



KESSLER

Manufacturer recommendation

Systems, Swivelling axes, Rotary tables

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1 About these manufacturer's recommendation

The copyright on these instructions remains with Franz Kessler GmbH. They may not be copied, distributed or made accessible to others either in part or in full without permission.

At the time of publication the information provided in these instructions complied with technical standards. Subject to change without notice. We reserve the right to make alterations without notice.

The original instructions are provided in German. All other languages are a translation of the original.

1.1 Purpose

These instructions support you during the planning, project development and preparation of machine installations for systems, swivel axes and rotary tables. They contain all important general technical data, specifications and recommendations.

These instructions contain information about the various features and functions. If your spindle does not have these features or functions, ignore the sections which are not relevant.

1.2 Limits

These instructions are not a stand-alone manual. They do not replace the original assembly instructions.

These instructions do not contain any specific information about the system, swivel axis or rotary table. Specific information can be found in the corresponding assembly instructions.

1.3 Validity

These instructions are no longer valid after initial delivery.

Important notice

Once your product has been delivered and received, only the specifications in the corresponding assembly instructions apply.

- Make sure that the assembly instructions are observed.
- Please note the data sheet.

2 Transport and storage

2.1 Transport

Transport may only be carried out by qualified technical staff or a specialised company.

2.1.1 Protection during transport

During transport protect the unit from the following:

- moisture
- impact
- contamination
- being dropped

2.1.2 Packaging upon delivery

The unit is supplied wrapped in anti-corrosion film in a box. Depending on the model, the unit may also be secured on a transport frame inside the box.

2.1.3 Unpacking

→ Check the transport packaging immediately after receipt of goods for external signs of damage.

NOTICE**Risk of damage from corrosion**

If the unit is unpacked too quickly or exposed to fluctuating temperatures, this could lead to corrosion and, as a consequence, damage to the unit.

→ Store the unit for at least 24 hours at a temperature of $23 \pm 2^{\circ}\text{C}$. After this, first remove the protective foil.

2.2 Storage

NOTICE**Risk of damage from incorrect storage and return transport**

Incorrect storage and return transport can result in corrosion of the unit or damage to the bearings.

→ Observe the following instructions for storage time, environmental conditions, protection against bearing damage and storage and return transport.

2.2.1 Storage time

The maximum storage time is 18 months.

Additional rust protection measures are required for storage times over 7 days.

→ Make a note of the date put into storage and the unit's identification.

2.2.2 Environmental conditions

The environmental conditions influence functionality and service life of the unit.

→ Observe the following conditions for the environment:

- The temperature of the unit may not exceed 40 °C during storage.
- The storage area must maintain as constant a temperature as possible, between 4 °C and 40 °C.
- The storage area must be dry and free of dust and dirt.
- To prevent condensation, the temperature must not fall below the dew point.
- Storage outdoors is not permitted.

2.2.3 Corrosion protection

Corrosion protection measures are necessary for storage of used units and for return transport to the manufacturer.

Corrosion protection measures for storage and return transport

→ Ensure that the unit does not contain any fluids and that all openings are closed with sealing caps.

→ Apply oil to the housing.

→ Pack the unit in anti-corrosion film. We recommend the use of VCI-foil.

→ Use the box and/or transport frame supplied for storing or returning the unit. In this way the unit is better protected against damage and corrosion.

→ Make a note of the date of storage or date of packing and the designation of the unit. Label the packaging with this information.

→ Observe the specifications on environmental conditions in this chapter.

Warranty for incorrect corrosion protection measures

There is no warranty for damage and consequential damage caused by incorrect corrosion protection measures.

2.2.4 Protection against bearing damage

Standstill marks

Exposure of the unit to shock or vibrations can result in bearing damage in the form of standstill marks.

- Vibrations of max. 0.1 mm/s are permitted for a storage time of up to 6 months.
- Vibrations of max. 0.08 mm/s are permitted for a storage time of up to a maximum of 18 months.
- If necessary, store the unit on a base which isolates against vibration.

Standstill corrosion

Long storage times can result in standstill corrosion in the bearings.

- The rotor must be spun once a month by technical staff. We recommend at least 10 revolutions.
- When installing bearing motors that have been in storage for more than 2 weeks, a start-up cycle must be carried out on commissioning. See chapter "Commissioning".

3 Installation

The fitting surfaces must comply with the measurements and tolerances specified in the Kessler dimension sheet.

Fitting of the unit may only be carried out by qualified technical staff.

3.1 Rotary-tilt table with mill turn table (MT)

NOTICE**Potential damage to the machine due to high gyroscopic torques.**

Where there are superimposed rotary movements, i.e. if the C-axis is rotating at the same time as the A-axis is swivelling, gyroscopic torques can occur.

These gyroscopic torques will exert forces on the workpiece clamping mechanism and may cause that mechanism to fail. If the workpiece clamping system fails at high rotational speed, there is a risk of damage to the machine and injury to the machine operative.

The machine tool manufacturer must ensure the following conditions:

- ➔ The workpiece clamping mechanism must be designed to withstand such gyroscopic torques.
- ➔ The swivelling axis (A-axis) must have a speed limitation programmed in the machine control system in case the rotary speed of the C-axis exceeds a given level.

This prevents the workpiece clamping mechanism being overloaded.

NOTICE**Potential damage to the machine due to high centrifugal forces**

The high speed and workpiece imbalance cause high centrifugal forces at the workpiece clamping mechanism.

If the workpiece clamping mechanism fails at high centrifugal forces, there is a risk of damage to the machine and injury of the machine operative.

The machine tool manufacturer must ensure the following conditions:

- ➔ The workpiece clamping mechanism must be designed to withstand such centrifugal forces.

This prevents the workpiece clamping mechanism being overloaded

3.2 Speed limitation of the axes



Damage to the machine and spindle due to high gyroscopic torques!

Overlapping rotary movements, i.e. rotating A- or C-axis and simultaneously rotating motor spindle, gyro torques occur.

These gyro torques load drives of the axes and can lead to uncontrolled axis movements in the event of overload.

The machine tool manufacturer must ensure the following conditions:

- ➔ That a speed limitation of the A- and C-axes is programmed in the machine control above a certain speed of the motor spindle or is limited by non-critical values.
- ➔ That the maximum speed of the A- and C-axes is calculated when using specific tools (different from the data sheet).

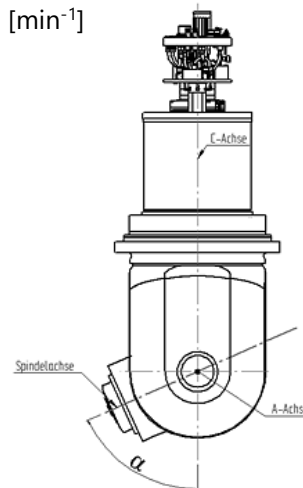
➔ Persons must not be within the swivel range of the unit!

3.2.1 Calculation of the max. speed C-axis and A-axis

- M_{A-/C hold}** Stand still S6 max: holding torque [Nm], C-axis or A-axis.
See data sheet of the different axes.
- J_{Sp}** Rotor moment of inertia spindle [kgm²] *See data sheet motor spindle.*
- J_{tool}** Mass moment of inertia tool [kgm²]
See reference tools in data sheet, other tools must be calculated separately.
- n_{Sp}** Speed spindle [min⁻¹]
- n_{C-/A max}** Max. permissible speed of the C-axis or A-axis [min⁻¹]

$$n_{C \max} = \frac{M_{A \text{ hold}} \times 900}{(J_{Sp} + J_{\text{tool}}) \times \pi^2 \times n_{Sp}}$$

$$n_{A \max} = \frac{M_{C \text{ hold}} \times 900}{(J_{Sp} + J_{\text{tool}}) \times \pi^2 \times n_{Sp}}$$



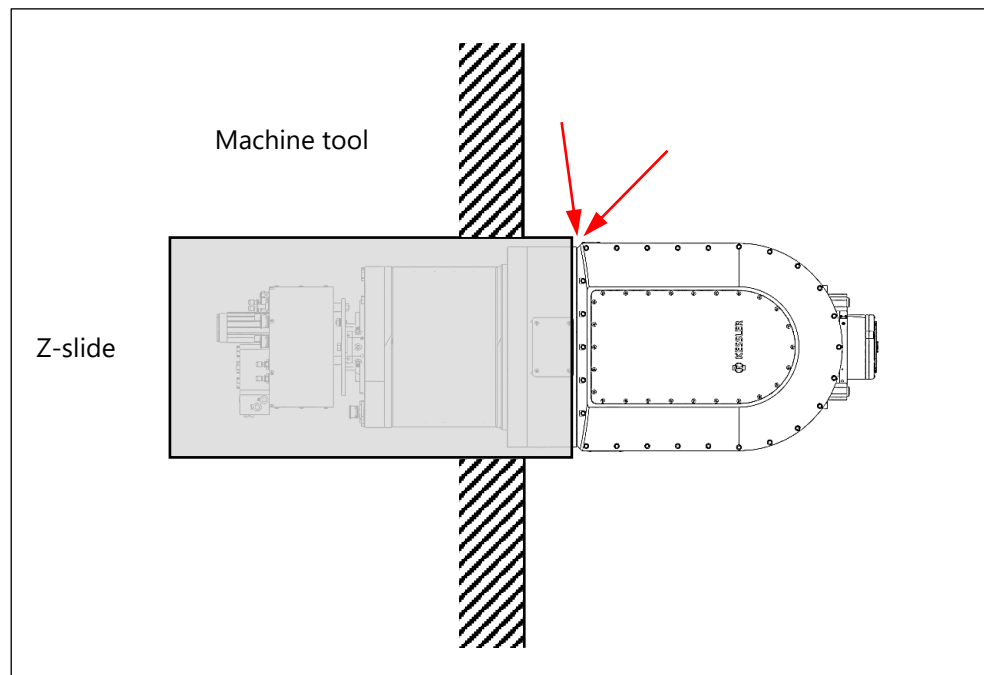
Position A-axis α = ±90° worst case!

3.3 2-axis-head horizontal installation position

NOTICE**Damage caused by cutting chips in the labyrinth**

The accumulation of cutting chips between A-axis and C-axis can cause damages to the seals in the labyrinth.

- The machine manufacturer must ensure that by the adjacent construction a cutting chip accumulation at the area of the labyrinth is not supported.



4 Electrical system

Work on the electrical system may only be carried out by an electrician.

→ Ensure that a second qualified person is available to disconnect the power supply in the event of an emergency.

4.1 Electrical interface

The electrical interface is designed with wire or plug. The relevant specifications for the electrical connection can be found in the dimension sheet and/or circuit diagram.

For connection with cable

Starpoint (if applicable)

The starpoint is for diagnostic and measuring purposes.

- Ensure that the neutral point is electrically insulated.
- Ensure that the starpoint is not connected to the protective earth conductor.

Contact points

- Protect the contact points against corrosion.
- Protect the contact points and outlets from mechanical loads e.g. with strain reliefs or terminal boxes.

Connecting lines

- Ensure adequately dimensioned connection lines in accordance with specifications for current in the data sheet

For connection with plug

The interface consists of one or more plugs. The plug allocation can be found in the dimension sheet and/or circuit diagram.

- Ensure correct fit of plug connections.
- Ensure correct fitting of the O-rings in the connector.
- Leaking plug connections can result in a short-circuit. This could lead to damage to the unit, machine or surrounding area.

5 Thermal motor protection

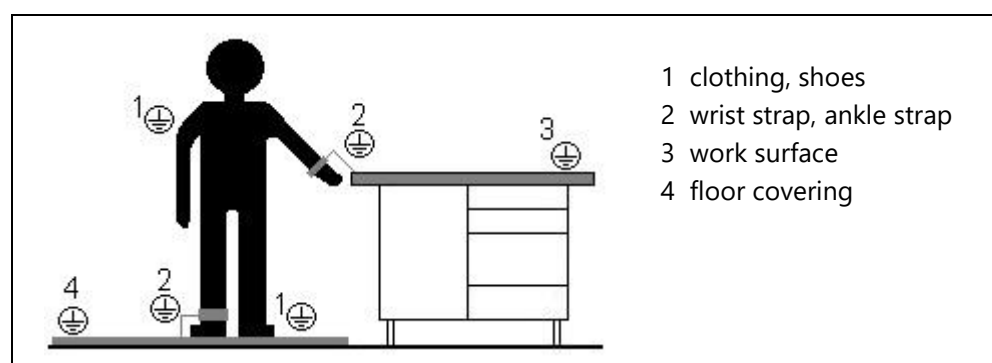
The electric motors are supplied with integrated temperature sensors. PTC thermistors and bimetal temperature sensors provide thermal motor protection. To guarantee protection, especially with load during standstill, each motor phase is provided with one of the three in-series connected temperature sensors.

Connection of the bimetal or PTC thermistor sensors is compulsory in order to avoid damage from thermal overload.

5.1 Electrostatic discharge

Protective measures against electrostatic charge

- ➔ Before touching electronic components, the body of the person must be electrostatically discharged and earthed.
- ➔ Only touch electronic components if absolutely necessary.
- ➔ Place electronic components on conductive bases.
- ➔ Ensure that electronic components do not come into contact with electrically insulating materials such as plastic parts or foil, or synthetic clothing.
- ➔ For this use:
 - antistatic shoes and clothing (1)
 - wrist and/or ankle straps for earthing (2)
 - ESD work surfaces (3)
 - conductive and antistatic floor coverings (4)



5.2 Protective measures KTY 84-130

The wires of the protective 84-130 sensor must not be connected in-series to the wires of the PTC thermistor or bimetal temperature sensor.

Connect the temperature sensor in accordance with the circuit diagram.

The maximum permissible current for identification of the rotor position by the frequency converter may not be exceeded. See parameter list.

Short-circuit the reserve set.

5.3 Protective measures temperature sensor PT1000-sensor

Damage to temperature sensor possible

- ➔ The wires of the PT1000 sensor must not be connected in-series to the wires of the PTC thermistor or bimetal temperature sensor.
- ➔ Connect the temperature sensor in accordance with the circuit diagram.
- ➔ Ensure that the working environment is electrostatically protected.

Damage to PT1000-sensor possible

The maximum permissible current for identification of the rotor position by the frequency converter may not be exceeded.

- ➔ Limit the power for rotor position identification. See parameter list.
- ➔ Short-circuit the reserve set.

5.4 Motor shut-down temperature

To avoid overheating and damage to the motor, the control system must be programmed as follows in accordance with the specifications in the parameter list:

- When the threshold limit for the motor temperature is reached a warning signal must be issued.
- When the shut-down limit for the motor temperature is reached the motor must be switched off immediately.

Should the parameter list no longer be available, a copy can be requested from Kessler Service. See chapter "Service and Support" for contact details.

5.4.1 PT1000-sensor

To monitoring the coil temperature of the motor, the unit is equipped with a platinum temperature sensor. When the temperature rises, the electrical resistance increases. The characteristic curve is almost linear within the measuring range.

Technical specifications

Warning temperature	130°C
Shut-down temperature	140°C
Nominal resistance	1000 Ω by 0 °C DIN EN 60751:2009

Tolerance	Class B ± 0.3 °C by 0°C
Disruptive strength	3.8 kV AC, 50Hz / 1 min.
Measuring current	0.1 - 0.3 mA

5.5 Shut-down temperature motor

To protect the motor from overheating and damage, make sure that the control system is programmed according to the parameter list, as specified below:

- If the motor temperature reaches the threshold limit, a warning signal must be emitted.
- If the motor temperature reaches the shutdown limit, the motor must be switched off immediately.
- The parameter list is supplied with the operating instructions.

5.6 Bimetal temperature sensor

Bimetal temperature sensors are purely switching elements. The contact is interrupted in the area of the nominal response temperature (140 °C). This is a NC-contact (NC = normally closed):

- Up to the nominal response temperature the contact is closed.
- From the nominal response temperature the contact is open. After opening the contact, switch the motor off immediately.

6 Operation of the motor

Considerable voltage peaks can occur due to system oscillations when operating the motor with a frequency converter with pulsed voltage output (e.g. PWM). Significant influencing factors, along with the motor size, include the length of the connection leads as well as the number and type of axes in the drive assembly.

Excessively high voltage peaks strain the motor's electrical insulation system and can result in failure. The following limit values may not be exceeded:

Amplitude	Max. 2000 V peak to peak
Build-up time	Max. 10kV / μ s

In order to avoid voltage peaks, observe the frequency converter's manufacturer's instructions. If necessary, attenuators must be used in the drive assembly.

6.1 Torques

Torque standstill (S0)

During standstill increased thermal loads can occur in the individual motor phases.

- Ensure that the "standstill torque" does not exceed the S1-torque more than 0.7-fold for sustained periods.

Torque maximum (S1)

The S1 torque corresponds to the maximum permissible motor speed in continuous operation with a uniform load for all phases. It also describes the thermal limit value of the motor.

- Ensure that the cooling system dissipates the heat as specified..
- Ensure that the S1 torque is also not effectively exceeded for load cycles (e.g. S6).

Max. torques by synchronous motors (S_{max})

The maximum torque has been reached, when the motor has drawn the maximum permissible current. The maximum permissible current is limited by the demagnetisation danger of the rotor's permanent magnets.

- Ensure that the temperature of the magnets does not exceed 80 °C.

Due to the danger of overheating, the maximum torque may not be applied for more than 1 second. The cycle time is in relation to the thermic conditions.

- Ensure that, on average, heat dissipation for S1 operation is not exceeded.

7 Sensory system

The unit has measuring sensors which influence the control. Only correct connection of these measuring sensors ensures fault-free operation.

8 Pneumatic system

Work on the pneumatic system must be carried out strictly by qualified technical staff.

8.1 Required line diameter

The outer diameter of the lines must comply with the specifications. In order to ensure sufficient volume flow, the minimum diameter of the lines must comply with the specifications in the following table.

Outer diameter (calibrated)	Inner diameter (minimum size)
16 mm	11.0 mm
14 mm	11.0 mm
12 mm	8.0 mm
10 mm	7.0 mm
8 mm	5.7 mm
6 mm	4.0 mm
4 mm	2.6 mm

8.2 Important specifications for all lines

Due to the high requirements for functionality of the unit ensure that the following specifications are observed:

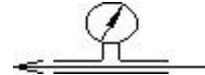
- Ensure absolute cleanliness for all work.
- Only cut the hose with hose cutters.
- Ensure that all lines are cleanly cut at a right angle to the axis.
- Ensure that all tubes are hydrolysis resistant and dimensioned for the stated pressures.
- Observe the manufacturer's installation specifications for your peripheral devices.
- Remove sealing caps at the unit only shortly before connecting the tubes.
- Blow through the hoses before use.
- Ensure that sufficient hose length is available. Folding and tension on the lines must not occur during operation.
- Ensure that the bending radius of the lines does not fall below that stated by the manufacturer.
- Ensure that hoses are not twisted during fitting or operation.
- Ensure that tubes are arranged and protected so that wear on the outer layer is prevented.
- Ensure that tubes are fitted so that the weight of the tubes does not lead to non-permissible loads.
- Do not use Teflon sealing tape to seal the screw connections. Particles can break off and cause deposits in the tubes and lead to damage of the rotary union.

8.3 Important conditions for compressed air

Pressure

The pressure quoted in the dimension sheet and/or data sheet must be applied directly to the unit. The air pressure on entry to the unit depends on line length.

- When connecting, use a suitable pressure gauge to measure the air pressure in the line on entry to the unit.



Air purity

Filters must be used to keep the compressed air clean. Otherwise dirt can build up in the lines and congest them.

- To trap water from the air supply use a suitable water trap with automatic emptying.
- Use dry and filtered compressed air in accordance with ISO 8573-1.

Air purity according to ISO 8573-1:2010				
Solid particles			Water	Oil
Maximum number of particles per m ³ Class 3			Pressure dew point Class 4	Total part oil Class 4
[0.1-0.5 µm]	[0.5-1 µm]	[1-5 µm]	[°C]	[mg/m ³]
-	≤ 90000	≤ 1000	+3	5

9 Hydraulic system

Work on the hydraulic system must be carried out strictly by qualified technical staff with special knowledge and experience with hydraulic systems.

9.1 Important specifications for hydraulic lines

Due to the high requirements for functionality of the unit ensure that the following specifications are observed:

- Ensure absolute cleanliness for all work.
- Ensure that all lines are hydrolysis resistant and dimensioned for the stated pressures.
- Ensure that all lines are cleanly cut at a right angle to the axis.
- Observe the manufacturer's installation specifications for your peripheral devices.
- Remove sealing caps only shortly before connecting the hydraulic lines.
- Ensure that sufficient hose length is available. Folding and tension on the lines must not occur during operation.
- Ensure that the bending radius of the lines does not fall below that stated by the manufacturer.
- Ensure that hoses are not twisted during fitting or operation.
- Ensure that lines are arranged and protected so that wear on the outer layer is prevented.
- Ensure that lines are fitted so that the weight of the lines does not lead to non-permissible loads.
- Do not use Teflon sealing tape to seal the screw connections. Particles can break off and cause deposits in the lines and lead to damage of the rotary union.

9.2 Media purity at the hydraulic system

The media purity depends on the components installed and the function. See the table in the relevant sections for details about the hydraulic clamping, motor cooling, rotary union, tool cooling etc..

9.3 Avoid wear of hydraulic components

Limit pressure peaks

Pressure peaks may not exceed 10 % of the maximum pressure. Excess pressure results in impairment of the service life and destroys the components.

- Use pressure control valves to limit pressure peaks. Pressure control valves are not included in the scope of delivery nor shown on the dimension sheet.
- Use a minimum pressure accumulator in the lines to absorb pressure peaks.

Maximum pressure increase/time

If the maximum pressure per time unit is exceeded, this will result in impairment of the service life and destroy the components.

- Ensure that the maximum pressure increase per time unit is not exceeded.

Maximum pressure increase/time	≤ 1 bar / ms
--------------------------------	--------------

Bleeding

The hydraulic system must be completely depressurized.

Pressure for bleeding: ≤ 3 bar

If there is a connection "bleed clamp" then this connection should preferably be used to bleed the clamp.

If there is no special connection to bleed the clamp, then the clamp is to be bled via the screw connection "clamp the clamp" or "release clamp". The location of the connections can be found on the dimension sheet.

The hydraulic clamp can be bled by using a portable bleeding device.

Hydraulik oil

Media purity according to ISO 4406					
No. particles/100 ml > 4 µm		No. particles/100 ml > 6 µm		No. particles/100 ml > 14 µm	
Code	from-to	Code	from-to	Code	from-to
19	260000-500000	17	64000-130000	14	8000-16000

10 Cooling system

Work on the cooling system must be carried out strictly by qualified technical staff with special knowledge and experience with hydraulic systems.

10.1 Required line diameter

The outer diameter of the lines must comply with the specifications. In order to ensure sufficient volume flow, the minimum diameter of the lines must comply with the specifications in the following table.

Outer diameter (calibrated)	Inner diameter (minimum size)
16 mm	11.0 mm
14 mm	11.0 mm
12 mm	8.0 mm
10 mm	7.0 mm
8 mm	5.7 mm
6 mm	4.0 mm
4 mm	2.6 mm

10.2 Important specifications for the cooling agent

Pure water severely lowers the pH-value and causes immediate corrosion to uncoated parts. The corrosion goes unnoticed for a time, but later can cause serious corrosion damage.

→ Do not use pure water.

The quality of the cooling agent influences the functionality and service life of the unit to a high degree.

→ Ensure that the freshly mixed cooling agent meets the stated specifications.

ph value	8,5 – 9,5
Conductivity	max. 700 µS/cm
Total hardness	5 – 30 °dH 0.89 – 5.35 mmol/l

10.2.1 Protective measures

Cooling agent filter

Filters must be used to keep the cooling agent clean. Otherwise dirt can build up in the lines and congest them. This can cause destruction of the motor.

→ Use a solids filter for this.

Filter grade	< 100 µm
--------------	----------

When choosing a cooling lubricant, make sure that the lubricant selected does not corrode, disintegrate or otherwise damage the materials listed.

The following materials are used in the motor cooling circuit:

- Steel (St52, C435E, 16MnCr5 and similar)
- EN-GJS-600
- AlMg4,5Mn
- Viton
- Zurcon®
- Nitrile butadiene rubber
- Polyurethane
- POM

Avoid damage from corrosion

- Avoid a combination of electro-chemically incompatible metals, such as copper and aluminium.
- Avoid an electrically conductible connection between electro-chemically incompatible metals.
- Avoid electrolytes which facilitate an exchange of metal ions.
- When installing a closed cooling circuit, add an anti-corrosion agent with a mixture ratio in line with the manufacturer's specifications.

Cooling agent properties

- When installing the cooling unit, ensure that the cooling agent is prepared to prevent the following under extreme conditions:
 - Organic deposits (such as fungi and bacteria),
 - Corrosion
 - Freezing of the water.
 - Wear of seals

10.2.2 Systemreiniger verwenden

Observe the manufacturer's specifications for the coolant and cleaning agents used. Incorrect use could otherwise cause irreparable damage to the seals and other severe damage.

If you use system cleaner, first make sure that the cooling system of the plant is rinsed through separately to remove any particles which are present. Only include the cooling system of the Kessler unit after you have done this.

10.3 Anti-corrosion agent without rotary union

When installing a closed water cooling circuit, add an anti-corrosion agent. Observe the manufacturer's instructions on the mixing ratio.

Manufacturers of chemical additives for water

Manufacturer	Internet
Fuchs Europe Schmierstoffe GmbH	www.fuchs.com
Cimcool Europe B.V.	www.cimcool.net
Hebro Chemie GmbH	www.hebro-chemie.de

Unless otherwise specified in the data sheet, we recommend the following coolants.

Manufacturers of chemical additives for water

Motorex COOL CONCENTRATE Observe the manufacturer's instructions.	
Manufacturer	Internet
MOTOREX AG LANGENTHAL	www.motorex.com

Manufacturer of ready-for-use motor coolant

Motorex Cool-X Observe the manufacturer's instructions.	
Manufacturer	Internet
MOTOREX AG LANGENTHAL	www.motorex.com

10.4 Anti-corrosion agent with existing rotary union

Additives for producing ready-corrosion protection agent

When installing a closed water cooling circuit, add a corrosion protection concentrate.

Glysantin G48 (Mixture ration 33-60%) → Observe the manufacturer's instructions.	
Manufacturer	Internet
BASF SE Fuel and Lubricant Solutions	www.glysantin.de

Antifrost C (Mixture ration 20-58%) → Observe the manufacturer's instructions.	
Manufacturer	Internet
AVIA Mineralöl AG	www.avia.de

Ready for use motor coolant + required lubricating additive

Motorex Cool-X + V=15 % Lube 400 (lubricating additive) → Observe the manufacturer's instructions.	
Manufacturer	Internet
MOTOREX AG LANGENTHAL	www.motorex.com

NOTICE

Destruction of the seals in the rotary unit possible

The use of Cool-X without additive leads to the destruction of the seals in the rotary unit.

→ When using Motorex Cool-X add V=15 % Motorex Lube 400 to the coolant.

Ready-to-use motor coolant with lubricating additive

Motorex Cool-X AW → Observe the manufacturer's instructions.	
Manufacturer	Internet
MOTOREX AG LANGENTHAL	www.motorex.com

11 Cooling lubricant

Work on cooling lubricant circuits must be carried out strictly by qualified technical staff with special knowledge and experience with cooling lubricant.

Unsuitable cooling lubricant

Kessler provides no guarantee for consequential damage when inappropriate cooling lubricants are used.

→ Ensure that the cooling lubricant used meets the technical specifications provided.

11.1 Important specifications for the cooling lubricant

Pure water severely lowers the pH-value and causes immediate corrosion to uncoated parts. The corrosion goes unnoticed for a time, but later can cause serious corrosion damage.

→ Do not use pure water.

The quality of the cooling lubricant influences the functionality and service life of the unit to a high degree.

→ Ensure that the freshly mixed cooling lubricant meets the stated specifications.

ph value	8,5 – 9,5
Conductivity	max. 700 µS/cm
Total hardness	5 – 30 °dH 0.89 – 5.35 mmol/l
Corrosion protection (Test method in accordance with DIN 51360-2)	After 2 hours test time there should be no corrosion.
Elastomer compatibility	No changes to shore hardness or expansion permitted
Adhesive residue characteristics when slowly evaporating at 50 °C	There must be no development of sticky deposits. The coolant must remain easily soluble and emulsifiable.

11.2 Media purity (if rotary union is used)

Recommended media purity

Contamination such as foreign bodies, dirt, chips, etc., can considerably reduce the service life of the seals and hoses. Damage to seals and/or hoses can lead to failure of the rotary union and unit.

In order to ensure failure-free function of the rotary union and unit for as long as possible, we recommend that the specifications for media purity be adhered to.

Media purity according to ISO 4406					
No. particles/100 ml > 4 µm		No. particles/100 ml > 6 µm		No. particles/100 ml > 14 µm	
Code	from-to	Code	from-to	Code	from-to
17	64000-130000	15	16000-32000	12	2000-4000

Minimum requirements for media purity

In order to avoid increased wear and damage to the rotary union and unit, the minimum requirements for media purity must not be fallen short of.

Media purity according to ISO 4406					
No. particles/100 ml > 4 µm		No. particles/100 ml > 6 µm		No. particles/100 ml > 14 µm	
Code	from-to	Code	from-to	Code	from-to
-	- -	17	64000-130000	14	8000-16000

Solids filter minimum cooling lubrication

Filter grade:	< 12 µm
---------------	---------

Solids filter for internal cooling lubricant

Filter grade:	< 50 µm
---------------	---------

Solids filter for external cooling lubricant

Filter grade:	< 100 µm
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12 Rotary union (if available)

See data sheet

12.1.1 Avoiding permanent leakage flow

Permanent leakage flow with unusually high amounts of leakage can cause damage to the rotary union. If the damaged rotary union is not replaced in time, consequential damage to the unit can occur.

Measures for avoiding permanent leakage flow

- Ensure that Teflon sealing tape is not used to seal the screw connections of the rotary union.
- Carry out all connections for the rotary union in a flexible manner. Strain relief must be included for line lengths over 50 cm.
- Ensure that no force is applied to the screw connections.

12.1.2 Media purity

Recommended media purity

Contamination such as foreign bodies, dirt, chips, etc., can considerably reduce the service life of the seals and hoses. Damage to seals and/or hoses can lead to failure of the rotary union and unit.

In order to ensure failure-free function of the rotary union and unit for as long as possible, we recommend that the specifications for media purity be adhered to.

Media purity according to ISO 4406					
No. particles/100 ml > 4 µm		No. particles/100 ml > 6 µm		No. particles/100 ml > 14 µm	
Code	from-to	Code	from-to	Code	from-to
17	64000-130000	15	16000-32000	12	2000-4000

Minimum requirements for media purity

In order to avoid increased wear and damage to the rotary union and unit, the minimum requirements for media purity must not be fallen short of.

Media purity according to ISO 4406					
No. particles/100 ml > 4 µm		No. particles/100 ml > 6 µm		No. particles/100 ml > 14 µm	
Code	from-to	Code	from-to	Code	from-to
-	- -	17	64000-130000	14	8000-16000

12.2 Air purity

Filters must be used to keep the compressed air clean. Otherwise dirt can build up in the lines and congest them.

→ Use dry, filtered compressed air with the following air purity:

Air purity according to ISO 8573-1:2010				
Solid particles			Water	Oil
Maximum number of particles per m ³ Class 3			Pressure dew point Class 4	Total part oil Class 4
[0.1-0.5 µm]	[0.5-1 µm]	[1-5 µm]	[°C]	[mg/m ³]
-	≤ 90000	≤ 1000	+3	5

12.3 Sealing air

Sealing air provides effective protection of the bearings from cooling lubricant and splash water which can get into the unit and prevents condensation from forming.

13 Grease-lubricated bearings

The design of the bearings and lubrication is adapted to the operating requirements. The ex-factory mounted bearings are lubricated and ready for operation.

13.1 Service life greased bearings

Bearings which are lubricated for their service life do not require maintenance or regreasing.

The service life is up to 20,000 operating hours or a maximum of three years, whichever occurs first.

The service life is heavily dependent on load, speed, vibrations and operating time. High loads, speeds and operating times result in a reduced service life.

13.2 Bearings with regreasing unit

If there is a regreasing unit, the bearings can be regreased as required.

Specifications for lubricating interval, lubricant quantity, lubricant recommendation and lubrication process can be found in the assembly instructions for the unit.

14 Hydraulic clamping

Work on the hydraulic system must be carried out strictly by qualified technical staff with special knowledge and experience with hydraulic systems.

Delay time

Delay time	0.3 s
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Recommendation for oil

Hydraulic oil recommendation according to DIN 51524-2	e.g. HLPD 46
---	--------------

Filter grade

Filter grade maximum	40 μm
Filter grade standard	5 μm

Seals

Seals are required for the connection. Fitting of the seals belongs to the customer's scope of services.

→ Ensure that the seals are not crushed or damaged.

Leak-tightness of the lines

After connection and before commissioning, the leak-tightness of the whole system must be checked by the customer.

Avoiding wear and failure

The clamp must:

- Not be used to slow the unit down.
- Only be used to secure the unit when it is at a standstill.
- The clamp must be released before commissioning the unit.

14.1 Media purity

Recommended media purity

Contamination such as foreign bodies, dirt, chips, etc., can considerably reduce the service life of the seals and hoses. Damage to seals and/or hoses can lead to failure of the unit.

In order to ensure failure-free function of the unit for as long as possible, we recommend that the specifications for media purity be adhered to.

Hydraulic oil

Media purity according to ISO 4406					
No. particles/100 ml > 4 µm		No. particles/100 ml > 6 µm		No. particles/100 ml > 14 µm	
Code	from-to	Code	from-to	Code	from-to
19	260000- 500000	17	64000- 130000	14	8000- 16000

15 RotoClamp pneumatic clamping

Work on the pneumatic system must be carried out strictly by qualified technical staff.

The clamp opens pneumatically and generates its clamping force via a spring accumulator at 0 bar. Optionally, the clamping force can be increased with the function "secondary air".

The clamp closes pneumatically and generates its clamping force via the deformation of a pre-tensioned spring at operating pressure.

Pressure

The air pressure for secondary air for release and clamping must always be applied, as due to the design-type air can always escape.

According to the manufacturer's test directives, maximum permissible pressure loss is defined as 0.5 bar per minute.

Cleaning of compressed air

Filters must be used to keep the compressed air clean. Otherwise dirt can build up in the lines and congest them.

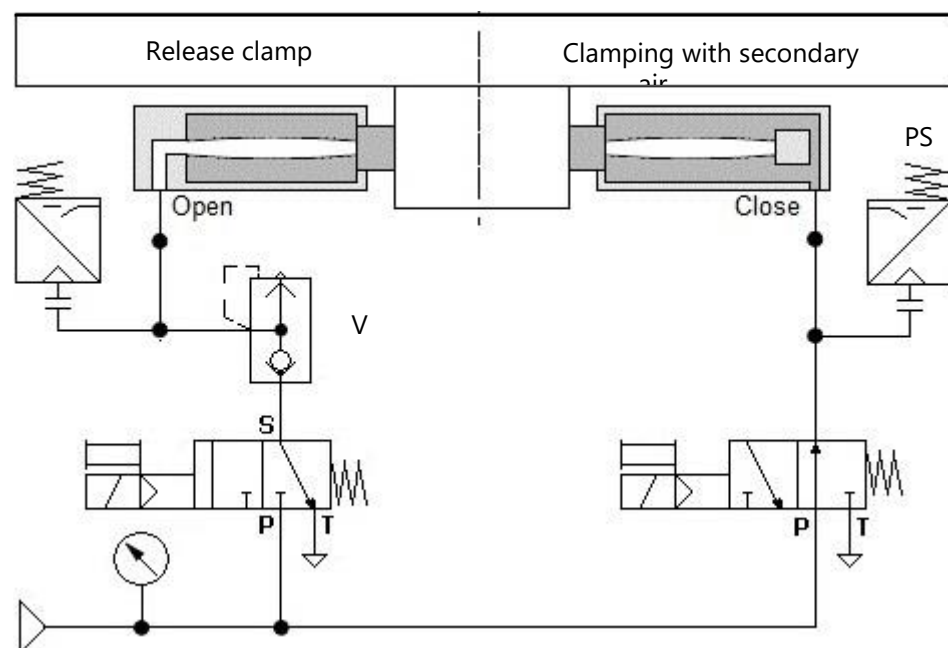
→ Use a maintenance unit with air filter.

Air filter	< 40µm
------------	--------

Media purity

→ Observe the manufacturer's instructions. (e.g. Hema)

Connection diagram



V = Quick air vent

PS = Pressure switch

15.1 Emergency clamping

Based on the design, clamping takes effect when a pressure drop occurs. This ensures emergency clamping.

A pressure monitor can be fitted to detect any leaks.

For option with secondary air

The clamping force is increased through pressurisation of the outer spring membrane chamber.

However, operation with secondary air should be avoided as this can negatively affect the service life.

16 Repairs

Due to the high requirements for functionality of the unit, repair work such as replacing parts must be carried out strictly by technical staff or their representatives who have been authorized and trained by Franz Kessler GmbH.

- Contact details for the Kessler Service can be found in the chapter "Service and Support".

The Kessler Academy offers practical seminars for qualification of personnel.

- Contact details for the Kessler Academy can be found in the chapter "Service and Support".

→ Before you begin work on the unit, read the safety instructions. See chapter "For your safety".

16.1 Wear and replacement parts list

→ For all questions regarding the unit or replacement parts, always state the type, article number and, if available, the serial number.

16.1.1 Wear parts

Wear parts are parts which are subject to wear when use as intended.

Depending on the intensity of the use of the unit, wear parts can be result in failure within the statutory warranty period.

KESSLER does not accept any warranty claims for wear parts.

Typical wear parts could be for example: rotary union, clamp, toothed wheels, seals, springs.

16.1.2 Replacement parts

Replacement parts are parts which wear out during normal operation. Replacement parts may also include parts that are damaged or destroyed in case of not intended use or improper use.

Damaged or destroyed parts must always be replaced by original replacement parts from KESSLER.

Typical replacement parts could be for example: sensors, monitoring systems, bearing housing, torque motor, diverse rings, tubing.

Replacement parts should be exchanged as standard in case of an overhaul or repair.

A list of replacement parts for the unit can be found in the chapter "Wear and replacement parts list" in the assembly instructions.

17 Service and Support

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