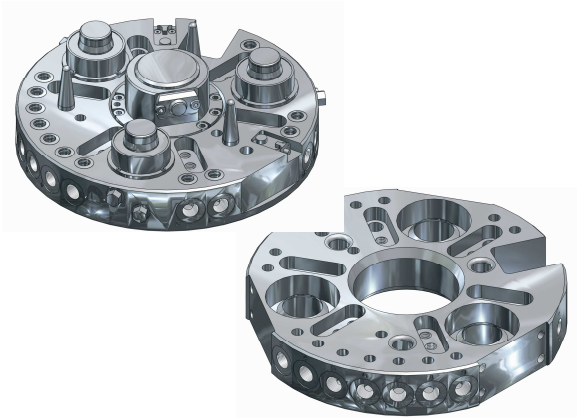
Tool Changer

ISO TK Series

TK-200



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Dear customer,

Thank you for the confidence that you have placed in our company by purchasing an IPR tool changer.

Every tool changer is fully assembled in the plant and is subject to an individual test. This includes examining their complete proper functioning and safe working.

These instructions illustrate how the tool changer is set up and operates. In addition, all the main details for assembly, commissioning and maintenance are clearly arranged.

Please carefully read through the contents.

Do directly contact us if any of your questions are not answered in these instructions. We are at the following address.

IPR – Intelligente Peripherien für Roboter GmbH
Industriestrasse 29
74193 Schwaigern/Germany

Phone: +49 (0) 7138 812-100
Fax: +49 (0) 7138 812-500
E-Mail: service-ipr@iprworldwide.com
Internet: www.iprworldwide.com

Translation of Original Assembly Instructions

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1. General

1.1. Information on these instructions

These instructions enable the tool changer to be safely and effectively handled. These instructions form part of the machine and should be kept close to it so that the personnel responsible can easily access them.

The personnel involved must have carefully read through these instructions and understood them before beginning any work. Keeping to all the safety and handling pointers in these instructions is the basis on which work is done safely.

Also applying are any local health & safety regulations and the general safety conditions where the machine is used.

Illustrations in these instructions are there to assist in basic understanding; they may deviate somewhat from the actual design.

Also follow the generally valid, statutory and other binding regulations of European and national legislation as well as the accident prevention and environmental protection provisions in force in your country.

1.2. Terms of the guarantee

The terms of the guarantee can be found in the manufacturer's general terms & conditions of business. Please turn to our Customer Service (for contact data see cover) if any matters are not clear.

2. Safety

This section provides an overview on all the important safety aspects for the protecting people and for reliable, no-trouble operations. Further task-related safety instructions are included in the sections on the individual service life phases.

2.1. Symbol explanations

Safety instructions are identified by symbols in these instructions. The safety instructions are introduced by signalling words expressing the degree of hazard involved.

	**CAUTION!** Points to a **possible** dangerous situation which - if not avoided - may result in either minor or slight injuries.
	NOTE! Points to a **possible** dangerous situation which - if not avoided - may result in either material or ecological damage.
	This symbol brings useful tips and recommendations to one's notice as well as information on efficient, no-trouble operations.

2.2. Intended use

The TK tool changer system is solely for automatically and pneumatically changing robot tools. It consists of a tool side and a robot side. The tool side (T) is fitted at the tool and the robot side (R) to the fixture flange of the robot.

Tool changers are not ready-to-use machines as envisaged under the EU Machinery Directive. Tool changers are solely for attaching to machinery and equipment.

Do also follow their documentation.

	**NOTE!** You must use this tool changer exclusively in accordance with the operating conditions and performance specifications established in theses instructions.

2.3. Inappropriate use

Any other use or one going beyond that described in the "Intended Use" chapter is deemed to be inappropriate and will void all warranty or guarantee claims.

It is the owner - and not the manufacturer - who accepts liability for damage resulting from this.

	**NOTE!** The tool changer must not be used in any explosive environment.

2.4. General risks

The tool changer was state-of-the-art manufactured at the time of delivery. Even so, dangers could still proceed from it if the safety information listed here in these instructions is not followed.

- The personnel involved must have carefully read through these instructions and understood them before beginning any work.
- The instructions must always be available for all users where the tool changer is deployed.
- These instructions are also to accompany the tool changer if it is handed over to third parties.
- Do not delve into moving components or handle them during on-going operations.
- Never open protective covers under ongoing operations.
- Only authorized specialist personnel - outside the danger zone - are allowed to carry out any work such as assembly, commissioning, operating, dismantling and maintenance.
- Before any work is begun on the tool changer, the energy supply needs to be disconnected and the line system relieved of pressure. Secure the system against being unintentionally reactivated for the duration of the work.
- Ensure during commissioning that all pneumatic connections are either allocated or firmly closed.

2.5. Owner obligations

Together with the safety instructions in these instructions, the valid safety, accident prevention and environmental protection regulations in force where the tool changer is used must be adhered to.

As part of his obligation to exercise due car, the owner is to ensure that:

- The tool changer is used as intended
- During the entire period of use of the tool changer a check is to be made on whether his operating instructions comply with the ongoing status of the standards & codes and, if necessary, he is to adapt them.
- The responsibilities for installation, operation, fault rectification, maintenance and cleaning are clearly settled and laid down.
- All those dealing with the tool changer have both read these instructions and understood them. In addition, he has to regularly train the personnel involved and inform them as to hazards/risks.

2.6. Requirements placed on the personnel

The variety of tasks described in these instructions place differing requirements on the qualifications of those performing these tasks.

Only appropriate specialist personnel or a duly instructed person under the supervision of specialist personnel are allowed to carry out any work such as assembly, commissioning, operating, dismantling and maintenance.

In view of his technical training, knowledge, experience and knowledge of the relevant standards and regulations, the specialist is in a position to perform the work he has been entrusted with and - on his own - to recognize/avoid any hazards.

3. Specifications

(Please refer to the ongoing catalogue or the internet for specifications of the individual tool changers)

3.1. General basic data

Min. operating pressure:	4,5 bar
Max. operating pressure:	8 bar
Temperature range:	5 ℃ to 80 ℃ (higher if request ed)
Drive:	Pneumatic with fail-safe spring
Material:	Casing of high-strength aluminium hard-coated/Operating parts hardened tool-steel
Tolerance particulars	
Thread:	+/− 0.1 mm
Alignment pin drill hole:	+/− 0.02 mm

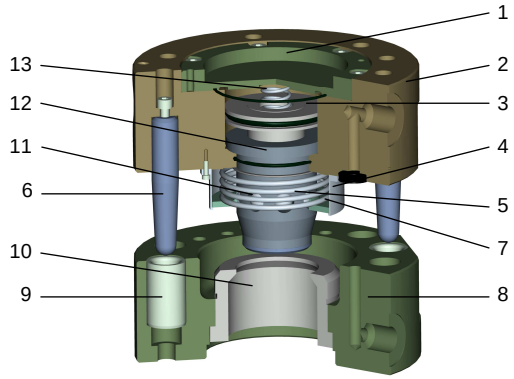
3.2. Operating conditions

The working environment is not to contain any dirt, dust, spray or vapours. The machine is to be used at temperatures between 10 ℃ and 40 ℃.

The maximum (non-condensing) relative air humidity is to be between 10% and 70%.

4. Setup and function

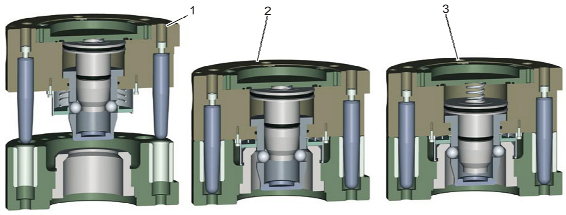
4.1. Overview



1	Cover	8	Tool Side
2	Robot Side	9	Centering Bushing
3	Piston	10	Locking Bushing
4	Spring Maintaining Ring	11	Ball
5	Spring Ball Resetting	12	Ball Bushing
6	Taper Pin	13	Fail-Safe Spring
7	Ball Resetting Ring		

4.2. Brief description

The locking mechanism of the tool changing system is realized over balls. The balls are pressed over a bevel in a receptacle. With air pressure loss the balls are held in the receptacle by a spring integrated in the cylinder, whereby an automatic locking is ensured with decrease of pressure. A cover plate fitted with springs protects the locking mechanism against contamination. Contacts fitted with springs are used for the signal transmission. Thanks to the springs a bend of the contacts can be avoided. The individual contact pins can be exchanged individually by a patch cord. Thereby a high life span and transmission reliability are ensured.



(1) System decoupled; (2) System coupled; (3) System locked

Power and moment transmission is by means of two generously proportioned pins that also function as an antitwist protector.

After the system is locked, the TK tool changer system can transfer 6 - 12 pneumatic lines depending on type and - with the aid of the plug connectors - 12 to 38 electrical signals depending on the version from the robot side to the tool side.

Tool changer of the TK-series provide a number of benefits:

- For fast and problem-free changing from tools and grippers at robots or gantries up to a payload of 1000kg.
- Transmissionof electrical signals by spring fitted contact pins
- Coupling and uncoupling of pneumatic and hydraulic lines.
- Specific splash-proof execution (optional)
- IP 65 sealed electrical signal transmission (optional)
- Tool changer with internal routing (optional)
- Stainless steel tool changer (optional)

5. Transport, packing, storage

5.1. Transport

Immediately check on the delivery when received as to completeness and any transportation damage.

Proceed as follows if there are signs of external damage:

- Do not accept the delivery or only under reservation.
- Note down the extent of damage on the transportation documents or on the forwarder's delivery note.
- Initiate the complaint procedure.

	Object to any shortcoming as soon as it is discovered. Claims for damages can only be filed within the valid time spans as set aside for complaints.

Transportation temperature −20 ℃ to 65 ℃.

Protect against external impact (jolt, blow, vibration)

5.2. Packing

The packing is to be such as to protect the components up to the assembly stage from transportation damage, corrosion and other kinds of damage. Thus, the packing is to be left intact and only removed just before actual assembly.

Only recyclable materials are used for the packing.

Dispose of packaging materials in accordance with the respectively valid statutory regulations and local requirements.

5.3. Storage

Store packs under the following conditions:

- Do not store outdoors.
- Store at a dry and dust-free location.
- Do not expose to corrosive media.
- Protect from direct sunlight.
- Avoid mechanical shocks.
- Temperature for storage: 15 ℃ to 35 ℃
- Relative air humidity: max. 60%.
- In cases of storage exceeding 3 months, regularly check on the general condition of all the parts and packing. If need be, either recondition the conservation protection or renew it.

There may also be information on the packs themselves extending beyond the requirements set out here. They are to be correspondingly kept to.

6. Assembly and commissioning

CAUTION!

Before assembling the tool changer, the energy supply needs to be disconnected and the line system relieved of pressure.

Make a note of the safety instructions and general hazards listed on Page 2.

6.1. Assembly

The assembly drill holes and pneumatic connections can be taken from our ongoing catalogue or the internet.

The tool changer is only to be fastened at the threads provided for the purpose. If needed, manufacture an appropriate adapter flange or acquire it from the manufacturer.

Tighten the assembly bolts with thread locking adhesive (e.g. Loctite 4052) or with Schnorr/Nord lock washers, as appropriate.

Provide compressed air at 4,5-8 bar, install pneumatic connections at the housing; close off any connections not needed.

Connect electrical signal lines on the robot and tool sides. To this end, use either sub-D plug connections or IP65 type plug connections depending on version.

6.2. Commissioning

There is no extra switch-on/off procedure for the system. The system is ready-for-operations following installation at the robot/tool and when the compressed air is supplied. Alternatively, the system is shut down when the robot is immobilized and the supply of compressed air interrupted.

In the case of a drop in air pressure, the system is automatically locked. Only when the system is supplied with compressed air can the tool be disconnected.

7. Malfunctions

Tool changer does not lock/unlock

- Check on supply of air, replace any non-tight lines, if necessary
- Air pressure too low, raise the air pressure
- Examine tool changer seals and renew, if necessary

Tool changer does not dock

- Foreign matter/contamination present; clean the tool changer
- Ball resetting ring jams or is faulty; grease or possibly renew

8. Maintenance and repairs

NOTE!

Make a note of the safety instructions and general hazards listed on Page 2.

8.1. Cleaning and upkeep

NOTE!

Corrosive cleaning agents could damage the tool changer seals and result in them ageing more rapidly.

Make a note of the following when cleaning and tending to the tool changers:

- Use protective caps and the like to firmly close all the openings
- Check that all connections are tight
- Use a metal cleaner
- Remove any coarse dirt and keep the coupling surfaces clean.

8.2. Maintenance

No particular maintenance is necessary under normal operations given that the Tool changer is used as originally intended.

To retain tool changer functions, we recommend carrying out the following maintenance steps at least 2x a year:

- Clean tool changer
- Schrauben und Anschlüsse prüfen, ggf. nachziehen
- Werkzeugwechslerfunktion prüfen, ggf. instandsetzen
- Werkzeugwechsler auf äußere Verformungen, Beschädigungen und Verschleiß prüfen, ggf. instandsetzen
- Prüfen O-Ringe an Dichtfläche; ggf. austauschen

8.3. Repairs

The manufacturer provides you with a comprehensive tool changer repair service.

Repairs are only to be carried out by authorized specialist personnel.

CAUTION!

Risk of injury from tensioned compression springs

There is a strongly tensioned compression spring in the piston chamber on the robot side. This stored spring tension could result in serious injuries arising when dismantling.

- Be careful when opening and taking apart

The following corrective maintenance can be carried out at the owner's:

- Replacing the seals of the coupling surfaces
- Replacing the locking piston/seals on the robot side
- Replacing the ball bushing on the robot side
- Replacing the tapered pins on the robot side

Proceed as follows:

Locking piston

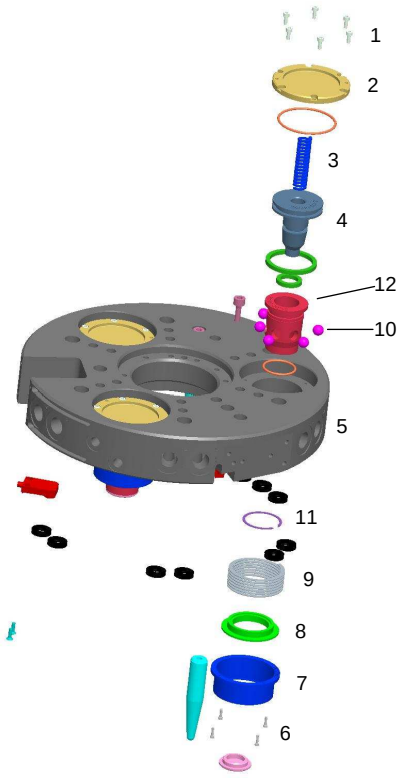
1. Undo fastening screws (1)
2. **Caution!** Cover (2) under spring tension - when unscrewing the final two screws, press the cover on the robot flange downwards to prevent injuries due to the housing cover popping up
3. Remove the compression spring (3) and locking piston (4). Remove the 4 hardened steel balls (10) from the locking piston
4. You can now replace the piston seals

Ball Bushing

5. Carry out Items 1 -4
6. Lay the main body (5) on the mounting surface
7. Loosen the cheese head screws (6) of the spring holder
8. Remove the spring maintaining ring (7), the ball resetting ring (8), the sinous spring (9) and the balls
9. Remove the circlip (11) with a pair of appropriate pliers
10. Now use a rubber hammer to lightly tap the ball bushing (12) inwards towards the piston chamber
11. Refit in reverse order
12. Check tool changer as to function

	Tighten all screw connectors with a DIN-based tightening torque and lock to medium strength with a thread locking adhesive (e.g. Ergo 4052).

Spare parts and a full set of seals can be obtained through the manufacturer.



1	Flat head screw	7	Spring Maintaining Ring
2	Cover	8	Ball Resetting Ring
3	Compression spring	9	Sinous spring
4	Locking piston	10	Balls
5	Housing	11	Circlip
6	Cheese head screw	12	Ball Bushing

9. Dismantling, decommissioning, disposal

	**CAUTION!** Before dismantling the tool changer, the energy supply needs to be disconnected and the line system relieved of pressure. Make a note of the safety instructions and general hazards listed on Page 2.

9.1. Dismantling

At the end of their useful lives, the tool changer must be dismantled and disposed of in an environmentally compatible manner.

Properly clean sub-assemblies and components and disassemble them with consideration given to the prevailing local health & safety and environmental protection provisions.

9.2. Decommissioning

You carry out decommissioning in the reverse order to commissioning.

- Any tool changer malfunctioning needs to be corrected before decommissioning
- Tool changer needs to be cleaned
- Non-plugged connection openings need to be firmly closed

9.3. Disposal

Pass on disassembled parts for recycling if no arrangements have been made for returning them or disposal:

- Turn metals into scrap.
- Hand in plastic elements for recycling.
- Sort the rest of the components by material properties and dispose of accordingly.

10. Accessories

(Please refer to the ongoing catalogue or the internet for individual tool changer accessories.)

OPTION:

- Specifici splash-proof execution
- IP65 sealed electrical signal transmission
- Tool changer with internal routing
- Stainless Steel tool changer for pharmaceutical, medical and food industry