

# Technical Documentation



## SK-Tool Gripper

Tool Grippers for tool shanks with 7/24 taper

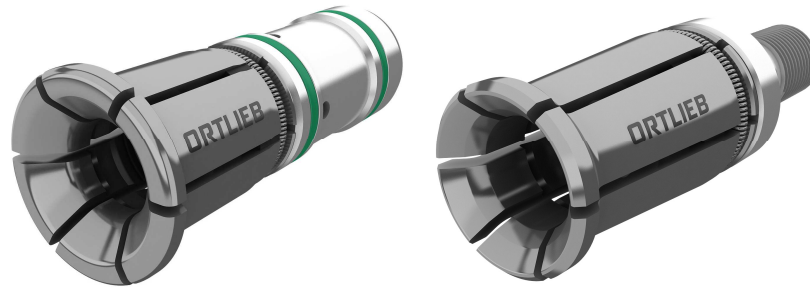
DIN 69871 /72 / ISO 7388/1+2 / ANSI B5.50 / MAS BT

---

## Content:

1	General .....	3
1.1	Introduction.....	3
1.2	Guarantee .....	4
1.3	Intended Use .....	5
1.4	Initial start-up.....	5
1.5	Checklist for Installation.....	6
2	Product description .....	8
2.1	Tool-Grip® SK.....	9
2.2	Multi-Grip® SK .....	9
2.3	Technical Data .....	9
3	Spare parts .....	10
4	Mounting instructions .....	11
5	General Safety Instructions .....	12
5.1	Troubleshooting.....	14
6	Assembly declaration .....	15
7	Shipping data.....	16

## 1 General



### 1.1 Introduction

This operation instruction will help you to operate your Ortlieb product safely and to avoid accidents, possible dangers and risks.

→ Please read this operation instruction and the safety instructions carefully before initial start-up.

This documentation provides all information on operating and maintaining your Ortlieb product. Ortlieb Präzisionssysteme GmbH & Co. KG assumes no liability for damages and interruptions caused by disregarding several articles of this documentation.

Ortlieb Präzisionssysteme GmbH & Co. KG reserves the right to make any technical changes and improvements to this product. No liability on literal mistakes.

For Start-up, operation and maintenance, the information in this manual must be supplemented by the relevant national and international „safety and accident prevention regulations“. Compliance with the safety regulations and statutes will prevent injury and damages to machinery and this product.

## 1. General

---

### **1.2 Guarantee**

Products of Ortlieb Präzisionssysteme GmbH & Co. KG are produced according to national and international standards as well as company standards, supervised by a certified quality assurance.

For those products Ortlieb Präzisionssysteme GmbH & Co. KG assumes liability in the manner that parts with material or production defects proven within 12 month after purchasing were repaired free-of-charge, replaced by new ones or taken back to the charged price.

In the event of improper assembly and operation, use of non-original spare parts, unauthorized modifications to our product we shall assume no liability for personal injury or damage to machinery and our product.

We shall assume no liability for damage of any type resulting from the removal of safety devices. We take the initial start-up of our products on appropriate and technically flawless machines by qualified and continuous trained personal for granted.

## 1. General

---

### 1.3 Intended Use

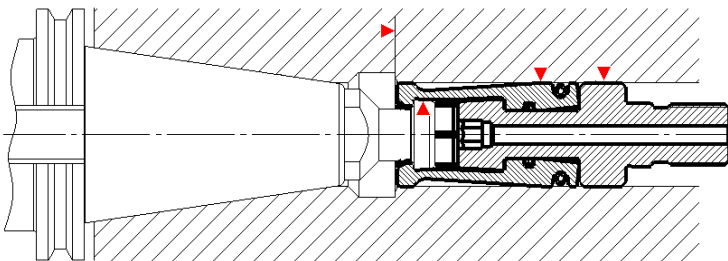
Use the tool-grippers only for the intended use. Insufficiently clamped tools or work-pieces, failure to comply „safety and accident prevention regulations“, and the use of work-pieces and our products on machines that are not intended for this propose, can result in personal injury and damages to the clamping devices. In this case, we shall assume no liability. Do not apply force during assembly, disassembly and operation; this could damage the clamping device or the machine.

### 1.4 Initial start-up

A function check is implicitly before initial operation of the tool-gripper. To ensure a safe and precise operation of the tool-gripper during machining, a sufficient clamping force must be provided. Check the clamping force.

→ See: Checklist for Installation p.6

The tool-gripper, especially the function surfaces must be clean and lubricated sufficiently. It is strongly recommended to grease with suitable assembling grease.



Never exceed the axial and radial forces specified on the tool-gripper.

Check the clamping force regularly!

## 1.5 Checklist for Installation

- 1.) Tool –“Eject” max. 1.0 mm. The tool is only drawn in securely by the tool gripper in this range. Ensure that the clamping reserve is min. 2 mm and max. 3 mm.
- 2.) Check the clamping force. The max. pull-in force,  $F_z$  max. , must not be exceeded.
- 3.) Tool clamping must not be one-sided. Guide the disc spring stack accurately.
- 4.) Spindle receiver must meet DIN 69871 /72 standard and Ortlieb installation dimensions. Functional surfaces hardened min. 1mm deep to HRc 60 +2.
- 5.) Observe the control operation.  
Insert the tool until it reaches the limit stop at the draw-bolt plane surface, then clamp it. Clamping must not be done too soon, as otherwise the clamping segments are not disengaged properly and can be damaged.
- 6.) Tool change: Grip the tool – eject – unclamp - blow-out. Make sure that the tool and spindle are clean. If chips are drawn in, clamping segments will sustain damage. (One-sided overloading of the clamping segments).
- 7.) If one clamping segment breaks, the tool will nevertheless be clamped safely. However the tool-gripper must be exchanged immediately as a complete unit.
- 8.) The tool-gripper is a part which is subject to wear. Under favourable operation conditions, the complete tool-gripper must be exchanged every  $1 \times 10^6$  load alternations. We do not assume liability and guarantee on consequential damages in case only parts are exchanged.
- 9.) Refer to the Mounting instructions p.11 for information about how to change the tool-gripper! Before installing the tool-gripper, check the spindle for damage. Grease the functional surfaces.

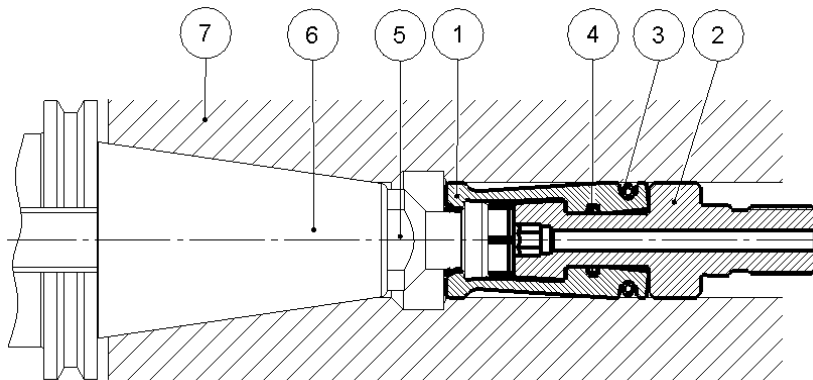
## 1. General

---

- 10.) For optimal drawing-in force,  $RPM_{max.}$  and  $n_{max.}$ , please refer to data on the installation drawing.
- 11.) Tools must meet DIN 69871 /72 standards.
- 12.) Without an HSK tool insert, there is no operation of the spindle allowed. (Out-of-balance!)
- 13.) After every crash, the tool-gripper must always be exchanged completely.
- 14.) The clamping force transmitted to the tool shank by the tool-gripper may not be below the incident machining forces and torques. It is also important that the functional surfaces and the clamping system are greased regularly (Metaflux lubricant metal paste) Based on experience, re-greasing should be done after every 200.000 load alternations at the least in order to keep the clamping force as uniform as possible. Regular measurement of the clamping force, either quarterly or semi-annual, will ensure the required safety for the work process. (See p.12)
- 15.) Check the tightening of the draw-bolt and the drawbar regularly to ensure a proper function of the tool-gripper.  
A loose draw-bolt causes a loss of clamping force and ejects the tool far over the allowed max. 1,0mm.

## 2 Product description

The Ortlieb tool-grippers for tool shanks with 7/24-taper are an approved serial product for automatic tool changing. They are clamping tools with ISO taper (7/24) and pull studs acc. DIN 69871/72. The six-piece clamping segment has an optimal load balancing. Therefore a higher permitted clamping force is possible. And this at faster cycles.



Pos.	Item
1	clamping segment
2	draw-bolt
3	ring spring
4	rubber shim
5	pull stud
6	tool
7	spindle

### Function:

Milling spindles on machine tools are usually fitted with conventional spring loaded tool clamping systems. The tool-gripper operates on pulling force.

The six-piece clamping segment is pulled by the draw-bolt into the machine spindle. The clamping segment catches the pull stud of the tool and pulls it into the spindle whereas the clamping segments are backed radial by the spindle-bore.

To change the tool, the disk springs were compressed, usually by a hydraulic cylinder. The draw-bolt is pushed by the drawbar to the front, releases the clamping segments and pushes the tool by force out of the spindle taper. The ring spring provides the opening of the clamping segments which release the tool for changing.



## 2. Product description

### 2.1 Tool-Grip® SK

By its simple design and few components, this tool-gripper is mounted quickly, extreme maintenance friendly and persistent. This tool-gripper clamps tool shanks with 7/24-taper and pull studs acc. DIN 69871/72.

DIN 69871/72
--------------

### 2.2 Multi-Grip® SK

The Multi-Grip tool-gripper clamp tool shanks with 7/24-taper and pull studs acc. DIN 69871/72 by default. In the same spindle with the same measures, tool shanks with other pull studs can be clamped by simply change the tool-gripper. The following standards are supported:

DIN 69871/72	ISO 7388/1+2 (A+B)	ANSI B5.50	MAS BT JIS B6339-1992
--------------	--------------------	------------	-----------------------

#### On request:

- Reinforced design for higher clamping forces
- Design with air blast, coolant, minimal quantity lubrication delivery and additional sealings

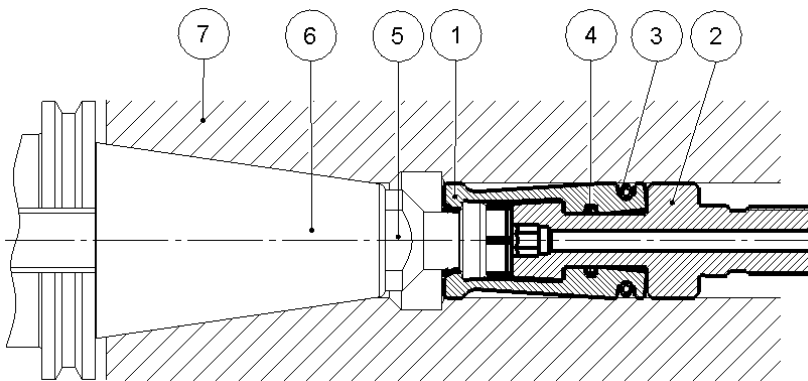
### 2.3 Technical Data

Size	Item	Installation measure (EM)	Release stroke	Reserve	Fsp max
SK 30	BSK 2557-03	71,3	5	2	9 kN
	BSK 2557-02	71,3	6,5	2	5 kN
	BSK 2557-11	71,3	4	2	9 kN
	BSK 2557-16	71,3	4	2	9 kN
SK 40	BSK 2602-03	93,9	6	2	20 kN
	BSK 2605	93,9	6	2	20 kN
	BSK 2537-06	93,4	5,5	2	20 kN
	BSK 2537	93,7	6	2	15 kN
SK 45	BSK 2425-01	112,2	8	2	25 kN
	BSK 2425-02	112,2	8	2	25 kN
	BSK 2543-04	112,2	6	2	25 kN
	BSK 2543-03	112,2	6	2	25 kN
SK 50	BSK 2528	134,7	8	2	35 kN
	BSK 2528-02	134,7	6	2	35 kN
	BSK 2615-02	135,3	6	2	35 kN
	BSK 2494	134,7	8	2	35 kN
SK 60	BSK 2604	201,3	8	2	60 kN
	BSK 2604-12	201,3	9,5	3	60 kN

\* Further technical data and installation measures on the installation drawing

### 3. Spare parts

## 3 Spare parts



Pos.	Item
1	clamping segment
2	draw-bolt
3	ring spring
4	rubber shim
5	pull stud
6	tool
7	spindle

Size	Item	Clamping segment	Draw-bolt	Ring spring	Rubber shim
SK 30	BSK 2557-03	BSK 2557/1	BSK 2557/203	OBN 7196/10	BSK 2358/4
	BSK 2557-02		BSK 2557/202		
	BSK 2557-11	BSK 2557/101	BSK 2557/211	OBN 7169/12	BSK 2358/4
	BSK 2557-16		BSK 2557/216		
SK 40	BSK 2602-03	BSK 2415/1	BSK 2602/203	OBN 7169/11	BSK 2415/4
	BSK 2605		BSK 2605/2		
	BSK 2537-06	BSK 2537/1	BSK 2537/206		
	BSK 2537		BSK 2537/2		
SK 45	BSK 2425-01	BSK 2425/1	BSK 2425/201	OBN 7169/14	BSK 2415/4
	BSK 2425-02		BSK 2425/202		
	BSK 2543-04	BSK 2543/1	BSK 2543/204		
	BSK 2543-03		BSK 2543/203		
SK 50	BSK 2528	BSK 2416/1	BSK 2528/2	OBN 7169/12	BSK 2416/4
	BSK 2528-02		BSK 2528/202		
	BSK 2615-02	BSK 2649/101	BSK 2615/202		
	BSK 2494		BSK 2494/1		
SK 60	BSK 2604	BSK 2604/1	BSK 2604/2	OBN 7169/13	BSK 2604/4
	BSK 2604-12		BSK 2604/212		

## 4. Mounting instructions

---

### 4 Mounting instructions

The tool-gripper is usually mounted through the taper of the machine spindle. The clamping segments are already mounted with the ring spring and the rubber shim to the draw-bolt.

- Make sure, that the machine spindle is cleaned completely and well lubricated.
- Drive the draw-bar in release position.
- Screw the complete tool-gripper onto the draw-bar of the machine spindle. Refer to the installation measures (table: Technical Data p.9 or on the installation drawing).
- Handle the o-rings and sealings with care (O-rings optionally).
- The clamping reserve should be at least 2mm (possible stroke from clamping position).

#### Function:

- Clamping occurs on pulling, usually by disc-spring or a clamping-cylinder.
- The draw-bar pulls the draw-bolt with the clamping segments into the machine spindle. During pulling, the segments were closed by the inner contour of the spindle, grip the pull stud of the tool and tow it into the spindle till it fits form-locking.
- To change the tool, the disc-spring is compressed by a hydraulic, pneumatic or electric cylinder. The draw-bar pushes the tool-gripper to the front, the clamping segments were spread by the ring-spring and release the pull stud and the tool.
- Finally, the tool is pushed-out by force, when the draw-bolt hits the face plane of the pull stud (about 0.5 mm stroke).
- The tool can be changed manually or automatically by a tool-changer.
- Pressure to the release cylinder must persist until a new tool is changed in safely. Pay attention on optional driving pins and slot nuts

## **5 General Safety Instructions**

### **1. Safety requirements to machines**

- Do not rotate the spindle without a clamped tool.
- On a breakdown of the clamping power – unless not clamped by a laminated disc spring – a signal must stop the machine spindle and the tool has to be clamped till a complete stop of the spindle.
- After a power breakdown and on return of the power, a change over must not occur.
- During operation, the spindle and the clamped tool must be secured by a safety facility.
- The opening of the safety doors is only possible if the machine spindle stands still.
- All operations and maintenance to the spindle and the tool-gripper are only allowed if the spindle stands still.

### **2. Operation cylinders, machine spindles**

To operate the tool-grippers, please use only appropriate cylinders according the safety and accident preventions regulations. Mounting the tool-gripper to a spindle with an existing operating cylinder, make sure that the release power is sufficient to release the tool from the spindle and the maximum clamping force is not exceeded! The drawbar and the laminated disc springs must be designed to endurance strength. Set and check the limit switch to check the stroke before initial operations. The clamping segments might get damaged.

### **3. Operating data**

The allowed operating data, maximum clamping force and maximum revolutions shown on the technical data sheet (p.9) may not be exceeded. The minimum clamping force depends on cutting rates. → See DIN 69871 /72

### **4. Tools**

Please use solely suitable tools according DIN 69871 with pull studs acc. DIN 69872, ISO 73388/1+2, ANSI B5.50, MAS BT matching your machine (see Technical Data p.9).

## 5. General Safety Instructions

---

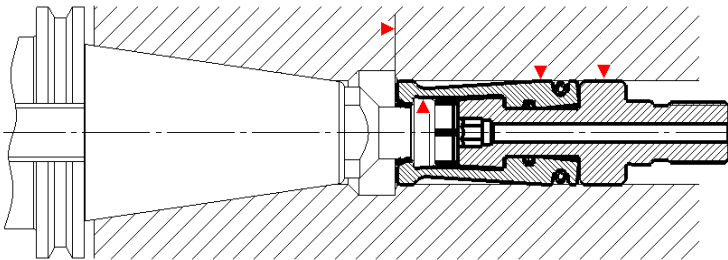
### 5. Residual risks

The system machine tool – tool-gripper – tool holder is mainly influenced by the properties of the tool (shape, weight, unbalance, material, etc.) as well as the cutting parameters which can cause residual risks. Those remaining dangers must be considered by the worker and eliminated by appropriate means.

### 6. Maintenance

Accurate and regularly maintenance (quarter annually) increases the natural life of the tool-gripper. Please keep the following advices.

- Check set-up measurement and the tightening of the draw-bolt regularly.
- Check clamping force
- Clean the tool-gripper regularly according the operation conditions from swarf and cooling lubricant. Dirt reduces the runout accuracy and reduces the clamping force.
- Do not use polar or ester-containing solvents to clean the spindle and the tool-gripper. Sealings and the rubber-bonded parts could be damaged.
- Avoid cleaning with compressed-air gun.
- Re-grease the tool-gripper at least after 200.000 load alternations. Sufficient lubrication increases the clamping force and reduces wear.



- Check the tool-gripper for cracks and other damages. After a crash, a complete check is essential. You will find spare parts on page 10.
- Replace damaged parts only by original spare-parts. Otherwise guarantee is expired.

## 5. General Safety Instructions

### 5.1 Troubleshooting

Below, you will find some of the most frequently asked questions. If an error cannot be eliminated with the methods below, please contact your technical support team. Always name the accurate article-number and the description in case of questions or re-order.

Problem	Possible cause	Remedy
Low clamping force	Set-up measurement of the draw-bolt does not match	Check set-up measurement according the installation drawing. Re-tighten the draw-bolt if necessary
	Tool-gripper is lubricated insufficiently	Re-grease tool-gripper according greasing instructions
	Wear of the segments	Check clamping segments on wear
	Damage of the disk spring stack	Disassemble the tool-gripper and check pulling-force on the drawbar
	Low pulling-power of the cylinder / disk-springs	
To high clamping force	Set-up measurement of the draw-bolt does not match	Check set-up measurement according the installation drawing. Re-tighten the draw-bolt if necessary
	high pulling-power of the cylinder / disk-springs	Disassemble the tool-gripper and check pulling-force on the drawbar
Bad run-out accuracy on the tool / tool-holder	Dirt at the front plane surface or in the SK-taper	Eject the tool-holder; clean the SK-taper in the spindle and the tool-gripper
	Damaged tool-holder	Dimensional check of tool-holder, change tool-holder if necessary
No proper ejection of the tool-holder	Set-up measurement or stroke does not match	Check set-up measurement and stroke
	To low hydraulics pressure	Check for leaks and pressure to the hydraulics cylinder, Eventually increase
Tool-holder is not clamped or pulled-in properly	Distance between tool-holder and spindle is too big	Check set-up measurement, adjust the tool-changer, especially if the spindle is re-grinded and reworked

## 6. Assembly declaration

---

### 6 Assembly declaration

for an incomplete machine (acc. machine directive 2006/42/EG)

Name of the company and producer:

**Ortlieb Präzisionssysteme GmbH & Co. KG**  
**Jurastraße 11**  
**73119 Zell unter Aichelberg – Germany**  
**Phone: +49 (0) 7164 79701 0**  
**FAX: +49 (0) 7164 79701 51**

The **SK -Tool-gripper** is described as a incomplete machine according article 2g of the machine directive and designated only to be mounted into or with an other machine or equipment.

The following fundamental safety and health-protection requirements according attachment 1 of the machine directive were used, are valid and adhered:

Nr. 1.1.3, Nr. 1.3.2, Nr. 1.5.4, Nr. 1.6.1

The following standards (or extracts of these standards) are used:

DIN 69871 /72, ISO 7388/1+2

The start-up of this product is forbidden until it is proven, that the machine in which the above named incomplete machine is mounted to conforms the regulations according the machine directive 2006/42/EG.

The special technical documentations according attachment VII part B have been complied. The producer obligates to provide these documentations in written form to public authorities if their request is justified.

Only the management of Ortlieb Präzisionssysteme GmbH & Co. KG, represented by Mr. Dr. Dieter Simpfendörfer, is authorized to comply the relevant technical documents according attachment VIII B to this product

Zell unter Aichelberg,



---

**Dirk Laubengeiger**

(Geschäftsführer)

7. Shipping data

---

**7 Shipping data**

Article-No.: .....

Serial No.: .....

Delivery date: .....

---