



ROEMHELD
HILMA ■ STARK

Zero point clamping system 3000

Operating Manual

WM-020-309-10-en BA system 3000



precise, fast and powerful

system 3000

Art. no.: 3000 850, 3000 851, 3000 852, 3000 853,
3000 854, 3000 855, S04408-01



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2 Identification of the partly completed machinery

Product:	Fast closing clamp
Options:	Clamp control, blow-off/equipment check, unlockable non-return valve
Function:	Clamping and centring of workpiece pallets
Article numbers:	3000 850, 3000 851, 3000 852, 3000 853, 3000 854, 3000 855, S04408-01
Commercial name:	system 3000

3 User Instructions

3.1 Purpose of the document

This operating manual

- describes the function, operation and maintenance of the fast clamping device
- gives important instructions for safe and efficient use of the fast clamping device

3.2 Presentation of safety instructions

Safety instructions are identified by a pictogram and a signal word. The signal word describes the severity of the impending risk.



DANGER

Immediate imminent risk to life and health of persons (serious injury or death). Be sure to follow these instructions and the procedures described!



CAUTION

Potentially hazardous situation (minor injury or material damage). Be sure to follow these instructions and the procedures described!



INFORMATION

Tips for use and particularly useful information.



INSTRUCTION

Obligation to follow the described procedure or activity for the safe use of the machine.



4 Fundamental safety instructions

4.1 Intended use



The fast closing clamp is used for clamping pallets with mounting devices for workpieces.

The workpieces are intended for processing, transporting and measuring.

The intended use also presupposes:

- compliance with all the instructions in the operating manual
- observance of the inspection and maintenance intervals
- use of only OEM parts

4.2 Foreseeable misuse



Any use other than that specified under "Intended use" or use beyond this is considered improper use!

Risks may arise if the system is not used as intended. Improper uses include e.g.:

- exceeding the technical values specified for normal operation
- application for hoist operation and load transportation

The operating company bears sole responsibility for any injury or damage resulting from such improper use. The manufacturer assumes no liability.

4.3 When using rotating machine tools



For rotating applications, the fast closing clamp may only be operated if it is ensured that it is securely clamped. We recommend the use of a clamp control. It must also be ensured that the forces involved do not exceed the permissible forces of the fast closing clamp according to the technical data.

Specialists must be consulted for the calculation and design of the fast closing clamps for rotating applications. STARK provides this service.

4.4 Modifications or alterations



Unauthorised modifications or alterations of the fast clamping device will void any liability and warranty on the part of the manufacturer!

Therefore do not make any modifications or alterations to the fast closing clamp without consultation with and the written approval of the manufacturer.

4.5 Spare and wear parts and auxiliary materials



The pallets with the clamping devices are operating company by the operator or on their behalf. Only retractable nipples from STARK may be used on the pallet and must be installed according to the appropriate STARK data sheet.

The use of spare and wear parts from third-party manufacturers can result in risks. Use only OEM parts or parts approved by the manufacturer. The manufacturer will assume no liability for any injury or damage resulting from the use of spare and wear parts and auxiliary materials not approved by the manufacturer.



4.6 Obligations of the operating company



The operating company is obliged to allow only persons to work on the fast clamping device who

- are familiar with the fundamental occupational health & safety and accident prevention regulations
- have been instructed in the use of the fast clamping device and have read and understood this operating manual.

The requirements of EC Directive 2007/30/EC on the use of work equipment must be observed.

4.7 Residual risks



Attention must be paid to the existence of mechanical, hydraulic and pneumatic residual energies at the fast clamping device and the pressure in the cylinders and valves after switching off the fast clamping device!

For example:

- preloaded springs
- pressure locked in by non-return valve
- pressure locked in by valve lock position
- etc.

4.7.1 Design for the pallet and fast closing clamp plate



To ensure safe positioning on the fast closing clamp, make sure there is a grip point for a hand on the pallet. If such a grip point is not possible due to design reasons, make sure that no hands/fingers can get between the fast clamping lock and nipple or between the fast closing clamp plate and the pallet. When changing procedure, only grab the pallet at the front..

DIN EN 349 Safety of machinery – Minimum gaps to avoid crushing of parts of the human body must be observed.

When clamping, do not reach with your fingers into the gap between the fast closing clamp plate and the pallet.

4.7.2 Hydraulic system malfunction



During operation, a malfunction in the hydraulic system can lead to an unintended pressure increase and consequently to the release of the fast closing clamp.

Particularly in rotating applications, this can result in a hazardous situation.

Possible measures to prevent accidental release:

- Mechanically disconnecting the hydraulic line (uncoupling). This means that a pressure increase is no longer possible during operation.
- Disconnecting the safety valves from the machine hydraulics. This means that a pressure increase is no longer possible during operation.
- Pressure monitoring in the release circuit of the fast closing clamp. This causes the emergency stop to be triggered when the pressure increases, resulting in an immediate stop of the machine.



4.7.3 Danger due to incorrect assembly of the fast clamping lock



Incorrect tightening of the fixing screws and insufficient strength of the screws, as well as insufficient strength of the panel material or too small a thread screw-in depth (e.g. aluminium, cast iron, etc.) could cause the pallet to come loose.

Measure:

The mounting instructions for strength class, tightening torque and arrangement must be observed.

If necessary, use longer screws.

The product-related data is shown on the enclosed drawing with parts list and in chapter 6 Assembly and installation.

4.7.4 Danger due to changes in rotational speed



Excessive rotational speed, weight and unbalance can cause the fast clamping lock to break, resulting in the pallet being catapulted away.

Measure:

Observe the information and regulations regarding the maximum values of Stark.
(see chapter "9 Technical data")

4.7.5 Pressure hazards



Lines or hoses bursting due to excessive pressures can endanger persons.

Measure:

- Protect hydraulic lines with pressure relief valves
- Observe the specified pressure limits

4.7.6 Influences on service life

Negative influences include:

- Insufficient filtering of the oil; observe filter mesh size < 15 µm
- Damage to components.
- Undefined forces or defined forces exceeded.
- Insufficient ventilation of the hydraulic circuit.
- Overloading due to sudden pressure peaks.
- Too high volume flow rates / piston speeds due to large pump delivery capacity.
- Heavy contamination (e.g. chips, casting or grinding dust.)
- Aggressive environment, e.g. cooling lubricants or cleaning agents which chemically attack seals / wipers.
- Incorrect preload position or loading position.



5 Description of the fast clamping device

The fast closing clamp is the connection between the machine and the clamping device. It is used for fast setting-up. While one pallet is being processed, the other can be set up.

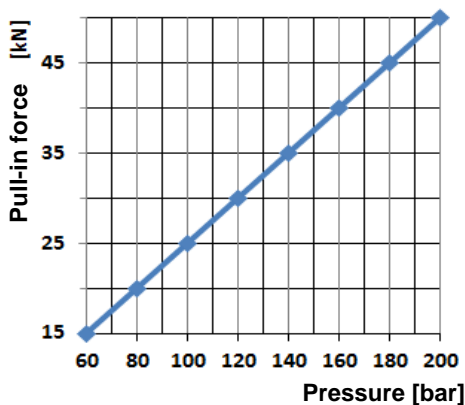
The "system 3000" zero point clamping system is ideal for handling large pallets or heavy workpieces. Due to the flush-mounted installation of the clamping element and the clamping spigot, handling (automated or crane loading) without interference contours is easily possible. By "sliding" the pallet on, as well as the optional query, the element is ideal for automation.

Different versions are available within the product family. The options for each version are shown in the table below. The exact technical data are given in general terms in chapter 9.

Order no.	3000 850	3000 851	3000 852	3000 853	3000 854	3000 855	S04408-1
Design							
Support islands	X	X			X	X	
Blow-off	X	X			X	X	X
Query pin		X				X	X
Non-return valve					X	X	
Flange oil supply	X	X	X		X	X	X
Flange and base oil supply				X			

5.1 Pull-in force/lateral force

The pull-in force of the clamping element is directly proportional to the applied clamping pressure. The following diagram shows the relationship between clamping pressure and pull-in force or clamping force.

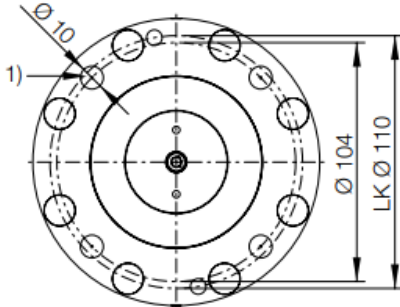


The element produces a pure frictional connection – thus any lateral or transverse force that occurs can only be absorbed through the frictional force. Thus the relationship between surface/surface condition and contact pressure (clamping force and, if necessary, weight) must be observed.




5.2 Support islands/blow-off option

In the version with support islands or blow-off, the disc is designed with 4 circumferential elevations with $\varnothing 10$ mm. In the middle of these islands, the blow-off takes place to clean these support surfaces.



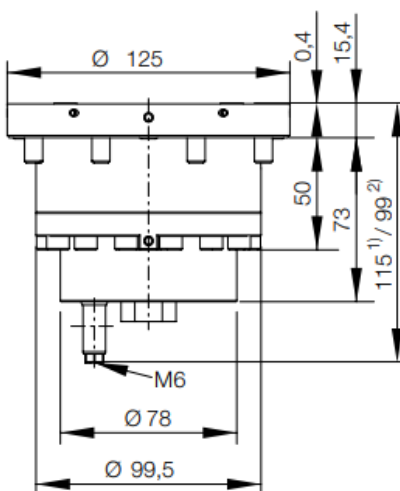
Z 3000 850

- 1) Support islands with central blow-off
(0.4 mm high)

 To ensure maximum flatness of all elements when installed, the support islands can be ground. A maximum removal of 0.1 mm must not be exceeded. Caution: The clamping elements are then no longer interchangeable.

5.3 Query pin option

Especially for automated applications, a position query or a "clamped/released" determination is highly recommended.



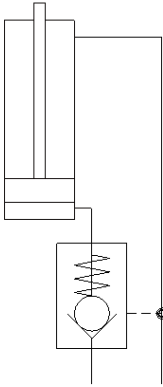
- 1) Query pin released
2) Query pin clamped

On the rear of the clamping element in this design there is a query pin which changes its position depending on the clamping state (see diagram above). Now, for example, the position of the pin can be determined using one or more proximity sensors. Two M5 threads are provided at the rear for mounting the additional sensors.



5.4 Non-return valve option

Depending on the application, it may be useful to preserve the "clamped state" of the element. For these cases, an element with integrated non-return valve can be used.

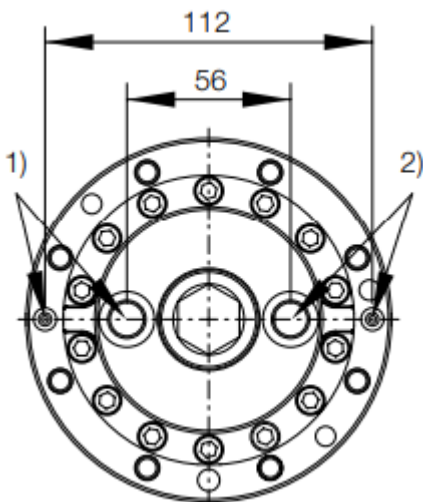


Due to the integrated non-return valve, the element is under pressure in the "clamped" state.

CAUTION: Before installing or removing the element, release the pressure or loosen the element.

5.5 Flange and base oil supply option

In special applications, the oil cannot be supplied via the flange, as the installation situation does not allow this. Therefore, the base oil supply option has one clamping and one release connection on the rear of each element. Optionally, the flange connections can also be used for this element.

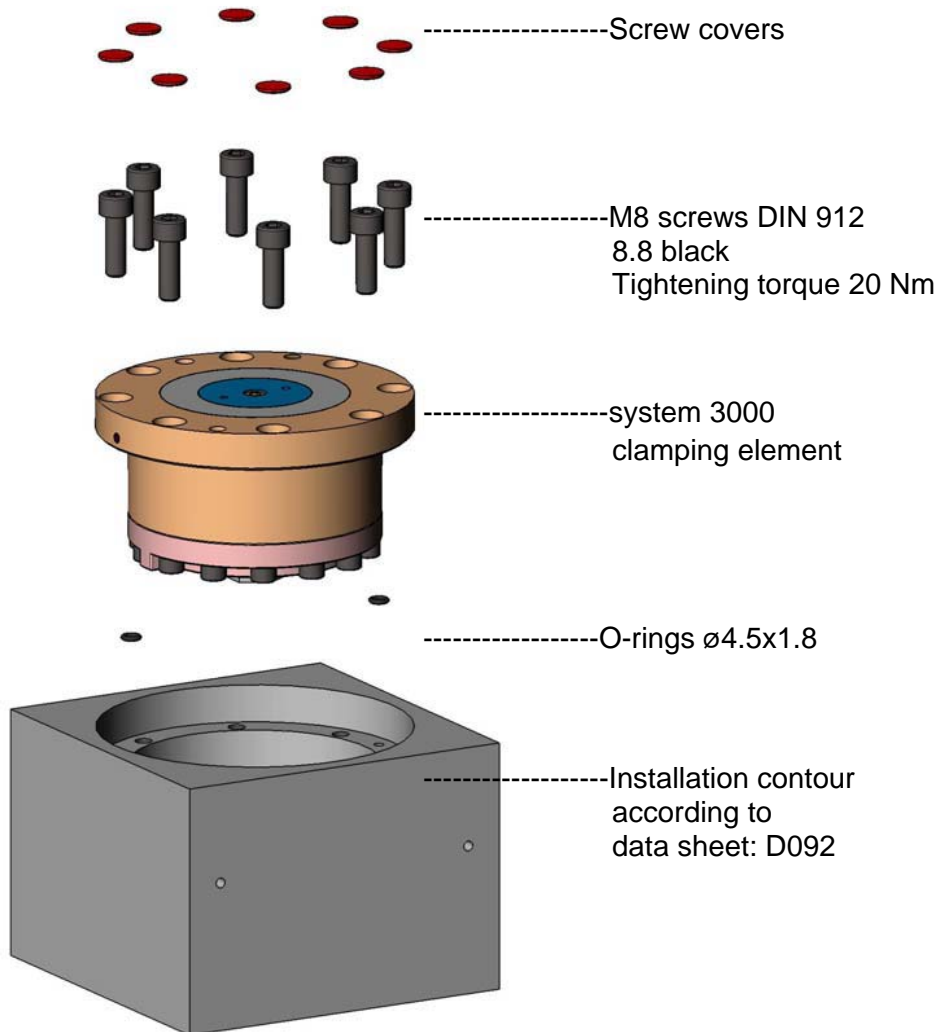


- 1) Release connection via O-ring or 1/4" thread
- 2) Clamp connection via O-ring or 1/4" thread

6 Assembly and installation

The installation and removal of the different element versions is identical regardless of the options. Here it is described using type 3000 350 as an example.

6.1 Fast closing clamp installation



1. Check the installation contour of the clamping element for dimensional accuracy and surface condition. Important: The bores must be accurate to size (see data sheet). All parts must be clean. This also applies to all supply lines (deep-hole bores, hoses, pipes, etc.).
2. Grease the O-rings and insert them into the bottom of the housing. Then install the pre-assembled clamping cylinder into the installation contour. Pay attention to the installation position, especially the position of the connections.



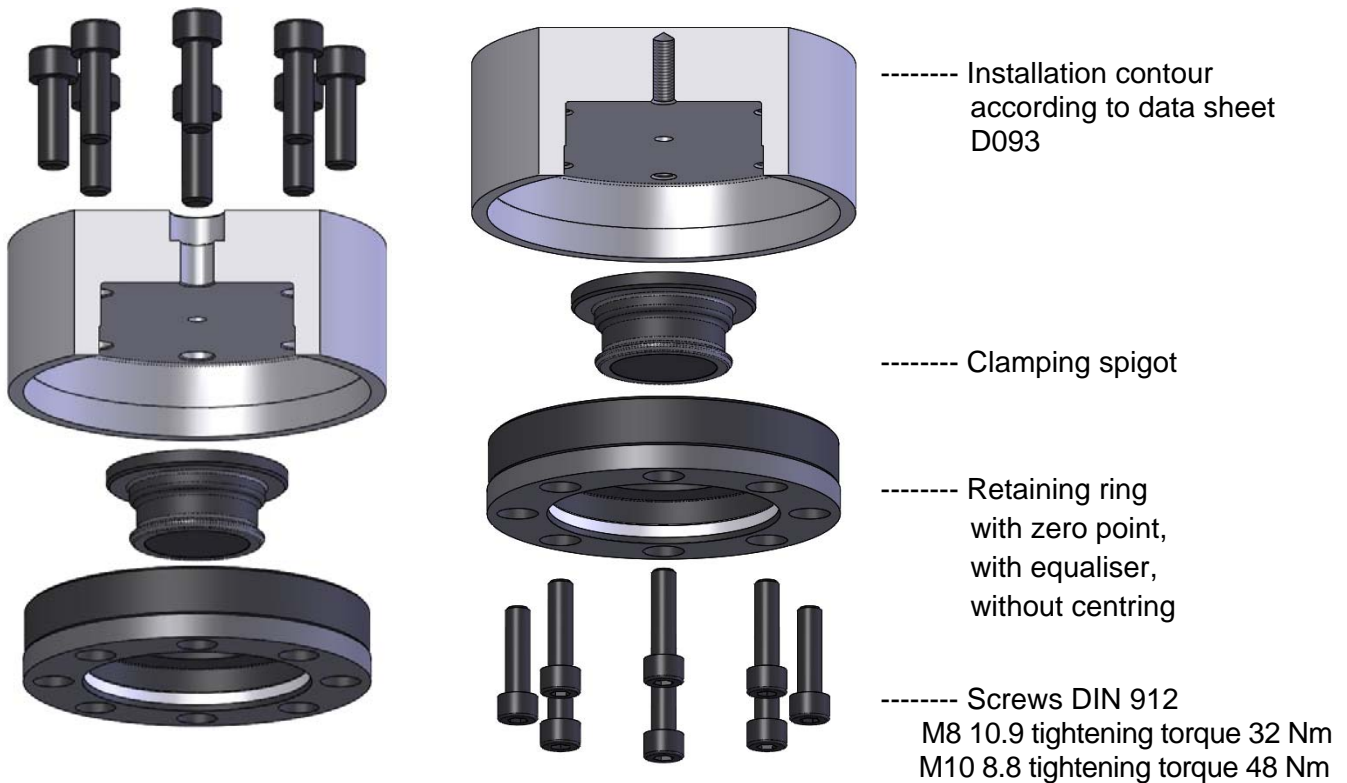
3. Tighten the element in parallel with the enclosed screws up to the system. Only use the supplied screws, or DIN 912 screws with quality 8.8. All 8 screws must be tightened to 20 Nm using a torque spanner.
4. When all clamping elements are connected to the same hydraulic circuit (if installed and tightened with the appropriate tightening torque), the hydraulic pressure generator must be connected to the circuit.
5. Now start up the machine as described in chapter "7".
6. When the function of the clamping elements is checked and given, you can mount the screw covers.



Important: Only apply pressure to the fast closing plate when it is screwed on. Check specification dimension A for each element. Only when the specification dimension is complied with is proper functioning of the element guaranteed. If the specification dimension is not achieved for one or more elements, the systems concerned must be removed and reinstalled.

6.2 Clamping spigot installation

The counterpart for the clamping element (the clamping spigot with retaining ring) can be installed from the front with M8 screws or from the rear with M10 screws, as required by the installation situation. The threaded holes are continuous.



1. Check installation contour for the clamping spigot for dimensional accuracy and surface condition. Important: The bores must be accurate to size (see data sheet). All parts must be clean.
2. Tighten the clamping spigot and the retaining ring in parallel with the enclosed screws up to the system. Only use the supplied screws, or DIN 912 screws with quality 8.8. All 8 screws must be tightened to 20 Nm using a torque spanner.



Important: When installing the clamping spigots, the arrangement of the different retaining ring versions (with zero point, with equaliser, without centring) must be observed. In case of redundancy, increased transverse forces and thus increased wear can occur.



After installing, check the radial movement of the clamping spigot in the retaining ring. It must be easy to move the clamping spigot regardless of the version (with zero point, with equaliser and without centring). The position is determined by the retaining ring in combination with the piston of the clamping element.



6.3 Removing the fast closing clamp

1. The system must be completely depressurised before disassembly is started. (Interrupt energy supply to the pressure generator) Remove clamping elements with unlockable non-return valve only in release position.
2. Loosen all 8 screws evenly.
3. Remove all screws and then screw 2 screws into the M8 pull-off threads to press the clamping element evenly out of the clamping plate. Then remove system 3000.



If the elements are "ground" after installation (see 5.2 Support islands/), the effective height of the disc can be determined before replacing the elements using the two pull-off threads in the disc.

6.4 Removing the clamping spigot

1. Loosen all 8 screws evenly.
2. Remove all screws and then screw 2 screws into the M8 pull-off threads to press the retaining ring evenly out of the pallet. Then remove the clamping spigot with retaining ring.

7 Commissioning, handling and operation

7.1 During initial commissioning:

- Carry out a visual inspection of the entire machine and the fast closing plate
- Direct unauthorised persons away from the machine
- Check the filling levels of the hydraulic oil.
- Test the proper function of the clamp control valve (optional)
- Check depth A (see chapter "8.1 Specification dimension A")
- Check all elements for hydraulic leaks and pneumatic tightness
- Set the operating pressure of the fast closing clamp (see chapter "9 Technical data")
- Set the excess pressure safety valve of the pressure lines to max. 5 bar above the max. operating pressure (see chapter "9 Technical data")



Excessive pressures can permanently damage the element and destroy it!

CAUTION: Before using the system, check the operating pressure and the safety valves.



7.2 Function check:

- When all clamping elements are connected with the appropriate tightening torque, the hydraulic pressure generator can be connected to the circuit.
- Clamp: After assembly, the fast closing plate can be slowly put under pressure. Observe the permissible pressure according to chapter "9 Technical data". While increasing the pressure, check the clamping elements for leaks. If necessary switch off the pressure generator immediately and eliminate the leakage. After reaching the clamping pressure, all clamping elements must be checked for leaks.
Check depth A (see chapter "8.1 Specification dimension A")
- Release: Slowly and carefully increase the hydraulic pressure to the release pressure. When doing so, check the clamping elements for leaks, switch off the pressure generator immediately if necessary and eliminate the leakage. After reaching the release pressure, the clamping elements must be checked again for leaks.
- Only with support islands/blow-out option: Switch on the blow-out air and check that sufficient air (min. 50 l/min) flows evenly from all openings.
- Only with unlockable non-return valve option: After the clamping process, the pressure in the clamping line can be released. The element must remain in the clamped state and, when pressed in manually, remain immobile even after 30 minutes. If the extended piston can still be moved, the non-return valve must be replaced. Only after the release pressure has been applied may the element change to the released position.



During commissioning, the clamping and release time must also be checked, changing the clamping state too quickly results in increased wear and thus has a negative effect on the service life.

7.3 Operation:

After proper installation and commissioning, the clamping system can be used.

- Apply blow-off air
- Wait approx. 3 seconds
- Release the system
- Change pallet
- Clamp system
- Switch off blow-off air

If an element is in use without blow-off, these steps are omitted accordingly.



The element consists of many moving parts and is therefore manufactured with appropriate tolerances. It cannot be excluded that a small amount of oil may leak even with new fully functional elements. This is not a defect! If, however, the amount leaking increases over time, the element should be examined.



8 Maintenance and repair

8.1 Specification dimension A



Check for proper function using specification dimension A.

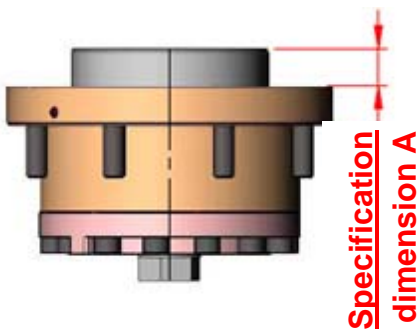
If the height of A adheres to the table, the fast closing clamp will function properly.

system 3000	14	+0.2 +0.0
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If dimension A is not reached, an authorised service technician must be called in immediately.

If no service is performed, safe clamping of the clamping spigot is not possible. There is a risk of accident.



Monthly:

Check the specification dimension when the clamping element is released. Check the fast closing cylinder for cleanliness, foreign bodies and possible leaks. Check the ball ring according to the instructions "Checking and replacing the ball ring". In the event of premature wear such as deformation of the ball surfaces (e.g. due to incorrect clamping), deformed or damaged round wire ring, corrosion, etc., the ball chain must be replaced immediately with a new one. Check the surface appearance of the retractable nipple and the piston surfaces for abnormal wear!

Yearly or after 25000 clamping cycles:

The following service must be observed in order to guarantee the proper function of the clamping elements permanently.

Stark recommends replacing the ball ring once a year or after 25,000 clamping cycles and

sending it to STARK for overhaul. Replace the ball ring according to the instructions "Checking and replacing the ball ring".

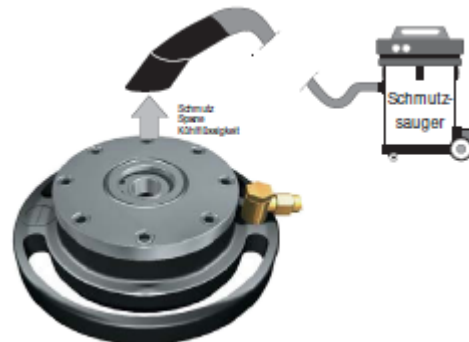
8.2 Surface cleaning

In principle, no soiling is permitted in the fast closing plate. Cleaning depends on the application and replacement interval. Observe max. clamping cycles. If reached: Maintenance only by instructed personnel.



Correct!

The fast closing clamp may be blown out and off with compressed air.



Correct and improved!

Extraction and suction of chips, dirt and coolant from the fast clamping lock.



Cleaning agent

The product may not be cleaned with:



- corrosive or caustic components or
- organic solvents such as halogenated or aromatic hydrocarbons and ketones (nitro thinner, acetone etc.), as this can destroy the seals.

The element must be cleaned at regular intervals. In particular, the area of the piston or bolt housing must be cleaned of chips and other liquids.

In case of heavy contamination, cleaning must be carried out at shorter intervals.

Lubricants and oils (hydraulic oil)



Unsuitable lubricants and oils can damage the seals and have a strong negative influence on the service life.

CAUTION: Mixing of oils is not permitted.

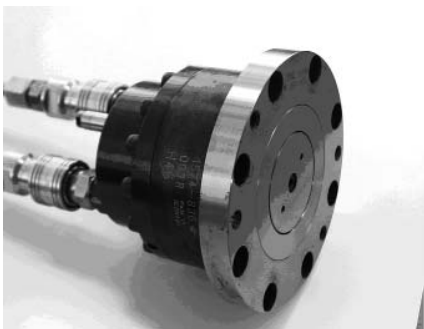
Recommendation: Hydraulic oil Castrol Hyspin AWS 32 or Castrol Hyspin AWS 46

8.3 Checking and replacing the ball ring



In principle, only an authorised service technician or trained personnel may carry out installation work on the fast closing clamps. The necessary safety measures must be observed in their entirety and without exception during all work.

Procedure:



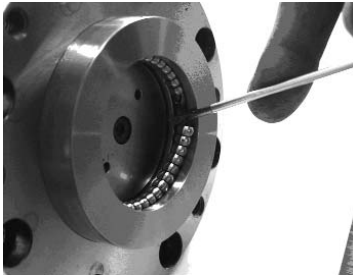
Step 1:

Set element to "Release"
(without pallet).

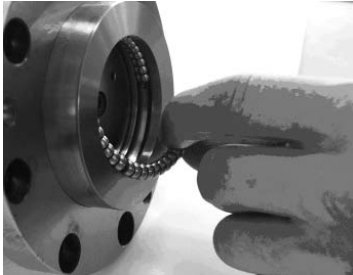


Step 2:

Set element to "Clamp"
(without pallet).


Step 3:

Use a small screwdriver to carefully lift the ball ring.

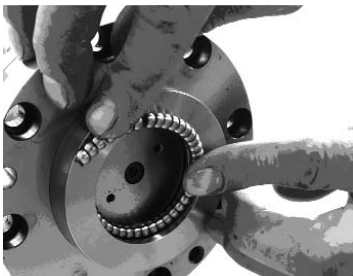

Step 4:

Pull off the ball ring with two fingers.

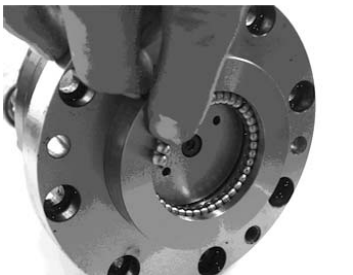
If loose balls are present, replace the entire ball ring. Bending the round wire ring is not permitted. There is a risk of breakage.


Step 5:

Lightly grease the cleaned replacement ball ring with SKF LGWA2/1 before installation. Place the ball ring with the lower end in the groove.


Step 6:

Fix in the centre and upper end.


Step 7:

Grasp upper end.


Step 8:

Snap the ball ring into the groove.



8.4 Storage:

Until first use:

If you do not use the fast closing clamp immediately, please store it dry and dust-free in its original packaging.

Long period of storage after use:

Before storage, clean the fast closing clamp (see chapter "8.2 Surface cleaning") and take measures for corrosion protection.

After long period of storage:

After a long period of storage (approx. 3 years), replace the O-rings before use.

8.5 Disposal/recycling:

All parts, auxiliary materials and process media of the fast clamping device must be separated according to type and disposed of in accordance with the local regulations and directives.

9 Technical data

Article number:	3000 850 - 855, S04408-01
Name:	system 3000
Specification dimension:	14 mm
Repeat accuracy ¹ :	<0.01 mm
Clamping force ² :	max. 50 kN at 200 bar (see table under "5.1 Pull-in force")
Max. lateral force ³ :	xx
Max. operating pressure:	200 bar
Blow-off:	min. 50 l/min (per clamping element)
Preset clamping time:	approx. 0.5 seconds or 3 seconds with non-return valve
Preset release time:	approx. 0.5 seconds or 3 seconds with non-return valve
Radial pre-positioning:	±0.4 mm (with low-force, movable feeder)
Axial pre-positioning:	+0.1 mm
Temperature range:	+10 °C to +80 °C
Total system maintenance:	500,000 clamping cycles (under optimum conditions)
Ball chain maintenance:	25,000 clamping cycles
Oil volume:	65 cm ³ clamp / 22 cm ³ release
Hydraulic oil:	according to DIN 51524 (HLP32 or HLP 46)
Filter class:	Quality class 4
Seal material:	NRB; other materials on request

1 The repeat accuracy depends on the application and the installation situation.

2 The clamping force depends on the operating pressure. It should only be selected as high as necessary, as the service life is positively affected by the lower pressure.

3 The maximum lateral force indicates the value until the zero point is left. The lateral force is only absorbed by friction.



10 Manufacturer's declaration

Declaration of Conformity Konformitätserklärung

We / Wir

**Stark Spannsysteme GmbH
Römergrund 14
A-6830 Rankweil
Austria**

declare under our sole responsibility that the product
erklären in alleiniger Verantwortung, dass das Produkt

Type: Clamping system 3000

No.: 3000 850, 3000 851, 3000 852, 3000 853, 3000 854, 3000 855, S04408-01

to which this declaration relates, corresponds to the following standards
auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt

2006/42/EC	Machines, Addendum II A
2006/95/EC	Low voltage
2004/108/EG	Electromagnetic compatibility / Elektromagnetische Verträglichkeit

and the following standards were applied.
und dass die folgenden Normen zur Anwendung gelangten.

EN 292-1/2	Safety of machines, devices and equipment Sicherheit von Maschinen, Geräten und Anlagen
EN 60204-1	Electric equipment of industrial machines Elektrische Ausrüstung von Industriemaschinen
EN 414	Safety principles Sicherheitsgrundsätze

A technical documentation exists completely. The instruction manual for the product is available.
Eine technische Dokumentation ist vollständig vorhanden. Die zum Produkt gehörende Betriebsanleitung liegt vor.

Stark Spannsysteme GmbH

Rankweil, 16/10/2018

Martin Greif
Managing director / Geschäftsführer