

Assembly instructions

„Ketterer gearmotors and spindle drives“



Original assembly instructions

31XX.71-00EN Rev. A

for partly completed machines

according to machinery directive 2006/42/EG Attachment VI

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1 Introduction

1.1 Content

This documentation contains general information on working safely with all Ketterer gearmotors and spindle drives, hereinafter referred to as "drives". Safe working is only possible if the product-specific assembly instructions are observed, which are provided for each drive.

The operating instructions must be made available to all persons who work on and with the drives.

The operating instructions must always be complete and in a clearly readable condition.



Please read these operating instructions carefully and observe the safety instructions!

Depending on the design or modification status of the product, differences may occur compared to these operating instructions.

1.2 Other applicable documents

- Product-specific assembly instructions

1.3 Scope

- These instructions apply to all standard Ketterer gearmotors and spindle drives.

1.4 Directives

Ketterer gearmotors and spindle drives are "partly completed machinery" according to Article 2, paragraph g), MRL 2006/42/EC.





The drives are not covered by the Low Voltage Directive 2014/35/EU because the rated operating voltage is outside the voltage range of 75 VDC and VDC.

The conformity procedure was carried out according to Machinery Directive (MRL) 2006/42/EC. The drives are designed according to the directives 2011/65/EU (RoHS) and 2014/30/EU (EMC).

The manufacturer of the overall system in which the drives are integrated must check and ensure compliance with the essential requirements of the MRL before placing the overall system on the market.

1.5 Warnings and symbols used

In these assembly instructions, the following danger levels are used, which include the possible dangerous situations and important safety instructions:

 DANGER!	Dangerous situation resulting in death.
 WARNING!	Potentially dangerous situation resulting in death or serious, irreversible injuries.
 CAUTION!	Dangerous situation with minor or moderate injuries.
 INFO!	Possible harmful situation with damage to the product or the environment.

2 Safety



Read the safety instructions and information on safe handling in these assembly instructions carefully before starting work.

Keep these assembly instructions in a safe place and pass them on to others if necessary.

It is very important for your safety that you understand and follow all the safety information.

Non-observance of the safety instructions can lead to danger to the life and health of persons and to considerable damage to property.

2.1 Personnel - qualification and obligations



Information

All handling activities with Ketterer gearmotors and spindle drives may only be performed by authorized and qualified persons.

The authorized and qualified persons must...

- be familiar with the applicable accident prevention regulations and safety instructions in the technical documentation and be able to apply them.
- have been trained and instructed in accordance with the rules of behaviour in the event of a malfunction.
- have the physical and mental capabilities to handle the drives safely.

2.2 Obligations of the operator

Every person who works with the drives has a responsibility for their own safety and health and must be able to handle the drives safely.

Safe condition and use is a requirement for safe operation:

- Make sure that only authorized and qualified persons handle the drives.
- Avoid unsafe and dangerous working practices.
- Immediately report all safety problems when handling the drives to a supervisor.

2.3 General safety instructions

**DANGER!**

Risk of electric shock due to damaged live cables or plugs.

- Do not carry out any activities if the electrical equipment is damaged.

**DANGER!**

Electrical or mechanical danger due to liquids leaking into the product internals.

- Make sure that no liquids enter the inside of the drives.

**WARNING!**

Danger of being pulled in, caught or gripped by the rotary motion of the spindle drive system.

- Do not reach into moving parts during operation.

**WARNING!**

Danger of parts falling over or down.

- Do not drop the drives on the floor.
- Wear suitable safety shoes.

**WARNING!**

Danger of crushing and impact due to the lifting motion.

- Make sure that there are no persons or objects in the range of motion of the drives.

**WARNING!**

Risk of breakage due to incorrect installation or non-compliance with the operating data.

- Observe all notes and information in these mounting instructions during mounting, start-up and operation.

**CAUTION!**

Risk of cut injuries due to dangerous surfaces.

- Wear suitable protective gloves.

2.4 Use

2.4.1 Intended use

Ketterer gearmotors and spindle drives are designed to transfer speeds, torques and linear movements to an application. The specified speed and torque ranges must not be exceeded.

The drives are only intended for industrial systems, for installation in machines as defined by MRL 2006/42/EC.

The actuators must not be used in potentially explosive atmospheres, on ships, on rails and motor vehicles, in aircraft and spacecraft or in mines.

2.4.2 Foreseeable misuse

In case of misuse, Ketterer is not responsible for property damage, personal injury or possible consequential damage.

Misuse can be:

- Operation in the range outside the operating data specified in these assembly instructions.
- Incorrect or faulty assembly.
- Interference with the components or the system during operation.
- Non-observance of the maintenance work specified in these assembly instructions.

2.5 Residual risks

Despite all actions taken to integrate safety in the design, the safety devices and the supplementary safety instructions, residual risks cannot be completely eliminated. You can reduce residual risks by observing the safety instructions and the intended use.

Residual risks can be:

- Danger of cuts due to sharp edges and corners.
- Danger from residual voltages remaining in the electrical lines.
- Mechanical hazards due to moving parts.

3 Transport / Unpacking / Storage

**Danger of parts falling or overturning due to inappropriate transport.**

- Do not stand under suspended loads.
- Lift heavy components at least in two persons or with suitable lifting equipment.
- Do not drop any parts on the floor.
- Wear suitable safety shoes.

WARNING!**Risk of cut injuries due to sharp edges.**

- Wear your personal protective equipment depending on the ambient conditions, but at least suitable cut-resistant protective gloves.

CAUTION!**Transport:**

- Only transport the drives in their original packaging.
- During transport, the drives must be protected from dust, impact and moisture.
- Observe the temperature ranges (- 15°C to + 70°C) during transport.

Unpacking:

- When removing the packaging, pay attention to the danger of cuts on cardboard boxes.
- Do not use sharp objects to remove the packaging.
- Make sure that all packaging components are removed.
- Dispose of all packaging components, according to the disposal regulations in force in the country of use.

Storage:

- During storage, the drives must be protected from dust, shock and moisture.
- Observe the temperature ranges (- 15°C to + 70°C) and humidity (up to 70%) during storage.
- Avoid storage in aggressive atmospheres.

4 Assembly



Also observe the notes in the product-specific mounting instructions for your selected drive!



DANGER!

Risk of electric shock due to incorrect mounting or damage to the live cables.

- Carry out the mechanical installation in a voltage-free state.
- Before electrical installation, check for damage to the live cables / connectors.
- Before starting the installation, make sure that the power supply is protected by suitable and functioning fuses and a residual current circuit breaker.



WARNING!

Danger of falling parts during installation due to improper handling or assembly.

- Do not stand under suspended loads.
- Lift heavy components at least in two persons or with suitable lifting equipment.
- Only mount the components in accordance with the instructions in this operating manual.
- The installation surface must have a firm and level ground.



CAUTION!

Risk of cut injuries due to sharp edges.

- Wear your personal protective equipment depending on the ambient conditions, but at least suitable cut-resistant protective gloves.

Observe the following general safety instructions for assembly:

- Remove all packaging components before assembly
- Check all components for external damage before assembly. Do not install damaged components under any circumstances.
- Only use suitable tools to avoid damaging the screw connections.
- Do not drop the components.

5 Initial Start-up



Also observe the notes in the product-specific mounting instructions for your selected drive!



Risk of electric shock due to incorrect installation or damage to the live cables.

- Inspection of the electrical equipment by the electrician according to DIN EN 60204.
- For safety reasons, be sure to connect all PE protective conductors and ground conductors before start-up.

DANGER!



Danger of uncontrolled movements due to incorrect installation or incorrect control signals.

- Before start-up, check whether all components of the drive system have been correctly assembled.
- Only use a suitable control system.

WARNING!



Risk of breakage due to incorrect assembly or non-observance of the allowed operating data.

- Observe the notes in these assembly instructions for correct assembly.
- Observe the operating conditions.

WARNING!



Danger of breakage due to automatic start-up of rotating components.

- Pay attention to automatically starting components after applying a voltage or after a power failure.

WARNING!



Danger of crushing and shearing points.

- Observe the mounting position of the drives.
- Always perform a load-free function test during start-up.
- Check the function of all safety systems used.

WARNING!



Danger of hot surfaces.

- Touching the components of the drive system during start-up is only permitted after they have cooled down completely and with suitable personal protective equipment.

CAUTION!

Observe the following general safety instructions for start-up the drives:

- Before start-up, make sure that all mechanical and electrical installation work has been carried out properly.
- Have the electrical equipment checked by a trained electrician before start-up.
- Before start-up, make sure that the product voltage matches the supply voltage.
- Start-up may only be carried out with a suitable control unit, see chapter Control unit requirements.
- Always carry out the first movement for start-up without load in order to check the correct function.
- Move to the inner and outer end positions to check the correct range of motion.
- Check all integrated safety devices such as limit switches, emergency stop switches, light curtains, etc.
- If the function is correct, check the application under nominal load.
- Please note that block travel at full power is not recommended as this will damage the drive.

5.1 General requirements for control units

- In the following, Ketterer defines the requirements for the control system to be used for the motor drive's jog mode. These serve as a basis for safe operation. These requirements are a not conclusive list, since the company Ketterer can consider an intended use, but not the explicit application completely.

The control system must provide the following capability:

- The motor drive must be supplied with a DC voltage according to the motor specification (12 V, 18 V or 24 V) and with a Hall sensor supply of preferably 5 V (max. 24 V).
- The control system must comply with the relevant EC directives.

6 Operation



Also observe the notes in the product-specific mounting instructions for your selected drive!



Risk of electric shock due to incorrect installation or damage to the live cables.

- Inspection of the electrical equipment by the electrician according to DIN EN 60204.
- Do not interfere with the drive during operation.

DANGER!



Danger of uncontrolled movements due to incorrect control signals.

- Only use a suitable control system.

WARNING!



Risk of breakage due to non-observance of the allowed operating data.

- Observe the operating conditions.

WARNING!



Danger of breakage due to automatic start-up of rotating components.

- Pay attention to automatically starting components after applying a voltage or after a power failure.

WARNING!



Danger of crushing and shearing points.

- Do not interfere with the drive during operation.

WARNING!



Danger of being pulled in, caught or gripped by the rotary motion of the drive.

- Do not interfere with the drive during operation.

WARNING!



Danger of hot surfaces.

- Do not interfere with the drive during operation.

CAUTION!

Observe the following general safety instructions for operating the drives:

- Do not operate the drives if there is obvious damage to the mechanical and electrical components.
- Do not interfere with the components of the drives during operation.
- Observe the technical data and operating conditions at all times during operation.
- Please note that block travel at full power is not recommended as this will damage the drive.
- Observe the maximum duty cycle of the drive.

7 Shutdown



Also observe the notes in the product-specific mounting instructions for your selected drive!



Risk of unexpected movements due to unauthorized restart during shutdown.

- Protect the system against unauthorized restarting, e.g. by using a key / lock on the mains isolating device / information sign.

DANGER!

Observe the following general safety instructions for shutting down the drives:

- The drive is shut down by disconnecting the power supply.
- After disconnection, protect the electrical equipment against unauthorized reconnection.

8 Maintenance



Also observe the notes in the product-specific mounting instructions for your selected drive!



Risk of electric shock due to live cables or movements caused by residual energy.

- Only perform maintenance when all components are voltage-free.
- Observe the 5 electrical safety rules.
- Only perform maintenance work 5 minutes after disconnecting the power supply to avoid hazards due to residual energy.

DANGER!



Risk of unexpected movements due to unauthorized restart during maintenance.

- Protect the system against unauthorized restarting, e.g. by using a key / lock on the mains isolating device / information sign.

WARNING!



Explosion hazard due to dust deposits with a layer thickness > 5 mm. These can ignite on hot surfaces and cause fires or explosions!

- Do not use the drives in potentially explosive areas.
- Clean the drives regularly.

WARNING!



Risk of cut injuries due to sharp edges.

- Wear your personal protective equipment depending on the ambient conditions, but at least suitable cut-resistant protective gloves.

CAUTION!



Danger of hot surfaces.

- Touching the components of the drive system during maintenance is only permitted after they have cooled down completely and with suitable personal protective equipment.

CAUTION!

Observe the following general safety instructions for maintenance:

- The drives are maintenance-free, but they should be cleaned regularly to avoid dust deposits.

9 Disposal



Also observe the notes in the product-specific mounting instructions for your selected drive!



Disposal of the drives (mechanical and electronic components, operating media) is subject to the local disposal regulations and the environmental protection laws applicable in the country of use.



The drives must not be disposed of with household waste.

10 Service / Repair



Also observe the notes in the product-specific mounting instructions for your selected drive!



In case of service or repair please contact:



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11 Troubleshooting



Danger of electric shock due to live cables.

- Do not carry out any repairs yourself.

DANGER!

Malfunction	Possible cause	Action
Drive does not start or does not rotate	Voltage supply missing	Connect the power supply
	The fuse in the control unit is defective	Replace the fuse
	The cable is damaged	Send drive for repair
	Mechanical blockage	Switch off, de-energize and remove mechanical blockage
	Mains voltage faulty	Check mains voltage, restore power supply
	Connection faulty	Correct connection, see Pin assignment
	Drive is too hot	Cool down motor, find cause of problem
	Ambient temperature too high	Reduce ambient temperature
Excessive power consumption		Send drive for repair
Motor runs but the spindle does not move	Gear or spindle damaged	Send drive for repair
Drive cannot lift the full load	Defective power supply	Increase power supply
	Voltage drop in cable	Use thicker cable
	Motor damaged	Send drive for repair
Motor runs too slowly or not with full power	Defective power supply	Increase power supply
	Voltage drop in cable	Use thicker cable



In case of further malfunctions and unusual running noises, please contact Ketterer. Have the following information ready:

- Type plate data
- Type and extent of malfunction
- Accompanying circumstances of the malfunction
- Application Data (cycle of torque, speed, loads ambient conditions, etc.)