

Technical Documentation



Tool-Grip[®]-HSK

Tool grippers for Hollow Taper Interface

DIN 69893 / DIN 69063 / ISO 12164-1 + ISO 12164-2

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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

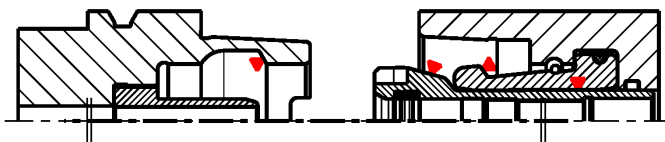
Use the tool-grippers only for the intended use. Insufficiently clamped tools or work-pieces, failure to comply „safety and accident prevention regulations“, and the use of work-pieces and our products on machines that are not intended for this propose, can result in personal injury and damages to the 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.16

The tool-gripper, especially the function surfaces must be clean and lubricated sufficiently. It is strongly recommended to grease with “lubricant metal (Metaflux)” (special grease).



METAFLUX-lubricant metal paste Nr. 70-8508

Pay attention:

Mixture with other greases is not allowed!

Techno-Service GmbH (Metaflux-Dealer),

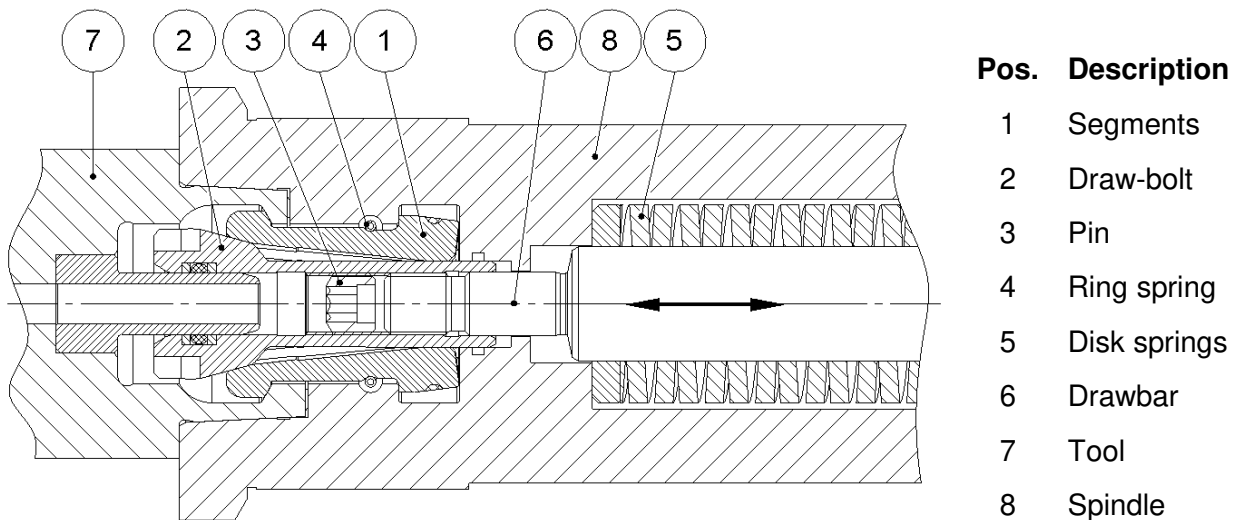
Detmolderstr. 515; 33605 Bielefeld, Germany

Phone: +49 (0) 521/92444-0, Fax: +49 (0) 521/207432

Never exceed the axial and radial forces specified on the tool-gripper. Check the clamping force regularly!

2 Product-description

The Ortlieb Tool-Gripper distinguishes by a simple outline in the spindle and compact dimensions. The rubber-bonded clamping segments are designed for maximum clamping force and high revolutions, especially for HSC-machining and are rated for a life time of 2 mio. load alternations. The large central cooling feed provides a secure cooling when using coolant lubricant or MQL (minimal quantity lubrication).



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 rubber-bonded clamping segments were spread equally by the taper on the draw-bolt and draw-in the tool-holder by the 30°-shoulder into the taper of the machine spindle. During clamping, 25% of the clamping force is dispensed upon the taper, 75% upon the front surface. Thus, also with high machining forces it is granted, that the tool never lifts from the front surface.

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 a closing of the clamping segments which release the tool for changing.

2. Product-description

2.1 Tool-Grip® Standard



The Standard-Tool-gripper for high clamping forces and high revolutions with large central cooling feed. Maintenance friendly and persistent.

By its simple design and few components, this tool-gripper is mounted quickly, extreme maintenance friendly and persistent.

Your benefit:

- Designed for high clamping force and high revolutions (Technical p.11)
- Large central cooling feed for cooling lubricant or MQL
- Maintenance friendly and persistent

2.2 Tool-Grip® Repair-kit



The repair-kit tool-gripper allows to restore and rework worn spindles by regrinding the taper and the front plane surface.

Designed especially for spindle-services and the rework of used spindles. Worn spindles were regrinded on the front plane surface and the taper. This repair-kit allows to double the life time of spindles without the loss of clamping force or accuracy which safes money for expensive spare parts.

Your benefit:

- Cost efficient: Allows rework and regrinding the machine spindle
- Easy replacement of the tool-gripper
- Available in standard version, maintenance-free or with holding function

2. Product-description

2.3 Tool-Grip® Maintenance-free



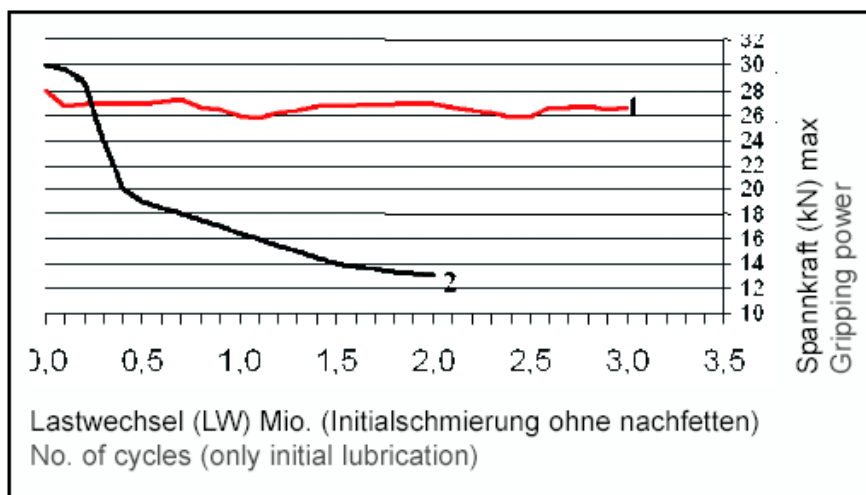
The version with ceramics on the draw-bolt is complete maintenance-free up to 3 mio. load alternations with constant clamping-force. Afterwards, just the clamping segments have to be replaced. The draw-bolt can be reused.

Function:

The incomparable sliding properties and wear-resistance of the steel-ceramics combination is undisputable since the introduction of the hybrid-bearing. Ortlieb offers those advantages for the first time ever for tool-grippers.

Insiders are aware of the problems of constant decreasing clamping force caused by a lack of maintenance. As long as the maintenance instructions are kept, constant clamping force is guaranteed over the total life time. Reality shows that regular maintenance and re-greasing is not accomplished with the required care. Result: the clamping force decreases rapidly and the life-time of the clamping system is extremely shortened (black line).

After initial lubrication, the tool-gripper with ceramics stands 3 million load alternations with constant clamping force without maintenance. (red line)



Your benefit:

- After initial lubrication maintenance-free up to 3 mio. load alternations with constant clamping force
- Available as standard, repair-kit and with holding function

2.4 Tool-Grip[®] with holding function



These tool-grippers are especially designed for even faster changeovers. The already released tool is held safely in the spindle with a defined force till the tool changer pulls the tool out of the spindle.

Function:

By replacing the standard tool-gripper by a tool-gripper with holding function (p.11) faster changeovers are possible.

Connection dimensions and the stroke are the same to the standard version. During the release of the draw-bolt pushes the tool-holder $0.2 +0,2$ mm out of the taper of the spindle. The tool-holder is held on the 30° shoulder by clamping segments with small slots in a distance of 0,5 - 0,6mm to the front plane surface of the spindle. When the tool-holder is pulled out by the tool-changer, the clamping segments with the slots act as a spring with adjustable holding force. When the tool-changer pushes a tool-holder in the spindle, the clamping segments were compressed and hold the tool-holder on the 30° -shoulder in a distance of 0,5 - 0,6 mm to the front plane surface of the spindle.

Your benefit:

- Faster changeovers due to holding function
- Simply replace the standard tool-gripper with same installation dimensions
- Tool-grippers with different holding forces on demand

Technical advices:

- Blow-out air: Force which occurs by blow-out air has to be lower than the holding force
- Tool-weight: Limiting the tool weight is strongly recommended
- Release velocity: To ensure a safe tool-holding, decreasing of the release velocity can be necessary.

3 Accessories

3.1 Technical data

Size	Type	Fz max	Fsp max	rpm	stroke	Nm*
HSK-A 25 / B 32	TG 19-06	1,5 kN	4,5 kN	80000 1/min	4,6	7 Nm
HSK-A 32 / B 40	TG 24-06	2,0 kN	6,0 kN	60000 1/min	6,0	14 Nm
HSK-A 40 / B 50	TG 30-06	4,0 kN	12,0 kN	45000 1/min	5,7	25 Nm
HSK-A 50 / B 63	TG 38-06	8,0 kN	24,0 kN	40000 1/min	6,0	50 Nm
HSK-A 63 / B 80	TG 48-06	10,0 kN	30,0 kN	30000 1/min	6,0	100 Nm
HSK-A 80 / B100	TG 60-06	15,0 kN	45,0 kN	25000 1/min	6,9	200 Nm
HSK-A 100 / B125	TG 75-06	24,0 kN	60,0 kN	15000 1/min	7,6	365 Nm
HSK-A 125 / B160	TG 95-06	35,0 kN	105,0 kN	12000 1/min	10,0	710 Nm
HSK-A 160	TG 120	40,0 kN	120,0 kN	10000 1/min	10,5	1435 Nm

* transferable torque without driving dog (Form E)

**Further technical data and installation dimensions on demand

3.2 Spare parts

Size	Tool-gripper (complete)	TGR- segments	TGZ draw-bolt	Mounting devices	
				for segments	for draw-bolts

Standard-version

HSK-A 25 / B 32	TG 19-06	TGR 19-06	TGZ 19	TGM 19	-
HSK-A 32 / B 40	TG 24-06	TGR 24-06	TGZ 24	TGM 24	TGS 24
HSK-A 40 / B 50	TG 30-06	TGR 30-06	TGZ 30	TGM 30	TGS 30
HSK-A 50 / B 63	TG 38-06	TGR 38-06	TGZ 38	TGM 38	TGS 38
HSK-A 63 / B 80	TG 48-06	TGR 48-06	TGZ 48	TGM 48	TGS 48
HSK-A 80 / B100	TG 60-06	TGR 60-06	TGZ 60	TGM 60	TGS 60
HSK-A 100 / B125	TG 75-06	TGR 75-06	TGZ 75	TGM 75	TGS 75
HSK-A 125 / B160	TG 95-06	TGR 95-06	TGZ 95	TGM 95	TGS 95
HSK-A 160	TG 120	TGR 120	TGZ 120	TGM 120	TGS 120

* All sizes hard coated on request

** Other designs on request

Holding version

HSK-A 40 / B 50	TG 30-66	TGR 30-66	TGZ 30	TGM 30	TGS 30
HSK-A 50 / B 63	TG 38-66	TGR 38-66	TGZ 38	TGM 38	TGS 38
HSK-A 63 / B 80	TG 48-66	TGR 48-66	TGZ 48	TGM 48	TGS 48
HSK-A 100 / B125	TG 75-66	TGR 75-66	TGZ 75	TGM 75	TGS 75

Maintenance-free

HSK-A 50 / B 63	TGC 38	TGRB 38-06	TGCZ 38	TGM 38	TGS 38
HSK-A 63 / B 80	TGC 48	TGRB 48-06	TGCZ 48	TGM 48	TGS 48
HSK-A 100 / B125	TGC 75	TGRB 75-06	TGCZ 75	TGM 75	TGS 75

4. Mounting instruction

4 Mounting instruction

Mounting devices:

- Mounting device TGM to mount clamping segment TGR
- Installation wrench TGS to mount the draw-bolt TGZ
- torque wrench, heagon-wrench
- depth gauge



→ Pay attention:

Mounting devices are only suitable for one size.

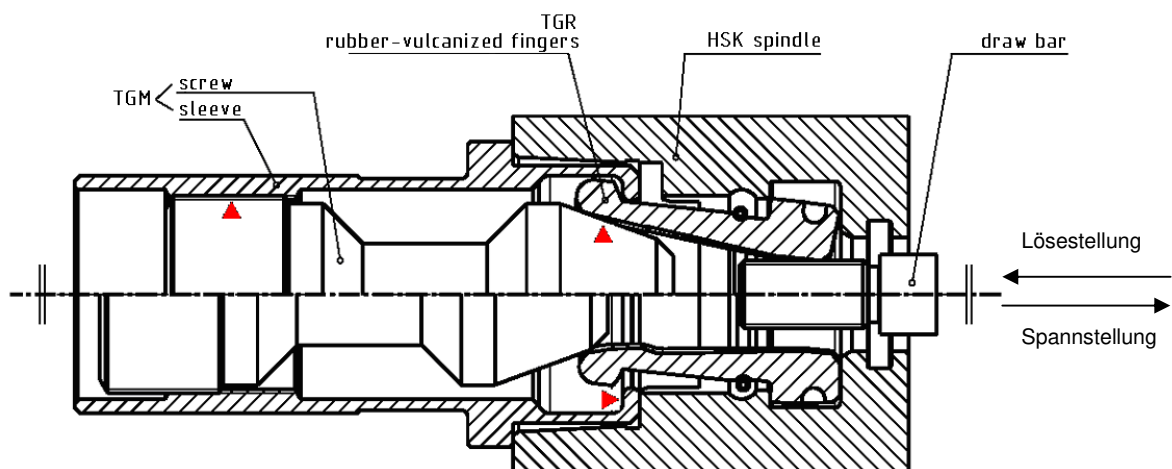
Each size needs its own mounting devices.

1. Setting of rubber-bonded clamping segments TGR

- Take out the draw-bolt TGZ.
- Drive drawbar in clamping position. (without tool)
- Release the clamp screw of the TGM mounting device.
- Insert rubber-bonded segments TGR in the sleeve (see drawing).
- The vulcanized end of the clamping segment is compressed down by tightening the clamp screw.

(In case a drawbar is mounted, make sure TGR fingers are closed down to thread dia.)

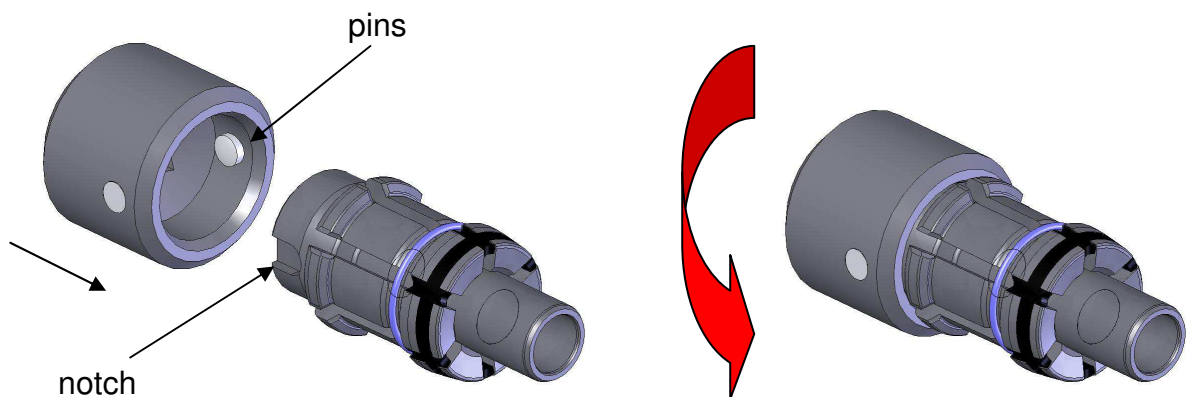
- Insert TGM and TGR into the HSK spindle.
- Release the spanner screw. The TGR automatically stays at its place in the spindle recess.
- Take off the mounting device.
- ▲ Function-surfaces must be lubricated!



4. Mounting instruction

2. Setting of draw-bolt TGZ

- Drive drawbar in release position.
- Screw draw-bolt on the drawbar.
- Adjust the position of the draw-bolt according the set-up measure (EM) shown in the drawing of the tool-gripper. Tighten the set screw against the draw-bar.
- Mount installation wrench TGS to a torque wrench and adjust the demanded torque.
- Insert the pins of the installation wrench TGS into the notches of the draw-bolt TGZ.
- Tighten with demanded torque. Do not exceed the maximum torque.



- Check set-up measurement!
- Check clamping force

Disassembly:

- Remove the draw-bolt TGZ from the tool-gripper.
- Insert TGM into the HSK-Spindle. Front plane surfaces must match.
- Compress rubber-bonded clamping segments by tighten the spanner screw. The draw-bar can stay in the spindle. Remove TGM and TGR
- Do not apply force during compressing the clamping segment to prevent damages.

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 changing 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. 11) may not be exceeded. The minimum clamping force depends on cutting rates. → see DIN 69893 / DIN 69063

4. Tools

Please use solely suitable tools according DIN 69893 / DIN 69063, matching your machine (see Technical data page 11).

5. General Safety Instructions

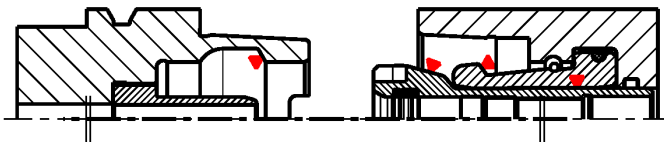
5. Residual risks

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.



METAFLUX-lubricant metal paste Nr. 70-8508

Pay attention:

Mixture with other greases is not allowed!

Techno-Service GmbH (Metaflux-Dealer),

Detmolderstr. 515; 33605 Bielefeld, Germany

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- Check the tool-gripper for cracks and other damages. After a crash, a complete check is essential. You will find spare parts on page 11.
- Replace damaged parts only by original spare-parts. Otherwise guarantee is expired.

**→ The alternative: Use the maintenance-free tool-gripper with ceramics!
Please contact us!**

5. General Safety Instructions

5.1 Checklist for Installation

(Rubber Clamping Segment TGR + draw-bolt TGZ)

- 1.) TGR and TGZ are grounded and paired in the testing facility. TGR + TGZ are not individually interchangeable. This guarantees stroke position ± 0.1 mm when TG is exchanged.
- 2.) Tool –“Eject” max. 0.5 mm (0.3mm up to TG30). The tool is only drawn in securely by the tool gripper TG in this range. Ensure that the clamping reserve is min. 2 mm and max. 3 mm.
- 3.) Check the clamping force. The max. pull-in force, F_z max. , must not be exceeded.
- 4.) Tool clamping must not be one-sided. Guide the disc spring stack accurately.
- 5.) Spindle receiver must meet DIN 69063 standard and Ortlieb TG installation dimensions. Taper pre-load 0.1-0.4 mm, depending on size.
(Distance between spindle and tool plane surfaces).
Functional surfaces hardened min. 1mm deep to HRc 60 +2.
- 6.) When clamping the tool, there must not be any pressure (blow-out) present before the taper pre-load. Otherwise the tool may not be able to be moved into the end position. TGR would sustain damage.
- 7.) Observe the control operation.
Insert the tool until it reaches the limit stop at the TGZ plane surface, then clamp it. Clamping must not be done too soon, as otherwise the TGR can not pull-in the tool.
- 8.) Tool change: Gripper – eject – unclamp - blow-out. Make sure that the tool and spindle are clean. If chips are drawn in, TGR will sustain damage. (One-sided overloading of the TGR clamping segments).
- 9.) If one TGR- segment breaks, the tool will nevertheless be clamped safely. However the TG (TGR + TGZ) must be exchanged immediately as a complete unit.

5. General Safety Instructions

- 10.) The tool gripper is a part which is subject to wear. Under favourable operation conditions, the complete tool gripper must be exchanged every 2×10^6 load alternations. We do not assume liability and guarantee on consequential damages in case only parts (TGR + TGZ) are exchanged).
- 11.) Refer to the installation instructions for information about how to change the TG. Before installing the TG, check the spindle for damage. Grease the functional surfaces.
- 12.) For optimal drawing-in force, $RPM_{max.}$ and $n_{max.}$, please refer to WLZ RWTH Aachen: Richtlinie zur Grenzbelastbarkeit HSK-Schnittstelle (Project Jan. 2003)
- 13.) Tools must meet DIN 69893 standards. After usage, please check that the cooling lubricant supply tube in the tool is tightened. If it gets loose, the tool cannot be pulled-in properly!
- 14.) Without an HSK tool insert, there is no operation of the spindle allowed. (Out-of-balance caused by TGR + TGZ)
- 15.) After every crash, the TGR and TGZ must always be exchanged completely.
- 16.) The clamping force transmitted to the HSK by the tool gripper TG should not be below the standard values specified in DIN 69063 / DIN 69893. It is also important that the functional surfaces and the clamping system are greased regularly (with ball bearing or assembly grease.)
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.
- 17.) Check the tightening of the draw-bolt TGZ 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. 0,5mm.

5.2 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	
Too 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 HSK-taper	Eject the tool-holder; clean the HSK-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
	Inner outline does not match DIN 69893	Check inner outline of the tool holder; Especially l_6 acc. DIN 69893
	Damaged clamping segments	In emergency: cut tool-holder with an angle grinder and change tool-gripper
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
	Coolant feed tube is bend	Check coolant feed tube, replace if necessary

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
Jurastr.11
73119 Zell unter Aichelberg
E-Mail: info@ortlieb.net

The **Tool-Grip® HSK-Tool-gripper** is described as an 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 69893, DIN 69063,

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. Dirk Laubengeiger, 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:
