunk.com).

### 1.1.3 Sizes

This operating manual applies to the following sizes:

- KSH3 64, 100, 140, 160, 200
- KSH3-LH 64, 100, 140, 160, 200, 250, 315
- KSH3-F 64, 100, 140, 160, 200

### 1.1.4 Variants

This manual applies to the following variants:

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

## 1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the date of delivery from the production facility or 500 000 cycles\* under the following conditions:

- Observe the applicable documents, ▶ [1.1.2 \[6\]](#)
- Observe the ambient conditions and operating conditions, ▶ [2.6 \[8\]](#)
- Observance of the specified care and maintenance instructions ▶ [7 \[26\]](#)

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

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

## 1.3 Scope of Delivery

**Clamping force block**

**KSH3 or KSH3-LH or KSH3-F**

(without top jaws)

ACCESSORY KIT:

(for contents, see sealing kit list and parts list) ▶ [8.1 \[34\]](#)

## 2 Basic safety notes

### 2.1 Intended use

- This product is intended for clamping and holding workpieces on machine tools and other suitable technical devices.
- It is designed to be set up on a machine table or machine pallets.
- The product may only be used within the scope of its technical data, ▶ 3 [14].
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

### 2.2 Not intended use

The product is not being used as intended if, for example:

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

### 2.3 Constructional changes

#### Implementation of structural changes

By conversions, changes, and reworking, e.g. additional threads, holes, or safety devices can impair the functioning or safety of the product or damage it.

- 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.

- Use only original spare parts or spares authorized by SCHUNK.

## 2.5 Use of special chuck jaws

### Requirements of the chuck jaws

When using special chuck jaws, please observe the following rules:

- The chuck jaws should be designed to be as low as possible. The clamping point must be as close as possible to the housing. (clamping points at a greater distance cause higher surface pressures in the jaw guidance and can significantly reduce the clamping force.)
- Do not use welded jaws.
- Reduce operating pressure for higher clamping points.

## 2.6 Environmental 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 to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▶ 3 [14].
- Make sure that the product is a sufficient size for the application.
- Ensure that maintenance and lubrication intervals are observed, ▶ 7 [26].
- Ensure that the environment is free from ferromagnetic particles or chips.



## 2.7 Personnel qualification

### Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

<b>Trained electrician</b>	Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.
<b>Qualified personnel</b>	Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.
<b>Instructed person</b>	Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.
<b>Service personnel of the manufacturer</b>	Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

## 2.8 Personal protective equipment

### Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

## 2.9 Notes on safe operation

### Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

### IMPORTANT!

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

## 2.10 Transport

### Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

## 2.11 Malfunctions

### Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

## 2.12 Disposal

### Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

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

## 2.13 Fundamental dangers

- Observe safety distances.
- Never deactivate safety installations.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- 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.

### 2.13.1 Protection during handling and assembly

#### Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

#### Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

## 2.13.2 Protection during commissioning and operation

### Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

## 2.13.3 Protection against dangerous movements

### Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- Never rely merely on the response of the monitoring function (dynamic pressure monitoring with pressure sensors) to avert danger. Assume that the drive movement is faulty as long as the installed monitors are not effective, since the effect depends on the control and the current operating state of the drive. Perform maintenance, modification and attachment work outside of the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

## 2.13.4 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 may only be used within the scope of its technical data



### ⚠ WARNING

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

- Provide system pressure monitoring in the hydraulic system
- Provide protection in the user program in case of pressure loss



### ⚠ 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 remain in the danger zone
- Wear protective equipment (protective shoes)



### ⚠ WARNING

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

- Prioritize automated loading
- Do not reach between the workpiece and the chuck jaw during the clamping procedure



### ⚠ WARNING

**Risk of injury due to accidental actuation when working on the product**

- Disconnect the power supply when working on the product



### ⚠ 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)

### 3 Technical data

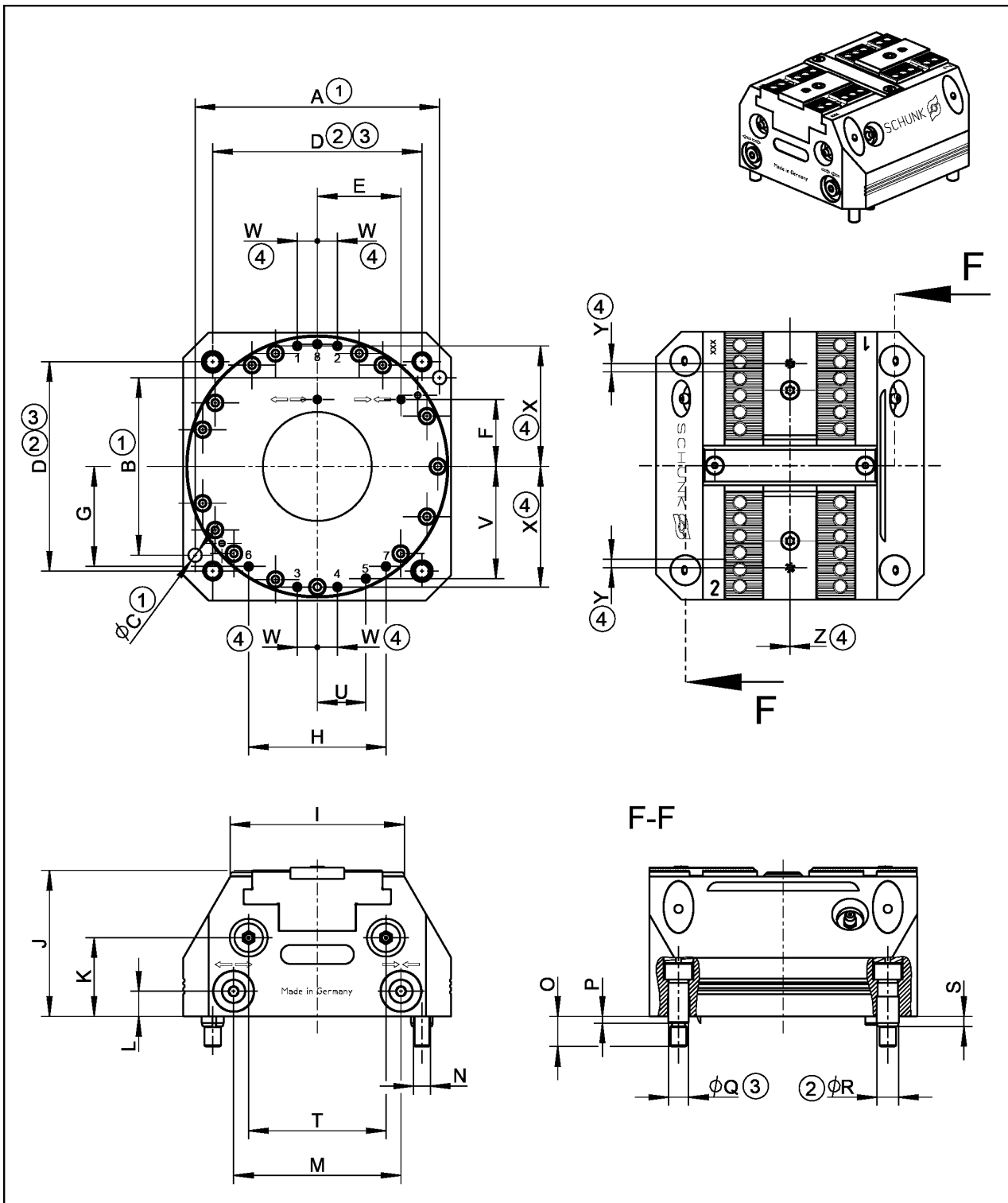
Installation position	any
Operating temperature	+5 °C to +60 °C
Noise emission [dB(A)]	≤ 70
Pressure medium	Hydraulic oil
Requirement for the pressure medium	filtered (10 µm), viscosity 46 mm/s at 40 °C in line with ISO VG
Volumetric flow	max. 2 l/min
Oil loss by adhering oil removal	max. 0.5 mg/cycle
Max. speed of rotation	100 RPM

Size	Stroke/ jaw [mm]	Clamping force at max. pressure* [kN]	Max. pressure [bar]	Repeat accuracy ** [mm]	max. jaw height [mm]	Weight [kg]	
KSH3	64	2	4.5	60	0.01	60	1.5
	100	2	18	60	0.01	60	5
	140	3	30	60	0.01	60	9.5
	160	3	45	60	0.01	60	14
	200	4	60	60	0.02	100	24
KSH3-LH	64	4	4.5	120	0.01	60	1.5
	100	6	16	120	0.01	60	5
	140	7	30	120	0.01	60	9.5
	160	8	40	120	0.01	60	14
	200	10	53	120	0.02	100	24
	250	15	50	60	0.02	150	36.5
	315	18	95	120	0.02	200	83
KSH3-F	64	4	4	60	0.01	60	1.5
	100	4	18	60	0.01	60	5
	140	6	30	60	0.01	60	9.5
	160	6	45	60	0.01	60	14
	200	8	60	60	0.02	100	24

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

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

Dimension	KSH3 / KSH3-LH / KSH3-F					KSH3-LH	
	64	100	140	160	200	250	315
A	36	90	126	146	184	180	290
B	56	64	92	106	146	160	230
∅ C	4H7 x 7.5	6H7 x 12	8H7 x 14	8H7 x 14	8H7 x 14	10H7 x 20	10H7 x 20
D	50	80	110	125	160	200 x 180	250
E	17	29.5	25 (2x)	50	64.5	45 (off-center)	100
F	17	32	40	40	64.5	80	108
G	21	34.5	51.8	59.7	72	50	112
H	33.6	55	74	82	116	140	192
I	41	64	91	104	138	170	220
J	55.7	74.2	77.7	87.2	95.2	103.2	141
K	33.3	41	43	47	53	57	78
L	14	15	13.5	15	17.5	20	25
M	30	57	88	100	129	45	200
N	M6	M8	M8	M10	M12	M12	M16
O	12	15	16	18	21	20	26
P	2.5	4	4	4	6	5	5
∅ Q	8f7	10f7	10f7	12f7	14f7	14f7	18f7
∅ R	8	11	11	13	16	16	21
S	4	4.5	5.5	6	6	6	6
T	32	54	74	82	116	140	192
U	0	18.7	26	29	41	54	65
V	27	40	58.5	67	83	104	132
W	6	9.5	12	12	17	18	25
X	26.5	43	63	72	91	115	146
Y	7.3	6	6	5	9	20	37.5
Z	2.5	4.5	0	0	0	0	0



- 1 Optional Z variant  $\pm 0.01$  mm to clamping center

---

- 2 Clamping sleeve  $\pm 0.04$  mm to clamping center

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- 3 Clamping sleeve fitting screw  $\pm 0.02$  mm to clamping center

---

- 4 Only with variant "PM"

---



## 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)**

Description	Screw size	M5	M8	M10	M12	M20
KSH3	Tightening torque $M_A$ (Nm)	9	32	62	108	510
KSH3-LH	Tightening torque $M_A$ (Nm)	9	32	75	140	510
KSH3-F	Tightening torque $M_A$ (Nm)	4	25	50	90	290

## 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. ▶ 9 [ 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

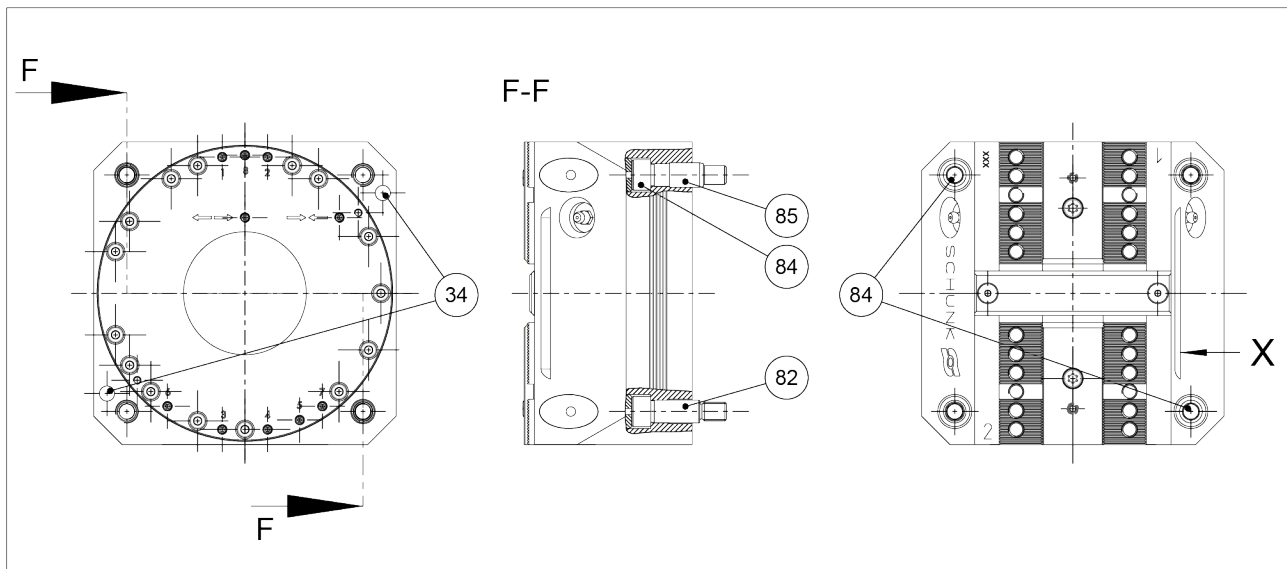


### **⚠ CAUTION**

**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 $\varnothing$ M6 ▶ 8.3 [ 35]
82	Fitting screw $\varnothing$ f7 ▶ 8.3 [ 35]
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 (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 (85) and screws (84).

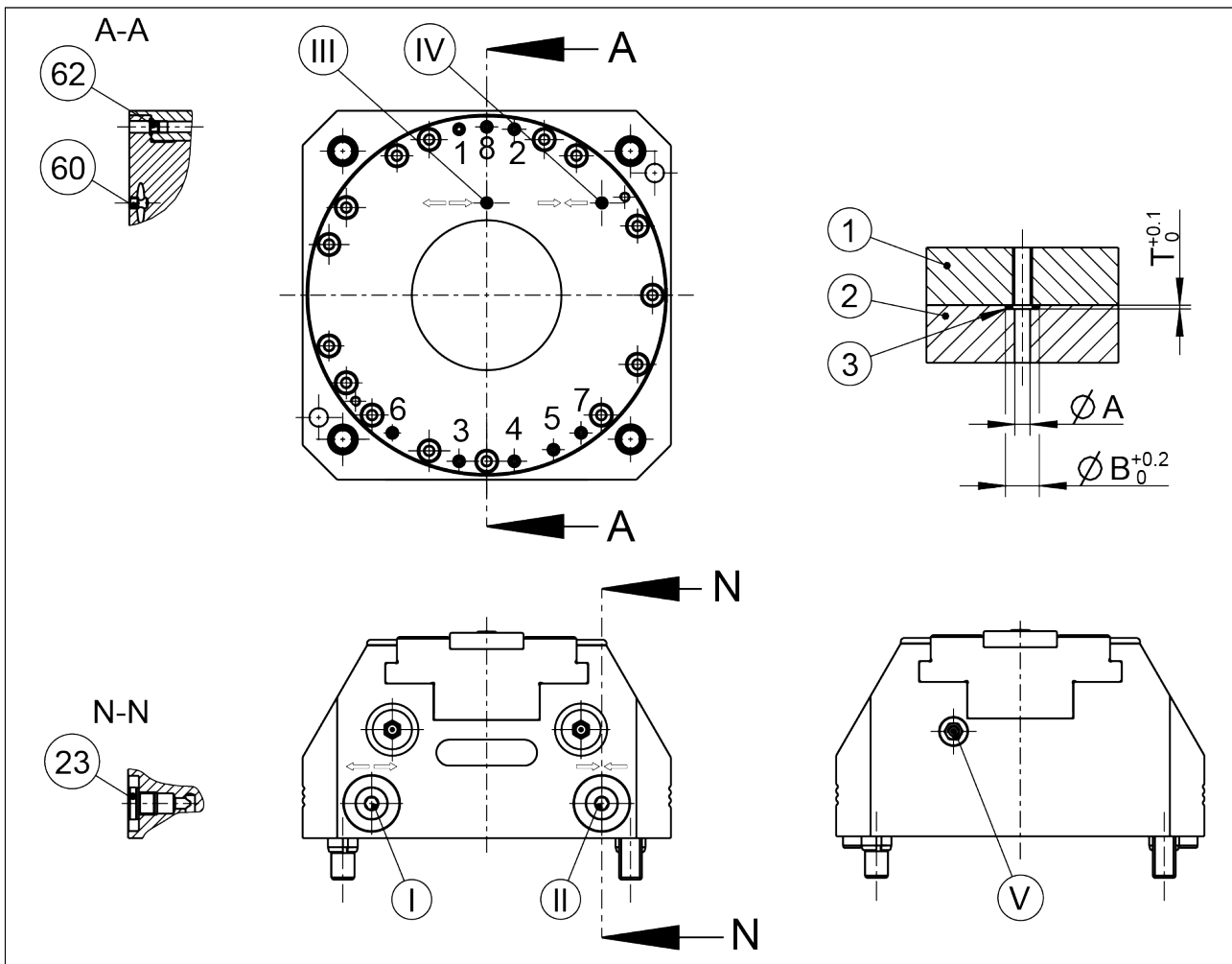
### Assembly with fitting screws:

There are two fittings in the housing (1) that, along with the fitting screws (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 (82), these are used instead of the clamping sleeves (85) and two of the four screws (84).

### Assembly with cylindrical pins (Z variant):

The clamping force block is fastened to the machine table with 4 screws (84). The two cylindrical pins (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)         |
| 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  |

### Hose-free direct connection

- |   |                 |
|---|-----------------|
| ① | Clamping system |
| ② | Adapter         |
| ③ | Sealing element |

### 5.2.1 Supply lines

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

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

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

- Connection **I** and **II** for operation with external hydraulic pipes or hose lines.

The threads for the hydraulic fittings – on the front of the housing (1) – are for all G<sup>1</sup>/<sub>8</sub>" clamping force blocks.

- Connection **III** and **IV** in the base for hose-free direct connection in the machine table.

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

Hose-free direct connection		Size					
		64	100	140	160	200	250
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 5.28 x 1.78					Ø 9 x 2
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 3.5 x 1	Ø 5.28 x 1.78			Ø 9 x 2	

\*Included in accessory kit and sealing kit

**NOTE:**

With the delivery of the clamping force block, all four hydraulic connections are sealed. On the bottom side with set-screws (60) and on the front with locking screws (23).

- When using the air purge via connection 5, the sound absorber (V) must be removed and replaced by a set-screw (93). ▶ 8.2 [ 35]

The clamping force block has two more base connections (**617**) for direct lubrication through the machine table. These connections come sealed on delivery with set-screws (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 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				

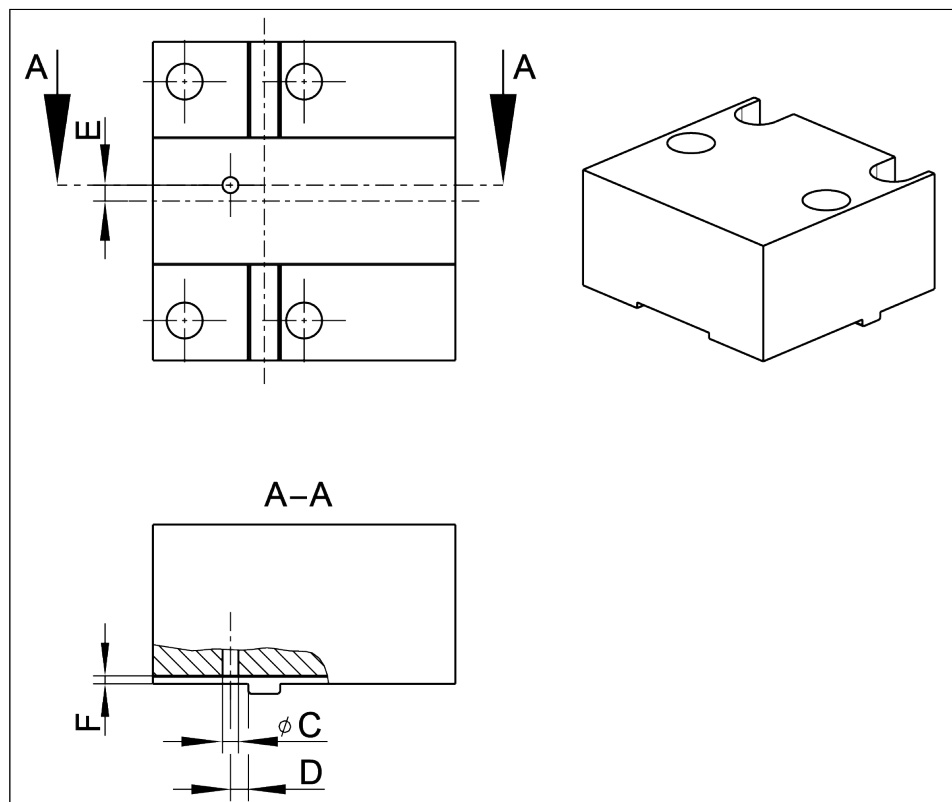
Connection	1	4
Jaw end position open clamping force block closed	0	1
Clamping position	0	0
Jaw end position closed clamping force block open	1	0

#### 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.

### 5.2.3 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	64	100	140	160	200	250	315
Ø C [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

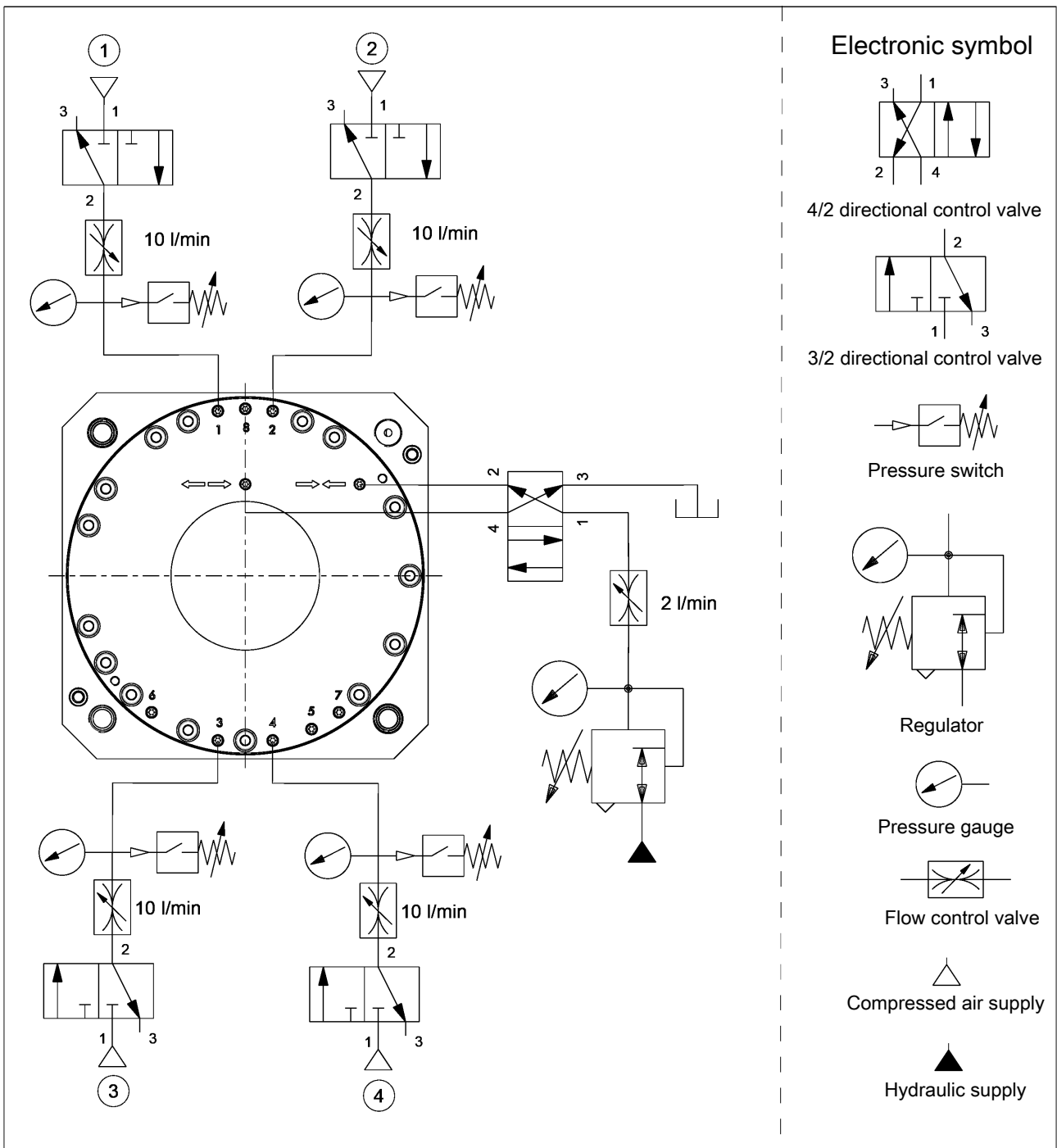
For this purpose, the customer must provide the top jaw with a Ø2 mm monitoring hole on the workpiece flat work surface. This ensures that the escaping air purge can be released up to where contact is made with the mounted workpiece and that a differential pressure measurement can be carried out via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

### 5.2.4 Hydraulic 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)



## 6 Troubleshooting

### Clamping force block chuck jaws will not move

Possible cause	Solution(s)
Oil supply interrupted	Check the hydraulic supply
System pressure too low	Increase system pressure according to clamping system technical specifications
Connections mixed up	Check connections and functions and connect properly
Hydraulic connections that are in use are closed	Check connections and open

### Clamping force block does not complete stroke

Possible cause	Solution(s)
Chips or dirt between covering strip and base jaws	Unscrew the covering strip (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 ▶ 7.4.2 [ 32] and replace all the seals (see sealing kit lists ▶ 8.1 [ 34])
Inadequate lubrication	Lubricate the lubrication nipples with microGLEIT LP 410 ▶ 7 [ 26]

### Clamping force block movement jerky

Possible cause	Solution(s)
Steel guide rollers on sliding surfaces not greased	See chapter "Maintenance and Care" ▶ 7 [ 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 ▶ 7 [ 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 ▶ 8.1 [ 34]

## 7 Maintenance and care

### 7.1 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.

### 7.2 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

### 7.3 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.

## 7.4 Maintenance work

### 7.4.1 Lubricate



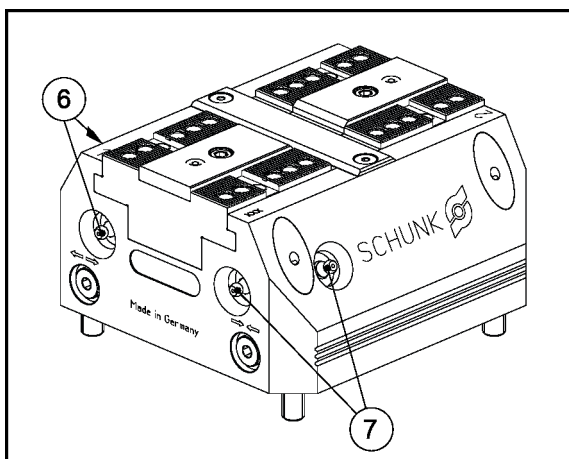
#### ⚠ CAUTION

**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.

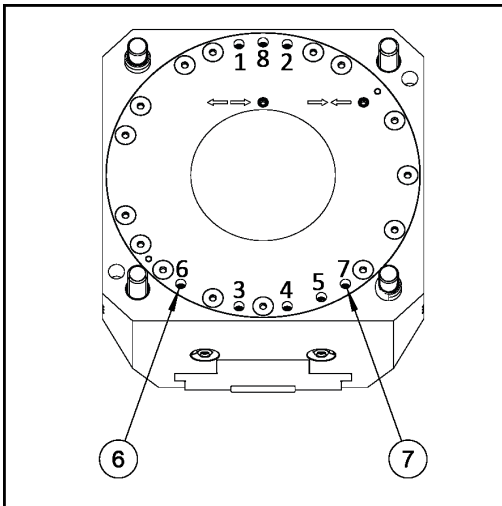
#### Manual lubrication



- 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. ▶ 7.3 [ 26 ]

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, ▶ 7.3 [ 26 ]

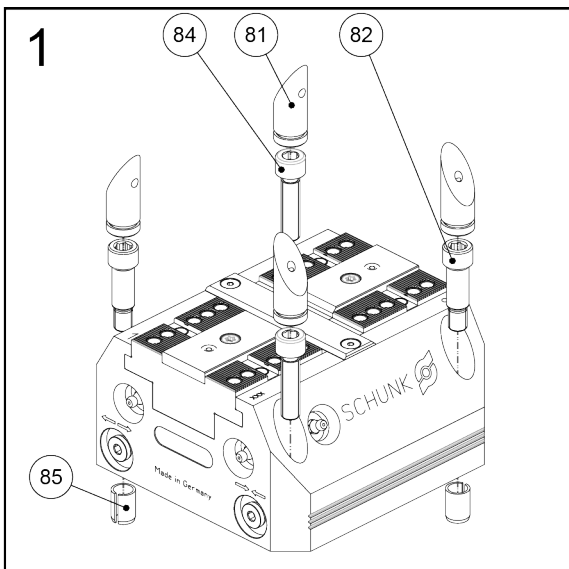
Size	Grease quantity (per connection) [cm <sup>3</sup> ]
64	2
100	4
140	4
160	4
200	4
250	4
315	6

### 7.4.2 Basic cleaning

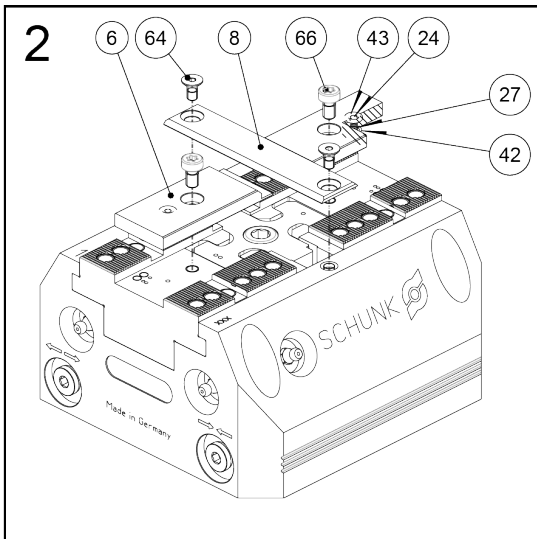
For basic cleaning, the product must be disassembled, cleaned and reassembled. With the "PM" variant, the pneumatic jaw end position control must also be set.

#### Disassembly

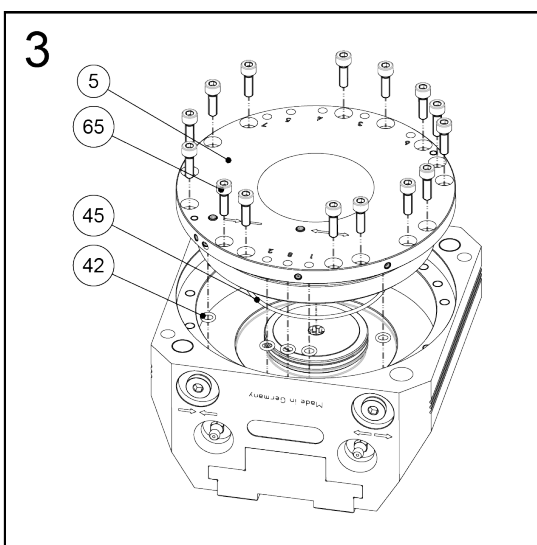
**Before disassembling the product, switch off the machine and secure it against being switched on again. Then remove all hydraulic lines. No residual energy may be left in the product.**



- 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.

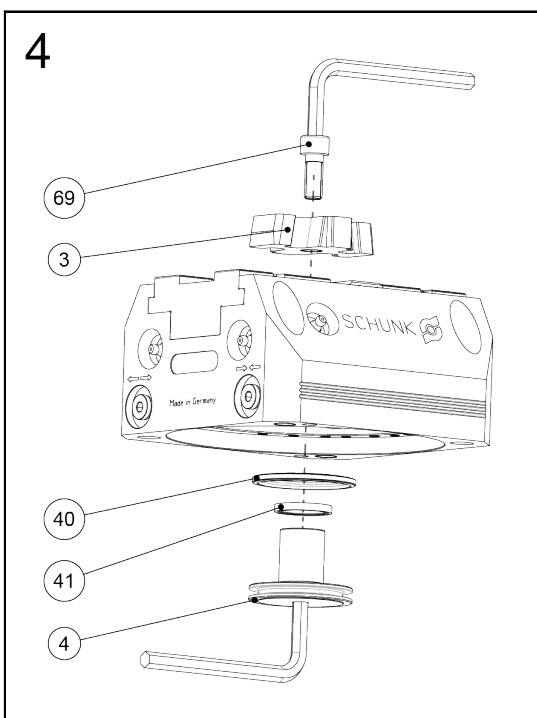


- Remove screws (64) and take off the cover strip (8).
- Remove screws (66) and take off the guide strip (6).
- Variant "PM" also includes a compression spring (27), O-ring (43), sphere (24) and O-ring (42).

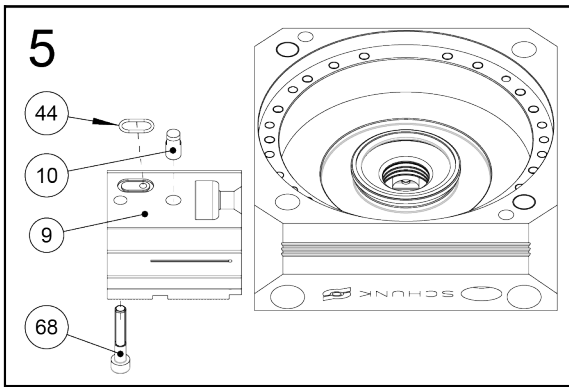


Remove screws (65) and pull out cover (5) together with O-ring (45) and flat gaskets (48) out of the housing. To do this, screw two screws into the threaded holes as an extraction tool

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: M8 x L>25



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 seal (40) out of the housing. Remove the seal (41) from the housing.

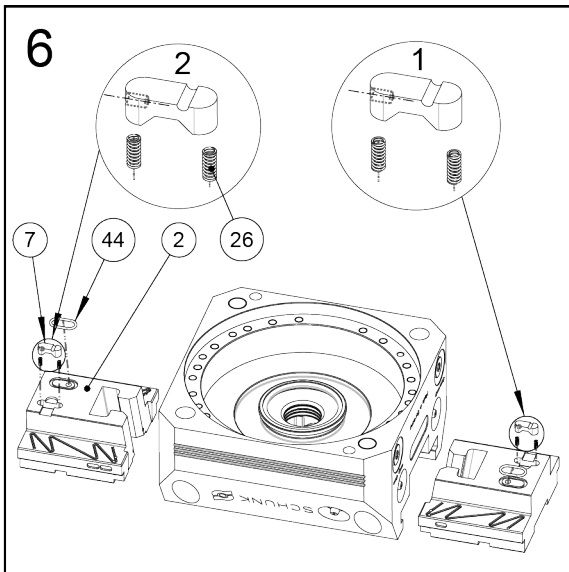


**Additionally for the KSH3-F variant:**

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 O-ring (44).



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

Variant "PM" also includes O-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**

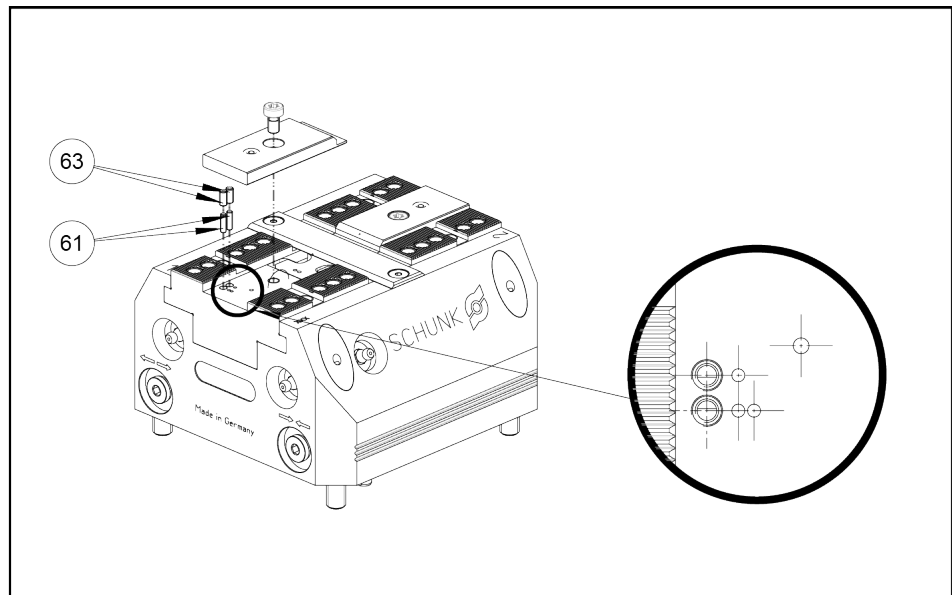
- Clean all parts thoroughly and check for damage and wear.
- Treat all greasing areas with lubricant ▶ 7.3 [□ 26].
- Replace all wearing parts and seals if necessary ▶ 8.1 [□ 34].

**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 (3).
- Observe the tightening torques for the screws ▶ 4 [□ 17].
- After completion of the assembly, carry out a leak test and a function test. ▶ 7.4.3 [□ 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 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 the set-screw (61) in the 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 the set-screw (61) in the bore hole "oo".
- Screw set-screw (63) in both bore holes and hand-tighten.

### 7.4.3 Testing the leakage and tightness of the hydraulic system

The following is needed to check for leaks:  
hydraulic unit or manually actuated hydraulic pump, pressure gauge, shut-off valve and quick couplers.

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

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

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

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

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

#### Measures in the event of a leaking hydraulic system

If the clamping system is leaking, check the fittings first.

Seal any leaking fittings. Once the fittings are sealed, check the seals in the clamping force block for leaks and replace if necessary. ▶ 8.1 [ 34]

### 7.4.4 Assembly devices piston seals

To assemble the seal (40), a multi-part assembly tool is required. If no assembly tool is available, repair work on the TANDEM clamping force block should be carried out by SCHUNK.

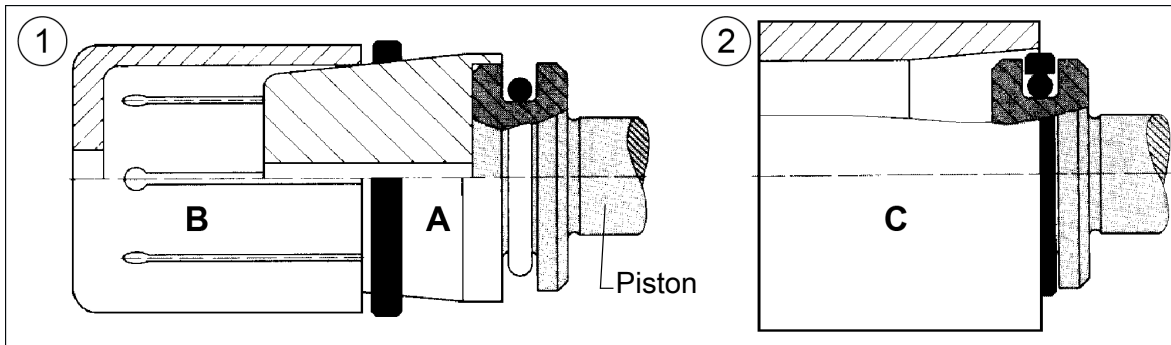
#### 1. Assembly

- Disassemble the two-part seal (40) and grease with Renolit HLT 2 or an equivalent grease.
- Pull the O-ring of the seal (40) over the cylinder piston (4) and into the groove. (Do not overstretch or tear the O-ring in the process.)
- Stretch the sealing ring with an expansion sleeve over the cone sleeve and slide over the cylinder piston and the O-ring that was previously inserted into the groove.

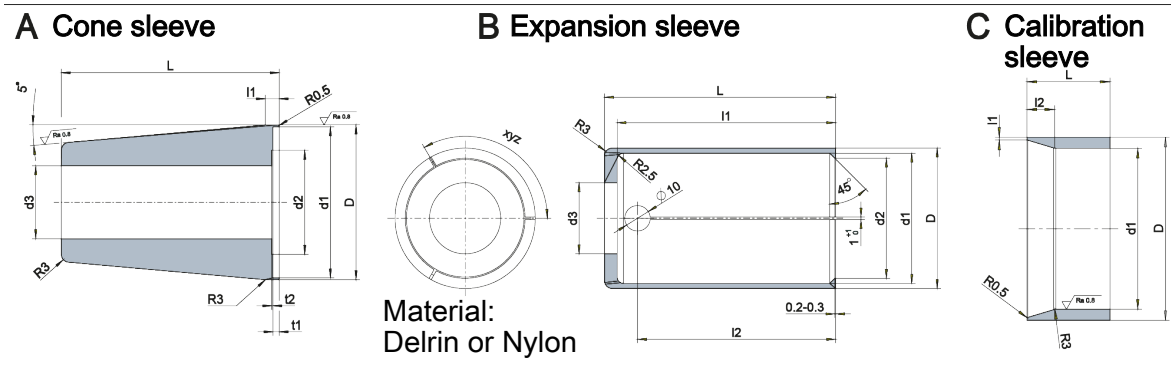
#### 2. Calibration

After sliding it over, the Turcon-ring snaps into the groove. However, assembly is still not complete. The stretched ring needs to be returned to its original shape with a calibration sleeve.





Assembling the piston seal



Assembly tools for the piston seal

<b>A cone sleeve</b>		<b>Material: steel</b>							
KSH3	Piston Ø	D	$d_1^{+0.15}$	$d_2$	$d_3$	L	$l_1$	$t_1^{+0.3}$	$t_2$
64	21	22.5	21	13	5	70	5	2	0.5
100	35	36.5	35	22	17	75	5.7	2.7	0.5
140	50	51.5	50	37	25	80	50	2	0.5
160	58	59.5	58	40	28	85	5.4	2.4	0.5
200	75	76.5	75	55	43	85	6	3.5	0.5
250/315	105	106.5	105	80	58	100	6	3	0.5

<b>B expansion sleeve</b>		<b>Material: POM, NYLON® or similar</b>							
KSH3	Piston Ø	D	$d_1$	$d_2$	$d_3$	L	$l_1$	$t_1^{+0.3}$	xyz
64	21	20.37	16.37	12.37	5	76	71	63	3 x 120°
100	35	34.64	30.64	26.64	17	81	76	68	3 x 120°
140	50	48.94	44.94	40.94	25	86	81	73	4 x 90°
160	58	55.22	51.22	47.22	28	91	86	78	4 x 90°
200	75	71.5	67.5	63.5	30	91	86	78	6 x 60°
250/315	105	99.67	95.67	91.67	35	96	91	83	6 x 60°

<b>C calibration sleeve</b>		<b>Material: steel</b>				
KSH3	Piston Ø	D	$d_1$	L	$l_1$	$l_2^{\pm 1}$
64	21	29.05	21.05	30	1	10
100	35	43.05	35.05	30	1	10
140	50	58.05	50.05	30	1	10
160	58	66.05	58.05	30	1	10
200	75	85.5	75.0	30	1	10
250/315	105	120.5	105.05	30	1	10

## 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 connections.

Sealing kit *	ID
Size 64	1477668
Size 100	1477671
Size 140	1477673
Size 160	1477675
Size 200	1516776
Size 250	1477677
Size 315	1516778

\* 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	1470482
Size 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	1446553
Size 100	1446556
Size 140	1446557
Size 160	1446558
Size 200	1486400
Size 250	1446559
Size 315	1497988

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

## 8.3 Parts lists

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

Item	Designation	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	4	64 / 100
	Conical lubrication nipple	4	140 / 160 / 200 / 250 / 315
22	Sound absorber	1	
23	Locking screw	2	
24	Steel ball	2	Y
26	Compression spring	4	Y
27	Compression spring	2	Y
34	Cylindrical pin	2	
40	Turcon Glyd Ring	1	X
41	Turcon Glyd Ring	1	X
42	O-ring	2	Y
43	O-ring	2	Y
44	O-ring	2	Y
45	O-ring	1	X
47	Sealing ring	1	X
48	Flat gasket	9	64 / X
	Flat gasket	10	100 / 140 / 160 / 200 / 315 / X

Item	Designation	Quantity	Note
60	Set-screw	2	64 / 100 / 140 / 160 / 200 / 315
	Set-screw	4	250
61	Set-screw	4	
62	Set-screw	7	64
	Set-screw	8	100 / 140 / 160 / 200 / 315
	Set-screw	6	250
63	Set-screw	4	
64	Countersunk screw	2	64 / 100 / 140 / 160 / 200 / 250
	Countersunk screw	4	315
65	Countersunk screw	9	100
	Cylindrical screw	7	64
	Cylindrical screw	15	140 / 160 / 315
	Cylindrical screw	13	200
66	Cylindrical screw	2	
69	Screw	1	
70	Sealing plug	2	64
	Sealing plug	3	100 / 200 / 315
	Sealing plug	4	140 / 160
81	Plug	4	
82	Fitting screw	2	
83	O-ring	4	<b>X</b>
84	Screw	4	
85	Clamping sleeve	2	
86	Screw	8	
87	O-ring	2	64 / <b>X</b> / <b>Y</b>
	O-ring	10	100 / 140 / 160 / 200 / 250 / 315 / <b>X</b> / <b>Y</b>
88	O-ring	7	64 / <b>X</b> / <b>Y</b> / <b>Z</b>
93	Set-screw	2	<b>Z</b>
100	Eye bolt	2	200 / 250 / 315 / <b>Z</b>

#### Parts list key

64	for size 64	250	for size 250
100	for size 100	315	for size 315
140	for size 140	<b>X</b>	included in the piston chamber sealing kit
160	for size 160	<b>Y</b>	included in the monitoring sealing kit
200	for size 200	<b>Z</b>	included in accessory kit

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

## Parts list "fixed jaw" variant

Item	Designation	Quantity	Note
1	Body >Housing<	1	*
2	Base jaw	1	*
3	Chuck piston	1	
4	Cylinder piston	1	
5	Cover	1	
6	Guide strip	2	
	Guide strip	1	
7	Monitoring piece	1	
8	Covering strip	1	
9	Base jaw	1	
10	Bolt	1	
11	Guide strip	1	64 / 160
21	Cupped-type lubrication nipple	4	64 / 100
21	Conical lubrication nipple	4	140 / 160 / 200
22	Sound absorber	1	
23	Locking screw	2	
24	Steel ball	2	Y
26	Compression spring	2	Y
27	Compression spring	2	Y
34	Cylindrical pin	2	
40	Turcon Glyd Ring	1	X
41	Turcon Glyd Ring	1	X
42	O-ring	2	Y
43	O-ring	2	Y
44	O-ring	2	Y
45	O-ring	1	X
47	Sealing ring	1	X
48	Flat gasket	9	64 / X
	Flat gasket	10	100 / 140 / 160 / 200 / X
60	Set-screw	2	
61	Set-screw	2	
62	Set-screw	7	64
	Set-screw	8	100 / 140 / 160 / 200
63	Set-screw	2	

Item	Designation	Quantity	Note
64	Countersunk screw	2	
65	Countersunk screw	9	100
	Cylindrical screw	7	64
	Cylindrical screw	15	140 / 160
	Cylindrical screw	13	200
66	Cylindrical screw	1	
67	Cylindrical screw	1	
68	Cylindrical screw	1	
69	Screw	1	
70	Sealing plug	2	64 / 100
	Sealing plug	3	100 / 200
	Sealing plug	4	140 / 160 / Z
81	Plug	2	Z
82	Fitting screw	4	X / Z
83	O-ring	4	Z
84	Screw	2	Z
85	Clamping sleeve	8	Z
86	Screw	2	64 / X / Y / Z
87	O-ring	10	100 / 140 / 160 / 200 / X / Y / Z
	O-ring	7	64 / X / Y / Z
88	O-ring	2	200 / Z
93	Set-screw	2	200 / Z
100	Eye bolt	2	200 / Z

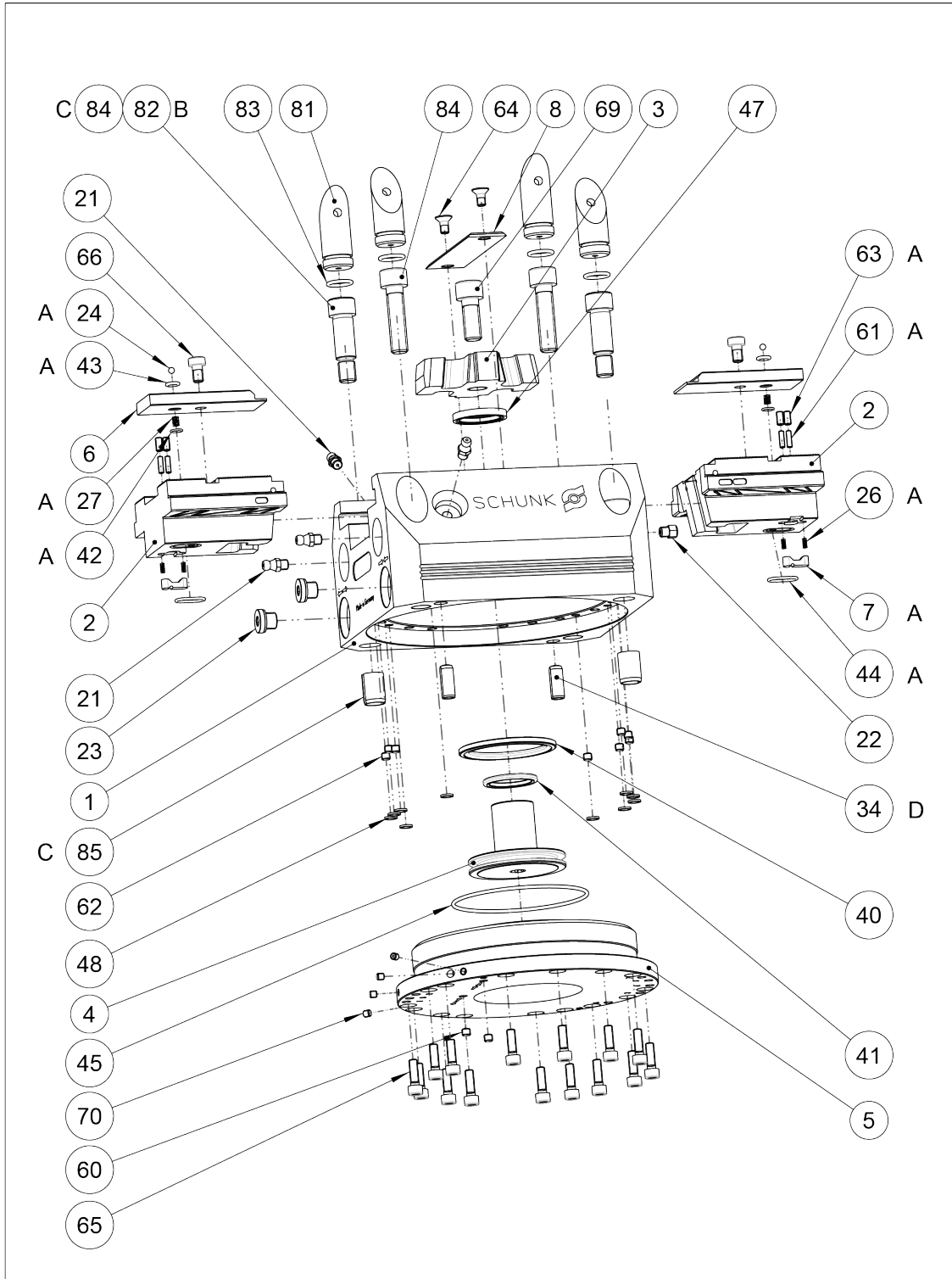
#### Parts list key

64	for size 64	200	for size 200
100	for size 100	X	included in the piston chamber sealing kit
140	for size 140	Y	included in the monitoring sealing kit
160	for size 160	Z	included in accessory kit

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

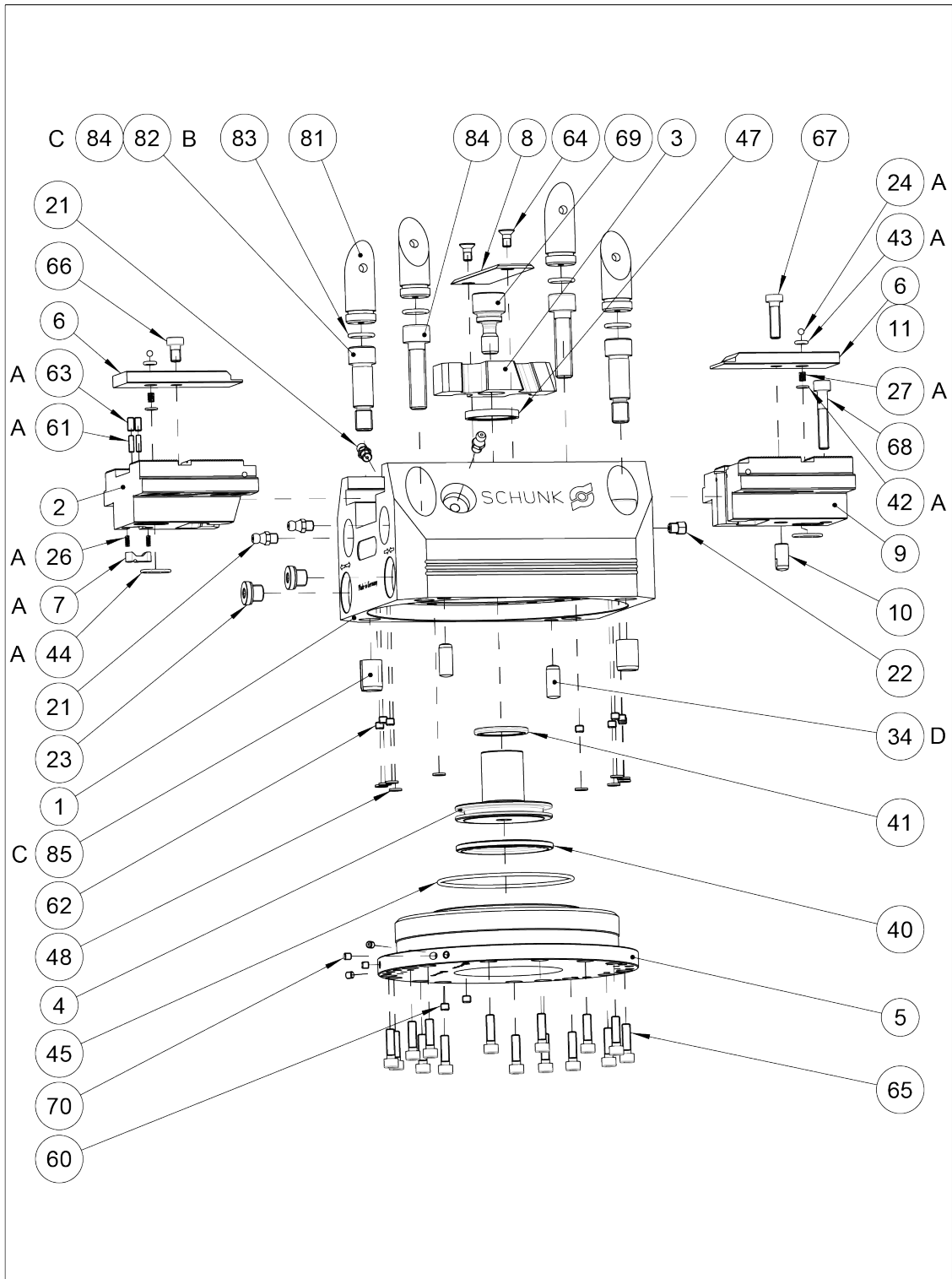
## 9 Assembly drawings

### 9.1 KSH3, KSH3-LH



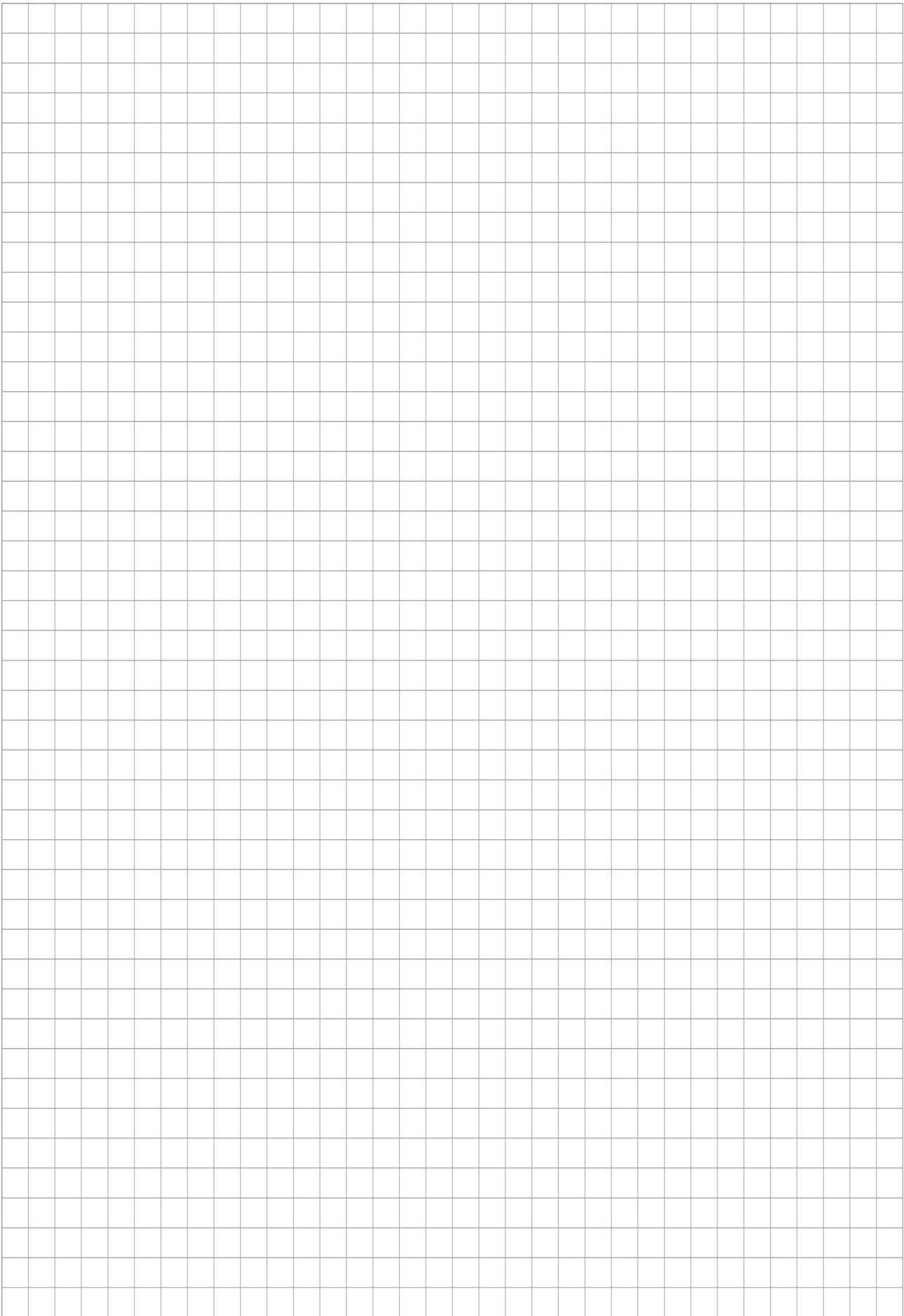
A	with variant "PM"	B	Centering with fitting screws
C	Centering with clamping sleeves	D	Centering with cylindrical pins (Z variant)

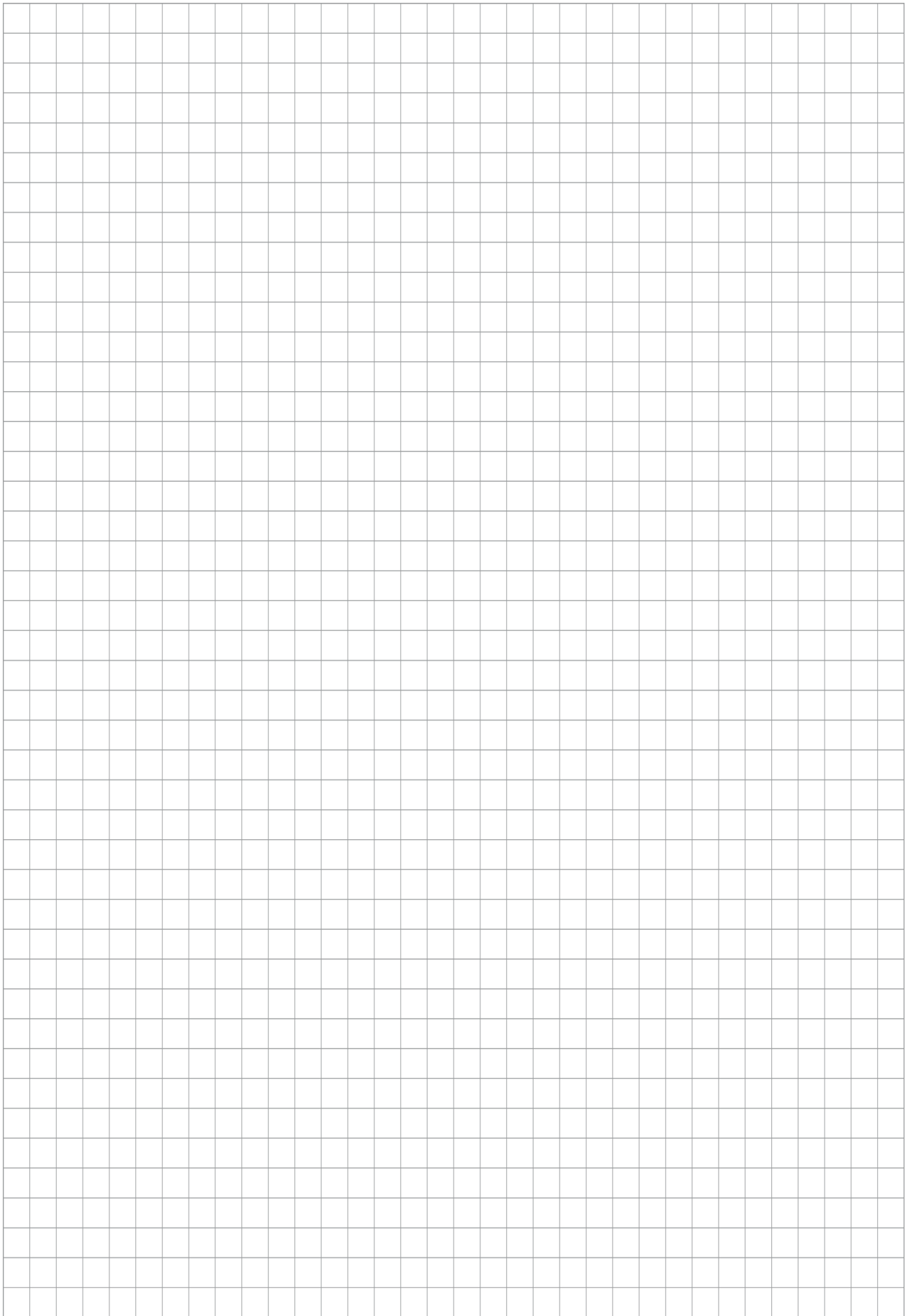
## 9.2 KSH3-F



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









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

Lothringer Str. 23  
D-88512 Mengen  
Tel. +49-7572-7614-0  
Fax +49-7572-7614-1099  
info@de.schunk.com  
schunk.com

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# Manufacturer certificate

**Manufacturer /** Heinz-Dieter SCHUNK GmbH & Co. Spanntechnik KG.  
**Distributor:** Lothringer Str. 23  
D-88512 Mengen

**Product:** Clamping force block  
**Description:** TANDEM  
**Type designation:** KSH, KRH, HZS

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.

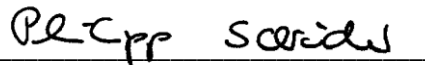
#### Harmonized standards applied:

- **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. Aug. 2022



p.p. Philipp Schröder / Head of Development

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

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

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