

Translation of original operating instructions

Electromagnetically actuated slip ring-SINUS- multi-plate clutch

Model series 006

Production order number 000000000-999999999

In the course of further technical development, we reserve the right to make technically related changes to these operating instructions. Keep for future reference.

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1 General notes

This chapter describes how the product and the available accessories are used.

These operating instructions, hereinafter referred to as OI, are part of the product and contain important information. The operator is responsible for ensuring that the OI are accessible to every person charged with working at or with the product and that these OI are read and understood before undertaking the activities.

Upon receipt, the delivery must be checked for transport damage and obvious defects. must be notified in the event of damage. Only install/commission products that are in a technically sound condition.

1.1 Description of the product and its intended use

The 006 model series clutch is intended for use in drivetrains. In these, it is intended for use as a connecting element between two shafts. The clutch is actuated by an electromagnetic force and is then designated as "closed". By means of pressure springs in the magnet body, it is released when de-energised and is then designated as "open". The clutch can be used for both wet- and dry-running.

Our products are designed to be used exclusively according to their technical data and the application scenarios agreed with . The order-specific configuration for the application carried out by must be adhered to. If this is missing from the documentation, please request this immediately from .

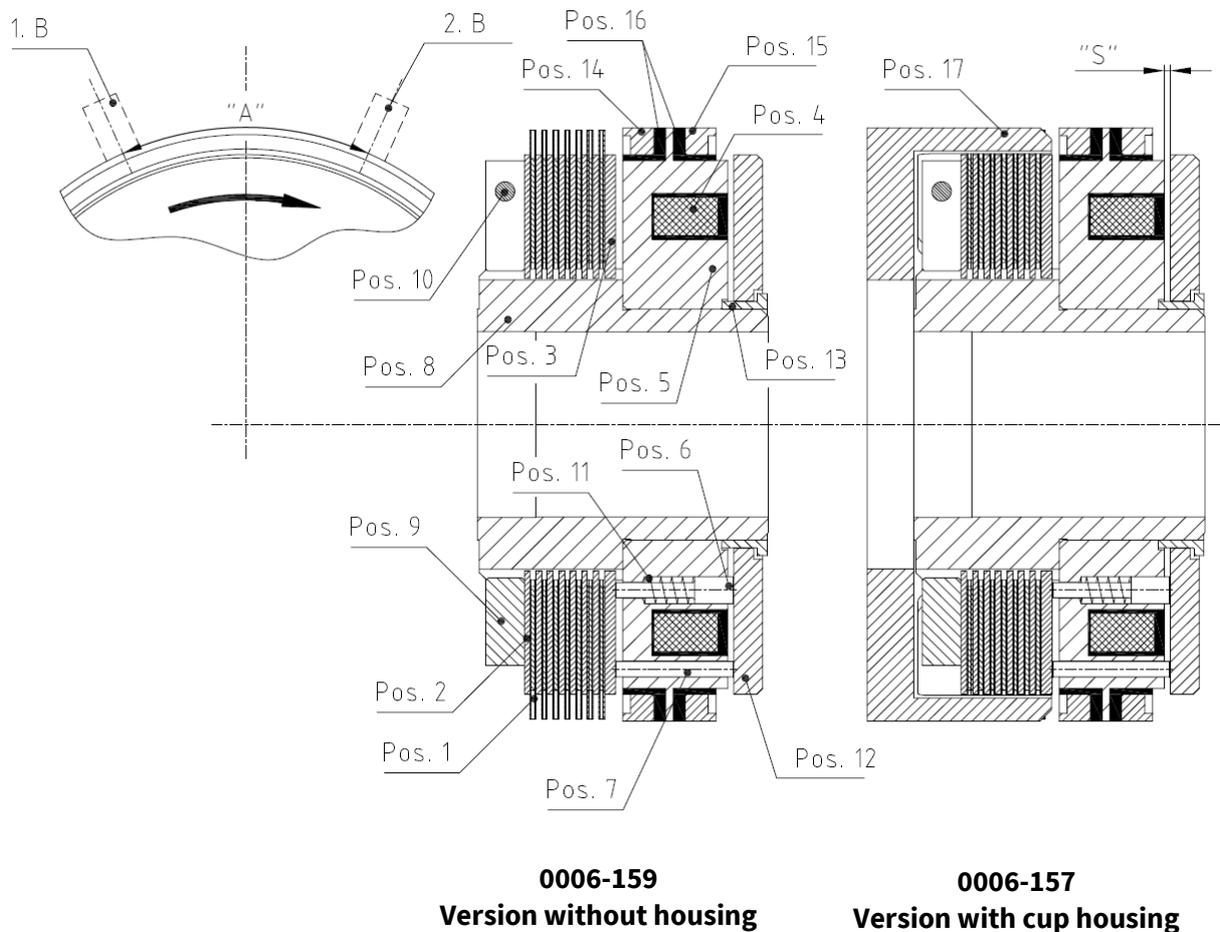
It is not intended for the product to be used as a "safety component" in terms of the EC Machinery Directive.

1.2 Non-intended use and foreseeable misuse

shall not be held liable for non-intended use and any damage arising from this. In particular, but not exclusively, non-intended use is where:

- Our product is used as a bearing in the sense of supporting and guiding machine parts against the stationary part.
- Non-original parts are used as accessories.
- Unauthorised modifications are made.
- Our product is used outdoors without sufficient protection against environmental conditions.
- Our product is not operated in accordance with the technical data defined in the design/product drawing.
- Our product is overloaded by too high a speed and/or too high a drive torque.
- Our product must decelerate an impermissibly high moment of inertia.
- Our product is subjected to undue stress from unacceptable sliding actions on the friction surfaces (e.g. by overloading).
- Our product is operated with oil in a dry-running system.

1.3 Basic equipment of the product



Sectional drawings of the 006 model series

The electromagnetic multi-plate clutch of the 006 model series consists of a magnet body (item 5) with magnet spool (item 4) on one side. This outer part of the clutch is securely connected to the inner hub (item 8) via positive locking. The hub is in turn connected to the machine shaft via further positive locking (e.g. key).

On the opposite side, the housing (item 17), which engages in the outer plates (item 1), is connected to the other machine shaft (flanged shaft) via a screw connection and, if necessary, dowel pins. In the case of the version "with cup housing", this is already supplied. The connection geometry (centring and hole pattern) must be specified and installed by the customer or can also be installed by arrangement. In the version "without housing", the housing must be provided by the customers. You can find information about the design of the interface to the outer plates (item 1) on the product drawing.

If the input and output are to be connected, 24 V (+10%) DC voltage must be applied so that the magnet attracts the armature disc (item 12) and the pressure pins (items 6 and 7) press on the pressure disc (item 3), whereby the plate pack (items 1 and 2) is pressed against the clamping nut (item 9). This applied axial force creates a frictional connection between the inner plates, which are connected to the hub, and the outer plates, which engage in the housing. The clutch is described as "closed".

If the shafts are to be disconnected, the clutch must be de-energised. The spring-loaded pressure pins (item 6) push the armature disc away from the magnet body back to its original position against

the stop of the centring nut (item 13). The design of the inner plates as SINUS plates pushes the plate pack apart and ensures separation of the frictional connection. The friction system is therefore optional and is described as "open".

The coil ends each lie on one of the two slip rings (items 14 or 15). Contact with the respective slip ring is made via a brush in dry-running (1. B) or one or two brushes (1. B and/or 2. B) in wet-running for each slip ring. In wet-running, the first brush (1. B) is mainly used to wipe off the oil and therefore improve the contact between the slip ring (item 14 or 15) and the second brush (2. B). A radian measure of < 80 mm must be maintained between the two brushes. The polarity can be selected as required.

In addition to the versions "with cup housing" and "without housing", other housing versions are available on request for the 006 model series.

2 Safety regulations

This chapter describes the applicable symbols relating to the safety instructions as well as the requirements of the personnel.

No claim to completeness is made regarding the instructions and safety instructions included in these OI. For commissioning, operation, maintenance and repair, observe the notes in the corresponding chapters of these OI as well as the documentation of the system or the complete machine.

2.1 Symbols



Note!

- Pay special attention to this text.



Danger

Danger!

- Danger when performing the described activity or during active operation from hazard sources that could result in (severe) physical injuries or health hazards.



Caution

Caution!

- Danger when performing the described activity or during active operation from hazard sources that could result in material damage.

2.2 Requirements of the personnel

The operator is responsible for ensuring that work on our products is only carried out by specialists who have the relevant knowledge and are suitably qualified or have been trained to carry out the activity and know and understand the contents of these OI. Qualified specialists include, in particular, the following:

- Installation engineers of the system/machine manufacturer
- Industrial mechanics/fitters of the machine operator
- Other qualified and properly trained specialist personnel, responsible for and thereby entrusted with project planning, assembly, commissioning, operation, maintenance, decommissioning, storage and disposal of the product.

Furthermore, the applicable national safety engineering standards must be observed and suitable personal protective equipment worn.

**Note!**

- As the operator, make sure that the specialist personnel have a translation of the operating instructions (or selected chapters) at their disposal in their native language.

2.3 Additional hazards

Despite measures having been taken to integrate safety in the design, the foreseeable safety precautions and the supplementary protective equipment that is explained in these operating instructions, risks still exist in relation to handling.

3 Transport

This chapter describes the procedure required by the manufacturer to transport the equipment to the final installation site.

Only persons who meet the requirements from the "Requirements of the personnel" chapter are permitted to transport the product. The personnel must be trained accordingly and have the necessary skills for transport.

Personal protective equipment

Make provision for the following prescribed (personal) protective equipment for activities involved with transport:

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable footwear, e.g. safety shoes with a safety rating relevant to the activity in question



Danger

If moving parts approach a fixed part, injuries can ensue.

- Observe the accident prevention regulations.
- Do not reach into the components while the product is being transported.
- Secure loose components to prevent unintended movements.

If the product is not stable, this may result in injuries.

- Make sure that the ground is firm and the location is stable before placing the product down.
- Secure the product or components against rolling or toppling over.

Obstacles falling down may cause injuries.

- Observe the accident prevention regulations when moving heavy loads.
- When moving the product, use safe lifting equipment with a sufficient load-bearing capacity and lifting gear with appropriate dimensions and the dedicated mounting points for the entire product in accordance with the product drawing.
- Observe the location of the package (TOP direction!).

Sharp edges and pointed components may cause injuries.

- Secure the components during transport.
- Before removing the components, check them for damage and sharp edges.

For details about the position of the transport threads and the precise weight, refer to the product drawing accompanying the product and the technical data of the product in the appendix. Tighten

the transport bolts as prescribed for transport and only use lifting equipment with sufficient load-bearing capacity.

4 Storage

This chapter describes the temporary or long-term storage of the product. The item is supplied in a preserved state. Check the corrosion protection before placing in storage. If necessary, supplement or renew it.

Only persons who meet the requirements from the "Requirements of the personnel" chapter are permitted to store the product. The personnel must be trained accordingly and have the necessary skills for storage.

Personal protective equipment

Provide the following prescribed (personal) protective equipment for activities associated with storage:



Danger

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable footwear, e.g. safety shoes with a safety rating relevant to the activity in question

If moving parts approach a fixed part, injuries can ensue.

- Observe the accident prevention regulations.
- Do not reach into the components while the product is being transported.
- Secure loose components to prevent unintended movements.

If the product is not stable, this may result in injuries.

- Make sure that the ground is firm and the location is stable before placing the product down.
- Secure the product or components against rolling or toppling over.

Obstacles falling down may cause injuries.

- Observe the accident prevention regulations when moving heavy loads.
- When moving the product, use safe lifting equipment with a sufficient load-bearing capacity and lifting gear with appropriate dimensions and the dedicated mounting points for the entire product in accordance with the product drawing.
- Observe the location of the package (TOP direction!).

Sharp edges and pointed components may cause injuries.

- Secure the components during transport.
- Before removing the components, check them for damage and sharp edges.

For longer periods of storage, suitable measures for additional corrosion protection must be taken in agreement with .

For storage periods exceeding five years, the product must be inspected by . In the process, the product is partially dismantled, inspected and reassembled. Any parts found to be damaged are replaced. The product subsequently undergoes an acceptance test.

5 Assembly

This chapter describes all assembly processes within the course of initial assembly or repeat assembly following maintenance or conversion work.

Only persons who meet the requirements from the "Requirements of the personnel" chapter are permitted to assemble the product. The personnel must be trained accordingly and have the necessary skills for assembly.

Personal protective equipment

Provide the following prescribed (personal) protective equipment for activities associated with assembly:

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable footwear, e.g. safety shoes with a safety rating relevant to the activity in question



Danger

Failure to observe the instructions in the operating manual may impair safe operation, e.g. impermissible heat build-up or low torque. This may lead to complete failure of the product functions and cause injuries.

- Ensure that the product is assembled in accordance with the specifications provided in these operating instructions.

If moving parts approach a fixed part, injuries can ensue.

- Observe the accident prevention regulations.
- Do not reach into the components while the product is being transported.
- Secure loose components to prevent unintended movements.

If the product is not stable, this may result in injuries.

- Make sure that the ground is firm and the location is stable before placing the product down.
- Secure the product or components against rolling or toppling over.

If components under spring pressure are suddenly released, this may lead to injuries.

- Observe the instructions in the chapters relating to correct assembly and removal of the product.

Obstacles falling down may cause injuries.

- Observe the accident prevention regulations when moving heavy loads.
- When moving the product, use safe lifting equipment with a sufficient load-bearing capacity and lifting gear with appropriate dimensions and the dedicated mounting points for the entire product in accordance with the product drawing.

Sharp edges and pointed components may cause injuries.

- Secure the components during transport.
- Before removing the components, check them for damage and sharp edges.

A faulty electrical connection may lead to short circuits on the electromagnet and supply lines, and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that the connection is only carried out by qualified personnel.

Selecting the incorrect electrical control and connection components may lead to high currents, electric arcs, heating and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that any connectors and cables used are sufficiently insulated.
- Ensure that the components are selected by a specialist.

Live parts or parts that have become live due to a fault may lead to injuries.

- Observe the relevant safety standards for electrical appliances.

Physical strain or poor posture due to the weight of the product may lead to injuries.

- Observe the weight specifications.
- Use suitable transport equipment when moving the product.
- Only carry out work on the product when it is in an upright position.

If the securing elements are not tightened correctly or inappropriate securing elements are selected, this may lead to injuries.

- Observe and check the installation instructions in the operating instructions. If there is no information, the applicable guidelines are to be observed according to current engineering practices.
- Also observe the instructions in the operating manual for the system/machine manufacturer.
- Check the tightening torque, number and strength ratings of the bolts according to the specifications on the product drawing and in the technical data of the product in the appendix.
- Make sure that the bolts cannot become loose accidentally.

Incorrect alignment of the product may lead to injuries.

- Observe the information on the alignment and installation position of the product in accordance with the product drawing.
- Avoid any kind of offset.

The supplier or operator is responsible for assembly of the product described. Comply with the applicable regulations and requirements as well as these operating instructions. Check the operational

readiness before installation. During the assembly work, note also the information provided in the "Transport" chapter.

5.1 Assembling the product – basic equipment

<p>General notes</p>	<ol style="list-style-type: none"> 1. Carry out the assembly in accordance with this version. 2. For the requisite tightening torques, see the chapter "Supplementary technical data". 3. Sufficient lubrication of the friction system and the centring nut must be guaranteed for 006 model series clutches that are operated in wet-running. The clutch should be immersed to a maximum of 10% of its outer diameter. Depending on the operating conditions, we recommend using an oil baffle plate. Information about the oil to be used can be found in the technical data. <p>Clutches in the 006 model series that are operated in dry-running mode must not come into contact with oil. Only the centring nut (item 13) should be provided with a higher-consistency grease. You can find information about the grease that is to be used in the technical data.</p>
<p>Assembly of the clutch in version 0006-159 without housing</p>	<p>Assembling the housing</p> <ol style="list-style-type: none"> 1. The housing is provided and installed by the customer, and is not part of the scope of delivery. <p>Assembling the hub (item 8)</p> <ol style="list-style-type: none"> 2. Slide the hub (item 8) together with the magnet body (item 5), the plate pack (items 1 and 2), the armature disc (item 12) and the clamping nut (item 9) as a package onto the shaft and secure it in place. 3. Secure the hub (item 8) against axial displacement. <p>Completing the assembly</p> <ol style="list-style-type: none"> 4. Check that the housing can move freely in relation to the clamping nut (item 9) and hub (item 8).
<p>Assembling the clutch in version 0006-157 with cup housing</p>	<p>Assembling the cup housing (item 17)</p> <ol style="list-style-type: none"> 1. Place the cup housing (item 17) on the counter-centring of the axially backlash-free customer shaft (flanged shaft). 2. Screw the cup housing (item 17) to the customer shaft. Use Loctite type 262 to secure it. 3. If required, drill the through holes in the cup housing (item 17) together with the customer shaft, and pin both together (if pinning is provided). <p>Assembling the hub (item 8)</p> <ol style="list-style-type: none"> 4. Slide the hub (item 8) together with the magnet body (item 5), the plate pack (items 1 and 2), the armature disc (item 12) and the clamping nut (item 9) as a package onto the shaft and secure it in place. 5. Secure the hub (item 8) against axial displacement.

	<p>Completing the assembly</p> <p>6. Check that the housing can move freely in relation to the clamping nut (item 9) and hub (item 8).</p>
<p>Concluding the installation</p>	<p>1. Connect the power supply of 24 V (+ 10%) DC. Depending on the choice of switching element, it may be necessary to prevent contact pieces from burning off, for example. This can be achieved by connecting a protective device in parallel.</p>
<p>Following the installation</p>	<p>1. Carry out a function test as described in the chapter "Commissioning".</p>

6 Commissioning

This chapter describes all processes for initial commissioning as well as recommissioning.

Only persons who meet the requirements from the chapter "Requirements of the personnel" are authorised to commission the product. The personnel must be trained accordingly and be in possession of the necessary skills for commissioning.

Personal protective equipment

Provide the following prescribed (personal) protective equipment for activities associated with commissioning:

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable eyewear, e.g. safety glasses or goggles with a safety rating relevant to the activity in question
- Suitable ear defenders, e.g. ear muffs, ear plugs or ear moulds with a safety rating relevant to the activity in question
- Suitable respiratory protection, e.g. masks with a safety rating relevant to the activity in question

Failure to observe the instructions in the operating manual may impair safe operation, e.g. impermissible heat build-up or low torque. This may lead to complete failure of the product functions and cause injuries.

- Make sure that the product is operated according to the specifications in these operating instructions.



Danger

Parts of the product moving towards each other may cause injuries.

- Make sure that openings to the product are covered and provision has been made to protect against reaching into components that are moving towards each other.
- Wear tight-fitting clothing and tie-up or cover hair to prevent it from being pulled in.

Accelerations or decelerations within the product may cause injuries.

- Ensure that there are no persons in the hazard area of the product. To do this, make provision for a product housing or barrier.

Accidental movements of the product may lead to injuries.

- Note the installation position in accordance with the product drawing.
- Check the alignment and fastening of the inner drive element to the outer drive element.
- Before commissioning, check the clearance and correct position of the components.
- Observe and monitor the minimum required actuating voltage and the maximum permissible voltage.
- If necessary, monitor the end position of the armature disc.

Hazards during commissioning or operation of the product may lead to injuries.

- Ensure that there are no persons in the hazard area of the product. To do this, make provision for a product housing or barrier.

Moving and rotating parts of the product may lead to injuries.

- Make sure that any openings to the product are covered and provision has been made to protect against reaching into rotating components.
- Wear tight-fitting clothing and tie-up or cover hair to prevent it from being pulled in.

A faulty electrical connection may lead to short circuits on the electromagnet and supply lines, and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that the connection is only carried out by qualified personnel.

Selecting the incorrect electrical control and connection components may lead to high currents, electric arcs, heating and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that any connectors and cables used are sufficiently insulated.
- Ensure that the components are selected by a specialist.

Live parts or parts that have become live due to a fault may lead to injuries.

- Observe the relevant safety standards for electrical appliances.
-

High operating temperatures of the product may lead to thermal radiation and cause injuries.

- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.

High operating temperatures of the product may lead to burn injuries.

- Observe the instructions from the operator.
- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.
- Observe and monitor the speed limits on the input and output sides.

Processes involving switching within the product may generate noise for short periods and cause discomfort and stress.

- Provide appropriate noise protection measures such as damping or encapsulation of the product if the noise generation cannot be corrected.

Processes involving friction within the product can generate noise for short periods and cause discomfort and stress.

- Provide appropriate noise protection measures such as damping or encapsulation of the product if the noise generation cannot be corrected.

Faulty alignment of moving parts can cause discomfort, stress and increased wear.

- Observe the information on the alignment and installation position of the product in accordance with the product drawing.
- Check the alignment and fastening of the inner drive element to the outer drive element.
- Before commissioning, check the clearance and correct position of the components.
- Observe and monitor the minimum required actuating voltage and the maximum permissible voltage.
- If necessary, monitor the end position of the armature disc.

Low-frequency electromagnetic radiation may cause interference in nearby electronic components or devices.

- Take constructive measures or use magnetic field-resistant sensors to avoid interference.

Wear from friction surfaces can cause breathing difficulties.

- Prevent any dust associated with plate wear from escaping by encapsulating the parts.

If the securing elements are not tightened correctly or inappropriate securing elements are selected, this may lead to injuries.

- Observe and check the installation instructions in the operating instructions. If there is no information, the applicable guidelines are to be observed according to current engineering practices.
- Also observe the instructions in the operating manual for the system/machine manufacturer.
- Check the tightening torque, number and strength ratings of the bolts according to the specifications on the product drawing and in the technical data of the product in the appendix.
- Make sure that the bolts cannot become loose accidentally.

Incorrect alignment of the product may lead to injuries.

- Observe the information on the alignment and installation position of the product in accordance with the product drawing.
- Avoid any kind of offset.

If, during commissioning, irregularities such as unusual noises, vibrations and oscillations or an unusual increase in operating temperature are encountered, bring the system/machine immediately to a halt.

Before commissioning and after maintenance or repair with the system/machine at standstill	<ol style="list-style-type: none"> 1. Check the connection of all components to ensure that they are secured correctly. 2. Carry out the function test.
Function test	<ol style="list-style-type: none"> 1. Charge the clutch to the requisite switching voltage while it is stationary. 2. Check that the armature disc (item 12) is pulled against the magnet body (item 5) and that the pressure pin (items 6 and 7) and pressure disc (item 3) are pulled against the plate pack (items 1 and 2) onto the clamping nut (item 9) and that the clutch is fully closed. 3. After the clutch has been de-energised, the SINUS plates (item 2) must release the plate pack (items 1 and 2) and move the armature disc in the direction of the housing. 4. Check that there is no contact between the cup housing (item 17) or the customer's housing and the clamping nut (item 9) and hub (item 8).

7 Operation

This chapter describes the operation and operating principle as well as the handling instructions in the event of irregularities.

Only persons who meet the requirements in the "Requirements of the personnel" chapter are authorised to operate the product. The personnel must be trained accordingly and have the necessary skills for operation.

Personal protective equipment

Make provision for the following prescribed (personal) protective equipment for activities involved with operation:



Danger

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable eyewear, e.g. safety glasses or goggles with a safety rating relevant to the activity in question
- Suitable ear defenders, e.g. ear muffs, ear plugs or ear moulds with a safety rating relevant to the activity in question
- Suitable respiratory protection, e.g. masks with a safety rating relevant to the activity in question

Failure to observe the instructions in the operating manual may impair safe operation, e.g. impermissible heat build-up or low torque. This may lead to complete failure of the product functions and cause injuries.

- Make sure that the product is operated according to the specifications in these operating instructions.

Parts of the product moving towards each other may cause injuries.

- Make sure that openings to the product are covered and provision has been made to protect against reaching into components that are moving towards each other.
- Wear tight-fitting clothing and tie-up or cover hair to prevent it from being pulled in.

Accelerations or decelerations within the product may cause injuries.

- Ensure that there are no persons in the hazard area of the product. To do this, make provision for a product housing or barrier.

Accidental movements of the product may lead to injuries.

- Note the installation position in accordance with the product drawing.
- Check the alignment and fastening of the inner drive element to the outer drive element.
- Before commissioning, check the clearance and correct position of the components.
- Observe and monitor the minimum required actuating voltage and the maximum permissible voltage.
- If necessary, monitor the end position of the armature disc.

Hazards during commissioning or operation of the product may lead to injuries.

- Ensure that there are no persons in the hazard area of the product. To do this, make provision for a product housing or barrier.

Moving and rotating parts of the product may lead to injuries.

- Make sure that any openings to the product are covered and provision has been made to protect against reaching into rotating components.
- Wear tight-fitting clothing and tie-up or cover hair to prevent it from being pulled in.

A faulty electrical connection may lead to short circuits on the electromagnet and supply lines, and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that the connection is only carried out by qualified personnel.

Selecting the incorrect electrical control and connection components may lead to high currents, electric arcs, heating and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that any connectors and cables used are sufficiently insulated.
- Ensure that the components are selected by a specialist.

Live parts or parts that have become live due to a fault may lead to injuries.

- Observe the relevant safety standards for electrical appliances.

High operating temperatures of the product may lead to thermal radiation and cause injuries.

- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.

High operating temperatures of the product may lead to burn injuries.

- Observe the instructions from the operator.
- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.
- Observe and monitor the speed limits on the input and output sides.

Processes involving switching within the product may generate noise for short periods and cause discomfort and stress.

- Provide appropriate noise protection measures such as damping or encapsulation of the product if the noise generation cannot be corrected.

Processes involving friction within the product can generate noise for short periods and cause discomfort and stress.

- Provide appropriate noise protection measures such as damping or encapsulation of the product if the noise generation cannot be corrected.

Worn components may result in discomfort and stress.

- Check the friction linings regularly for wear.
- If necessary, change the plates and replace worn components.

Faulty alignment of moving parts can cause discomfort, stress and increased wear.

- Observe the information on the alignment and installation position of the product in accordance with the product drawing.
- Check the alignment and fastening of the inner drive element to the outer drive element.
- Check the clearance of the product.
- Observe and monitor the minimum required actuating and release pressure as well as the maximum permissible pressure
- Observe and monitor the speed limits on the input and output sides.

Low-frequency electromagnetic radiation may cause interference in nearby electronic components or devices.

- Take constructive measures or use magnetic field-resistant sensors to avoid interference.

Wear from friction surfaces can cause breathing difficulties.

- Prevent any dust associated with plate wear from escaping by encapsulating the parts.

If the securing elements are not tightened correctly or inappropriate securing elements are selected, this may lead to injuries.

- Observe and check the installation instructions in the operating instructions. If there is no information, the applicable guidelines are to be observed according to current engineering practices.
- Also observe the instructions in the operating manual for the system/machine manufacturer.
- Check the tightening torque, number and strength ratings of the bolts according to the specifications on the product drawing and in the technical data of the product in the appendix.
- Make sure that the bolts cannot become loose accidentally.

Incorrect alignment of the product may lead to injuries.

- Note the installation position in accordance with the product drawing.
- Avoid any kind of offset.

If irregularities are detected during operation, such as unusual noises, vibrations or oscillations, or an unusual increase in operating temperature, bring the system/machine to a standstill immediately.

<p>Open clutch</p>	<ol style="list-style-type: none"> 1. The spring-loaded pressure pins (item 6) move the armature disc (item 12) away from the magnet body (item 5) when de-energised and release the pressure on the plate pack (items 1 and 2). 2. The SINUS plates (item 2) cause the plate pack (items 1 and 2) to be released. 3. The tension of the friction elements is released. 4. The clutch is opened.
<p>Statically actuating the clutch</p>	<ol style="list-style-type: none"> 1. Apply the permissible switching voltage in accordance with the technical data while stationary. 2. The magnet spool (item 4) pulls the armature disc (item 12) against the magnet body (item 5) and therefore presses on

	<p>the pressure pins (items 6 and 7). The pressure pins (items 6 and 7) in turn transfer the force to the pressure disc (item 3) and the plate pack (items 1 and 2). This leads to axial tensioning of the friction elements.</p> <ol style="list-style-type: none"> 3. The clutch is active in this condition and the specified static clutch torque can be transmitted in accordance with the technical data. 4. Take the product- and application-specific layout into account.
<p>Dynamically actuating the clutch</p>	<ol style="list-style-type: none"> 1. Apply the permissible switching voltage in accordance with the technical data under differential speed. 2. The magnet spool (item 4) pulls the armature disc (item 12) against the magnet body (item 5) and therefore presses on the pressure pins (items 6 and 7). The pressure pins (items 6 and 7) in turn transfer the force to the pressure disc (item 3) and the plate pack (items 1 and 2). This leads to axial tensioning of the friction elements. 3. The clutch is active in this condition and the specified dynamic clutch torque can be transmitted in accordance with the technical data. 4. Take the product- and application-specific layout into account. 5. After each dynamic engaging process performed by the clutch, allow sufficient cooling time to cool the clutch down to the initial temperature before the engaging process. Operation without observing a sufficient cooling time is not permitted. 6. Ensure that the equilibrium temperature measured on the friction system does not exceed a value of 120 °C during successive engaging processes.
<p>Using together with an electromagnetic brake</p>	<ol style="list-style-type: none"> 1. The electromagnetic clutch from the 006 model series is often used together with an equally electromagnetic brake. 2. Prevent the closed state of the clutch and brake from overlapping, and the clutch (and therefore the drive) from having to move against a closed brake.

8 Malfunctions

This chapter describes instructions for actions to be carried out by you as the operator in the event of malfunctions.

If unusual operating noises, vibrations, elevated temperatures or malfunctions occur, the system/machine must be taken out of operation immediately and measures taken to prevent it from being commissioned again while repairs are being carried out.

In the event of malfunctions, the product must be sent back to for inspection or, alternatively, you should arrange for our trained fitters to carry out an inspection on site.

The following malfunctions are merely reference points for troubleshooting. Always take into account the other components of the system/machine and include these in the fault finding process.

Malfunction	Reason	Remedy
Clutch slips	Insufficient operating voltage	Check the specified operating voltage.
	The oil used is too viscous for a wet-running clutch	Use an oil that is approved by .
	Excessive lubrication for a wet-running clutch	Reduce the lubrication.
	Oily friction linings on a dry-running clutch oily (reduced friction coefficient)	Contact Service.
Clutch engages at idle	Residual voltage is present at the clutch due to defective switching elements or insulation	Check the control for defective switching elements or insulation
	The oil used is too viscous for a wet-running clutch	Use an oil that is approved by .
	Excessive lubrication for a wet-running clutch	Reduce the lubrication.
	Air gap too small due to the clamping nut being set too far back	Check the air gap and readjust it if necessary.
Heating of the clutch	Unidentifiable machine/product damage	Contact Service.

Malfunction	Reason	Remedy
Clutch does not shift or shifts too slowly	Insufficient operating voltage	Check the specified operating voltage.
	Magnet spool has a short circuit	Check the resistance of the magnet spools
	Magnet spool is burnt out	Check the magnet spool for continuity
	Continuity from magnet spool to the housing	Check for continuity between the connection contacts of the coil and the housing
Overlapping of the clutch and brake	Switching times too fast	Installation of a time relay on the clutch side or micro-switch on the brake side. Check the operating voltage. Adjust the brake.

After completion of the maintenance or repair work, observe the commissioning notes.

9 Maintenance

This chapter describes the time- or event-based maintenance activities.

Only persons who meet the requirements from the "Requirements of the personnel" chapter are permitted to service the product. The personnel must be trained accordingly and have the necessary skills for maintenance.

Personal protective equipment

Provide the following prescribed (personal) protective equipment for activities associated with maintenance:



- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable footwear, e.g. safety shoes with a safety rating relevant to the activity in question
- Suitable eyewear, e.g. safety glasses or goggles with a safety rating relevant to the activity in question
- Suitable ear defenders, e.g. ear muffs, ear plugs or ear moulds with a safety rating relevant to the activity in question
- Suitable respiratory protection, e.g. masks with a safety rating relevant to the activity in question



Danger

Failure to observe the instructions in the operating manual may impair safe operation, e.g. impermissible heat build-up or low torque. This may lead to complete failure of the product functions and cause injuries.

- Make sure that the product is assembled in accordance with the specifications provided in these operating instructions.

If moving parts approach a fixed part, injuries can ensue.

- Observe the accident prevention regulations.
- Do not reach into the components while the product is being transported.
- Secure loose components to prevent unintended movements.

Parts of the product moving towards each other may cause injuries.

- Make sure that openings to the product are covered and provision has been made to protect against reaching into components that are moving towards each other.
- Wear tight-fitting clothing and tie-up or cover hair to prevent it from being pulled in.

If the product is not stable, this may result in injuries.

- Protect yourself using suitable (personal) protective equipment, such as safety shoes and gloves.
- Make sure that the ground is firm and the location is stable before placing the product down.
- Secure the product or components against rolling or toppling over.
- Stop the system/machine before removing the product and secure it against accidental movements.
- Cordon off the hazard area.

If components under spring pressure are suddenly released, this may lead to injuries.

- Observe the instructions in the chapters relating to correct assembly and removal of the product.

Obstacles falling down may cause injuries.

- Observe the accident prevention regulations when moving heavy loads.
- When moving the product, use safe lifting equipment with a sufficient load-bearing capacity and lifting gear with appropriate dimensions and the dedicated mounting points for the entire product in accordance with the product drawing.
- Observe the correct sequence for removing the product.

Moving and rotating parts of the product may lead to injuries.

- Make sure that any openings to the product are covered and provision has been made to protect against reaching into rotating components.
- Wear tight-fitting clothing and tie-up or cover hair to prevent it from being pulled in.

Sharp edges and pointed components may cause injuries.

- Secure the components during transport.
- Before removing the components, check them for damage and sharp edges.

A faulty electrical connection may lead to short circuits on the electromagnet and supply lines, and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that the connection is only carried out by qualified personnel.

Selecting the incorrect electrical control and connection components may lead to high currents, electric arcs, heating and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that any connectors and cables used are sufficiently insulated.
- Ensure that the components are selected by a specialist.

Live parts or parts that have become live due to a fault may lead to injuries.

- Observe the relevant safety standards for electrical appliances.

High operating temperatures of the product may lead to thermal radiation and cause injuries.

- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.

High operating temperatures of the product may lead to burn injuries.

- Observe the instructions from the operator.
- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.
- Observe and monitor the speed limits on the input and output sides.

Processes involving switching within the product may generate noise for short periods and cause discomfort and stress.

- Provide appropriate noise protection measures such as damping or encapsulation of the product if the noise generation cannot be corrected.

Processes involving friction within the product can generate noise for short periods and cause discomfort and stress.

- Provide appropriate noise protection measures such as damping or encapsulation of the product if the noise generation cannot be corrected.

Worn components may result in discomfort and stress.

- Check the friction linings regularly for wear.
- If necessary, change the plates and replace worn components.

Low-frequency electromagnetic radiation may cause interference in nearby electronic components or devices.

- Take constructive measures or use magnetic field-resistant sensors to avoid interference.

Wear from friction surfaces can cause breathing difficulties.

- Prevent any dust associated with plate wear from escaping by encapsulating the parts.

Swirling dust may cause breathing difficulties and eye irritation.

- Avoid the use of compressed air.
- Arrange for the use of a vacuum cleaner.

Physical strain or poor posture due to the weight of the product may lead to injuries.

- Observe the weight specifications.
- Use suitable transport equipment when moving the product.
- Only carry out work on the product when it is in an upright position.

If the securing elements are not tightened correctly or inappropriate securing elements are selected, this may lead to injuries.

- Observe and check the installation instructions in the operating instructions. If there is no information, the applicable guidelines are to be observed according to current engineering practices.
- Also observe the instructions in the operating manual for the system/machine manufacturer.
- Check the tightening torque, number and strength ratings of the bolts according to the specifications on the product drawing and in the technical data of the product in the appendix.
- Make sure that the bolts cannot become loose accidentally.

Incorrect alignment of the product may lead to injuries.

- Observe the information on the alignment and installation position of the product in accordance with the product drawing.

It is only possible to carry out maintenance operations when stationary. Bring the system/machine to a secure position and lock it in place. Switch the main motor off and secure the system/machine against unintended movements.

9.1 Maintenance overview

Intervention	Frequency/event	Chapter
Checking product		
General visual inspection	Weekly	9.2
Check the threaded connections	Annually	9.2
Check for noise and heat build-up as well as oscillations	Monthly	9.2
Check the magnet spool	if required	9.2
Check the air gap	Monthly	9.2
Cleaning the product		
Clean the surface	Annually	9.2
Changing wear parts		
Change the friction linings	<p>Wet-running: The plate pack works wear-free in wet-running. The plate pack only needs to be replaced in the event of thermal overload.</p> <p>Dry-running: The plate pack does not work wear-free in dry-running. The plate pack must be replaced when the wear limit is reached (see information on the product drawing) and the resulting torque drop, or in the event of thermal overload.</p>	9.2

* If necessary, earlier change in consideration of oil change periods of system/machine manufacturer

9.2 Description of the maintenance intervention



Danger!

- Only use cleaning agents in accordance with the operating instructions of the manufacturer. Avoid contact with skin. Only use with good ventilation



Caution!

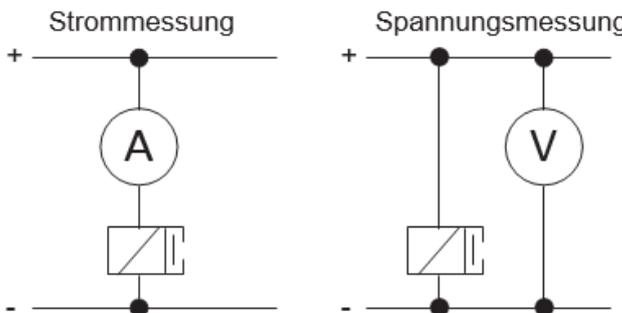
The cleaning of plates is not permitted.

- In the event of contamination, replace the plates.

incorrect care and cleaning may cause damage to the product.

- Do not use any corrosive, acidic or alkaline cleaning agents and abrasives.
- Electrical components may be damaged or destroyed by cleaning agents. Clean these with extreme care.
- Do not use water or agents that may damage the corrosion protection or parts of the product.

<p>General visual inspection</p>	<ol style="list-style-type: none"> 1. Check the clutch for mechanical damage, dirt, wear and corrosion. 2. Check load-bearing components for corrosion. 3. Check the function.
<p>Check the threaded connections</p>	<ol style="list-style-type: none"> 1. Check that all threaded connections are tightened to the specified torque in accordance with the specifications on the product drawing and in the technical data for the product in the appendix. 2. Tighten loose bolts and secure them using Loctite type 262.
<p>Check for noise and heat build-up as well as oscillations</p>	<ol style="list-style-type: none"> 1. Check for unusual noises, vibrations and oscillations. 2. Monitor the operating temperature. If unusual heating is detected during the test, it must be cancelled. 3. Before continuing operation, find the cause of the noise, vibration, oscillations and heat build-up, and rectify this.
<p>Cleaning the product</p>	<ol style="list-style-type: none"> 1. Remove loose dirt, corrosion, and deposits of dust or dirt. 2. To clean our products, you can use petroleum, for example, for all parts with the exception of friction surfaces, petroleum ether or a substance with additional anti-corrosive function, such as e.g. Castro Rustilo DW 180 HF for external use. 3. When using the liquids mentioned, only use them on a cleaning cloth, which will prevent liquid from penetrating the inside of the clutch.

<p>Check the magnet spool</p>	<ol style="list-style-type: none"> 1. To check the magnet spool, you can check the power consumption. 2. Measure the current using an ammeter and the applied voltage using a voltmeter in accordance with the following connection diagram:  3. Compare the resulting performance specifications with the data on the product drawing.
<p>Change the friction linings</p>	<ol style="list-style-type: none"> 1. Remove the clamping nut (item 9). 2. The plate pack (item 1 and 2) and the pressure disc (item 3) can now be replaced. 3. Assembly is carried out in reverse order.
<p>Checking the air gap and readjusting</p>	<ol style="list-style-type: none"> 1. Frictional wear reduces the air gap between the magnet body (item 5) and armature disc (item 12) when the clutch is closed. In any case, a small residual air gap is required and the armature disc (item 12) must be prevented from hitting the magnet body (item 5). 2. Check the air gap "S" between the magnet body (item 5) and armature disc (item 12) in the closed state using a non-magnetic feeler gauge and compare it with the specifications in the technical data. 3. The clamping nut (item 9) and hub (item 8) are connected to each other via a right-hand thread. If required, adjust the air gap by loosening the clamping screw (item 10) of the clamping nut (item 9). Turn the clamping nut (item 9) clockwise to reduce the torque and increase the air gap. Turn the clamping nut (item 9) anti-clockwise to increase torque and decrease the air gap. 4. Re-lock the clamping nut (item 9) by tightening the clamping screw (item 10) and check the air gap again using a non-magnetic feeler gauge.

10 Removal

This chapter describes removal for a service event and disposal.

Only persons who meet the requirements from the "Requirements of the personnel" chapter are permitted to remove the product. The personnel must be trained accordingly and have the necessary skills for removal.

Personal protective equipment

Provide the following prescribed (personal) protective equipment for activities associated with removal:



Danger

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable footwear, e.g. safety shoes with a safety rating relevant to the activity in question
- Suitable eyewear, e.g. safety glasses or goggles with a safety rating relevant to the activity in question
- Suitable respiratory protection, e.g. masks with a safety rating relevant to the activity in question

If moving parts approach a fixed part, injuries can ensue.

- Observe the accident prevention regulations.
- Do not reach into the components while the product is being transported.
- Secure loose components to prevent unintended movements.

If the product is not stable, this may result in injuries.

- Make sure that the ground is firm and the location is stable before placing the product down.
- Secure the product or components against rolling or toppling over.
- Stop the system/machine before removing the product and secure it against accidental movements.
- Cordon off the hazard area.

If components under spring pressure are suddenly released, this may lead to injuries.

- Observe the instructions in the chapters relating to correct assembly and removal of the product.

Obstacles falling down may cause injuries.

- Observe the accident prevention regulations when moving heavy loads.
- When moving the product, use safe lifting equipment with a sufficient load-bearing capacity and lifting gear with appropriate dimensions and the dedicated mounting points for the entire product in accordance with the product drawing.
- Observe the correct sequence for removing the product.

Sharp edges and pointed components may cause injuries.

- Secure the components during transport.
- Before removing the components, check them for damage and sharp edges.

A faulty electrical connection may lead to short circuits on the electromagnet and supply lines, and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that the connection is only carried out by qualified personnel.

Selecting the incorrect electrical control and connection components may lead to high currents, electric arcs, heating and cause injuries.

- Observe the relevant safety standards for electrical appliances.
- Ensure that any connectors and cables used are sufficiently insulated.
- Ensure that the components are selected by a specialist.

Live parts or parts that have become live due to a fault may lead to injuries.

- Observe the relevant safety standards for electrical appliances.

High operating temperatures of the product may lead to thermal radiation and cause injuries.

- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.

High operating temperatures of the product may lead to burn injuries.

- Observe the instructions from the operator.
- Make sure that the product cannot be touched by persons during operation.
- Make provision for sufficient supply of air and/or cooling.
- Observe and monitor the speed limits on the input and output sides.

Wear from friction surfaces can cause breathing difficulties.

- Prevent any dust associated with plate wear from escaping by encapsulating the parts.

Swirling dust may cause breathing difficulties and eye irritation.

- Avoid the use of compressed air.
- Arrange for the use of a vacuum cleaner

Physical strain or poor posture due to the weight of the product may lead to injuries.

- Observe the weight specifications.
- Use suitable transport equipment when moving the product.
- Only carry out work on the product when it is in an upright position.

If the securing elements are not tightened correctly or inappropriate securing elements are selected, this may lead to injuries.

- Observe and check the installation instructions in the operating instructions. If there is no information, the applicable guidelines are to be observed according to current engineering practices.

- Also observe the instructions in the operating manual for the system/machine manufacturer.
- Check the tightening torque, number and strength ratings of the bolts according to the specifications on the product drawing and in the technical data of the product in the appendix.
- Make sure that the bolts cannot become loose accidentally.



Note!

- These operating instructions are only relevant to the scope of delivery from . Also observe the operating instructions of the system/machine manufacturer.

Removal is generally only possible when stationary. Move the system/machine to a secure position and lock it in place. Switch the main motor off and secure the system/machine against unintended movements.

Remove the product in the reverse order of assembly as per the respective installation situation (see "Assembling the product – basic equipment" chapter).

11 Disposal

This chapter describes correct disposal of the product.

Only persons who meet the requirements from the "Requirements of the personnel" chapter are permitted to dispose of the product. The personnel must be trained accordingly and have the necessary skills for disposal.

Personal protective equipment

Provide the following prescribed (personal) protective equipment for activities associated with disposal:

- Suitable hand protection, e.g. gloves with a safety rating relevant to the activity in question
- Suitable footwear, e.g. safety shoes with a safety rating relevant to the activity in question
- Suitable eyewear, e.g. safety glasses or goggles with a safety rating relevant to the activity in question

If moving parts approach a fixed part, injuries can ensue.

- Observe the accident prevention regulations.
- Do not reach into the components while the product is being transported.
- Secure loose components to prevent unintended movements.



Danger

If the product is not stable, this may result in injuries.

- Make sure that the ground is firm and the location is stable before placing the product down.
- Secure the product or components against rolling or toppling over.

Obstacles falling down may cause injuries.

- Observe the accident prevention regulations when moving heavy loads.
- When moving the product, use safe lifting equipment with a sufficient load-bearing capacity and lifting gear with appropriate dimensions and the dedicated mounting points for the entire product in accordance with the product drawing.

Sharp edges and pointed components may cause injuries.

- Secure the components during transport.
- Before removing the components, check them for damage and sharp edges.

Swirling dust may cause breathing difficulties and eye irritation.

- Avoid the use of compressed air.

**Note!**

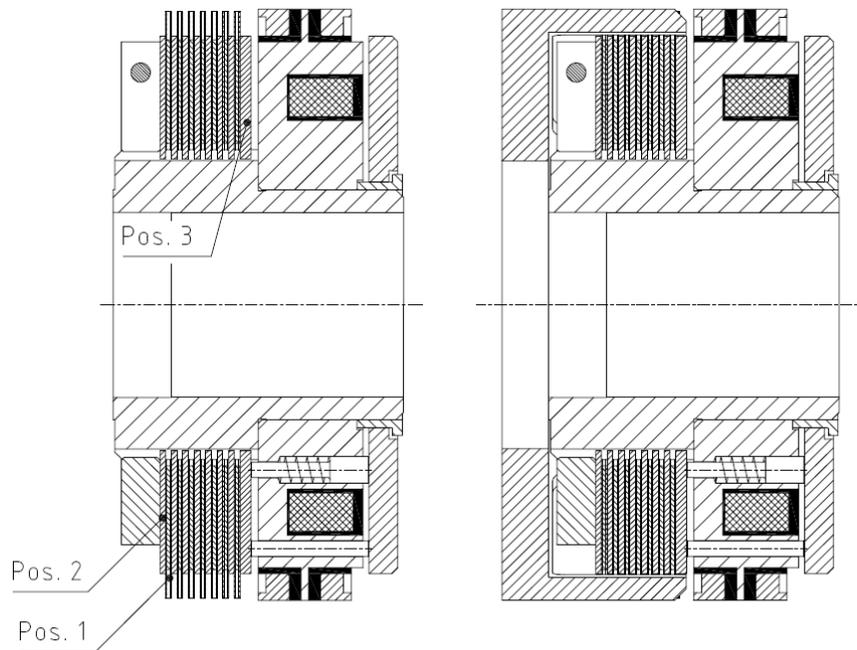
- Observe the applicable environmental regulations.

The product consists of various materials that can be recycled or need to be disposed of separately. After removal, separate the individual parts of the product according to the type of material.

Dispose of the individual parts according to the provisions of the relevant country of the user and according to the national and local regulations.

12 Spare parts

This chapter lists the available spare parts that the customers can replace themselves.



Spare parts drawing for the 006 model series

Item	Individual part
1	Outer plate
2	Inner plate
3	Pressure disc

13 Service

For the replacement of components, repairs or a conversion on site, contact Service. To be able to advise you in the best possible way, please have the article number or the order number ready, e.g. 100123456.

Contact us via e-mail or telephone:

info@stuewe-ag.ch

+41 (0) 81 77 22 500

The warranty entitlement can only be honoured if original spare parts are used.

Size	Selectable torque M_s [Nm]		Maximum speed n_{max} [rpm]		
	Dry-running	Wet-running	Dry-running	Wet-running One coil connection	Wet-running Two coil connections
15	60	50	3400	1700	3400
23	120	100	3000	1500	3000
31	240	200	2400	1200	2400
43	600	500	1900	950	1900
51	1200	1000	1500	750	1500

Oil requirements

The function of the lubricant used is of crucial importance for the long-term operation of our wet-running products.

The following applies to wet-running:

- Use a hydraulic oil (HLP) with a viscosity of 32 mm²/s (cSt), e.g. Shell Tellus S2 MX 32 (formerly Tellus 127) at peripheral velocities between 5 and 12 m/s (based on the outer diameter of the clutch).
- Use a hydraulic oil (HLP) with a viscosity of 10 mm²/s (cSt), e.g. Shell Morlina S2 BL 10 (formerly Tellus 15) at peripheral velocities between 5 and 12 m/s (based on the outer diameter of the clutch).
- If other oils are used, must be consulted beforehand.

The following applies for dry-running:

- Clutches for dry-running must not be lubricated. Only the centring nut (item 13) should be provided with a grease of a higher consistency, e.g. Shell Alvania R2.
- If other greases are used, must be consulted beforehand.

Restrictions may be caused by other components connected to the same oil circuit.

Note!

- Observe the oil approval list from the system/machine manufacturer.

Mixed lubricants may lead to functional impairments, such as a reduction in friction or foaming, as well as product damage.

- To prevent a negative change to the properties, never mix different lubricants together.



Caution

14.3 Standards and directives

Where our products come under the area of application of an EU directive, we produce a declaration of conformity and confirm compliance with this declaration of conformity.

- **Machinery Directive 2006/42/EU/Low Voltage Directive 2014/35/EU:** The products have a CE mark if required under the directive.
- **RoHS Directive:** The products receive a CE mark on request.

14.3.1 REACH regulation

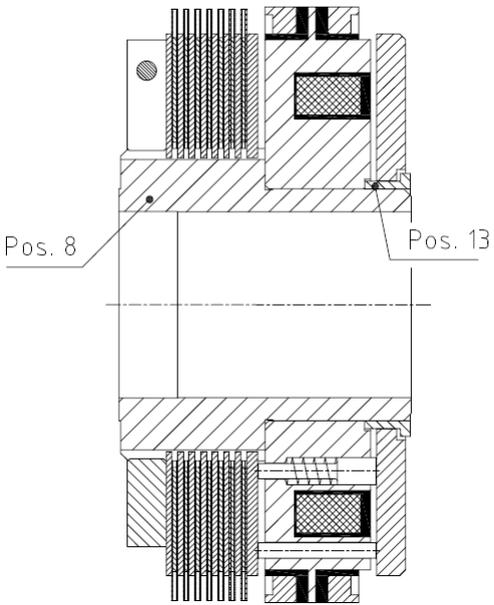
actively tracks the REACH requirements of the EU and has to the best of its knowledge and belief identified its duties and obligations. We unreservedly support the aim of the REACH regulation in improving the protection of human health and the environment.

We are a manufacturer of clutches, brakes and systems for various areas of industry. Our items are classed as products according to item 3 (3) of the REACH regulation.

acknowledges its duty to supply information to all of its customers according to item 33 of the REACH regulation if the product that we supply exceeds the defined value of the mass concentration of a substance of very high concern (SVHC).

regularly checks the published and updated list of SVHC substances on the website of the European Chemicals Agency ECHA.

This product contains lead (CAS number 7439-92-1) at a concentration of more than 0.1%.

Designation	Note/Explanation/SCIP no.
Hub, Centring nut	<p>The material of the hub (item 8) and the centring nut (item 13) contains lead.</p> 

For customer-specific products, see the shipping documents for deviating information.

SCIP database

The SCIP duty to inform applies to all items that are circulated in the EU.

Stüwe Switzerland AG will provide you with the necessary information for entry in the SCIP database. Entry in the database is to be carried out by you as an EU importer. This information contains the product, component and the affected substance from the SVHC substance list. If SCIP numbers are partially present from the supply chain, we will inform you of these as well.

You can find this information in these operating instructions in the "REACH regulation" chapter and/or in the order documents.

14.3.2 RoHS Directive

Electronic, electromagnetic and electrohydraulic products, as well as products with integrated electronic components, from may fall under this EU directive if they are not installed in large-scale, fixed installations.

Other products, e.g. hydraulic and pneumatic products, are not subject to this EU directive, i.e. we are not permitted to produce a declaration of conformity. However, should you require confirmation that a product of this kind is within the substance limits of this EU directive, we are able to provide this confirmation for certain order and material numbers.

The lead substance limits of RoHS Directive 2011/65/EU for aluminium alloys, steel alloys and copper alloys are complied with.

Lead cannot be removed from these alloys.

14.3.3 Machinery directive 2006/42/EC

Products of the standard series are components. They do not fall under the area of application of the machinery directive because, although they are intended for installation in machines, they are not designed for a specific application (for a special type of machine).

Customer-specific products are specially designed in terms of connection and performance data. However, these modified products are based on the designs of the standard series and are also components.

For this reason, a declaration of conformity or installation is not produced for these products.

It goes without saying that the products satisfy all applicable legal requirements, particularly with regard to further relevant regulations concerning CE marking as well as the Product Safety Act ProdSG (DE) and the Federal Product Safety Act PrSG (CH).

14.3.4 Low Voltage Directive 2014/35/EU

Electronic, electromagnetic and electrohydraulic products from may fall under this EU directive if the voltage is > 50 V AC and > 75 V DC and another specific directive does not exclude this NRL.

14.3.5 EMC test

The product is a component/assembly and not designed for the end user to install in a device.

Adherence to the EMC directive is the responsibility of the (industrial) user who will install or mount the device.

14.4 Supplementary technical data

Tightening torques for the bolts *

Strength class	10.9		12.9	
	M _A [Nm]	± M _A [Nm]	M _A [Nm]	± M _A [Nm]
M4	4.6	0.2	5.1	0.2
M5	8.6	0.3	10	0.4
M6	14.9	0.6	17.4	0.7
M8	36.1	1.4	42.2	1.7
M10	71	2.8	83	3.3
M12	123	4.9	144	5.8
M14	195	7.8	229	9.2
M16	302	12.1	354	14.2
M18	421	16.8	492	19.7
M20	592	23.7	692	27.7
M22	807	32.3	945	37.8
M24	1017	40.7	1190	47.6
M27	1496	59.8	1750	70
M30	2033	81.3	2380	95.2
M33	2747	109.9	3214	128.6
M36	3535	141.4	4136	165.4

* For deviating tightening torques, please refer to the supplied product drawing.

Scope: DIN EN ISO 4762 (formerly DIN 912) cylinder head bolt (with hexagon socket head)

DIN EN ISO 4014 (formerly DIN 931) hexagon head bolt (with shank)

DIN EN ISO 4017 (formerly DIN 933) hexagon head bolt (with thread up to head)

14.5 Declarations

If declarations exist for this product (declaration of conformity, declaration of installation, etc.), these can be found on the homepage.