

Z-Axis Compliance Device

ZN-50
ZN-80
ZN-100
ZN-125
ZN-160
ZN-200
ZN-250
ZN-300



Version 2.0 Last revision November 2012

Dear customer,

Thank you for the confidence that you have placed in our company by purchasing an IPR Z-axis compliance.

Every Z-axis compliance 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 Z-axis compliance 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.

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Translation of the original assembly instructions

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1. General

1.1. Information on these instructions

These instructions enable the Z-axis compliance 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 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 protecting people and for reliable, no-trouble operations. Further task-related safety instructions are included in the sections on the 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. Use as intended

The Z-axis compliance is only for gripping and holding workpieces and other objects.

Z-axis compliances are not ready-to-use machines as envisaged under the EU Machinery Directive. Z-axis compliances are solely for fitting/attaching to machinery and equipment.

	NOTE! You must use this Z-axis compliance exclusively in accordance with the operating conditions and performance specifications established in these instructions. Never convert or modify it without authorization.
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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 Z-axis compliance must not be used in any explosive environment.
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2.4. General risks

The Z-axis compliance 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 Z-axis compliance is deployed.
- These instructions are also to accompany the Z-axis compliance 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 Z-axis compliance, 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 machine is used must be adhered to.

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

- The Z-axis compliance is used as intended
- During the entire period of use of the machine 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 machine 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 Internet for specifications of the individual Z-axis compliances)

3.1. General basic data

Min. operating pressure:	3.5 bar
Max. operating pressure:	8 bar
Temperature range:	5 °C to 80 °C (higher if requested)
Drive:	Pneumatic
Material:	Casing of high-strength aluminium hard-coated/ Operating parts of hardened tool-steel
Tolerance particulars	
Thread:	+/- 0.1mm
Alignment pin drill hole:	+/- 0.02mm

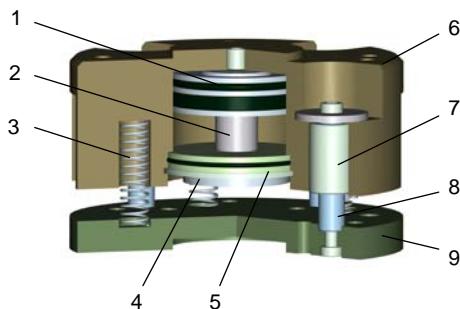
3.2. Operating conditions

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

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

4. Setup and function

4.1. Overview



1	Piston	6	Robot Side
2	Piston Rod	7	Guide Socket
3	Spring	8	Guide Column
4	Thrust Washer	9	Tool Side
5	Sealing Part		

4.2. Brief description

The position compensation takes place vertically via ball guide free from play alternatively in course direction or in pressure direction. The compression strength can be strengthened by the additional control of the pneumatic cylinder. For the monitoring of a starting and/or adding movement, the base plate is drove out; for the monitoring of a withdrawal operation drove in.* With fast procedure movements the cylinder should also be subjected with pressure, in order to block the mechanism. With the help of a sensor the movement of the plate is detected.

* only with option "bolted piston rod"

- Compensation for different vertical positions
- Collision recognition in Z-direction
- Protection of parts and work pieces
- Monitoring of the insertion forces during assembly operations
- Monitoring of the picking forces when removing parts from clamping fixtures or trays
- Fault recognition

5. Transport, packing, storage

5.1. Handling

Immediately check on the delivery when received as to completeness and any transport 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 times set aside for complaints.

Transportation temperature -20 °C to 65 °C.

Protect against external impact (jolt, blow, vibration).

5.2. Packing

The packing is 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 °C to 35 °C.
- 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.



Information may also be on the packs which extend beyond the requirements set out here. They are to be correspondingly kept to.

6. Assembly and commissioning



CAUTION!

When assembling the Z-axis compliance devices, the energy supply needs to be disconnected and the line system relieved of pressure.

Keep to the screw tightening torques during the assembly operation.

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

6.1. Assembly

To avoid damage to the Z-axis compliance devices (ZN module), the following shall be taken into consideration during assembly and commissioning:

- The assembly drill holes and pneumatic connections can be taken from our ongoing catalogue or the internet.
- The ZN module is only to be fastened, for instance, to a robot at the threads provided for this purpose.
- Tighten the assembly bolts with thread locking adhesive (e.g. Loctite 4052) or with Schnorr/Nord lock washers, as appropriate.
- Adjust the proximity switch (if present).



The compression procedure must be switched off before the gripper flange strikes the main body.

- Connect hoses to the ZN module
- Check on freedom of movement of the ZN module, the hoses and sensor cable to any interference contours on hand.
- Provide compressed air at 4-8 bar

6.2. Commissioning

- Pressurize the line system with compressed air.
- Set handling appliance with ZN module to "Hand operation"; check on end positions of the ZN module.
- Repeat operation with workpiece; check on all end positions.
- Shut down coordinates specified under hand operation a number of times on the workpiece being transferred.
- Examine all fastening screws and gripper parts as to a firm fit and retighten, if necessary.

7. Malfunctions

ZN module opens/ does not close

- Check on supply of air, replace any non-tight lines, if necessary
- Air pressure too low, raise the air pressure
- Check on seals from the ZN module and replace, if necessary

Z-axis compliance device does not close

- Foreign matter in the guiding system; clean ZN module

Compression strength incorrect

- Check springs and renew set of springs, if necessary

Compression signal not present

- Check sensor, re-adjust and replace, if necessary

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 ZN module seals and result in them ageing more rapidly.

Make a note of the following when cleaning and tending to the ZN module:

- 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 components such as sensors clean.

8.2. Maintenance

No particular maintenance is necessary under normal operations given that the ZN module is used as originally intended. The ZN module is lubricated for the length of its service life.

To ensure long-lasting proper functioning of the ZN module, we recommend the following maintenance steps to be undertaken at least 1x a year:

- Clean the outside of the ZN module (lightly grease the guiding system – e.g. with Magnalube-G)
- Check the functions; repair the ZN module, if necessary
- Check ZN module for signs of external deformation, damage and wear and repair, if necessary

The manufacturer recommends the following greases when undertaking corrective maintenance on the ZN module (see table).

Under standard application	EMKA Lagerstar LIC
Under foundry applications	Klüber Barrierta LX-55-2

No greases with MoS₂ additives are allowed.

8.3. Corrective maintenance

The manufacturer provides you with a comprehensive ZN module repair service.

Repairs are only to be carried out by authorized specialist personnel. Corrective maintenance involves all the parts being checked, cleaned and greased.

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

- Replacing a set of seals (not with ZN-50)
- Replacing the set of guides
- Replacing sensor


Proceed as follows: (Item No. Assembly Drawing)

Guide set

1. Undo screws, remove washers (8)
2. Withdraw gripper flange (2) complete with guide pillars (8)
3. Set of guides can be replaced
4. Assembly is carried out in the reverse order


Seal set

1. Undo screws, remove washers (8)
2. Withdraw gripper flange (2) complete with guide pillars (8)
3. Remove the circlip (7), unscrew the setscrew
4. Fully press piston through the setscrew opening out of the robot-side flange (1)
5. Remove thrust washer (3)
6. Set of seals and faulty parts can be replaced
7. Re-fit the piston and insert into the piston chamber
8. Fit the circlip and thrust washer
9. Seal the setscrew and examine
10. Insert set of guides and screw down firmly
11. Carrying out the function test.

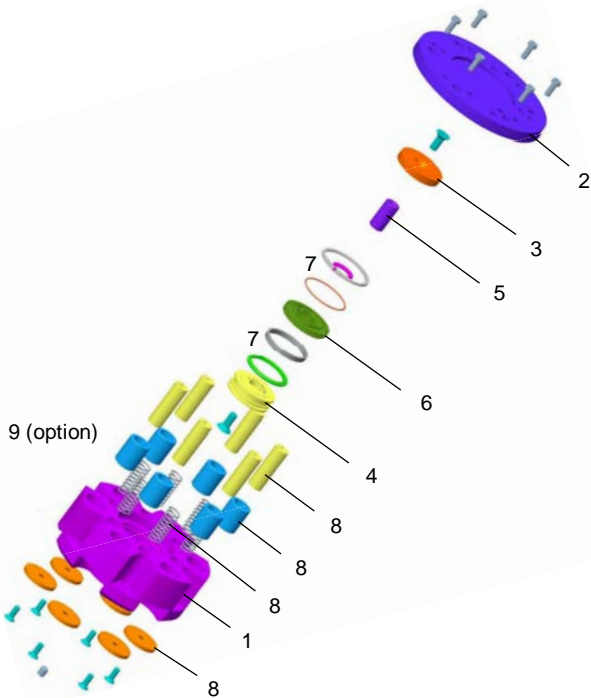
	NOTE! Do not damage any components when removing / inserting the seals.
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Replacing sensor

- Undo screws
- Pull sensor off its holder
- Sensor can be replaced
- Assembly is carried out in the reverse order


	Lubricate all guiding parts with teflon-containing grease before assembly. No greases with MoS ₂ additives are allowed. Tighten all screw connectors with a DIN-based tightening torque and lock to medium strength with a thread locking adhesive (e.g. Ergo 4052).
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Spare parts and a full set of seals and guides can be obtained through the manufacturer.



1	Robot Flange	6	Seal Cap
2	Gripper Flange	7	Seal Kit
3	Locking Cone	8	Guide Way Kit
4	Piston	9	Sensor Mounting kit (Option)
5	Piston Rod		

9. Dismantling, decommissioning, disposal

	CAUTION! Before dismantling the Z-axis compliance, 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.
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9.1. Dismantling

At the end of its useful life, the Z-axis compliance 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 Z-axis compliance malfunctioning needs to be corrected before decommissioning
- Z-axis compliance needs to be cleaned
- Re-lubricate lubricating points before decommissioning
- 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 and/or Internet for individual Z-axis compliance accessories)

OPTION:

- Bolted Piston Rod
- Sensor monitoring