



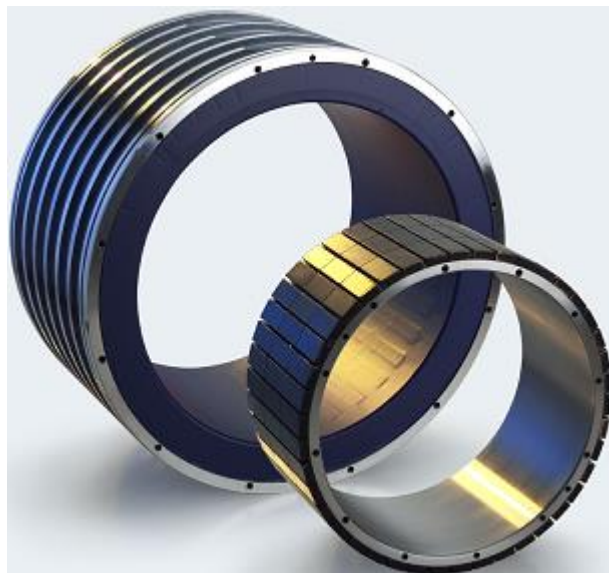
KESSLER

Assembly instructions

with operating and maintenance information

Torque motor

Type:	TSM, TMS TMU, TMI HTM, HTMx HTMe, STMx
Art. no.:	see type plate/data sheet
Serial no.:	see type plate/data sheet



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Original Assembly Instructions - German
All other languages are a translation of the original.

These assembly instructions include operating and maintenance information

READ BEFORE USE!
KEEP FOR FUTURE USE!

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1 About these assembly instructions

The copyright on these assembly 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 assembly instructions complied with technical standards. Subject to change without notice. We reserve the right to make alterations without notice.

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

1.1 Product designation

Torque motor: Article number – see data sheet

The product will be referred to as a unit throughout the documentation.

1.2 Importance of these assembly instructions

→ These assembly instructions are important for your safety. Read these assembly instructions carefully before starting any work.

→ Ensure that a copy of these assembly instructions is always available for reference.

→ Ensure that a copy of these assembly instructions is available during the service life of the unit.

A replacement copy of the assembly instructions can be obtained from our sales department. Contact details can be found in the section "Service and Support".

Contents of these assembly instructions

These assembly instructions contain information on the conditions which must be met so that the partly completed machinery can be installed correctly without impairment to safety and health.

Abbreviations used for connections refer to the dimension sheet. The abbreviations consist of letters and numbers, e.g. SE-H21.

The dimension sheet can be supplied as a PDF file and printed out larger for better legibility. The PDF file can be requested from your sales partner.

Technical specifications can be found in the technical data sheet or in the dimension sheet.

1.3 Scope of delivery

Torque motor

Assembly instructions German

Assembly instructions English

Assembly instructions, additional languages in accordance with technical data sheet

2 For your safety

The unit is designed in such a way that it can be operated safely and with a high degree of reliability after correct installation of electrical power, coolant, cooling lubricant, hydraulic system, pneumatic system and sensor system as well as correct programming of the motor control. The condition for this is that all technical parameters defined in these assembly instructions are observed at all times while taking the specified tolerances into account.

The contents of these assembly instructions were compiled to the best of our knowledge and belief. However, it is possible that not all information which may be required for safe operation or which must be observed by the operator is available. If you have any questions, please contact our technical sales department.

2.1 Designated use

Motor type	Torque motor
Type of construction	synchronous
Installation position	horizontal and vertical

The motor is a specially adapted unit for installation in machining centres. After installation, the motor is used as a drive for machine tool axes, preferably rotary axes.

Do not make alterations to the motor or its components. Dangers may arise from alterations or non-authorised use for which the existing protective equipment is not sufficient. This can lead to death, injury or property damage.

2.2 Non-authorised usage

Any use other than the designated use is improper use and is not permitted.

The unit is not authorised for the following uses:

- processing of foodstuffs of any kind
- operation in environments where there is a danger of explosion
- operation outdoors
- use in mines

2.3 Protection class IP54

The unit is designed with protection class IP54. Complete protection against the ingress and escape of dust and liquids is not provided.

See also DIN EN 60034-5.

2.4 Operator's responsibility

Read these assembly instructions before assembly and commissioning, and follow the warning and safety instructions carefully. In addition to these assembly instructions, the instructions attached to the unit must also be observed.

Knowledge of these assembly instructions is essential for avoiding accidents and ensuring fault-free operation. Failure to observe the warning and safety instructions can result in death, injury or property damage.

Failure to observe important information is likely to lead to inferior production quality, frequent operational faults and damage to the unit, for which we as the manufacturer cannot accept liability.

The operator must ensure the following points

- The unit must never be allowed in the vicinity of external magnetic fields or be allowed to come into contact with them.

NOTICE

There is a risk of damage to the unit or impairment in the functions of the unit from powerful external magnetic fields.

The unit is supplied in a demagnetised state. This demagnetised state may be destroyed if the unit is adversely affected by magnetic fields.

→ Avoid contact with external magnetic fields to prevent a re-magnetization.

- The unit may only be assembled and used according to the designated use.
- All relevant laws, directives and rules for safety, prevention of accidents and environmental protection must be observed.
- The necessary constructive safety and protection devices and appropriate warning notices must be fitted.
- Work may only be carried out by sufficiently qualified and instructed technical staff.
- The assembly instructions must be available to the personnel who work on the machine and they must have been read and understood before commencing work.
- The necessary personal protective equipment according to employment protection laws must be provided and used.
- It is forbidden to make constructional changes.
- Stated maintenance intervals and tasks must be observed.

2.5 Qualified technical staff

Work on the unit must be carried out strictly by qualified technical staff. The staff must have read and understood these assembly instructions.

Qualified technical staff is staff who are familiar with the installation, assembly, commissioning and operation of the product. The qualified staff must have the following qualification and knowledge:

- Qualified training and work experience.
- Knowledge of the relevant standards, regulations, accident prevention regulations and operational conditions.
- The ability to recognize and avoid possible dangers.
- Use of adequate safety and protective equipment.
- First-aid training.

2.5.1 Work on the electrical system

Work on the electrical system may only be carried out by qualified electricians or by trained technical staff under control and supervision of an electrician in accordance with electro technical rules.

2.5.2 Work on the hydraulic system

Work on the hydraulic system may only be carried out by technical staff with additional skills and experience with hydraulic systems.

2.6 Personal protective equipment

Personal protective equipment in accordance with employment protection laws must be provided and used when working on the unit.

Minimum requirements for protective equipment:

- Protective clothing
- Safety shoes
- Protective gloves
- Protective goggles
- Ear protection
- Face mask

2.7 Information about warning notices

To emphasise safety relevant procedures in these assembly instructions the following warning notices apply.

Warning notices consist of a signal word and a warning sign. If appropriate, prohibiting signs are used.

2.7.1 Warning symbols

Following is a list of warning symbols used. They warn about the risk of injury. To avoid injury or death comply with all measures which are marked with a warning symbol.



This warning symbol warns about the risk of injury.



This warning symbol warns about the risk of injury from electric shock.



This warning symbol warns about the risk of injury from hydraulic fluid and coolant.



This warning symbol warns about the risk of injury from compressed air.



This warning symbol warns about the risk of injury from magnets and magnetic fields.



This warning symbol warns about the risk of injury from suspended loads.



This warning symbol warns about the risk of injury from crushing or becoming trapped.

2.7.2 Warning levels



Warns about dangers which will lead to irreversible injuries or death. Failure to observe the warning notice will result in irreversible injuries or death!



Warns about dangers which can lead to serious injuries or death. Failure to observe the warning notice can result in serious injuries or death.



Warns about dangers which can lead to injuries. Failure to observe the warning notice can result in injuries.

2.7.3 Damage to property

NOTICE

Warns about possible damage to property. Failure to observe the notices can result in damage to property.

2.7.4 Other symbols used



Prohibiting signs denote a prohibited action, e.g. Entry prohibited.



This symbol denotes an action to be carried out, numbered if necessary.



This symbol denotes a list.



This symbol denotes possible environmental damage.

2.8 Safety instructions

→ Observe the following safety instructions in order to avoid danger to persons or the environment.

2.8.1 Danger due to electrical voltage



Acute danger of injury or to life from electric shock!

Electric shock can result in the following: Death, cardiac arrest, respiratory arrest, neural damage, burns and consequential injury such as broken bones.

- Work may only be carried out by a qualified electrician.
- When working on the electrical system ensure that a second technical person is present who can switch off the power supply in an emergency.

Before working on the unit:

- (1) Disconnect the plant from mains.
- (2) Ensure that power cannot be switched on again.
- (3) Check that no electrical current is flowing.
- (4) Earth and short-circuit.
- (5) Shield, cover or otherwise isolate adjacent parts or components which are electrically live.

In addition:

- For transport, installation and operation: Ensure that there is no strain on cables.
 - On assembly: First connect the protective earth conductor, then the power connection.
 - Ensure that the protective earth conductor is connected.
 - Ensure that the motor housing is earthed.
 - Ensure correct fit of plug connections.
 - Only run the unit when the terminal box and switch cabinet are shut.
 - On disassembly: First remove the power connection, then the protective earth conductor.
-

2.8.2 Danger due to electromagnetic fields



There is danger of injury or death due to electromagnetic fields in the vicinity of permanent magnets!

An acute danger to the life of persons with pacemakers exists in the immediate vicinity of permanent magnets! Pacemakers are influenced by electromagnetic fields!

In the immediate vicinity of permanent magnets there is an acute danger of injury to persons with metal implants or metal parts in their bodies. Magnetic objects align themselves and are attracted by magnetic fields!

Attracted magnetic objects present a danger of crushing to all body parts.

- Handling of permanent magnets is forbidden for persons with pacemakers, metal implants or metal parts in the body.
- Ensure that the danger zone and approach zone around permanent magnets are equipped with warning signs and that the area is clearly marked.
- Ensure that personnel who have access to the danger zone are informed of the dangers.

2.8.3 Danger due to cooling agent



Danger to health and the environment due to cooling agent!

Cooling agent can become up to 80 °C hot and be under high pressure.

Contact with cooling agent can cause allergic reactions, skin, eye and respiratory irritation, injuries and scalding.

Cooling agent can cause environmental damage.

- Before working on the cooling system, ensure that the power supply is switched off, and that the unit is free of electrical current.
 - Before working on the cooling system, ensure that the systems are free of pressure.
 - Avoid lengthy skin contact with cooling agent. Wear protective clothing, protective gloves and protective goggles.
 - Use appropriate collection devices for leaking cooling agent.
 - Dispose of cooling agent in an environmentally compatible manner according to local regulations.
-

2.8.4 Danger to the environment from operating fluids

**Danger to the environment from operating fluids!**

Operating fluids such as lubricating grease, hydraulic fluid, cooling agent, cleaning fluid etc. must not be allowed to enter the ground, the water supply or the sewer system. The smallest amount of these fluids can cause damage to health or the environment.

- Use suitable containers for collection, storage, transport and disposal so that no danger for persons or the environment can arise.
 - Dispose of operating fluid in an environmentally compatible manner according to local regulations.
-

3 Product information

Product identification

The unit can be identified by its type plate. The type plate is securely attached and may not be removed. In addition, the article number and/or serial number are engraved on the unit.

Product designation

Product name	Torque motor
Model	See data sheet
Article number	See data sheet
Weight	See delivery note

4 Transport and storage

4.1 Transport

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

→ Read the safety information. See chapter "For your safety".

The gross weight can be found in the chapter "Product information".


DANGER!

Danger of injury or death due to electromagnetic fields in the vicinity of permanent magnets!

Danger of injury or death for persons with pacemakers, metal implants or metal parts in the body.

Attracted magnetic objects present a danger of crushing to all body parts.

→ Handling of permanent magnets is forbidden for persons with pacemakers, metal implants or metal parts in the body.

→ Ensure, that the danger zone and approach zone around permanent magnets is sufficiently equipped with warning signs and that the area is clearly marked.

→ Ensure that personnel who have access to the danger zone are sufficiently informed of the dangers.




WARNING!

Danger due to suspended loads!

Falling suspended loads can lead to serious injuries or death.

→ Do not walk under suspended loads.

→ Only use lifting gear with sufficient load bearing capacity. Observe the gross weight.

→ Secure transport units in position.

→ When setting the load down, ensure that no persons can be trapped.

→ Use personal protective equipment.



4.1.1 Protection during transport

During transport protect the unit from the following:

- moisture
- impact
- contamination
- being dropped

4.1.2 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.

4.1.3 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.

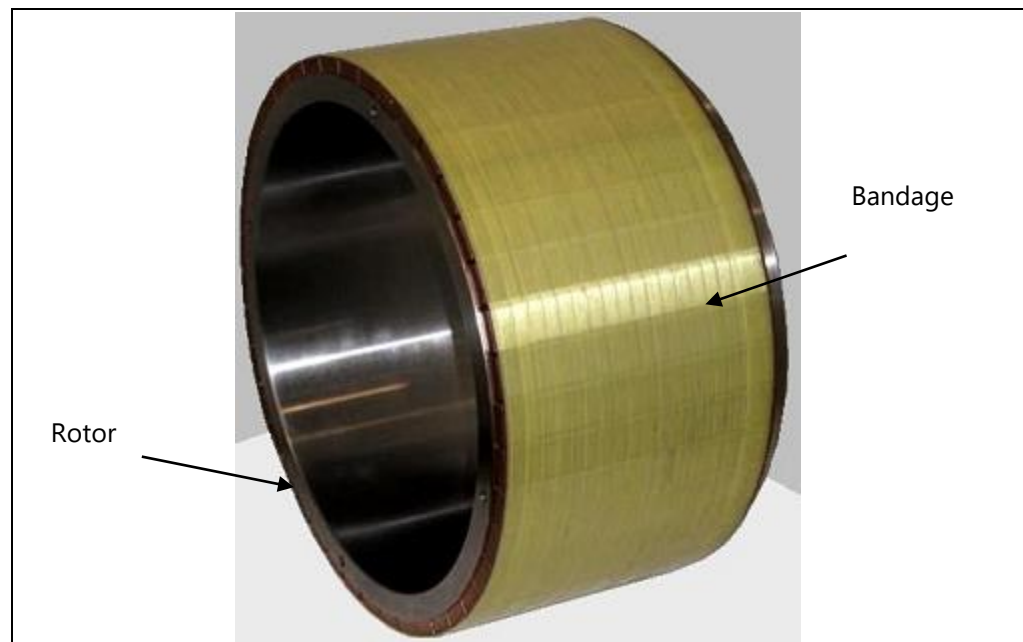
→ Inspect the unit for external signs of damage. Any damage is to be reported to the forwarder immediately.

→ Retain the packaging for return transport for repairs.

NOTICE**Damage to the rotor bandage (fibre composite material) during unpacking possible.**

→ When unpacking, ensure that the rotor bandage (fibre composite material) does not become damaged.

→ Do not open the transport packaging with a knife or other sharp or pointed object.



4.1.4 Transport with lifting eye bolts

The motor is provided with threads for lifting eye bolts.

→ Only use the lifting eye bolts supplied to transport the unit.

If lifting eye bolts are not included in the scope of delivery we recommend the use of Star Point VRS lifting eye bolts.

→ Observe the manufacturer's instructions for use when using rotatable lifting eye bolts.

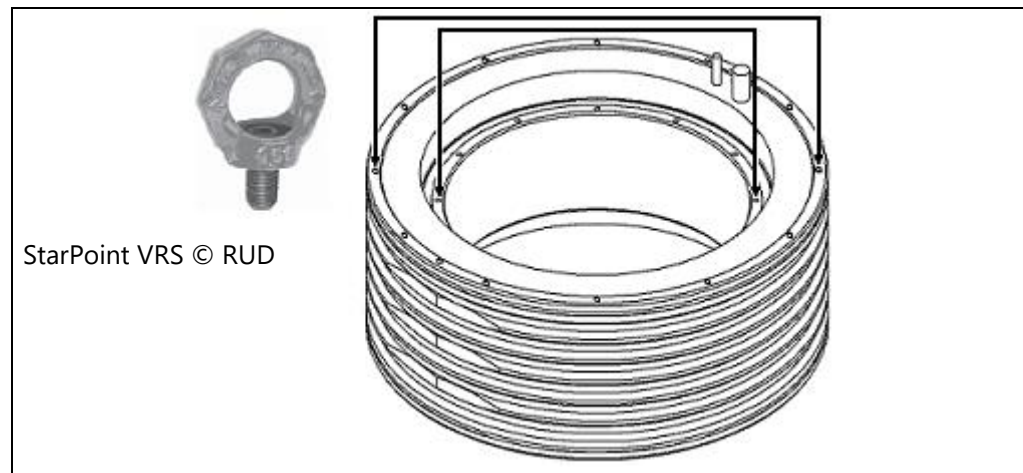

CAUTION!



Risk of injury from falling parts!

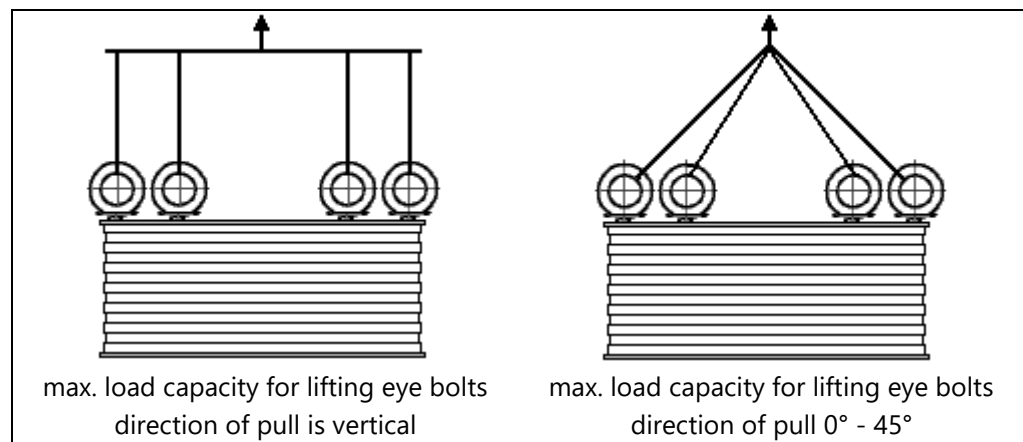
The rotor is not attached to the stator.

→ When transporting at least two lifting eye bolts must be attached to both the rotor and the stator. Otherwise, when being lifted, the rotor and stator can separate and fall.



Load capacity and direction of pull

→ Observe the correct load capacity and direction of pull.



4.2 Storage

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

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

→ Observe the following instructions for storage time, environmental conditions, corrosion and damage protection.

4.2.1 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.

4.2.2 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 45 °C during storage.
- The storage area must maintain as constant a temperature as possible, between 4 °C and 45 °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.

4.2.3 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.

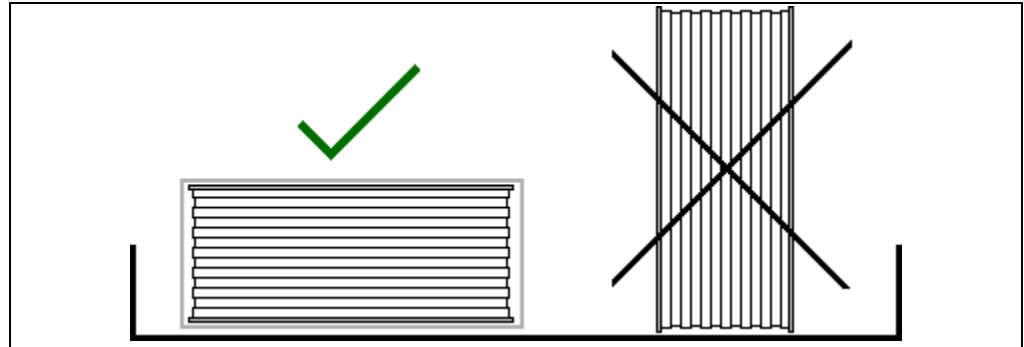
Warranty for incorrect corrosion protection measures

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


4.2.4 Protection from damage

The motor must be protected from vibration and oscillations.

- Store the motor on a base which isolates against vibration.
- Store motor and motor parts horizontally in the original packaging.



4.2.5 Storage of components with permanent magnets

 DANGER!	<p>Danger of injury or death due to electromagnetic fields in the vicinity of permanent magnets!</p> <p>Danger of injury or death for persons with pacemakers, metal implants or metal parts in the body.</p> <p>Attracted magnetic objects present a danger of crushing to all body parts.</p> <ul style="list-style-type: none"> → Handling of permanent magnets is forbidden for persons with pacemakers, metal implants or metal parts in the body. → Ensure, that the danger zone and approach zone around permanent magnets is sufficiently equipped with warning signs and that the area is clearly marked. → Ensure that personnel who have access to the danger zone are sufficiently informed of the dangers.
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NOTICE	<p>Damage or destruction of electronic equipment and items due to strong electromagnetic fields possible.</p> <ul style="list-style-type: none"> → Keep electronic equipment and items out of the danger zone.
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Storage area

- Store other magnetic parts separately and in non-magnetic protective packaging.
- Ensure that the storage area is designed specifically for permanent magnets.

Marking

- Ensure that the packaging of the components is clearly marked. See example.
- Ensure that the storage area for permanent magnets is sufficiently equipped with warning signs and that the area is clearly marked.

Marking: Entry forbidden!	
Marking: Warning sign: Magnets! Prohibiting sign: Metal implants! Prohibiting sign: Pacemaker!	

5 Assembly

5.1 Important notice

The assembly section contains important information on the connections and the specifications for the required media.

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

5.1.1 Environmental conditions

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

→ Observe the following conditions for the environment:

- The ambient temperature must not exceed 45 °C.
- The environment must maintain as constant a temperature as possible, between 4 °C and 45 °C.
- The environment must be as dry and free of dust and dirt as possible.
- The ambient temperature must not drop below the dewpoint.
- The unit must be protected from vibration and oscillations.

5.1.2 Specific dangers

Please note that during assembly different dangers can arise.

→ Before you begin with assembly, read the safety instructions. See chapter "For your safety".


DANGER!



Danger of injury or death due to electromagnetic fields in the vicinity of permanent magnets!

Danger of injury or death for persons with pacemakers, metal implants or metal parts in the body.

Attracted magnetic objects present a danger of crushing to all body parts.

→ Handling of permanent magnets is forbidden for persons with pacemakers, metal implants or metal parts in the body.

→ Ensure, that the danger zone and approach zone around permanent magnets is sufficiently equipped with warning signs and that the area is clearly marked.

→ Ensure that personnel who have access to the danger zone are sufficiently informed of the dangers.

5.2 Motor design

The motor is a synchronous motor. The motor consists of two main assemblies:

- the stator assembly
- the rotor assembly

The measurements and tolerances can be found in the dimension sheet and/or data sheet.

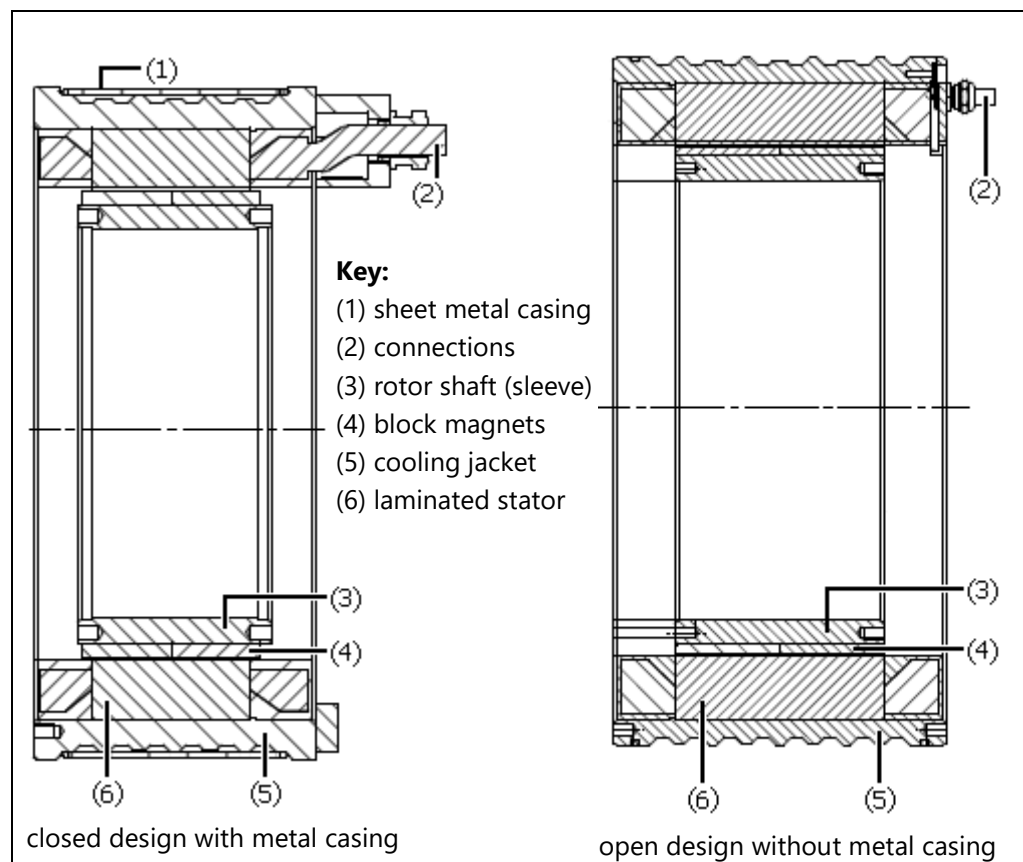
5.2.1 Stator

The stator assembly consists of the laminated stator with winding and the shrink-fit cooling jacket which surrounds the laminated stator.

The stator is liquid cooled. Optimum cooling is ensured by fitting a cascade housing which conducts the coolant along the cooling jacket in a meandering pattern. The connections are marked.

5.2.2 Rotor

The rotor assembly consists of the block magnets and the rotor shaft. The rotor is supplied pre-balanced with a machine-finished outer diameter.



5.2.3 Rotor shaft

The rotor shaft is manufactured in accordance with the specified measurements and tolerances of the relevant dimension sheet.

- Ensure that all edges of the rotor shaft are absolutely burr-free.

5.2.4 Housing

The housing for the motor must be adapted to match the shape and dimensions of the stator cooling jacket (see dimension sheet).

Housing sealing

For reliable sealing:

- Adjust the motor fitting diameter for your housing in accordance with the dimension sheet.
- A surface irregularity with a maximum of Rz 8 is permitted for the sealing surfaces.
- Avoid spiralled grooves.
- Measures for protecting against corrosion are necessary. Select protective measures appropriate for the housing material and type of coolant used. This applies especially to cast metal housings.
- Ensure that sufficiently dimensioned connections to the housing are used for the coolant inlet and outlet. The flow volume for coolant can be found in the technical data sheet.

For motors with sheet metal casing:

- Protect the sheet metal from mechanical load.
- Ensure that the sheet metal casing is not damaged.
- To ensure flow, use connections with a sufficient cross-section.

Mounting the stator

The stator can be mounted in the housing from either side. Fixing bore holes are provided on both sides.

- Observe the different linear expansion coefficients of the stator cooling jacket material and housing material.

Rotor/stator sealing and bearings

The motor is not factory-equipped with sealing and bearings.

- Ensure sufficient sealing so that no liquid or particles can enter the gap between the rotor and stator;
- Ensure that bearings are sufficiently dimensioned.

The rotor must be aligned with the stator housing with a concentricity of $\leq \pm 0.05$ mm so that radial forces do not become too great.

5.3 Installation

The unit was designed and built to the specifications of the customer. The fitting surfaces must comply with the specified measurements and tolerances.

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

→ Before you begin with installation, read the safety instructions. See chapter "For your safety".

5.3.1 Preparing for installation

The fitting surface must be completely free of contamination.

→ Before fitting, ensure that the fitting surface is free of swarf, dirt particles, oil, liquid, etc.

→ Clean the fitting surface of the unit and remove any preserving agents.



DANGER!



Danger of crushing during assembly/installation!

Due to the permanent magnets danger of crushing can occur when the rotor and stator and/or housing suddenly impact together.

→ During assembly/installation it is absolutely necessary to pay attention to ensure that fingers, hands and areas of skin are not trapped between the rotor and stator/housing.

→ Use personal protective equipment.



WARNING!



Danger of crushing or becoming trapped during installation!

→ Only use lifting gear with sufficient load bearing capacity. Observe the gross weight.

→ Use personal protective equipment.

→ When setting the load down and fitting, ensure that no body parts or persons can become trapped.

→ Do not remove transport securing devices before the unit is securely fitted.

NOTICE

During fitting, damage to the outer diameter of the rotor is possible

The strong electromagnetic fields pull the rotor shaft against the stator package housing. This can cause damage to the outer diameter of the rotor.

Damage to the outer diameter of the rotor can cause the rotor shaft to get jammed in the housing. This can later cause difficulty when disassembling.

→ Handle the rotor carefully.

→ Observe the following instructions for fitting.

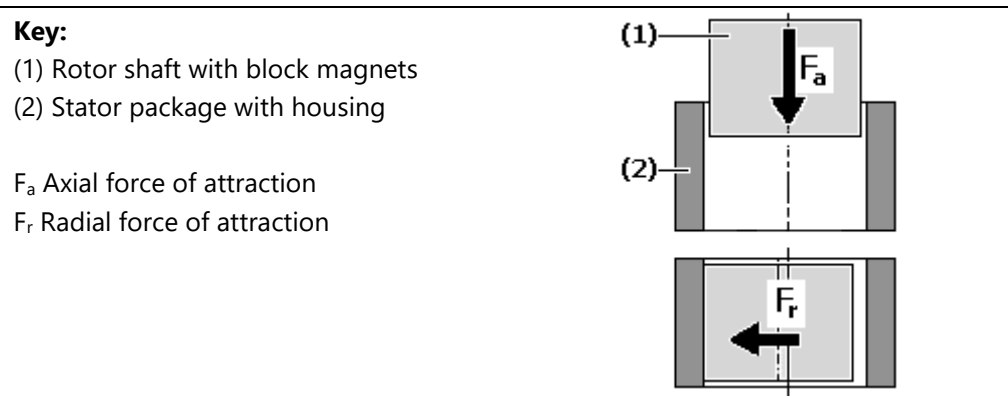
Installation example

Following is an installation example. If you have any questions, please contact our service department.

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

Installation steps

- (1) Wrap a 1 mm thick aluminium sheet around the rotor shaft. Ensure that the rotor bandage is not damaged.
- (2) Use a centering device to align the rotor shaft above the stator package.
- (3) Guide the rotor shaft carefully into the stator package.
- (4) Use the threads along the shaft to affix the rotor shaft.
- (5) Remove the aluminium sheet.



5.4 Electrical system

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

- Before you begin work on the electrical system, read the safety instructions. See chapter "For your safety".
- Ensure that a second qualified person is available to disconnect the power supply in the event of an emergency.


DANGER!

Acute danger of injury or to life from electric shock!

Failure to observe the warning notices and safety instructions can result in electric shock.

Before you begin work on the unit:

- (1) Disconnect the plant from mains.
 - (2) Ensure that power cannot be switched on again.
 - (3) Check that no electrical current is flowing.
 - (4) Earth and short-circuit.
 - (5) Shield, cover or otherwise isolate adjacent parts or components which are electrically live.
-

5.4.1 Electrical interface

The electrical interface is either with cable or connector. The relevant specifications for the electrical connection can be found in the dimension sheet and/or circuit diagram.

For connection with cable

The electrical interface consists of one or more wires which lead out of the motor/unit. The wire allocation can be found in the dimension sheet and/or circuit diagram.

Starpoint (if applicable)

The neutral point is only for diagnostic and measuring purposes.

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

Contact points

- Protect the contact points against corrosion.
- Protect the contact points and emersion points from mechanical load by use of appropriate means such as mains lead cleats or a terminal box.

Connection lines

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

For connection with plug

The electrical interface consists of one or more plugs. The connector 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 lead to short-circuit and result in damage to the unit, the machine and the surrounding area.
- Do not disconnect connectors under voltage/load.

5.5 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.

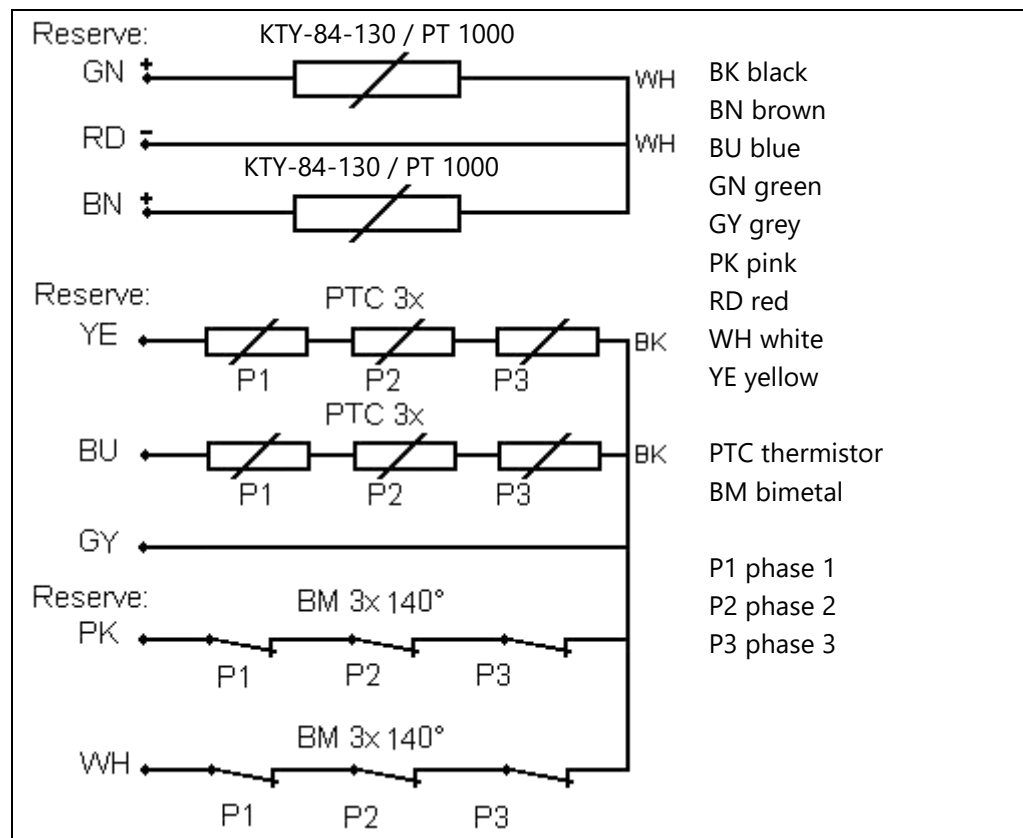
NOTICE

Motor damage possible

Motor damage from thermal overload is possible.

→ Connection of the bimetal or PTC thermistor sensors is compulsory.

5.5.1 Circuit diagram thermal motor protection



A reserve set is provided for each temperature sensor.

The sensor connections are provided by an 8-pin cable.

5.5.2 Electrostatic discharge

NOTICE
Damage to electronic components from electrostatic discharge possible

Electrostatic discharge can cause damage to electronic components.

→ Measures to protect from electrostatic charge are necessary. Observe the following instructions:

→ Ensure that electronic components do not come into contact with electrically insulating materials such as plastic parts or foil, or synthetic clothing.

→ Before touching electronic components, the body of the person must be electrostatically discharged and earthed.

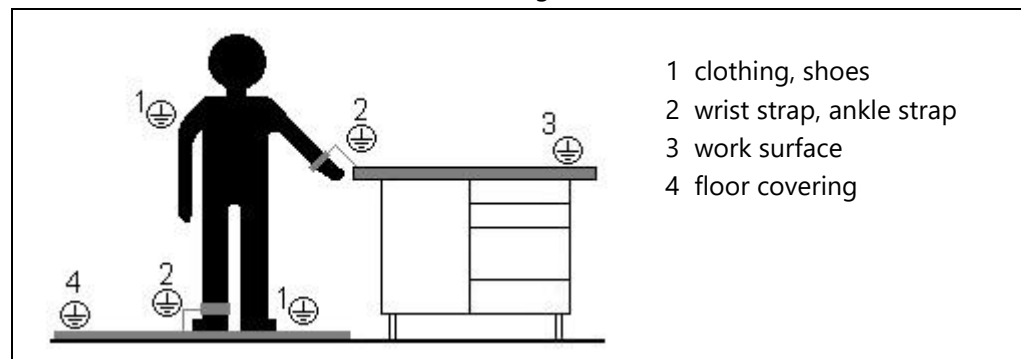
→ Only touch electronic components if absolutely necessary.

→ Place electronic components on conductive bases.

Protective measures against electrostatic charge

→ For this use:

- antistatic shoes and clothing (1)
- wrist and/or ankle straps for earthing (2)
- antistatic work surfaces (3)
- conductive and antistatic floor coverings (4)



5.5.3 Protective measures for the temperature sensor

NOTICE
Damage to temperature sensor possible

- The wires for the KTY 84-130 / PT 1000-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.

5.5.4 Protective measures KTY 84-130 / PT 1000-sensor

NOTICE
Damage to KTY 84-130 / PT 1000-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.

5.5.5 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.

5.5.6 PT1000 sensor

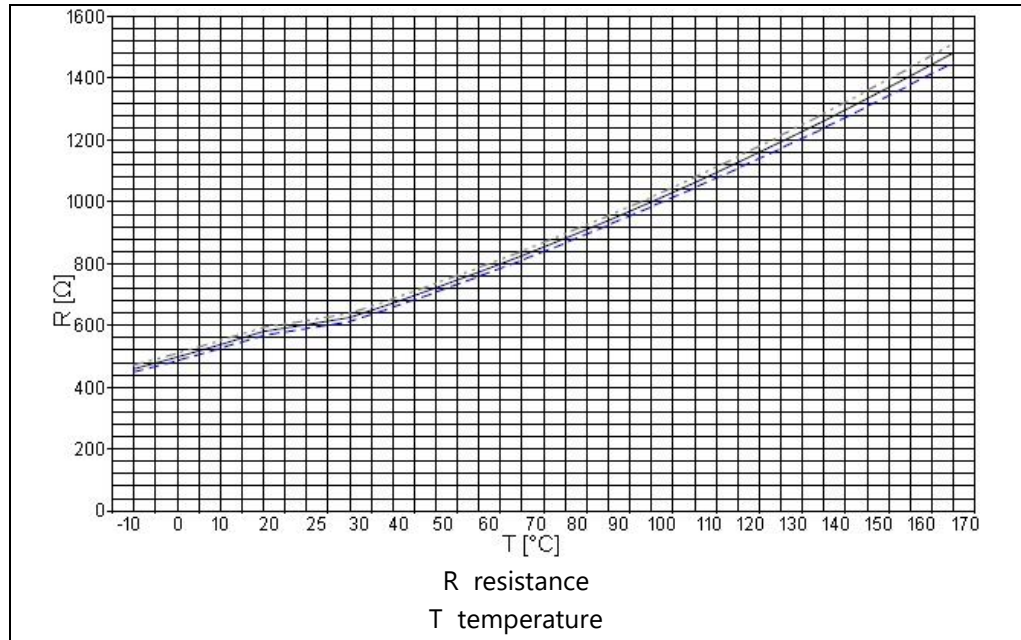
To monitoring the coil temperature of the motor, the unit is equipped with a platinum temperature sensor. When the temperature rises, the electrical resistance increases. The characteristic curve is almost linear within the measuring range.

Technical specifications

Warning temperature	see data sheet
Shut-down temperature	see data sheet
Nominal resistance	1000 Ω at 0 °C to DIN EN 60751:2009
Tolerance	Class B \pm 0.3 °C at 0°C
Disruptive strength	3.8 kV AC, 50 Hz / 1 min.
Measuring current	0.1 - 0.3 mA

5.5.7 KTY 84-130/PT 1000 sensor

The KTY 84-130/PT 1000 sensor measures the motor coil temperature. The sensor is a temperature-sensitive component. When the temperature rises, the electrical resistance increases. The characteristic curve is almost linear within the measuring range.



Three curves are shown:

maximum (max.)	— · — · —
typical (typ.)	—
minimum (min.)	- - -

The spread in numbers:

Temperature [°C]	max. resistance [Ω]	typ. resistance [Ω]	min. resistance [Ω]
20	592	581	570

5.5.8 Bimetal temperature sensor

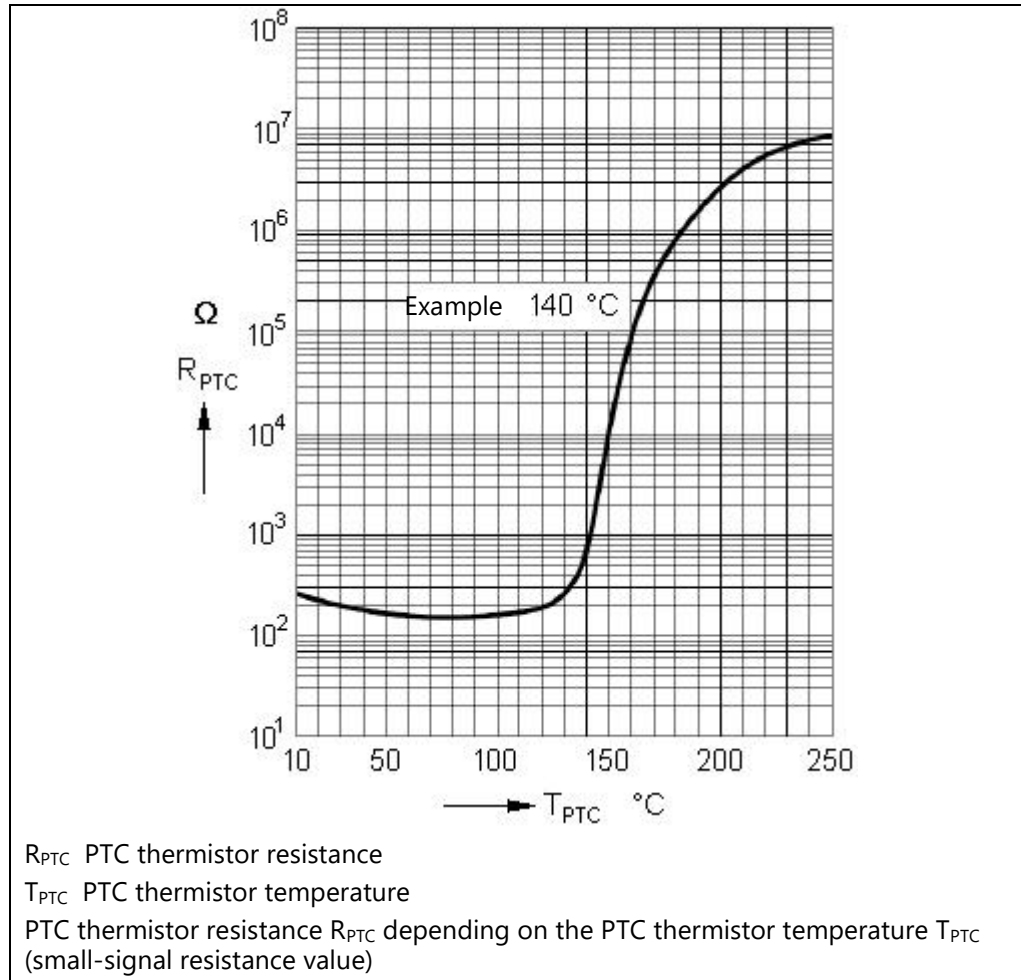
Bimetal temperature sensors are purely switching elements. The contact is interrupted in the area of the nominal response temperature (see data sheet). This is an NC contact (NC = normally closed):

- 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.

5.5.9 PTC thermistor temperature sensor

The PTC thermistor temperature sensors are elements which have an erratically changing characteristic curve.

The resistance rises steeply in the area of the nominal response temperature (see data sheet).



5.5.10 Connection example

Thermal motor protection

Thermal motor protection can be effected either by means of the triple bimetal sensors (grey-pink) or the triple PTC sensors (grey-blue).

Measuring the coil temperature

In addition, the coil temperature can also be measured by the KTY 84-130/ PT 1000 sensor.

5.6 Hydraulic system

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

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

The unit is provided with different media connections. The technical specifications for the connections can be found in the technical data sheet.



WARNING!



Danger due to hydraulic fluid!

Hydraulic fluid can become up to 80 °C hot and be under high pressure and lead to serious injury and death.

Hydraulic fluid can cause damage to health and the environment.

- Ensure that the power supply is switched off, and that the unit is free of voltage.
- Ensure that the hydraulic system is free of pressure: Reduce pressure by slowly turning out the vent screw (approx. 1/2 revolution).
- Use personal protective equipment.
- Use collection devices for leaking hydraulic fluid.
- Dispose of hydraulic fluid in an environmentally compatible manner according to local regulations.

5.6.1 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.
 - Only remove sealing caps 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.

5.6.2 Avoid wear of hydraulic components

Limit pressure peaks

In principle, pressure peaks must not exceed 10 % of the maximum pressure.

Example: 80bar nominal pressure, 120bar maximum pressure (take value from data sheet).

→ Maximum permissible pressure peak during operation with nominal pressure is 92bar (80bar +10% of 120bar).

This limitation prevents too great an abrupt pressure difference, which would have a damaging effect on the installed components.

Excessive pressure or impermissible pressure peaks will impair the service life and destroy 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 or other suitable measures in the lines to absorb pressure peaks.

Maximum pressure change/unit of time

Exceeding the maximum pressure change per time unit leads to significant impairment of the service life and destruction of the component seals.

→ Ensure that the maximum pressure change per time unit is not exceeded.

Maximum pressure change/unit of time	$\leq 1 \text{ bar / ms}$
--------------------------------------	---------------------------

Explosive decompression (RGD)

The installed seals and components are not designed for explosive decompression. A rapid pressure drop of a gaseous medium (e.g. poorly vented or non-vented hydraulic components) must therefore be avoided at all costs. In addition, the installed seals and components are not suitable for the use of hydraulic oils with traces of sour gas (H₂S).

5.7 Cooling system

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

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

The unit is liquid cooled. The technical specifications for the connections can be found in the technical data sheet.


WARNING!



Danger due to cooling agent!

Cooling agent can become up to 80 °C hot and be under high pressure and lead to serious injury and death.

Cooling agent can cause damage to health and the environment.

- Ensure that the power supply is switched off, and that the unit is free of voltage.
- Ensure that the cooling system is free of pressure: Reduce pressure by slowly turning out the vent screw (approx. 1/2 revolution).
- Use personal protective equipment.
- Use collection devices for leaking cooling agent.
- Dispose of cooling agent in an environmentally compatible manner according to local regulations.

NOTICE

Overheating and unit failure possible

Interchanging the connections can lead to overheating and failure of the unit.

- When connecting the cooling water ensure that the connection for cooling agent inlet and cooling agent outlet are not interchanged.

5.7.1 Required line diameter

The outer diameter of the lines must comply with the specifications in the dimension sheet. In order to ensure sufficient volume flow, the minimum diameter of the lines must comply with the specifications in the following table. Differing line diameters are specified in the appropriate sections.

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

5.7.2 Connection data

Cooling IN	H1
Cooling OUT	H2

5.7.3 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 $\mu\text{S}/\text{cm}$
Total hardness	5 – 30 $^{\circ}\text{dH}$ 0.89 – 5.35 mmol/l

Setting parameters

Volume	see data sheet
Max. temperature at inlet	see data sheet
Pressure p_{max}	see data sheet

5.7.4 Protective measures

Check temperature sensor

→ Before commissioning, ensure that the motor temperature sensors are functioning correctly.

Ensure flow

→ Ensure that sufficient flow is available in accordance with specifications. See setting parameters.

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 seals and motor.

→ Use a solids filter for this.

Filter grade	≤ 100 µm
--------------	----------

Avoid damage from corrosion

→ Do not use components containing copper or non-ferrous metal in connection with glycol in the cooling circuit.

→ Do not use galvanised components.

→ When installing a closed cooling circuit, add an anti-corrosion agent with a mixture ratio according to the manufacturer's specifications.

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 the seals

5.7.5 Using system cleaner

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.

5.7.6 Cooling system settings

Optimum operating conditions

Optimum operating conditions occur at the following temperatures:

Optimum room temperature:	18 – 30 °C
Optimum coolant temperature on entry to the motor:	20 - 25 °C

→ Set the cooling unit so that the coolant temperature on entry to the motor lies in the optimum range between 20 °C and 25 °C.

Lowest coolant temperature on entry to the motor:	18 °C
Maximum coolant temperature on entry to the motor:	see data sheet

→ The unit must not be run when the coolant temperature on spindle entry is < 18 °C or > 35 °C.

Formation of condensation

A too greater temperature difference between room temperature and coolant temperature can lead to formation of condensation. Condensation can lead to damage of the unit.

→ Observe the specifications on the relationship between room temperature and coolant temperature. See the following table.

Measured room temperature	Coolant temperature on entry to the motor	Operation	Max. possible speed after start-up cycle
< 10 °C	< 18 °C	not permitted	–
10 - < 18 °C	18 - < 25 °C	** Carry out start-up cycle	–
10 - < 18 °C	25 - 35 °C	permitted	100 %
18 - 30 °C	18 - < 20 °C	permitted	100 %
* 18 - 30 °C	* 20 - 25 °C	permitted	100 %
18 - 30 °C	25 - 30 °C	permitted	100 %
30 - 33 °C	25 - 35 °C	permitted	100 %
33 - 40 °C	29 - 35 °C	permitted	50 %
>40 °C	>35 °C	not permitted	–

* Optimum operating conditions

** Carry out start-up cycle: See section "Start-up cycles" in chapter "Commissioning".

5.7.7 Anti-corrosion agent

→ If the unit is installed in a system, adhere to the specifications for the coolant in the assembly instructions of the system.

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.

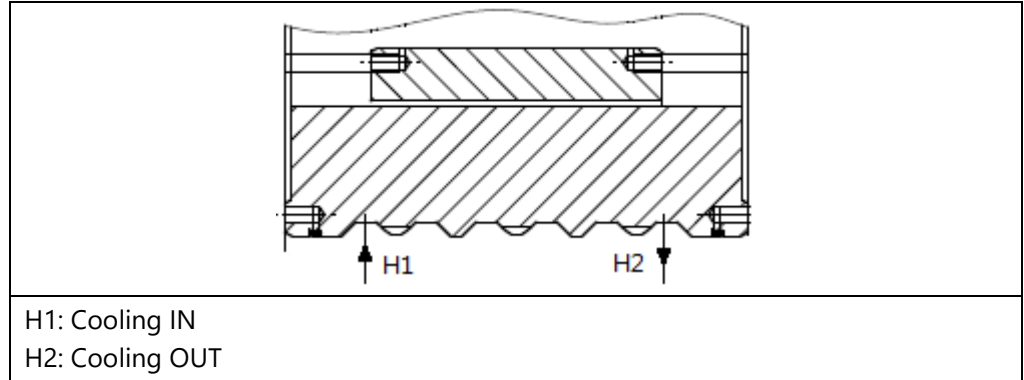
Manufacturers of chemical additives for water

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

5.7.8 Cooling diagram



6 Commissioning

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

- Before you begin commissioning, read the safety instructions. See chapter "For your safety".
- Before commencing commissioning, ensure that all assembly and connection work is completed.



DANGER!



Danger of injury or death due to electromagnetic fields in the vicinity of permanent magnets!

Danger of injury or death for persons with pacemakers, metal implants or metal parts in the body.

Attracted magnetic objects present a danger of crushing to all body parts.

- Handling of permanent magnets is forbidden for persons with pacemakers, metal implants or metal parts in the body.
- Ensure, that the danger zone and approach zone around permanent magnets is sufficiently equipped with warning signs and that the area is clearly marked.
- Ensure that personnel who have access to the danger zone are sufficiently informed of the dangers.

NOTICE

Damage or destruction of electronic equipment and items due to strong electromagnetic fields possible.

- Keep electronic equipment and items out of the danger zone.

6.1 Preparation

6.1.1 Check connections and peripheral devices

As far as possible, check all connections and peripheral devices.

Media connections

- Ensure that the media connections are correctly carried out and ready for operation.
- Ensure that the specified pressures and flow rates are guaranteed. See data sheet.

Water cooling

- Ensure that the cooling circuit is bled.

Electrical connections


DANGER!**Acute danger of injury or to life from electric shock!**

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



- Ensure that the electrical connections are correctly carried out.
- Ensure that the controller is working correctly with regard to the sensory system.

6.1.2 Limiting maximum current

Severe, uncontrolled movements can lead to destruction of machine parts or the complete unit.

- During initial commissioning ensure that the maximum current is limited to 10 %.

For example: Limiting maximum current by using a Siemens controller.

- Set the parameter 1105 = 10 %.

7 During operation

7.1 Monitoring of media supply

Recommendation for ensuring media supply

To ensure service life and safe function and to reduce failure of the unit the specified values for media supply must be observed..

We recommend monitoring and, if necessary, control of the media supply.

→ For this, use a conventional pressure control system.

7.2 Coolant flow

NOTICE

Overheating and motor failure possible

A decreased cooling agent flow rate can result in overheating of the motor. The motor will then be switched off by the control system. This can result in uncontrolled movements. Damage to the motor cannot be ruled out.

→ Ensure that sufficient coolant flow is available in accordance with the specifications for flow volume and pressure.

Recommendation for ensuring cooling agent flow rate

The coolant flow must be monitored by a coolant unit with pressure sensors.

→ Set the control system so that when values are lower than specified this is reported.

7.3 Temperature sensor at coil end

To protect the windings the temperature at the coil end must be monitored permanently during operation.

→ Ensure that a temperature sensor is connected to the control system and is functional.

7.4 Operation of the motor

NOTICE

Damage to the motor due to excessive voltage loads is possible

→ Observe the following instructions:

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.

PWM: pulse-width modulation

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. 10 kV / 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.

7.4.1 Torques

Torque at S1

The S1 torque corresponds to the maximum permissible motor speed in continuous operation with a uniform load for all phases. The S1 torque defines the motor's thermal limit value.

→ 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).

Torque at standstill

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.

Max. torque for synchronous motors

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.

7.5 Oscillation speeds of the motor

The maximum permitted oscillation speed of the unit must not be exceeded during operation. If the maximum permitted oscillation speed is exceeded, this can result in damage to the motor.

7.5.1 Permitted oscillation speed while running idle

The oscillation speed must be checked for the complete speed range of the motor.

The maximum permitted oscillation speed should not exceed double the limit value noted on the test report. The maximum permitted speed is 2.5 times the noted limit value (see test report provided).

7.5.2 Increased vibrations

Possible reasons for increased vibrations:

- Coupling deformed or not balanced
- Interface deformed
- Bearing damage (if bearings available)

8 Maintenance

Due to the high requirements for functionality of the unit, maintenance work must be carried out only by technical staff or 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".



CAUTION!



Risk of burns from hot surfaces!

The surface of the unit gets hot during operation.

→ Only work on the unit when it has cooled down and is switched off.

→ Wear protective gloves when working.

NOTICE

Damage to the unit possible

Incorrect maintenance can result in damage.

→ Observe the information on maintenance in order to avoid damage.

Preventative maintenance

Regular preventative maintenance minimizes unit failure and plant downtime. Regular maintenance ensures full service life and fault-free operation of the unit.

In the next section you will find maintenance plans with recommendations for intervals and tasks to be carried out.

The manner in which the maintenance work is to be carried out is largely dependent on the plant. For further information please contact the plant manufacturer or operator.

As far as maintenance work is permitted and can be carried out on the unit, this is described.

8.1 Electrical system

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

- Before you begin work on the electrical system, read the safety instructions. See chapter "For your safety".
- Ensure that a second qualified person is available to disconnect the power supply in the event of an emergency.



DANGER!



Acute danger of injury or to life from electric shock!

Failure to observe the warning notices and safety instructions can result in electric shock.

Before you begin work on the unit:

- (1) Disconnect the plant from mains.
- (2) Ensure that power cannot be switched on again.
- (3) Check that no electrical current is flowing.
- (4) Earth and short-circuit.
- (5) Shield, cover or otherwise isolate adjacent parts or components which are electrically live.

Maintenance plan

Task	Interval						Otherwise
	15 h/ daily	75 h/ weekly	300 h/ monthly	900 h/ quarterly	1800 h/ semi-annually	3600 h/ annually	
Electrical system							
Check connectors and lines			X				
Replace connectors and lines							Immediately when defective

Monthly

Check connectors and lines

- Check connectors and lines for damage.
Possible damage: chafe marks, cuts, tears, crushing, folding, etc.
- Check that cable connections are secure.

Immediately when defective

Replace connectors and lines

- Have damaged connectors and lines replaced immediately.

8.2 Cooling system

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

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

The unit is liquid cooled. The technical specifications for the connections can be found in the technical data sheet.



WARNING!



Danger due to cooling agent!

Cooling agent can become up to 80 °C hot and be under high pressure and lead to serious injury and death.

Cooling agent can cause damage to health and the environment.

- Ensure that the power supply is switched off, and that the unit is free of voltage.
- Ensure that the cooling system is free of pressure: Reduce pressure by slowly turning out the vent screw (approx. 1/2 revolution).
- Use personal protective equipment.
- Use collection devices for leaking cooling agent.
- Dispose of cooling agent in an environmentally compatible manner according to local regulations.

Maintenance plan

Task	Interval						Otherwise
	15 h/ daily	75 h/ weekly	300 h/ monthly	900 h/ quarterly	1800 h/ semi-annually	3600 h/ annually	
Cooling system							
Check pressure		X					
Check the cooling agent level		X					
Check flow			X				
Check pH-value of cooling agent			X				
Check connections and hose lines			X				
Clean filter				X			
Replace filter						X	
Replace cooling agent						X	
Replace hose lines							Immediately when defective, otherwise after 2 years

Weekly**Check pressure**

→ Check that the cooling unit is supplying sufficient operating pressure. Observe pressure specifications. See data sheet.

Check the cooling agent level

→ Observe the plant manufacturer's or operator's instructions.

Monthly**Check flow**

→ Observe the plant manufacturer's or operator's instructions.

Check pH value of cooling agent

→ Observe the requirements for cooling. See chapter "Assembly".

Check connections and hose lines

→ Check hoses for damage:

Possible damage: chafe marks, cuts, tears, brittleness, deformation, separation of layers, blistering, crushing, folding, etc.

→ Check hose connections for damage:

Possible damage: Deformation of hose joints or connections, impairment of sealing function, corrosion of hose joints or connections.

→ Check that hose connections are secure:

The hose must not become loose from the hose joint or connection.

→ Check the sealing function of hose joints and connections:

Visually check for escaping fluids.

Quarterly**Clean filter**

→ Observe the plant manufacturer's or operator's instructions.

Annually**Replace filter**

→ Observe the plant manufacturer's or operator's instructions.

Replace cooling agent

→ Observe the plant manufacturer's or operator's instructions.

Immediately when defective, otherwise after 2 years**Replace hose lines**

Due to the fact that hoses for coolant are subject to aging processes, their shelf and usage life is limited.

- We recommend replacing hoses after a usage life of a maximum of two years.
- Have damaged hoses replaced immediately.

9 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".

9.1 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.

10 Decommissioning

Decommissioning may only be carried out by qualified technical staff.

→ Before you begin decommissioning, read the safety instructions. See chapter "For your safety".


DANGER!

Acute danger of injury or to life from electric shock!

Failure to observe the warning notices and safety instructions can result in electric shock.

Before you begin work on the unit:

- (1) Disconnect the plant from mains.
- (2) Ensure that power cannot be switched on again.
- (3) Check that no electrical current is flowing.
- (4) Earth and short-circuit.
- (5) Shield, cover or otherwise isolate adjacent parts or components which are electrically live.


WARNING!

Danger due to cooling agent!

Cooling agent can become up to 80 °C hot and be under high pressure and lead to serious injury and death.

Cooling agent can cause damage to health and the environment.

- Ensure that the power supply is switched off, and that the unit is free of voltage.
- Ensure that the cooling system is free of pressure: Reduce pressure by slowly turning out the vent screw (approx. 1/2 revolution).
- Use personal protective equipment.
- Use collection devices for leaking cooling agent.
- Dispose of cooling agent in an environmentally compatible manner according to local regulations.


CAUTION!

Risk of burns from hot surfaces!

The surface of the unit gets hot during operation.

- Only work on the unit when it has cooled down and is switched off.
- Wear protective gloves when working.

10.1 Sequence for decommissioning

Observe the sequence for decommissioning.

Decommissioning the unit

- (1) Stop the unit.
- (2) Wait until the voltage in the controller has dissipated (approx. 10 minutes).
- (3) Check that the unit is free of voltage.

Electrical system

Before the unit can be dismantled the electrical connections and the system must be put out of operation.

- (1) Switch off the power to the electrical system.
- (2) Ensure that power cannot be switched on again.
- (3) Check that no electrical current is flowing, then earth and short-circuit.
- (4) Disconnect the power supply from the site.
- (5) Disconnect the power supply from the unit.
- (6) Disconnect the connections for measuring sensors.

Cooling system

- (1) Switch off the cooling system.
- (2) Drain off the coolant until the system is pressure-free.
- (3) Collect the coolant dispose of it in an environmentally compatible manner according to local regulations.
- (4) Remove the cooling system connections and close all openings with appropriate seals to prevent contamination and loss of coolant.

Dismantle the unit

Now the unit can be dismantled.




10.2 Disassembly

Disassembly may only be carried out by qualified technical staff.

→ Before you begin disassembly, read the safety instructions. See chapter "For your safety".

Dismantling the motors

The motor contains permanent magnets. During disassembly, observe the following safety instructions.

 DANGER!	<p>Danger of injury or death due to electromagnetic fields in the vicinity of permanent magnets!</p> <p>Danger of injury or death for persons with pacemakers, metal implants or metal parts in the body.</p> <p>Attracted magnetic objects present a danger of crushing to all body parts.</p> <p>→ Handling of permanent magnets is forbidden for persons with pacemakers, metal implants or metal parts in the body.</p> <p>→ Ensure, that the danger zone and approach zone around permanent magnets is sufficiently equipped with warning signs and that the area is clearly marked.</p> <p>→ Ensure that personnel who have access to the danger zone are sufficiently informed of the dangers.</p>
 WARNING!	<p>Danger of crushing or becoming trapped during disassembly!</p> <p>→ Before you begin with disassembly, fit suitable transport securing devices. e.g. lifting eye bolts, transport bands.</p> <p>→ Only use lifting gear with sufficient load bearing capacity. Observe the gross weight.</p> <p>→ Use personal protective equipment.</p>
 CAUTION!	<p>Risk of burns from hot surfaces!</p> <p>The surface of the unit gets hot during operation.</p> <p>→ Only work on the unit when it has cooled down and is switched off.</p> <p>→ Wear protective gloves when working.</p>

10.3 Disposal



→ Dispose of the unit in accordance with applicable local legal regulations.

You can also return worn-out units to the Franz-Kessler GmbH. We will carry out appropriate disposal.

11 Fault correction

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

→ Before you begin with fault correction, read the safety instructions. See chapter "For your safety".

→ If you cannot eliminate the fault, request a Kessler technician.

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

11.1 Fault diagnosis

11.1.1 General faults

Fault	Cause	Remedy
Motor does not start.	Electrical power has failed or is disconnected.	Check electrical connections and reconnect.
	Frequency converter defective.	Check for voltage on frequency converter outlet.
	Phases incorrectly connected.	Check phases and connect correctly.
Motor gets too hot: Cooling system problems.	Insufficient coolant flow: Cooling unit is switched-off, defective or set incorrectly.	Check cooling system: Switch cooling unit on, adjust correctly. Replace if necessary.
	Deposits have built up in the cooling system.	Clean cooling system and replace coolant. If necessary, send unit to manufacturer for repair.
	Coolant lines are crushed.	Check the cooling lines, place in correct position. If necessary, have replaced.
	Cooling system is not working, coolant temperature is too high.	Check cooling system and sensors. If necessary, clean the cooling system and replace the cooling agent. If necessary, have the sensors replaced.
Motor gets too hot: Temperature sensors responding.	PT100 (temperature sensor) defective.	Check the temperature sensor resistance at the next possible connector or clamping unit. At room temperature (20 °C) the resistance must lie between 107 and 110 Ohm. Otherwise, contact Kessler Service:
	KTY84/PT1000 (temperature sensor) defective.	Check the temperature sensor resistance at the next possible connector or clamping unit. At room temperature (20 °C) the resistance must lie between 570 and 592 Ohm (KTY84) or 1074 and 1082 Ohm (PT1000). Otherwise, contact Kessler service
	Sensor lines between the unit and frequency changer and/or control system are defective.	Check lines. Replace if necessary.

Motor gets too hot: Other causes.	Motor parameters set incorrectly.	Check motor parameters and set them correctly. See parameter list.
	Stator coil too hot due to continual load operation.	Check if rated output is exceeded. If necessary, reduce accordingly.

12 Error report

In the event of an error on the unit, please fax this checklist completed in full to Franz Kessler GmbH, Deutschland.

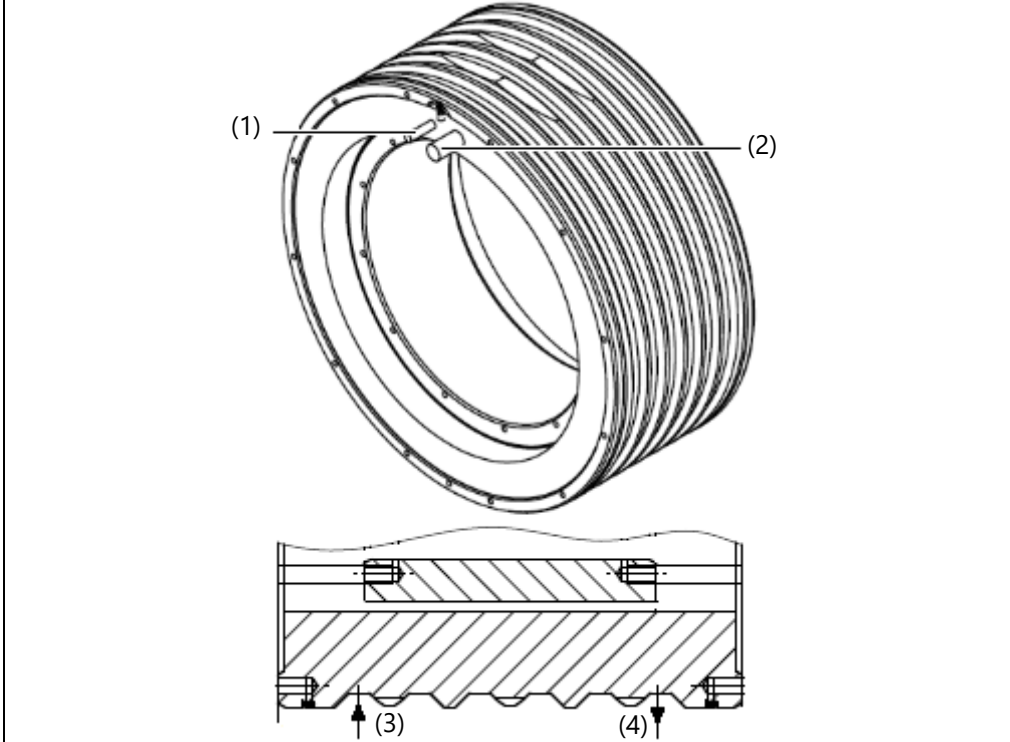
Fax: +49 (0)7582 809-172

Customer details			
Company	Telephone		
Street	Fax		
Postcode/town	Date		
Country	Fitter		
Machine data			
Model	Serial no.:		
Manufacturer	Fax		
Motor data			
Model	Max. speed		
Serial no. motor complete (old)			
Serial no. motor complete (new)			
Delivery note no. motor (new)			
Operating data			
Date of 1st commissioning			
Predominant speed range [rpm]			
Predominant output range [kW/%]			
Motor's total running time [hours]			
Use in shift operation [shifts per day]			
Ambient conditions [°C] (from/to)			
tool balanced	<input type="checkbox"/> with internal coolant supply <input type="checkbox"/> without internal coolant supply		
Fault description			
<input type="checkbox"/>	Running noise	<input type="checkbox"/>	Faulty rotary transmitter
<input type="checkbox"/>	Bearing damage	<input type="checkbox"/>	Intrusion of water
<input type="checkbox"/>	Collision	<input type="checkbox"/>	Eccentricity
<input type="checkbox"/>	Axis play	<input type="checkbox"/>	Overheating
<input type="checkbox"/>	Speed fluctuates	<input type="checkbox"/>	Unbalance
<input type="checkbox"/>	Coil terminal	<input type="checkbox"/>	
Other:			

13 Connections

Further information on connections can be found in the dimension sheet.

No.	Designation
(1)	Temperature sensor
(2)	Power connection
(3)	Cooling IN
(4)	Cooling OUT



Connection example

14 EC declaration of conformity

pursuant to the Low Voltage Directive 2014/35/EU

We the manufacturer:

- Franz Kessler GmbH, 88422 Bad Buchau, Germany

hereby declare that the following product:

Torque motor

Type:	TSM, TMS TMU, TMI HTM, HTMx HTMe, STMx
Art. no.:	see type plate/data sheet
Serial no.:	see type plate/data sheet

complies with the relevant provisions of the above mentioned directives.


Further, we declare that the following harmonized standards have been applied:

- EN 60034-1, Rating and performance
- EN 60034-2, Methods for determining losses and efficiency
- EN 60034-5, Degrees of protection
- EN 60034-6, Methods of cooling
- EN 60034-7, Types of construction
- EN 60034-9, Noise limits
- EN 60034-14, Mechanical vibration
- EN 60204-1, Safety of machinery

The following person is authorised to compile the relevant technical documentation:

- Franz Kessler GmbH, 88422 Bad Buchau, Germany

The product mentioned above may not be commissioned independently, but only after being installed in a predetermined machine or plant. Commissioning of the partly completed machinery is prohibited until the machine or plant in which the partly completed machinery is installed meets the requirements of the Machinery Directive 2006/42/EG.



Julius Herwanger
(Managing Director)
Bad Buchau

15 Service and support

15.1 KESSLER Germany

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15.2 KESSLER USA

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15.4 KESSLER Taiwan

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15.5 KESSLER Russia

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16 Revision index

Index	Date	Change
a	10.05.2012	KTY-84-130 changed
b	20.06.2012	Storage and return transport (corrosion protection)
c	25.09.2013	Contents updated
d	10.06.2015	Contents updated
e	18.04.2017	Contents updated
f	19.06.2018	Contents updated (PT1000)
g	27.05.2019	Contents updated (PT1000)
h	09.06.2021	Contents updated

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