

| No. | Equipment | Manufacturer | Document | No. of pages |
|-----|------------------|--------------------------------------|------------------------------------|--------------|
| 1 | | Motor List | | 1 |
| 2 | All motors | Siemens | Installing, operation, maintenance | 56 |
| 3 | Hoist gear | Sala Note: New model no.: J110 | Installing, operation, maintenance | 15 |
| 4 | Hoist motorbrake | Siemens | Operation, Maintenance | 20 |
| | | | | |
| 5 | Slewing brake | Krøll K-Brake | Adjustment | 4 |



List of motors

K250D-1292

| Designation | Туре | Krøll No. |
|-----------------------|--------------------|-------------|
| | | |
| Hoist motor 42.5 kW | 1LP92074AA91-Z | 15.00050916 |
| | | |
| Trolley motor 16.1 kW | 1LE10011CC322FB4-Z | 15.00050992 |
| | | |
| Slewing motors 5.5 kW | 1LA9 134-6KA11-Z | 15.00059019 |
| | | |

SIEMENS



SIMOTICS GP, SD, DP

Low-voltage motors
1LA, 1LE, 1LF, 1LG, 1LP, 1FP, 1PC, 1PF, 1PK, 1PP, 1PQ

Compact operating instructions



SIEMENS SIMOTICS GP, SD, DP Low-voltage motors Standard machines

Compact Operating Instructions

Legal information Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

/ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.

/!\WARNING

indicates that death or severe personal injury may result if proper precautions are not taken.

!\CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

1 Introduction

1.1 Machine types

These instructions are applicable for the following machine types 1LA, 1LE, 1LF, 1LG, 1LP, 1FP, 1PC, 1PF, 1PK, 1PP, 1PQ

1.2 Information for the reader



Note for 1LE1, 1FP1, 1MB1, 1PC1, 1PC3 machines



Note for 1LE1, 1PC1 and 1PC3 machines, frame sizes 80 and 90 with central terminal box locking

2 Safety notes

2.1 Information for those responsible for the plant or system

This electric machine has been designed and built in accordance with the specifications contained in Directive 2006/95/EC up to April 19, 2016 - and from April 20, 2016 according to Directive 2014/35/EU ("Low-Voltage Directive") and is intended for use in industrial plants. Please observe the country-specific regulations when using the electric machine outside the European Community. Follow the local and industry-specific safety and setup regulations.

The persons responsible for the plant must ensure the following:

- Planning and configuration work and all work carried out on and with the machine is only to be done by qualified personnel.
- The operating instructions must always be available for all work.
- The technical data as well as the specifications relating to the permissible installation, connection, ambient and operating conditions are taken into account at all times
- The specific setup and safety regulations as well as regulations on the use of personal protective equipment are observed.

Note

Use the services and support provided by the appropriate Service Center (Page 107) for planning, installation, commissioning, and servicing work.

You will find safety instructions in the individual sections of this document. Follow the safety instructions for your own safety, to protect other people and to avoid damage to property.

Observe the following safety instructions for all activities on and with the machine.

2.2 The five safety rules

For your own personal safety and to prevent material damage when carrying out any work, always observe the safety-relevant instructions and the following five safety rules according to EN 50110-1 "Working in a voltage-free state". Apply the five safety rules in the sequence stated before starting work.

Five safety rules

- 1. Disconnect the system.
 - Also disconnect the auxiliary circuits, for example, anti-condensation heating.
- 2. Secure against reconnection.
- 3. Verify absence of operating voltage.
- 4. Ground and short-circuit.
- 5. Provide protection against adjacent live parts.

To energize the system, apply the measures in reverse order.

2.3 Qualified personnel

All work at the machine must be carried out by qualified personnel only. For the purpose of this documentation, qualified personnel is taken to mean people who fulfill the following requirements:

- Through appropriate training and experience, they are able to recognize and avoid risks and potential dangers in their particular field of activity.
- They have been instructed to carry out work on the machine by the appropriate person responsible.

2.4 Safe handling

Workplace safety depends on the attentiveness, care, and common sense of the personnel who install, operate, and maintain the machine. In addition to the safety measures cited, as a matter of principle, the use of caution is necessary when you are near the machine. Always pay attention to your safety.

Also observe the following to prevent accidents:

- General safety regulations applicable in the country where the machine is deployed.
- Manufacturer-specific and application-specific regulations
- Special agreements made with the operator
- Separate safety instructions supplied with the machine
- Safety symbols and instructions on the machine and its packaging



/ WARNING

Live parts

Electric machines contain live parts.

Fatal or severe injuries and substantial material damage can occur if the covers are removed or if the machine is not handled, operated, or maintained properly.

- Always observe the "five safety rules" (Page 57) when carrying out any work on the machine.
- Only remove the covers using the methods described by these operating instructions.
- Operate the machine properly.
- Regularly and correctly maintain the machine.



/ WARNING

Rotating parts

Electric machines contain dangerous rotating parts.

Fatal or severe injuries and substantial material damage can occur if the covers are removed or if the machine is not handled, operated, or maintained properly.

- Only remove the covers using the methods described by these operating instructions.
- Operate the machine properly.
- Perform regular maintenance on the machine.
- Secure free-standing shaft ends.



/ WARNING

Hot surfaces

Electric machines have hot surfaces. Do not touch these surfaces. They could cause burns.

- Allow the machine to cool before starting work on the machine.
- Only remove the covers using the methods described by these operating instructions.
- Operate the machine properly.



/İ\CAUTION

Hazardous substances

Chemical substances required for the setup, operation and maintenance of machines can present a health risk.

Poisoning, skin damage, cauterization of the respiratory tract, and other health damage may result.

- Read the information in these operating instructions and the product information supplied by the manufacturer.
- Observe the relevant safety regulations and wear the personal protective equipment specified.



Flammable substances

Chemical substances required for the setup, operation and maintenance of machines may be flammable.

Burns and other damage to health and material may result.

- Read the information in these operating instructions and the product information supplied by the manufacturer.
- Observe the relevant safety regulations and wear the personal protective equipment specified.



Interference to electronic devices caused by electrical power equipment

Electrical power equipment generate electric fields during operation. Potentially lethal malfunctions can occur in medical implants, e.g. pacemakers, in the vicinity of electrical power equipment. Data may be lost on magnetic or electronic data carriers.

- It is forbidden for people with pacemakers to enter the vicinity of the machine.
- Protect the personnel working in the plant by taking appropriate measures, such as erecting identifying markings, safety barriers and warning signs and giving safety talks.
- Observe the nationally applicable health and safety regulations.
- Do not carry any magnetic or electronic data media.

2.5 Interference voltages when operating the converter



Interference voltages when operating the converter

When a converter is in operation, the emitted interference varies in strength depending on the converter (manufacturer, type, interference suppression measures undertaken). On machines with integrated sensors (e.g. PTC thermistors), interference voltages caused by the converter may occur on the sensor lead. This can cause faults which can result in eventual or immediate death, serious injury or material damage.

Observe the EMC instructions of the converter manufacturer in order to avoid exceeding the limit values according to IEC/EN 61000-6-3 for drive systems comprising machine and converter. You must put appropriate EMC measures in place.

3 Description

Additional languages in the Internet

You can find the operating instructions in other languages on the Internet page: http://support.industry.siemens.com (Page 107)

If you require additional language versions, please contact the Siemens Service Center (Page 107).

Intended use of the machines

These machines are intended for industrial installations. They comply with the harmonized standards of the series EN / IEC 60034 (VDE 0530). It is prohibited that these motors are used in hazardous zones if the marking on the rating plate does not explicitly permit line or converter operation. If other/more wide-ranging demands (e.g. protection so that they cannot be touched by children) are made in special cases – i.e. use in non-industrial installations – these conditions must have been complied with in the plant or system itself when the motors are installed.

Note

Machine directive

Low-voltage motors are components designed for installation in machines in accordance with the current Machinery Directive. Commissioning is prohibited until it has been absolutely identified that the end product is in conformance with this Directive. Observe machinery directive EN 60204-1!

3.1 Operating UL-certified machines with a converter

Note

Operating a machine with a converter

Implement all machines of the overall machine-converter system according to UL-File E227215 assuming that the machines are only to be operated with a converter and are supplied with UL certificate.

The company operating the equipment is responsible for implementing this in the actual application.

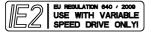
3.2 CE marking

Note

Use of machines without CE identification

Machines without **(** marking are intended for operation outside the European Economic Area (EEA). Do not use any machines without CE mark within of the EEA!

3.3 IE2 marking



Note

IE2 marking

Since January 1, 2015, according to REGULATION (EC) No. 640/2009, low-voltage motors with power ratings above 7.5 kW up to 375 kW – and with efficiency IE2 – have this label.

This is mandatory within the European Economic Area (EEA). Customers are solely responsible in ensuring the correct use.

When connecting the machine to a converter, carefully observe the rules and notes in Chapter "Connecting a converter."

3.4 Regulations

The regulations and standards used as basis to design and test this machine are stamped on the rating plate. The machine design basically complies with the following standards:

Table 3-1 Applicable general regulations

| Feature | Standard |
|---|--|
| Dimensioning and operating behavior | EN / IEC 60034-1 |
| Procedure for determining the losses and the efficiency of rotating electrical machines and inspections | EN / IEC 60034-2-1 EN / IEC 60034-2-2 EN / IEC 60034-2-3 |
| Degree of protection | EN / IEC 60034-5 |
| Cooling | EN / IEC 60034-6 |
| Type of construction | EN / IEC 60034-7 |
| Terminal designations and direction of rotation | EN / IEC 60034-8 |
| Noise emission | EN / IEC 60034-9 |
| Starting characteristics of rotating electrical machines | EN / IEC 60034-12 |
| Vibration severity grades | EN / IEC 60034-14 |
| Efficiency classification of three-phase squirrel-cage induction motors | EN / IEC 60034-30 |
| IEC standard voltages | IEC 60038 |

3.5 Forced ventilation (optional)

Forced ventilation (optional): Type of cooling IC 416 in accordance with EN / IEC 60034-6

Cooling that does not depend on the speed is achieved by means of a separately driven fan wheel (forced ventilation). Forced ventilation does not depend on the operating state of the machine.

The fan wheel for the external flow of cooling air is powered by an independent module and is enclosed by the fan cover.

3.6 Degree of protection

The machine has a type of protection as stamped on the rating plate, and can be installed in dusty or humid environments.

3.7 Environmental conditions

Limit values for the standard version

| Relative humidity for ambient temperature T _{amb} 40 °C | Max. 55 % |
|--|------------------|
| Ambient temperature | -20 °C to +40 °C |
| Installation altitude | ≤ 1000 m |
| Air with normal oxygen content, usually | 21 % (V/V) |

If the environmental conditions are different from the details listed here, then the values on the rating plate will apply.

The machine is suitable for tropical climates.

4 Preparing for use

Good planning and preparation of machine applications are essential in terms of keeping installation simple and avoiding errors, ensuring safe operation, and allowing access to the machine for servicing and corrective maintenance.

This chapter outlines what you need to consider when configuring your plant in relation to this machine and the preparations you need to make before the machine is delivered.

4.1 Safety-related aspects to consider when configuring the plant

A number of residual risks are associated with the machine. These are described in the chapter titled "Safety information" (Page 57) and in related sections.

Take appropriate safety precautions (covers, barriers, markings, etc.) to ensure the machine is operated safely within your plant.

4.2 Observing the operating mode

Observe the machine's operating mode. Use a suitable control system to prevent overspeeds, thus protecting the machine from damage.

4.3 Delivery

Checking the delivery for completeness

The drive systems are put together on an individual basis. When you take receipt of the delivery, please check immediately whether the items delivered are in accordance with the accompanying documents. Siemens will not accept any claims relating to items missing from the delivery and which are submitted at a later date.

- Report any apparent transport damage to the delivery agent immediately.
- Report any apparent defects/missing components to the appropriate SIEMENS office immediately.

Archive the safety and commissioning notes provided in the scope of delivery as well as the optionally available operating instructions so that these documents are always easily accessible.

The rating plate optionally enclosed as a loose item with the delivery is provided to enable the motor data to be attached on or near the machine or installation.

4.4 Transport and storage

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.



Risk of dropping and swinging when transported suspended

If you transport the motor suspended from cables or ropes, the cables or ropes can break, e.g. as a result of damage. Further, if not adequately attached, the motor can swing. This can result in death, serious injury, or material damage.

- Use additional, suitable lifting equipment for transport and during installation.
- Two cables alone must be able to carry the complete load.
- Prevent the lifting equipment from sliding by appropriately securing it.

/ WARNING

Toppling over or slipping of the motor

The motor can slide or topple over if it is not correctly lifted or transported. This can result in death, serious injury, or material damage.

- Use all the lifting eyes on the machine.
- When using the lifting eyes on the machine, do not attach any additional loads or weight. The lifting eyes are only designed for the weight of the machine itself.
- Any eyes that are screwed in must be tightly fastened.
- Eyebolts must be screwed in right up to their supporting surface.
- Comply with the permissible eyebolt loads.
- When necessary, use suitably dimensioned transport equipment, for example hoisting straps (EN1492-1) and load restraints (EN12195-2).

Note

When lifting the machines for transport, only lift them in a position that corresponds to their basic construction type.

The type of construction of the machine is stated on the rating plate.

4.4.1 Storage

Storing outdoors

NOTICE

Damage to the motor

Damage can occur if incorrectly stored.

Take all precautions to protect the motor under extreme climatic conditions, e.g. salt-laden and/or dusty, moist/humid atmospheres.

Choose a dry storage location which is safe from flooding and free from vibration. Repair any damage to the packaging before putting the equipment into storage if this is necessary to ensure proper storage conditions. In order to ensure protection against ground moisture, locate machines, equipment and crates on pallets, wooden beams or foundations. Prevent equipment from sinking into the ground. Do not impede air circulation under the stored items.

Covers or tarpaulins used to protect the equipment against the weather must not come into contact with the surfaces of the equipment. Use wooden spacer elements to ensure that air can circulate freely around the equipment.

Storing indoors

The storage rooms must provide protection against extreme weather conditions. They must be dry, free from dust, frost and vibration and well ventilated.

Bare metal surfaces

For transport, the bare surfaces (shaft ends, flange surfaces, centering edges) should be coated with an anti-corrosion agent which will last for a limited amount of time (<6 months). Apply suitable anti-corrosion measures for longer storage times.

Condensation drain hole

Open any condensation drain holes to drain the condensation depending on the environmental conditions, every six months at the latest.

Storage temperature

Permissible temperature range: -20 °C to +50 °C

The relative humidity of the air should be less than 60 %.

For machines that have a special design regarding the coolant temperature in the operating state or the installation altitude, other conditions could apply regarding the storage temperature. In this case, refer to the machine rating plate for data on the coolant temperature and installation altitude.

Storage time

Turn the shafts 1x every year to avoid bearing brinelling. Prolonged storage periods reduce the useful life of the bearing grease (aging).

Open bearings

- For open bearings, e.g. 1Z, check the status of the grease when stored for longer than 12 months.
- Replace the grease if it is identified that the grease has lost its lubricating properties or is polluted. The consistency of the grease will change if condensation is allowed to enter.

Closed bearings

 For sealed bearings, replace the DE and NDE bearings after a storage time of 48 months.

NOTICE

Storage

The motor can be damaged if you use it or store it unprotected outdoors.

- Protect the motor against intensive solar radiation, rain, snow, ice and dust. Use a superstructure or additional cover, for example.
- If required, contact the Siemens Service Center, or technically coordinate outdoors use.

4.5 Electromagnetic compatibility

Note

If the torque levels are very unequal (e.g. when a reciprocating compressor is being driven), a non-sinusoidal machine current will be induced whose harmonics can have an impermissible effect on the supply system and cause impermissible interference emissions as a result.

Note

Converter

- If operated with a frequency converter, the emitted interference varies in strength, depending on the design of the converter (type, interference suppression measures, manufacturer).
- Avoid that the specified limit values stipulated for the drive system (consisting of the motor and converter) are exceeded.
- You must observe the EMC information from the manufacturer of the converter.
- The most effective method of shielding is to conductively connect a shielded machine supply cable to the metal terminal box of the machine (with a metal screw connection) over a large surface area.
- On machines with integrated sensors (e.g. PTC thermistors), disturbance voltages caused by the converter may occur on the sensor cable.

4.6 Converter operation

4.6.1 Parameterizing the converter

- If the design of the motor requires connection to a particular converter type, the rating plate will contain corresponding additional information.
- Correctly parameterize the converter. Parameterizing data can be taken from the machine rating plate (not the supplementary rating plate with the operating data when connected to a converter).

You can find parameter data here:

- In the operating instructions for the converter.
- In the SIZER engineering tool
- In the SINAMICS Configuration Manuals.
- For explosion-protected machines, also in the declaration of compliance with the order 2.1.
- Do not exceed the specified maximum speed limit n_{max}. You can either find this
 on the rating plate n_{max}, under the supplementary plate for converter operation as
 the highest speed, or in Catalog D81.1.
- Check that it is guaranteed that the machine is cooled for commissioning.

4.6.2 Reducing bearing currents during operation with converter (low voltage)

Taking the following actions will reduce the bearing currents:

 Ensure that the contacts are established over a large area. Solid copper cables are not suitable for high frequency grounding because of the skin effect.

Equipotential bonding conductors:

Use equipotential bonding conductors:

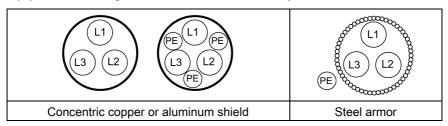
- Between motor and driven machine
- Between motor and converter
- Between the terminal box and the RF grounding point at the motor enclosure.

Selecting and connecting the cable:

As far as possible, use symmetrically arranged, shielded connection cables. The cable shielding, made up of as many strands as possible, must have good electrical conductivity. Braided shields made of copper or aluminum are very suitable.

• The shield is connected at both ends, at the motor and converter.

- To ensure good discharging of high-frequency currents, provide contacting over a large surface area:
 - as contact established through 360° at the converter
 - at the motor, for instance with EMC glands at the cable entries
- If the cable shield is connected as described, then it ensures the specified equipotential bonding between the motor enclosure and converter. A separate RF equipotential bonding conductor is then not necessary.



- If the cable shield is not connected due to special secondary conditions, or not
 adequately connected, then the specified equipotential bonding is not provided. In
 this particular case, use a separate RF equipotential bonding conductor:
 - Between the motor enclosure and protective ground rail of the converter.
 - Between motor enclosure and driven machine
 - Use braided flat copper straps or high-frequency cables with finely-stranded conductors for the separate RF equipotential bonding cable. Solid copper cables are not suitable for high frequency grounding because of the skin effect.
 - Ensure that the contacts are established over a large area.

Overall system design

To specifically reduce and prevent damage caused by bearing currents, you must consider the system as a whole, which comprises the motor, converter, and driven machine. The following precautions help to reduce bearing currents:

- In the overall system, set up a properly meshed grounding system with low impedance.
- Use the common-mode filter (damping cores) at the converter output. The Siemens sales representative is responsible for selection and dimensioning.
- Limit the rise in voltage by using output filters. This dampens the harmonic content in the output voltage.

Note

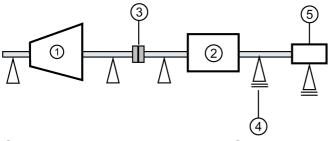
Converter documentation

The operating instructions for the converter are not part of this documentation. Refer also to the configuration information for the converter.

4.6.3 Insulated bearings when operated with a converter

If the machine is operated from a low-voltage converter, insulated bearings are fitted at the NDE and an insulated encoder with insulated bearings (option).

Comply with the plates on the machine relating to bearing insulation and possible bridges.



- Driving machine
- ② Motor
- 3 Coupling

- 4 Insulated bearings
- ⑤ Insulated tachometer fitting

Figure 4-1 Schematic representation of a single drive

NOTICE

Bearing damage

The bearing insulation must not be bridged. Damage may be caused to the bearings if there is a flow of current.

- Also for subsequent installation work, such as the installation of an automatic lubrication system or a non-insulated vibration sensor, make sure that the bearing insulation cannot be bridged.
- Contact the Service Center, if necessary.

Tandem operation

If you connect two motors in series in "tandem operation", install an insulated coupling between the motors.

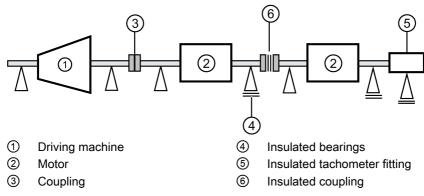


Figure 4-2 Schematic representation of a tandem drive

NOTICE

Bearing damage

If the coupling between the motors of the tandem drive is not insulated, bearing currents can cause damage to the drive-end bearings of both motors.

Use an insulated coupling to link the motors.

4.6.4 Operation with insulated coupling (EX)

If you connect two motors in series in "tandem operation", fit a coupling between the motors; this coupling should satisfy the ATEX Directive or the regulations that apply in the country where the equipment is installed.

5 Installation

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

Note

Loss of conformity with European directives

In the delivery state, the machine corresponds to the requirements of the European directives. Unauthorized changes or modifications to the machine lead to the loss of conformity with European directives and the loss of warranty.

5.1 Preparing for installation

5.1.1 Requirements for installation

The following requirements must be satisfied prior to starting installation work:

- Staff have access to the operating and installation instructions.
- The machine is unpacked and ready for mounting at the installation location.

Note

Measure the insulation resistance of the winding before starting installation work

Wherever possible, measure the insulation resistance of the winding before starting installation work. If the insulation resistance lies below the specified value, take appropriate remedial measures. These remedial measures may necessitate the machine being removed again and transported.

Note

Note also the technical data on the rating plates on the motor enclosure.

NOTICE

Damage to the motor

To avoid material damage, before commissioning, check whether the correct direction of rotation of the machine has been set on the customer side, e.g. by decoupling from the driven load.

5.1.2 Insulation resistance

5.1.2.1 Insulation resistance and polarization index

Measuring the insulation resistance and polarization index (PI) provides information on the condition of the machine. It is therefore important to check the insulation resistance and the polarization index at the following times:

· Before starting up a machine for the first time

- After an extended period in storage or downtime
- Within the scope of maintenance work

The following information is provided regarding the state of the winding insulation:

- Is the winding head insulation conductively contaminated?
- Has the winding insulation absorbed moisture?

As such, you can determine whether the machine needs commissioning or any necessary measures such as cleaning and/or drying the winding:

- Can the machine be put into operation?
- Must the windings be cleaned or dried?

Detailed information on testing and the limit values can be found here:

"Testing the insulation resistance and polarization index" (Page 74)

5.1.2.2 Testing the insulation resistance and polarization index



/ WARNING

Hazardous voltage at the terminals

During and immediately after measuring the insulation resistance or the polarization index (PI) of the stator winding, hazardous voltages may be present at some of the terminals. Contact with these can result in death, serious injury or material damage.

- If any power cables are connected, check to make sure line supply voltage cannot be delivered.
- Discharge the winding after measurement until the risk is eliminated, e.g. using the following measures:
 - Connect the terminals with the ground potential until the recharge voltage drops to a non-hazardous level
 - Attach the connection cable.

Measure the insulation resistance

- 1. Before you begin measuring the insulation resistance, please read the operating manual for the insulation resistance meter you are going to use.
- 2. Make sure that no power cables are connected.
- 3. Measure the winding temperature and the insulation resistance of the winding in relation to the machine enclosure. The winding temperature should not exceed 40° C during the measurement. Convert the measured insulation resistances in

accordance with the formula to the reference temperature of 40° C. This thereby ensures that the minimum values specified can be compared.

4. Read out the insulation resistance one minute after applying the measuring voltage.

Limit values for the stator winding insulation resistance

The following table specifies the measuring voltage and limit values for the insulation resistance. These values correspond to IEEE 43-2000 recommendations.

Table 5-1 Stator winding insulation resistance at 40° C

| V _N [V] | V _{Meas} [V] | R _C [MΩ] |
|--------------------|-----------------------|---------------------|
| U ≤ 1000 | 500 | ≥ 5 |
| 1000 ≤ U ≤ 2500 | 500 (max. 1000) | 100 |
| 2500 < U ≤ 5000 | 1000 (max. 2500) | |
| 5000 < U ≤ 12000 | 2500 (max. 5000) | |
| U > 12000 | 5000 (max. 10000) | |

 U_{rated} = rated voltage, see the rating plate

U_{meas} = DC measuring voltage

R_C = minimum insulation resistance at reference temperature of 40° C

Conversion to the reference temperature

When measuring with winding temperatures other than 40° C, convert the measuring value to the reference temperature of 40° C according to the following equations from IEEE 43-2000.

| (1) Ro | | Insulation resistance converted to 40° C reference temperature |
|---------------------------|----------------|--|
| $R_C = K_T \cdot R_T$ | k T | Temperature coefficient according to equation (2) |
| | R _T | Measured insulation resistance for measuring/winding temperature T in °C |
| (2) | 40 | Reference temperature in °C |
| | 10 | Halving/doubling of the insulation resistance with 10 K |
| $K_T = (0.5)^{(40-T)/10}$ | Т | Measuring/winding temperature in °C |

In this case, doubling or halving the insulation resistance at a temperature change of 10 K is used as the basis

The insulation resistance halves every time the temperature rises by 10 K.

The resistance doubles every time the temperature falls by 10 K.

For a winding temperature of approx. 25° C, the minimum insulation resistances are 20 M Ω (U \leq 1000 V) or 300 M Ω (U > 1000 V). The values apply for the complete winding to ground. Twice the minimum values apply to the measurement of individual assemblies.

- Dry, new windings have an insulation resistance of between 100 and 2000 MΩ, or
 possibly even higher values. An insulation resistance value close to the minimum
 value could be due to moisture and/or dirt accumulation. The size of the winding,
 the rated voltage and other characteristics affect the insulation resistance and
 may need to be taken into account when determining measures.
- Over its operating lifetime, the motor winding insulation resistance can drop due
 to ambient and operational influences. Calculate the critical insulation resistance
 value depending on the rated voltage by multiplying the rated voltage (kV) by the
 specific critical resistance value. Convert the value for the current winding
 temperature at the time of measurement, see above table.

Measuring the polarization index

- To determine the polarization index, measure the insulation resistances after one minute and ten minutes.
- 2. Express the measured values as a ratio:

PI = Rinsul 10 min / Rinsul 1 min

Many measuring devices display these values automatically following the measurement.

For insulation resistances > 5000 M Ω , the measurement of the PI is no longer meaningful and consequently not included in the assessment.

| R _(10 min) / R _(1 min) Assessment | |
|---|---|
| ≥ 2 | Insulation in good condition |
| < 2 | Dependent on the complete diagnosis of the insulation |

NOTICE

Damage to insulation

If the critical insulation resistance is reached or undershot, this can damage the insulation and cause voltage flashovers.

- Contact the Service Center (Page 107).
- If the measured value is close to the critical value, you must subsequently check the insulation resistance at shorter intervals.

Limit values of the anti-condensation heating insulation resistance

The insulation resistance of the anti-condensation heating with respect to the machine housing should not be lower than 1 M Ω when measured at 500 V DC.

5.2 Installation

5.2.1 Cooling



Overheating and failure of the motor

Death, severe injury or material damage can occur if you do not carefully observe the following points.

- Do not obstruct ventilation.
- Prevent the air expelled by neighboring equipment from being immediately sucked in again.
- For machines with a vertical type construction with air entry from above, prevent the ingress of foreign bodies and water in the air entry openings (standard IEC / EN 60079-0).
- If the shaft extension is facing upwards, liquid must be prevented from entering by moving along the shaft.

/I WARNING

Damage caused by small parts falling in

Material damage and injury can occur if the fan is destroyed and therefore the motor overheats.

- For types of construction with the shaft extension facing downwards, prevent small parts from falling into the fan cover by providing suitable covers (standard IEC / EN 60079-0).
- Prevent the cooling airflow from being reduced as a result of covers that might be in place.

Table 5-2 Minimum dimension "X" for the distance between neighboring modules and the air intake of the machine

| Frame size | X [mm] |
|------------|-----------|
| 63 71 | 15 |
| 80 100 | 20 |
| 112 | 25 |
| 132 | 30 |
| 160 | 40 |
| 180 200 | 90 |
| 225 250 | 100 |
| 280 315 | 110 |

5.2.2 Balancing

The rotor is dynamically balanced. The balancing quality corresponds to vibration severity grade "A" for the complete machine as standard. The optional vibration severity grade "B" is indicated on the rating plate.

The declaration regarding the type of featherkey for balancing is generally marked on the rating plate and optionally on the face of the shaft end.

Designation:

- As a standard measure, balancing is carried out dynamically with a half featherkey (code "H") in accordance with ISO 8821.
- "F" means balancing with a whole featherkey (optional version).
- "N" means balancing without a featherkey (optional version).



Incorrect installation or removal

To avoid injury and material damage, carefully observe general touch protection measures for output transmission elements:

- The general touch protection measures for drive output elements must be observed.
- Drive output elements may only be pushed on or pulled off with the correct equipment.
- The feather keys are only locked against falling out during shipping. If you
 commission a machine without a drive output element, the feather keys must be
 secured to prevent them from being thrown out.

Align the offset at the coupling between electrical machines and the driven machines so that the maximum permissible vibration values according to ISO 10816 are not exceeded.

5.3 Alignment and mounting

Observe the following when aligning and mounting:

- Ensure a flat and uniform contact surface for foot and flange mounting.
- Precisely align the machine when couplings are used.
- Ensure that the mounting surfaces are clean and free of any dirt.
- Remove any anti-corrosion protection using white spirit.
- Avoid installation-related resonances with the rotating frequency and twice the line frequency.
- Note any unusual noise when the rotor is manually turned.
- Check the direction of rotation with the motor uncoupled.
- Avoid rigid couplings.
- Repair any damage to the paint, this must be done immediately and correctly.

| Frame size | Flatness [mm] |
|------------|------------------|
| ≤ 132 | 0.10 |
| 160 | 0.15 |
| ≥ 180 | 0.20 |

6 Electrical connection

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.





Hazardous voltages

Death, injury or material damage can occur. Note the following safety information before connecting-up the machine:

- Only qualified and trained personnel should carry out work on the machine while it is stationary.
- Disconnect the machine from the power supply and take measures to prevent it being reconnected. This also applies to auxiliary circuits.
- Check that the machine really is in a no-voltage condition.
- Establish a safe protective conductor connection before starting any work.
- If the incoming power supply system displays any deviations from the rated values in terms of voltage, frequency, curve form or symmetry, such deviations will increase the temperature and influence electromagnetic compatibility.
- Operating the machine on a line supply system with a non-grounded neutral point is only permitted over short time intervals that occur rarely, e.g. the time leading to a fault being eliminated (ground fault of a cable, EN 60034-1).

6.1 Terminal box



/ DANGER

Hazardous voltage

Electric motors have high voltages. When incorrectly handled, this can result in death or severe injury.

Switch off the machine so that it is in a no-voltage condition before you open the terminal box.

NOTICE

Damage to the terminal box

If you incorrectly carry out work on or in the terminal box, this can result in material damage. You must observe the following to avoid damaging the terminal box:

- Ensure that the components inside the terminal box are not damaged.
- It must be ensured that there are no foreign bodies, dirt or moisture in the terminal box.
- Close the terminal box using the original seal so that it is dust tight and water tight.
- Use O-rings or suitable flat gaskets to seal entries in the terminal box (DIN 42925) and other open entries.
- Please observe the tightening torques for cable glands and other screws.
- When performing a test run, secure the feather keys without output elements.





/I\ WARNING

Hazardous voltage

Loosening the safety torx screw can result in death, serious injury or material damage.

Do not loosen the safety torx screw with respect to the center terminal, as this ensures a conductive connection between the grounding conductor and frame!

NOTICE

Serious damage to the machine

Failure to observe these measures will destroy the motor.

- Only rotate the terminal box if the connection cables have still not been laid.
- If you release the safety torx screw at both sides of the outer connecting terminals, this can destroy the machine.
- Remove the three large snap hooks on the terminal board before rotating the the terminal box. Keep the snap hooks pressed while rotating the terminal box and use a screwdriver to re-engage when finished.

6.1.1 Optional terminal board (star or delta circuit)



NOTICE

Arcing at the optional terminal board can destroy the machine

In order to avoid destroying the machine:

 To change the operating mode, always press the jumper fully into the base of the slot and use the red locking lever to ensure that it is engaged.

6.1.2 Protruding connection cables



/ WARNING

Risk of short-circuit and voltage hazard

A short circuit can occur if connecting cables are clamped and crushed between parts of the enclosure and the cover plate.

This can result in death, severe injury and material damage.

 During disassembly and particularly when installing the cover plate, make sure that the connecting cables are not clamped between enclosure parts and the cover plate.



Damage to connecting cables that are freely led out

You must observe the following note to avoid damaging connecting cables that are freely led out:

- It must be ensured that there are no foreign bodies, dirt, or moisture in the terminal base of the machine enclosure.
- Use O-rings or suitable flat gaskets to seal entries in cover plates (DIN 42925) and other open entries.
- Seal the terminal base of the machine enclosure using the original seal of the cover plate to prevent dust and water from entering.
- Please observe the tightening torques for cable glands and other screws.

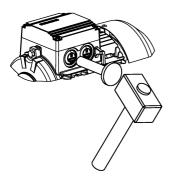
6.1.3 Knockout openings

NOTICE

Damage to the terminal box

To avoid damaging the terminal box:

- Knockout openings in the terminal box must be knocked out using appropriate methods.
- Do not damage the terminal box, the terminal board, the cable connections etc. inside the terminal box.



6.1.4 Installation and routing



NOTICE

Damage to terminal board

The terminal board can be damaged for incorrect installation and routing. You must apply the following measures to avoid damaging the terminal board:

- Remove the screw-type connections (EN 50262) only when the terminal box is closed.
- Tighten the screw-type connections to rated torque value only when the terminal box is closed.
- Tighten the screw-type connections only finger tight when the terminal box is open.
- Make sure that the three large snap hooks are engaged when tightening the screw connections.

6.2 Tightening torques

6.2.1 Electrical connections - Termincal board connections

Table 6-1 Tightening torques for electrical connections on the terminal board

| | Thre | ad Ø | M 3,5 | M 4 | M 5 | М 6 | M 8 | M 10 | M 12 | M 16 |
|-------|------|----------|-------|-----|-----|-----|-----|------|------|------|
| Curb. | Nm | min | 0,8 | 0,8 | 1,8 | 2,7 | 5,5 | 9 | 14 | 27 |
| 5 | | Ma x. | 1,2 | 1,2 | 2,5 | 4 | 8 | 13 | 20 | 40 |

6.2.2 Cable glands

Note

Avoid damaging the cable jacket.

Adapt the tightening torques to the cable jacket materials.

You should refer to the table in order to find the correct tightening torque for any metal and plastic cable glands that are to be mounted directly on the machine, as well as for any other screw-type connections (such as adapters).

Table 6-2 Tightening torques for cable glands

| | Metal | Plastic | Clamping ra | nge [mm] | O ring |
|------------|---------------|---------------|---|--------------------|----------------------|
| | ± 10% [Nm] | ± 10% [Nm] | Standard -30 °C 100 °C Ex -30 °C 90 °C | Ex -60 °C 90 °C | Cord dia. [mm] |
| M 12 x 1.5 | 8 | 1.5 | 3.0 7.0 | - | |
| M 16 x 1.5 | 10 | 2 | 4.5 10.0 | 6.0 10.0 | |
| M 20 x 1.5 | 12 | 4 | 7.0 13.0 | 6.0 12.0 | |
| M 25 x 1.5 | | | 9.0 17.0 | 10.0 16.0 | |
| M 32 x 1.5 | 18 | | 11.0 21.0 | 13.0 20.0 | 2 |
| M 40 x 1.5 | | 6 | 19.0 28.0 | 20.0 26.0 | |
| M 50 x 1.5 | 20 | | 26.0 35.0 | 25.0 31.0 | |
| M 63 x 1.5 | | | 34.0 45.0 | - | |

6.2.3 Terminal boxes, end shields, grounding conductors, sheet metal fan covers

If no other tightening torques are specified, then the values in the following table apply.

Table 6-3 Tightening torques for screws on the terminal box, end shields, screwtype grounding conductor connections

| | Thread Ø | | M 3.5 | M 4 | M 5 | М 6 | M 8 | M 10 | M 12 | M 16 | M20 |
|---|----------|-----|----------|-----|-----|-----|-----|------|------|------|-----|
| 5 | m | min | 0.8 | 2 | 3.5 | 6 | 16 | 28 | 46 | 110 | 225 |
| | | max | 1.2 | 3 | 5 | 9 | 24 | 42 | 70 | 165 | 340 |



Table 6-4 Tightening torques for self-tapping screws on the terminal box, end shields, screw-type grounding conductor connections, sheet metal fan covers

| | Thread Ø | | M 4 | M 5 | M 6 | |
|---------|----------|-----|-----|-----|------|--|
| Call Co | Nm | min | 4 | 7,5 | 12,5 | |
| 54) | | max | 5 | 9,5 | 15,5 | |
| | | | | | | |

6.3 General information on connecting the grounding conductor

The machine's grounding conductor cross-section must comply with EN / IEC 60034-1.

Please also observe installation regulations such as those specified in EN / IEC 60204-1.

6.4 Conductor connection





Short-circuit hazard

Connection and installation errors at connecting cables and cover washers can result in a short-circuit. Death or serious physical injury can result.

Note the following precautionary measures:

- Do not lay connection cables over the central dome of the terminal board.
- Observe the opening direction and the mounting position of the cover washers on the terminal board.

6.4.1 Type of conductor connection

| Terminal board | | | Con- ductor cross- section [mm²] |
|--|--|--------|--|
| Connection with cable lug DIN 46 234 Bend down the cable lug for the connection. | |) > | 25 |
| Connection of an individual conductor with terminal clamp | | 4 3 | 10 |
| Connection of two conductors of approximately the same thickness with terminal clamp | | | 25 |

- ① Link rail
- 2 Power supply cable
- 3 Motor connecting cable
- 4 Cover washer

6.5 Connecting converters



NOTICE

Excessively high supply voltage

Material damage can occur if the supply voltage is too high for the insulation system.

The machines can be operated with line voltages ≤ 500 V with SINAMICS G converters and SINAMICS S converters (uncontrolled and controlled infeed) when maintaining the permissible peak voltages.

The maximum permissible voltage rate of rise (gradient) is 9 kV/µs.

Ûconductor-conductor ≤ 1500 V; Ûconductor-ground≤ 1100 V

For VSD machines, the following data apply:

 $\hat{U}_{conductor\text{-}conductor} \le 1600 \text{ V}$, $\hat{U}_{conductor\text{-}ground} \le 1400 \text{ V}$, voltage rise times of ts > 0.1 μs .

See the list of additional operating instructions.

6.6 Final checks

Before closing the terminal box/terminal base of the machine enclosure, check the following:

- Establish the electrical connections in the terminal box in accordance with the details in the sections above and tighten with the correct torque.
- Maintain air clearances between non-insulated parts:
 ≥ 5.5 mm up to 690 V, ≥ 8 mm up to 1000 V.
- Avoid protruding wire ends!
- In order not to damage the cable insulation, freely arrange the connecting cables.
- Connect the machine corresponding to the specified direction of rotation.
- Keep the inside of the terminal box clean and free from trimmed-off ends of wire.
- Ensure that all seals and sealing surfaces are undamaged and clean.
- Correctly and professionally close unused openings in the terminal boxes.

7 Commissioning

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

7.1 Setpoint values for monitoring the bearing temperature

Prior to commissioning

If the machine is equipped with bearing thermometers, set the temperature value for disconnection on the monitoring equipment before the first machine run.

Table 7-1 Set values for monitoring the bearing temperatures before commissioning

| Set value | Temperature |
|---------------|-------------|
| Alarm | 115 °C |
| Shutting down | 120 °C |

Normal operation

Measure the normal operating temperature of the bearings T_{op} at the installation location in °C. Set the values for shutdown and warning corresponding to the operating temperature T_{op} .

Table 7-2 Set values for monitoring the bearing temperatures

| Set value | Temperature | | | |
|---------------|--|--|--|--|
| Alarm | T _{operation} + 5 K ≤ 115 °C | | | |
| Shutting down | T _{operation} + 10 K ≤ 120 °C | | | |

7.2 Measures before start-up

NOTICE

Damage to the machine

In order to avoid material damage, check the following points before commissioning the motor:

- Using appropriate measures, check whether the correct direction of rotation of the motor has been set by the customer, e.g. by decoupling from the driven load.
- Ensure that temperature-sensitive parts (cables, etc.) are not in contact with the machine enclosure.
- Ensure that the condensation drain holes are always located at the lowest part of the motor.

NOTICE

Damage caused by insufficient cooling

Effective cooling is no longer possible if air guidance of the machine is not provided as intended. This can damage the machine.

 Before commissioning, attach the covers to guarantee the intended air guidance.

Measures

Once the system has been correctly installed, you should check the following prior to commissioning:

- Ensure that the machine has been correctly installed and aligned.
- Connect the machine corresponding to the specified direction of rotation.
- Ensure that the operating conditions match the data specified on the rating plate.
- Lubricate the bearings, depending on the version. Ensure that machines with roller bearings, which have been stored for longer than 24 months, are relubricated.
 - Also observe the notes in Chapter Preparation for use.
- Ensure that any optional supplementary machine monitoring equipment has been connected correctly and is functioning as it should.
- For versions with bearing thermometers, check the bearing temperatures when the machine starts to run for the first time. Set the values for alarm and shutdown at the monitoring device. Also observe the notes in Chapter Setting values for monitoring the bearing temperature.

- Corresponding to the control and speed monitoring functions implemented, ensure that the machine cannot exceed the permissible speeds specified on the rating plate.
- Ensure the correct setting conditions of the drive output elements depending on the type (e.g. alignment and balancing of couplings, belt forces in the case of a belt drive, tooth forces and tooth flank backlash/play in the case of gear wheel output, radial and axial clearance in the case of coupled shafts).
- Comply with the minimum insulation resistances and minimum air clearances.
- Ensure correct grounding and potential bonding connection of the protective conductor.
- Tighten all mounting bolts, connection elements and electrical connections to the specified torques.
- Remove any lifting eyes that were screwed after installation or secure them to prevent them becoming loose.
- Rotate the rotor to ensure that it does not touch the stator.
- Implement all touch protection measures for both moving and live parts.
- Ensure that free shaft extensions cannot be touched, e.g. by attaching covers.
- Secure any featherkeys so that they cannot be flung out.
- Ensure that the optional external fan is ready for operation and connected so that it rotates in the specified direction.
- Ensure that the cooling airflow is not obstructed or diminished in any way.
- If an optional brake is being used, ensure that it is functioning perfectly.
- Comply with the specified mechanical limit speed n_{max}, and ensure that it is not exceeded.

If the design of the machine requires the converter to be assigned in a particular way, the relevant information will be provided on the rating plate or an additional label.

Note

It may be necessary to perform additional checks and tests in accordance with the specific situation on site.

See also

Observing the operating mode (Page 64)

8 Operation

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

Switching on the machine



DANGER

Hazardous voltages

Electrical machines are at hazardous voltage levels. Contact with these can result in death, serious injury or material damage.

Operating the machine on a line supply system with a non-grounded neutral point is only permitted for short periods of time that occur rarely, e.g. the time leading to a fault being eliminated. Cable ground fault EN / IEC 60034-1.

NOTICE

Damage to the machine or premature bearing failure

The bearings can be damaged if the following is not observed.

- It is absolutely crucial that you maintain the permissible vibration values to avoid damage to the machine or its destruction.
- In operation, observe the vibration values in accordance with ISO 10816.
- Under all circumstances maintain the minimum radial load of cylindrical roller bearings of 50% corresponding to what is specified in the catalog.
- Take the appropriate measures to reduce bearing currents. Observe the Chapter Converter operation.



Faults in operation

Changes with respect to normal operation indicate that there is an impaired function. This can cause faults which can result in eventual or immediate death, severe injury or material damage.

For instance, observe the following signs that could indicate a malfunction:

- Higher power drawn than usual
- Higher temperatures than usual
- Unusual noises
- Unusual smells
- · Response of monitoring equipment

Immediately contact the maintenance personnel if you identify any irregularities. If you are in doubt, immediately switch off the machine, being sure to observe the system-specific safety conditions.

NOTICE

Risk of corrosion due to condensation

If the machine and/or ambient temperatures fluctuate, this can result in condensation inside the machine.

- If available, remove the drain plugs or screws to drain the water depending on the ambient and operating conditions.
- If available, re-attach the drain plugs or screws.

If the motor is equipped with drain plugs, then the water can drain away by itself.

Switching on the machine with anti-condensation heating (optional)



Machine overheating

Minor injury or material damage can occur if you do not observe the following:

 If available, switch off the anti-condensation heating each time before switching on.

CAUTION

Risk of injury when touching the fan

There is a risk of injury at machines equipped with a fan cover (e.g. fan cover used in the textile industry), as the fan is not completely touch protected.

- Do not touch the rotating fan.
- Do not put your fingers into the larger air discharge openings.
- Manual intervention must be prevented on the customer's side by using suitable measures, e.g. appropriate housings or a protective grating.

8.1 Stoppages

Longer non-operational periods

Note

- For longer non-operational periods (> 1 month), either operate the machine or at least turn the rotor regularly, approximately once per month.
- Please refer to the section "Switching on" before switching on to recommission the motor.
- Remove any machine rotor locking devices before you turn the rotor.

NOTICE

Restricted motor function

If not used for longer periods of time, material damage or complete motor failure can occur.

If the motor is out of service for a period of more than 12 months, then environmental effects can damage the motor.

Apply suitable corrosion protection, preservation, packing and drying measures.

Switching on the anti-condensation heater

Switch on any anti-condensation heating while the machine is not being operated.

Taking the machine out of service

Details regarding the necessary measures, Chapter Preparing for use (Page 64).

Lubricating before recommissioning

NOTICE

Dry running bearings

Bearings can be damaged if they do not have sufficient grease.

Re-grease the bearings if they have been out of service for more than one year.
 The shaft must rotate so that the grease can be distributed in the bearings.
 Observe the data on the lubricant plate.

Chapter Bearings (Page 99).

9 Maintenance

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

9.1 Safety instructions for inspection and maintenance



Rotating and live parts

Electric machines contain live and rotating parts. Fatal or serious injuries and substantial material damage can occur if maintenance work is performed on the machine when it is not stopped or not de-energized.

- Perform maintenance work on the machine only when it is stopped. The only
 operation permissible while the machine is rotating is regreasing the roller
 bearings.
- When performing maintenance work, comply with the five safety rules.



Machine damage

If the machine is not maintained it can suffer damage. This can cause faults which can result in eventual or immediate death, serious injury or material damage.

Perform regular maintenance on the machine.



Dust disturbances when working with compressed air

When cleaning with compressed air, dust, metal chips, or cleaning agents can be whirled up. Injuries can result.

When cleaning using compressed air, make sure you use suitable extraction equipment and wear protective equipment (safety goggles, protective suit, etc.).

NOTICE

Damage to insulation

If metal swarf enters the winding head when cleaning with compressed air, this can damage the insulation. Clearance and creepage distances can be undershot. This may cause damage to the machine extending to total failure.

When cleaning with compressed air, ensure there is adequate extraction.

NOTICE

Machine damage caused by foreign bodies

Foreign bodies such as dirt, tools or loose components, such as screws etc., can be left by accident inside the machine after maintenance is performed. These can cause short circuits, reduce the performance of the cooling system or increase noise in operation. They can also damage the machine.

- When carrying out maintenance work, make sure that no foreign bodies are left in or on the machine.
- Securely attach all loose parts again once you have completed the maintenance procedures.
- Carefully remove any dirt.

Note

Operating conditions and characteristics can vary widely. For this reason, only general intervals for inspection and maintenance measures can be specified here.

9.2 Inspection

Notes

Note

Pay particular attention to the relubrication intervals for rolling bearings that deviate from the inspection intervals.

Note

When servicing a three-phase machine, it is generally not necessary to dismantle it. The machine only has to be dismantled if the bearings are to be replaced.

9.3 Maintenance

9.3.1 Re-greasing

For machines with regreasing system, relubrication intervals, grease quantity and grease grade are provided on the lubricant plate. Additional data can be taken from the main machine rating plate.

Grade of grease for standard motors (IP55) UNIREX N3 - ESSO.

Note

It is not permissible to mix different types of grease.

Prolonged storage periods reduce the useful lifetime of the bearing grease. Check the condition of the grease if the equipment has been in storage for more than 12 months. If the grease is found to have lost oil content or to be contaminated, the machine must be immediately relubricated before commissioning. For information on permanently-greased bearings, please refer to the section titled Bearings (Page 99).

Procedure

To relubricate the roller bearings, proceed as follows:

- 1. Clean the grease nipples at the drive end and non-drive end.
- 2. Press-in the specified grease and amount of grease according to the data stamped on the lubrication plate.
 - Please observe the information on the rating and lubricant plates.
 - Regreasing should be carried out when the motor is running (max. 3600 rpm).

The bearing temperature can rise significantly at first, and then drops to the normal value again when the excess grease is displaced out of the bearing.

9.3.2 Cleaning

Cleaning the grease ducts and spent grease chambers

The spent grease collects outside each bearing in the spent grease chamber of the outer bearing cap. When replacing bearings, remove the spent grease.

Note

Dismantle the bearing cartridges to replace the grease in the lubrication duct.

Cleaning the cooling air ducts

Regularly clean the cooling air ducts through which the ambient air flows.

The frequency of the cleaning intervals depends on the local degree of fouling.

NOTICE

Damage to the machine

Material damage can occur if you direct compressed air in the direction of the shaft outlet or machine openings.

Avoid pointing compressed air directly onto shaft sealing rings or labyrinth seals
of the machine.

In the case of machines with fan covers for the textile industry, regularly remove fluff balls, fabric remnants, and similar types of contamination (particularly at the air passage opening between the fan cover and cooling fins of the machine enclosure) to ensure that the cooling air can flow without obstruction.

9.3.3 Drain condensate

If there are condensation drain holes present, open these at regular intervals, depending on climatic conditions.



WARNING

Hazardous voltage

The winding can be damaged if objects are introduced into the condensation holes (optional). This can lead to death, serious injury or material damage.

Note the following to maintain the degree of protection:

- Switch off the machine so that it is in a no-voltage condition before you open the condensation drain holes.
- Close the condensation drain holes, e.g. using T-plugs, before commissioning the machine.

NOTICE

Reduction of the degree of protection

If condensation drain holes are not closed, then this can result in material damage to the motor.

In order to maintain the degree of protection, after the condensation has been drained, you must close all of the drain holes.

9.4 Repair

When carrying out any work on the machine, observe the general safety instructions (Page 57) and the specifications contained in EN 50110-1 regarding safe operation of electrical equipment.

9.4.1 Bearings

Refer to the rating plate or the catalog for the designations of the bearings being used.

Bearing lifetime

Prolonged storage periods reduce the useful lifetime of the bearing grease. For permanently lubricated bearings, this reduces the bearing service life. We recommend that the bearings or grease are replaced after a storage time of 12 months; if the time exceeds 4 years, replace the bearings or the grease.

Replacing bearings

Recommended interval after which bearings are to be replaced under normal operating conditions:

Table 9-1 Bearing replacement intervals

| Ambient temperature | Principle of operation | Bearing replacement intervals |
|---------------------|-----------------------------------|-------------------------------|
| 40 °C | Horizontal coupling operation | 40 000 h |
| 40 °C | With axial and radial forc- es | 20 000 h |

- Do not reuse bearings that have been removed.
- Remove the dirty spent grease from the bearing shield.
- Replace the existing grease with new grease.
- Replace the shaft seals when the bearings are replaced.
- Slightly grease the contact surfaces of the sealing lips.

Note

Special operating conditions

The operating hours are reduced, e.g.

- When machines are vertically mounted.
- High vibration and surge loads
- Frequent reversing operation
- Higher ambient temperatures.
- High speeds etc.

9.4.2 Disassembly

Note

Before commencing removal, you should mark how each of the fastening elements has been assigned, as well as how internal connections are arranged. This simplifies subsequent reassembly.

Fan

NOTICE

Destruction of the fan

Material damage can occur by forcefully removing the fan from the shaft.

Take care not to damage the snapping mechanisms on fans that are equipped with these.

Plastic fan

- Correctly expose the breakout openings provided in the fan plate
- Heat up the fans to a temperature of approximately 50 °C around the area of the hub.
- Use a suitable tool to pull off the fan (puller).
- Locate the arms of the pulling tool in the the breakout openings and slightly tension the pressure screw of the tool.
- Simultaneously release the two snap-in lugs of the fan from the shaft groove Keep the snap-in lugs in this position.
- Uniformly withdraw the fan from the shaft by turning the pressure screw of the pulling tool.
- Do not apply any hammer blows to avoid damaging the rotor shaft, the fan and the bearings.
- Order the appropriate new parts if damaged.

Metal fan

- Remove the locking ring.
- Use a suitable tool to pull off the fan (puller).
- Locate the arms of the pulling tool in the openings in the fan in the vicinity of the hub.
- Alternatively, the pulling tool can be placed at the outer edge of the fan plate.
- Uniformly withdraw the fan from the shaft by turning the pressure screw of the pulling tool.
- Do not apply any hammer blows to avoid damaging the rotor shaft, the fan and the bearings.
- Order the appropriate new parts if damaged.

Plastic fan cover



Frame size FS80 ... FS160

- Carefully release the snap openings of the cover one after the other from the lugs.
- 2. Do not insert the lever directly under the lug, as otherwise it could break.
- 3. Take care to not damage the catch mechanism. Order the appropriate new parts if damaged.







Frame size FS180 ... FS200

- 1. Carefully release the first snap opening of the cover.
- 2. For machines with type construction B3, select the snap opening in the area of the machine mounting feet.
- 3. Insert the lever at the edge of the cover close to the lug.
- 4. Carefully release two other snap openings together and then withdraw the cover.
- 5. Take care to not damage the catch mechanism. Order the appropriate new parts if damaged.





Protective cover



Canopies with spacer bolts or with bolted holding brackets

NOTICE

Destruction of the mounting elements

Forcibly removing or separating can destroy the distance bolts, the connecting elements of the mounting bracket or the fan cover.

- 1. Release the fixing screw on the outer surface of the canopy.
- 2. Under no circumstances remove the spacer bolts or the mounting bracket or forcibly separate them from one another or the cover.

Canopies with welded support brackets

 Release the fixing screws at the contact location (canopy foot - riveting nut) at the outer surface of the cover mesh.

9.4.3 Installation

If possible, assemble the machine on and alignment plate. This ensures that the mounting feet surfaces are all on the same plane.

Avoid damaging the windings protruding out of the stator enclosure when fitting the end shield.

Sealing measures

- 1. Apply Fluid-D to the centering edge.
- 2. Check the terminal box seals, and if required, replace these.
- 3. Repair any damage to the paint, also to screws/bolts.
- Take the necessary measures to ensure compliance with the applicable degree of protection.
- 5. Do not forget the foam rubber cover in the cable entry. Completely seal the holes, and ensure that cables do not come into contact with sharp edges.

9.4.3.1 Fitting bearings

Sealing the bearings

Note the following details:

- Shaft sealing rings are used to seal machines at the rotor shaft.
 - For V rings, comply with the assembly dimension.
- Use the specified bearings.
- Ensure that the bearing sealing disks are in the correct position.
- Insert the elements for bearing preloading at the correct end.
- Fixed bearings can have a locking ring or bearing cover.
- Seal the bearing cap screws with the appropriate gaskets or with grease.
- Do not interchange the position of the bearing covers (DE and NDE or inner and outer).

Mounting dimension "x" of V rings

| Motor types | Frame size | [| X mm] |
|------------------------------|------------|-----------|-----------------|
| All | 71 | 4.5 ±0.6 | Standard design |
| | 80 112 | 6 ±0.8 | |
| | 132 160 | | |
| 1LA 1MA6 | 180 200 | 7 ±1 | |
| 1FP1 | 180 200 | 11 ±1 | <u> X</u> |
| 1LG 1MA622 1LE 1MB1 | 180 225 | 11 ±1 | Special design |
| 1LG 1MA6 1LE 1MB1 | 250 315 | 13.5 ±1.2 | <u>x</u> |

9.4.3.2 Mounting fans

- Take care not to damage the snapping mechanisms on fans that are equipped with these.
- To ensure this, the fans should be heated to a temperature of approximately 50 °C around the area of the hub.
- If any damage is caused, request new parts.

9.4.3.3 Mounting the fan cover





Incorrectly mounting covers with snap mechanism

Avoid injury caused by touching the rotating fan or material damage caused by partial or complete release of the cover while the machine is operational.

 Carefully ensure that all four snap openings of the cover completely engage in the associated snap-in lugs.

Plastic fan hub FS 80 ... 200

- Align the cover with the line marked on the edge of the cover with the middle enclosure rib as extension to the terminal box base.
- Center the cover by axially moving on the snap-in lugs of the enclosure or the bearing shield cams.
- First engage two snap openings positioned next to one other, then carefully press
 the cover into position with the two openings situated opposite these using the
 snap-in lugs, and snap it into place.
- Attach the cover using all four of its snap-in lugs by applying axial pressure to the reinforced edge of the cover in the area of the cover mesh.
- If required, use a rubber hammer and apply it once or several times to the edge of the cover in the axial direction. When doing this, take care not to damage or destroyed the mesh of the cover.
- When fitting the cover, do not overextend it (you could break it).

9.4.3.4 Reassembly: Miscellaneous information

- Position all rating and supplementary plates as in the original state.
- Where relevant, fix electric cables.
- Check the tightening torques of all screws, as well as those of screws that have not been released.

10 Spare parts

10.1 Parts order

In addition to the exact part designation, please specify the machine type and the serial number in all orders for spare parts and repair parts. The part designation must be identical to the designation stated in the list of parts and specified together with the appropriate part number.

When spare and repair parts are ordered, the following details must be provided:

- Designation and part number
- Order number and serial number of the machine

Spare parts information and database

Using the Siemens order number and the associated serial number, you can download spare parts information from a database for almost all current motors → Spares On Web (https://b2b-extern.automation.siemens.com/spares_on_web)

A Service & support

A.1 Siemens Industry Online Support

Technical queries or additional information



If you have any technical queries or you require additional information, please contact Technical Support (https://support.industry.siemens.com/cs/ww/en/sc/2090).

Please have the following data ready:

- Type
- Serial number

You can find this data on the rating plate.

On-site service and spare parts

If you wish to request on-site service or order spare parts, please contact your local Siemens sales office. This office will contact the responsible service center on your behalf.

You can obtain optimum support everywhere using the SIOS App. The SIOS App is available for Apple iOS, Android and Windows phone.



A.2 Further documents

These operating instructions can also be obtained at the following Internet site:

http://support.industry.siemens.com (Page 107)

General Documentation

| 1.517.30777.30.000 | 1XP8001 encoder |
|--------------------|--|
| 5 610 00000 02 000 | Operating_Instructions_Simotics GP, SD, DP, XP |
| 5 610 00000 02 001 | Operating_Instructions_Compact_Simotics GP, SD, DP |
| 5 610 00000 02 002 | Operating_Instructions_Compact_Simotics XP |
| 5 610 00002 09 000 | Incremental encoder 1XP8012-1x |
| 5 610 00002 09 001 | Incremental encoder 1XP8012-2x |
| 5 610 70000 02 015 | External fan |
| 5 610 70000 10 020 | Spring-loaded brake |

Observe all of the other documents available for this machine.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG Division Process Industries and Drives Postfach 48 48 90026 NÜRNBERG

Standard machines 56100000002001, 01/2016



Series J - Shaft Mounted Gearbox Installation & Maintenance





Installation of hollowshaft gear

BENZLERS

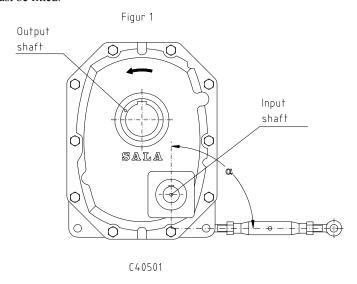
The hollowshaft gear is normally mounted on a shaft with js6 tolerance. The shaft bore has H7 tolerance.

The gear unit is lifted using suitable holes for the purpose: J11-72, using torque arm hole, J100-190 using torque arm hole or lifting lug supplied.

The shaft must be lubricated with Molycote BR2 or the supplied tube with copper grease, before fitting the gear unit. The gear unit must not be driven onto the shaft by force

When fitting a pulley wheel without a compression bushing the threaded hole in the input shaft must be used. A threaded hole in the shaft is not standard on size J11-32. The pulley wheel must not be driven on the shaft with force. The pulley wheel stop screw must be countersunk in the key. The stop screw must be locked.

The torque arm must be positioned so that it is in tension. This is determined by the direction of rotation of the output shaft. If rotation is anticlockwise the torque arm must be placed on the right (see fig1.) If the direction is reversible or unit is operating under harsh conditions then two torque arms must be fitted.



The torque arm should be located in $90^{\circ} + 0^{\circ} / -45^{\circ}$.

If a backstop is fitted ,the direction of rotation of the motor must be checked before fitting the pulley belts.

For applications with heavy duty and/or when speed reducer is mounted in angle of inclination from horizontal machine shaft, locking washer must be used.

Lubrication

The oil filling system of the SALA speed reducers means simplified maintenance and oil exchange. Front and back (on some sizes even sides) of reducer are equipped with oil level plugs.

The first oil change shall be made after 2500 operating hours. At operation temperatures up to 70° C we recommend oil change after 8000 operating hours or every 2 years. At operation temperatures above 70° C, oil must be changed twice a year. These recommendations apply for operations without shocks. When mounting reducer on vertical shaft or when the gearbox is working above or below recommended output speed please contact Benzlers or the local representative.

SALA speed reducers are normally delivered without oil. Different mounting positions need different oil volumes.

BENZLERS

Installation of hollowshaft gear

C40004GB 2001-11-05

Recommended type of oil and grade of viscosity according ISO VG.

Ambient temperature
-20° C -+10° C
+5° C -+30° C
-15° C -+40° C

ISO VG 68 EP
ISO VG 220 EP
ISO VG 220 Syntetic.

At other ambient temperatures please contact Benzlers or the local representative.

Oil quantities and oil level plugs.

The figures in the first column under each respective mounting position, shown in the table, refer to the approximate quantities of oil for gear units mounted according to these positions. If it is required to mount a gear unit in any other position, Benzlers or your local representative should be consulted.

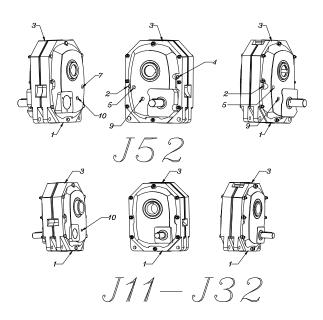
Approximate quantity of oil in litres.

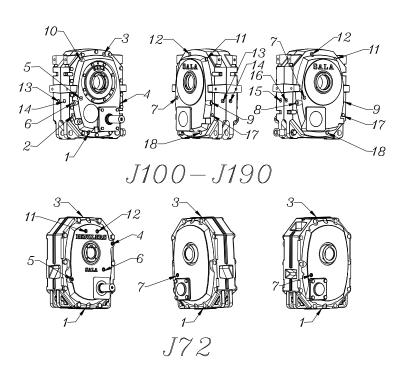
(Ref. Number of oil level plug.)

| J | H1 | Н2 | Н3 | H4 | Н5 | Н6 |
|------------|---------|------------------------------|---------|---------|----------|----------|
| 11A/11B | 0,9(10) | 0,8(10) | 0,9(3) | 0,4(3) | 0,3* | 1,5* |
| 21A/21B | 1,1(10) | 1,3(10) | 1,0(3) | 0,3(3) | 0,6* | 2,3* |
| 31A/31B | 2,4(10) | 2,1(10) | 2,2(3) | 1,1(3) | 1,6* | 3,9* |
| 51A/51B | 4,3(5) | 3,5(9) | 3,9(3) | 1,9(3) | 2,2* | 6,3* |
| 71A/71B | 5,9(6) | 5,3(5) | 5,4(12) | 2,5(11) | 2,8* | 8,6* |
| 12A/12B | 1,0(10) | 0,4(10) | 0,8(3) | 0,4(3) | 1,2* | 1,3* |
| 22A/22B | 1,6(10) | 0,6(10) | 1,4(3) | 0,6(3) | 1,9* | 2,1* |
| 32A/32B | 2,4(10) | 1,1(10) | 1,0(3) | 0,9(3) | 3,1* | 3,4* |
| 52A/52B | 4,5(5) | 1,6(9) | 3,7(3) | 1,9(3) | 4,8* | 5,6* |
| 72A/72B | 5,7(6) | 2,4(5) | 5,1(12) | 2,4(11) | 7,5* | 8,3* |
| 100 1-step | 11(6) | 11.5(4) | 9(3) | 3(10) | 14(13) | 16(13) |
| 110 1-step | 20(6) | 15.5(4) | 3.5(3) | 7(10) | 28(13) | 28.5(13) |
| 125 1-step | 38(6) | 26.5(4) | 9.5(3) | 4.5(10) | 37(13) | 38(13) |
| 100 2-step | 10(6) | >50rpm 4,5(2) <50rpm 9(4) | 8(3) | 3(10) | 12,5(14) | 14,5(13) |
| 110 2-step | 20,5(6) | 8(2) | 11,5(3) | 7(10) | 25,5(14) | 25,5(13) |
| 125 2-step | 24(6) | 15(2) | 9(3) | 4,5(10) | 34(14) | 35(13) |
| 140 2-step | 38(6) | 13(2) | 24(3) | 11(10) | 45(14) | 45(13) |
| 160 2-step | 52(6) | 21(2) | 36(3) | 17(10) | 67(14) | 64(13) |
| 190 2-step | 65(6) | 23(2) | 46(3) | 27(5) | 108(14) | 112(13) |

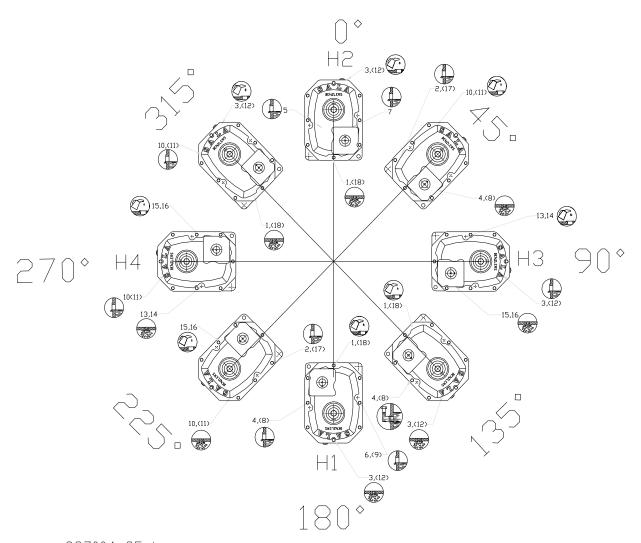
C37004-38.doc

^{*)} Oil gauge tube.





C37004-37.DWG



C37004-35.dwg

On J11-32 there is only one oil level plug.

All Benzler-SALA speed reducers are prepared for syntetic oil type Polyalfaolefin.

Note.

Oil of mineral type should not be mixed with oil of syntetic type.

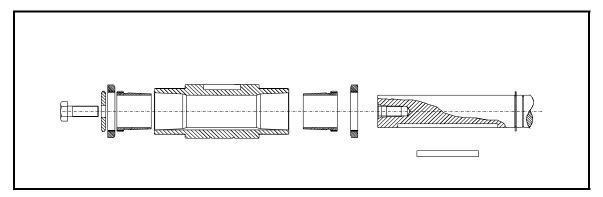
Always check oil level when changing oil.

SALA hollow shaft gears are supplied without lubricant.

KIBO-Mounting

For Correct mounting of speed reducer it is very important that both bushings get the same squeezing force.

- 1. Mount the inner bushing with the nut in its outer position. The bushing shall be mounted against the shoulder or circlip. Where the shoulder should not exceed inside of nut.
- 2. Put the key in the keyway.
- 3. Mount the reducer on the machine shaft and press it against the inner bushing.
- 4. Mount the outer bushing with the nut in it's inner position. Check that the bushing is not squeezed but the nut is in contact with the shaft sleeve.
- Mount the washer with it's bolt. Tighten the bolt with correct torque. The inner bushings is now locked.
- 6. Loosen the bolt, so the outer bushing is loose. Turn the nut on the bushing, in it's outer position.
- 7. Tighten the bolt once again with correct torque. The outer bushing is now locked. The thicker washer may be changed to the thinner one in order to gain more space at the hollow shaft end. The thinner washer should be tightened with a torque of 25% of the value given in the table below. (only valid for gear size J11-72)
- 8. Screw the nuts against the hollow shaft by hand, mounting is completed.



Tightening torque.

| Size | | Screw | Tightening torque. |
|------|-----|-------|--------------------|
| | D | | Nm |
| J12 | 35 | M12 | 53 |
| J12 | 45 | M16 | 59 |
| J22 | 45 | M16 | 130 |
| J22 | 55 | M20 | 110 |
| J32 | 55 | M20 | 150 |
| J32 | 65 | M20 | 120 |
| J52 | 60 | M20 | 200 |
| J52 | 75 | M20 | 180 |
| J72 | 70 | M20 | 290 |
| J72 | 85 | M20 | 170 |
| J100 | 100 | M24 | 510 |
| J110 | 110 | M24 | 380 |
| J125 | 125 | M24 | 370 |
| J140 | 140 | M30 | 510 |
| J160 | 160 | M30 | 430 |
| J190 | 190 | M30 | 650 |

C37004_16

BENZLERS

Installation of hollowshaft gear

C40004GB 2001-11-05

Note!

If reducer is mounted in a corrosive environment, ensure machine shaft bushings and nuts are oiled or greased.

Do NOT use lubricants based upon molybdendisulphide.

Dismounting

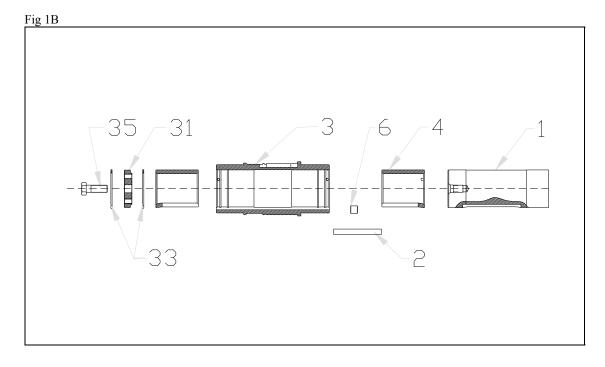
- 1. Loosen the bolt and take away the washer.
- 2. Pull out the outer bushing with the nut, by turning the nut with a adequate tool. Take out the bushing.
- 3. Press the reducer from the inner bushing with the nut, dismounting is completed.

Installing of shaft sleeve

J100-190 Fig. 1B

Installation kit consists of 2 pcs insert sleeves, 1 pcs special key and 2 stop screws.

- 1. Fit the insert sleeve (4) on the shaft (1).
- 2. Line up the key (2) with the keyway (3) in the shaft.
- 3. Fit the remaining insert sleeve(4) in the shaft sleeve (3).
- 4. Fit the gear with sleeve on the machine shaft so that the shaft sleeve slides over the insert sleeve..
- 5. Screw the two stop screws(6) through the shaft sleeve, through the inner insert sleeve and against the machine shaft.
- 6. Press the outer insert sleeve in position, assemble circlip(3), washer(31) and screw(35).



BENZLERS

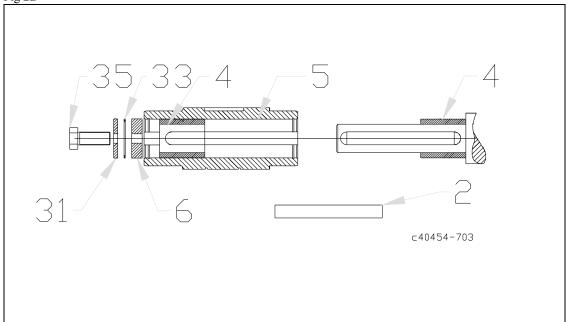
Installation of hollowshaft gear

C40004GB 2001-11-05

J11-72 Fig 2B

- 1. Fit the insert sleeve(4) on the machine shaft (1).
- 2. Line up the key (2) with the keyway in the machine shaft.
- 3. Fit the remaining insert sleeve (4), the spacer (6) and locking ring (33) in the shaft sleeve (5).
- 4. Fit the gear unit on the shaft so that the shaft sleeve slides over the insert sleeve.
- 5. Lock the gear unit by tightening the bolt (35) against the washer (31) and circlip(33).

Fig 2B



Removing of Gear from Machine Shaft.

J11A-32B, alternative 1.

- 1. Remove End screw, Washer and Torque arm.
- 2. Use a Puller of such size that it goes round on the back of gearbox to pull it of the Machine shaft.

J11A-32B, alternative 2.

- 1. Remove End screw, Washer and Torque arm.
- 2. Use Benzler dismounting kit (see fig 3.) to remove gear from Machine shaft.

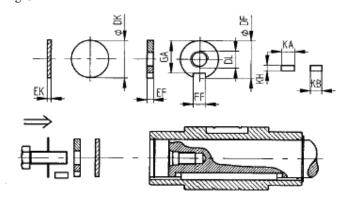
J51A-72B

- 1. Remove End screw, Washer, Circlip , Spacer (some sizes) and Torque arm
- 2. Use Benzler dismounting kit (see fig 3.) to remove gear from Machine shaft.

J100-190

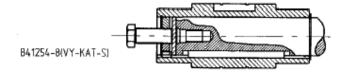
- 1. Remove End screw and Torque arm.
- 2. Check that Circlip is placed in outer grove.
- 3. Screw 2 fully threaded Screws into the prethreaded holes in End washer.
- 4. Turn the two screws diagonally until the gear is removed from Machine shaft.

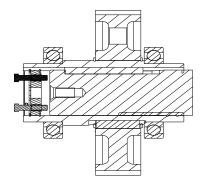
Fig 3



| J | DF | DK | DL | EF | EK | FF | GA | KA | KB | KH |
|-----|----|----|-----|----|----|----|------|----|----|----|
| 12A | 35 | 35 | M12 | 10 | 6 | 10 | 30 | 20 | 10 | 8 |
| 12B | 45 | 45 | M12 | 10 | 6 | 14 | 40 | 20 | 10 | 8 |
| 22A | 45 | 45 | M12 | 10 | 6 | 14 | 40 | 20 | 14 | 8 |
| 22B | 55 | 55 | M16 | 10 | 6 | 16 | 50 | 20 | 14 | 8 |
| 32A | 55 | 55 | M16 | 12 | 6 | 16 | 50 | 25 | 16 | 9 |
| 32B | 65 | 65 | M20 | 12 | 6 | 18 | 58 | 25 | 16 | 9 |
| 52A | 60 | 60 | M20 | 16 | 6 | 18 | 53 | 25 | 18 | 11 |
| 52B | 75 | 75 | M20 | 16 | 6 | 20 | 68,5 | 25 | 18 | 11 |
| 72A | 70 | 70 | M20 | 20 | 6 | 20 | 62,5 | 20 | 20 | 12 |
| 72B | 85 | 85 | M24 | 20 | 6 | 22 | 76 | 20 | 20 | 12 |

C37004-39.DOC





BENZLERS

Installation of hollowshaft gear

C40004GB 2001-11-05

General information about backstop.

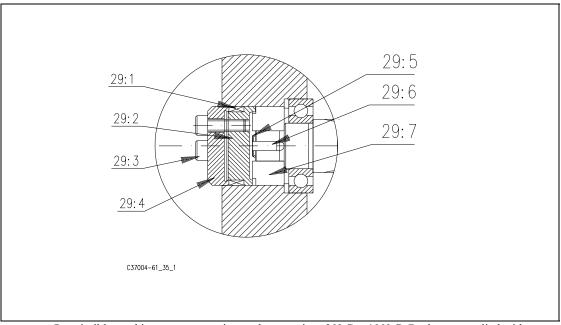
Before the backstop is fitted the torque and input speed should be checked against the table. Torque may reach $2.5 \, x$ value shown for brief periods.

See hollow shaft gear against input shaft and decide the direction of rotation of the output shaft: anticlockwise BV, or clockwise BH.

Always state direction of rotation when ordering gear unit including backstop.

| | Backstop | Max | Min | Max |
|---------|----------|--------------|-------------|-------------|
| Size | | Input torque | Input speed | Input speed |
| | Type | .Nm | rpm | rpm |
| J 12A/B | ASNU15EP | 75 | - | 2400 |
| J 22A/B | ASNU17EP | 112 | - | 2300 |
| J 32A/B | ASNU20EP | 160 | - | 2100 |
| J 52A/B | ASNU30EP | 500 | - | 1400 |
| J 72A/B | ASNU35EP | 750 | - | 1200 |
| J100 | RSCI40 | 1600 | 720 | 7600 |
| J110 | RSCI45 | 1800 | 665 | 6600 |
| J125 | RSCI50 | 2800 | 610 | 6100 |
| J140 | RSCI60 | 4700 | 490 | 6100 |
| J160 | RSCI70 | 6100 | 480 | 4500 |
| J190 | RSCI80 | 9000 | 450 | 4000 |

Instructions for backstop J12-32 Installation Fig.6



Permissible working temperature in steady operation -30° C -+100° C. Backstop supplied with corrosion protection DO NOT REMOVE.

- 1. Remove the cover (14) from the gear.
- 2. Decide the direction of rotation for the backstop (29:7) and slide it onto the shaft(1) against the gear casing bearing. The backstop must be slided on and inserted by hand. In no case strong violence may be used. If a small force is required apply it both on inner and outer race in accordance with general bearing assembly.
- 3. Fit the key (29:6) in the keyway between the shaft (1) and backstop (29:7).
- 4. Fit the locking ring (29:5).
- 5. Slide in the backstop bracket (29:2) making sure the lug engages in the slot in the backstop.(29:7)
- 6. Lubricate the clamp (29:1). NOTE OIL MUST NOT CONTAIN MOLYBDENDISULPHIDE.
- 7. Slide the clamp (29:1) onto the backstop bracket (29:2).
- 8. Coat at least 5mm of the thread nearest the screw heads (29:3) with thread locking agent.
- 9. Fit the clamp cover (29:4) using the screws (29:3). Tighten the screws diagonally to the torques given below.

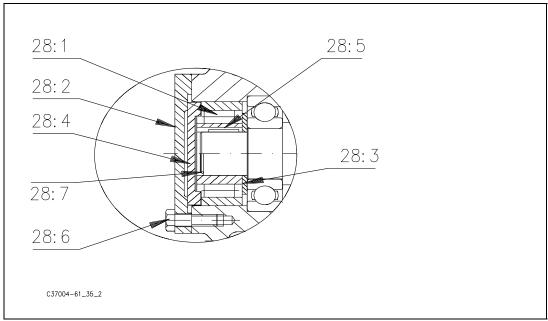
| Tightening torque.(29:3) | J12 | J22 | J32 |
|--------------------------|-----|-----|-----|
| Nm | 17 | 35 | 41 |

BENZLERS

Installation of hollowshaft gear

C40004GB 2001-11-05

Instructions for backstop J52-72 Installation Fig 9.

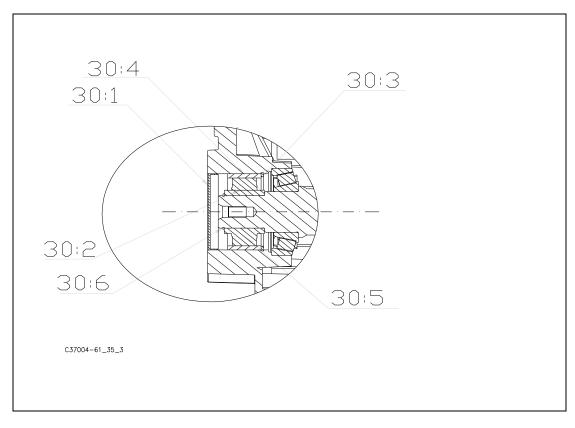


Permissible working temperature in steady operation -30° C -+100° C. Backstop supplied with corrosion protection DO NOT REMOVE.

- 1. Remove cover (14) from the gear.
- 2. Fit the support ring (28:3) against the bearing.(Only applies to J52)
- 3. Grease the shaft on which the backstop is to be mounted and fit the key (28:5) in the shaft keyway. In case of J72, fit also locking ring (28:7).
- 4. Determine the direction of rotation of the backstop (28:1) and slide this onto the shaft (1).
- 5. Fit the key (28:4) in the cover (28:2) and screw cover on the reducer.

C40004GB 2001-11-05

Instruction for back stop J100-J190 Assembly se fig 10.



Permissible working temperature in steady operation -30° C -+100° C. Backstop supplied with corrosion protection DO NOT REMOVE.

- 1. Dismantle the cover part (30:1*) from standard reducer.
- 2. Assembly the snap ring part (30:3*) in gear housing.
- 3. Grease shaft end where back stop is to be fitted and put Key part (30:2*)into the keyway.
- 4. Determine direction of rotation and remove outer race part (30:4*)of backstop and and fit it gently against the snap ring part (30:3*) in gear housing. (Direction of rotation is changed if back stop is reversed.)
- 5. Mount the inner part of back stop, part (30:5*) into guiding ring, (ordered separately).
- 6. Now press by hand the guiding ring with back stop against the outer race, part(30:4*) and push back stop against shaft shoulder.
- 7. Remove the guiding ring and fit snap ring, part (30:6*) on gear shaft.
- 8. Fit new cover, part (30:1*), and fill up with oil before starting.
 - * As shown in spare parts list.

CONTACT US

AUSTRALIA

Radicon Transmission (Australia) PTY Ltd

Australia

EUROPE

Germany

Tel: +61 421 822 315

DENMARK

Benzler Transmission A/S

Dalager 1 DK-2605 Brøndby, Denmark

Tel: +45 36 34 03 00 Fax: +45 36 77 02 42

FINLAND

Benzler TBA BV Oy Benzler AB

Jachthavenweg 2Vanha Talvitie 3CNL-5928 NT VenloFI-00580 Helsingfors,

Finland

Tel: +358 9 340 1716 Fax: +358 10 296 2072

Italy

Tel: +39 02 824 3511

Tel: 0800 350 40 00

Fax: 0800 350 40 01

Netherlands & the rest of Europe $\,$

Tel: +31 77 324 59 00 Fax: +31 77 324 59 01

INDIA

Elecon. Engineering Company Ltd.

Anand Sojitra Road Vallabh Vidyanagar 388120 Gujarat India

Tel: +91 2692 236513

SWEDEN & NORWAY

AB Benzlers

Porfyrgatan 254 68 Helsingborg

Sweden

Tel: +46 42 18 68 00 Fax: +46 42 21 88 03

THAILAND

Radicon Transmission (Thailand) Ltd

700/43 Moo 6 Amata Nakorn Industrial Estate Tumbol Klongtumru

Muang, Chonburi 20000 Thailand

Tel: +66 3845 9044 Fax: +66 3821 3655 **UNITED KINGDOM**

Radicon Transmission UK Ltd

Unit J3

Lowfields Business Park, Lowfields Way, Elland West Yorkshire, HX5 9DA

Tel: +44 1484 465 800 Fax: +44 1484 465 801

USA

Radicon Drive Systems, Inc.

2475 Alft Lane Elgin Chicago Illinois 60124 USA

Tel: +1 847 593 9910 Fax: +1 847 593 9950

























benzlers* radicon*

Benzlers

Denmark +45 36 340300 Finland +358 9 3401716 Germany +49 800 3504000 Italy +39 02 824 3511 Sweden +46 42 186800 The Netherlands +31 77 3245900 www.benzlers.com

Radicon

Thailand +66 38459044 United Kingdom +44 1484 465800 USA +1 847 5939910 www.radicon.com

SIEMENS

DE Federkraftbremse

Spring-operated brake

FR Frein monodisque à ressorts de serrage

ES Freno de disco de resorte

П Freni a molla

sv Fjäderbroms

cs Pružinová brzda

Пормоз с пружинным замыканием

Betriebsanleitung
Operating instructions
Instructions de service
Instrucciones para el manejo
Manuale d'uso
Bruksanvisning
Návod
Инструкция использования

2LM8 005-1NA10 ... 2LM8 400-0NA10

 ϵ

Œ

DEUTSCH

WARNUNG



Alle Arbeiten zum Transport, Anschluß zur Inbetriebnahme und regelmäßige Instandhaltung sind von qualifiziertem, verantwortlichem Fachpersonal auszuführen (VDE 0105, IEC 364 beachten). Unsachgemäßes Verhalten kann schwere Personen- und Sachschäden verursachen.

Die jeweils geltenden nationalen, örtlichen und anlagespezifischen Bestimmungen und Erfordernisse sind zu berücksichtigen.



ALLGEMEINE HINWEISE

Ergänzend zu dieser Anleitung immer die Sicherheitsund Inbetriebnahmehinweise bzw. Betriebsanleitung der zugehörigen Motoren mitbeachten.

1 Beschreibung

1.1 Anwendungsbereich

Bestimmungsgemäße Verwendung: Die federbetätigten, gleichstromerregten Scheibenbremsen werden für Drehstrom-Asynchronmotoren der Baugrößen 63 bis 225L verwendet. Die Bremse (Ferderkraftbremse) darf nicht in explosionsgefährdeter oder agressiver Atmosphäre betrieben werden. Bei hoher Luftfeuchtigkeit und tiefen Temperaturen müssen geeignete Maßnahmen gegen das Festfrieren von Ankerscheibe

und Rotor getroffen werden (z. B. Heizung). Um eine sichere Funktion der Federkraftbremse zu gewährleisten müssen beim Einsatz in staubiger Umgebung, bei möglichem Eindringen von Schmutzwasser oder wenn die Verteilung des Abriebstaubes verhindert werden soll geeignete Maßnahmen, z. B. durch Abdeckring, Wellendichtring oder Ver-

schlußdeckel, getroffen werden.
Umgebungstemperatur: -20° C bis 40° C

1.2 Aufbau und Arbeitsweise (s. Fig. 3)

Es handelt sich um Einscheibenbremsen mit zwei Reibflächen. Durch mehrere Druckfedern wird im stromlosen Zustand das Bremsmoment durch Reibschluß erzeugt. Das Lösen der Bremse erfolgt elektromagnetisch.

Beim Bremsvorgang wird der auf der Nabe (3.00) axial verschiebbare Rotor (2.00) durch die Druckfedern (1.04) über die

Ankerscheibe (1.02) an die Gegenreibfläche (8.22) gedrückt. Im gebremsten Zustand ist zwischen Ankerscheibe (1.02) und Magnetteil (1.01) der Luftspalt $s_{L\bar{l}}$ vorhanden.

Zum Lüften der Bremse wird die Spule des Magnetteils (1.01) mit Gleichspannung erregt. Die entstehende Magnetkraft zieht die Ankerscheibe (1.02) gegen die Federkraft an das Magnetteil.

Der Rotor ist damit von der Federkraft entlastet und kann sich frei drehen.

Die Ausführung mit **mechanischer Handlüftung** ermöglicht das Lüften der Bremse bei Motorstillstand durch Ziehen des Lüfthebels (6.00).

1.3 Approbation:



2 Betrieb



WARNUNG



Alle Arbeiten nur im elektrisch spannungslosen Zustand der Anlage durchführen!

2.1 Elektrischer Anschluß

Anschluß des Bremsmotors nach dem Schaltbild im Motorenanschlußkasten durchführen. Bremsenanschluß (Standardausführung) siehe Fig. 1.

Die Motoren haben die üblichen Leistungsschilder und erhalten zusätzlich auf der gegenüberliegenden Seite des Motors oder auf die Haube ein zweites Leistungsschild mit den Bremsendaten.

Die Wechselspannung für die Erregerwicklung der Bremse wird an den beiden freien Klemmen des Gleichrichterblockes (\sim) angeschlossen (s. Fig. 1).

Schnelles Einfallen der Bremse

Wird die Bremse vom Netz getrennt, erfolgt die Bremsung. Die Einfallzeit der Bremsscheibe wird durch die Induktivität der Magnetspule verzögert (**wechselstromseitiges** Abschalten). Hierbei tritt eine starke Einfallverzögerung auf.

Diese Schaltungsart ist nicht für Hubantriebe geeignet.

Bestell - Nr. / Order No.: 5 610 70000 10 020 a

DEUTSCH / ENGLISH / FRANÇAIS / ESPAÑOL / ITALIANO / SVENSKA/ ČESKY / рўсский

(DE) DEUTSCH

Für kurze Einfallzeiten muß **gleichstromseitig** abschaltet werden. Zum Schutz der Spule und Kontakte sollte bei gleichstromseitigem Abschalten parallel ein Funkenlöschglied (s. Fig.1) geschaltet werden (VDE 0580§26).

Lüften der Bremse bei abgeschaltetem Motor

Durch getrennte Erregung des Magneten läßt sich die Bremse im Stillstand des Motors lüften. Hierzu muß an die Klemmen des Gleichrichterblockes die entsprechende Wechselspannung (s. Bremsenleistungsschild) angeschlossen werden. Die Bremse bleibt gelüftet, solange die Spannung anliegt.

Die Gleichrichter sind durch Varistoren im Eingang und Ausgang gegen Überspannung geschützt.

Spannung und Frequenz

| Gleichrichter | (H) | ~ | | | |
|---------------|---------------------|---------------------|--|--|--|
| Anschluß | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz | | | |
| Magnetspulen | 205 V DC | 180 V DC | | | |

Bei 60 Hz darf die Spannung für die Bremse nicht erhöht werden!

24 V DC - Bremse - Anschluß im Anschlußkasten.

2.2 Betriebswerte (siehe Fig. 4)

2.3 Änderung des Bremsmomentes (siehe Fig. 2)

Die Bremse wird mit eingestelltem Bremsmoment geliefert. Eine Reduzierung durch Herausschrauben des Einstellringes mittels Hakenschlüssel (DIN 1810 Form A) ist bis max. auf das Maß "o," möglich. Pro Rastung des Einstellringes ändert sich das Bremsmoment nach Fig.2. Hierdurch kann das Bremsmoment auf "M_{Br min.}" reduziert werden.

Eine Bremsmomentverringerung über den Einstellring verlängert die Einfallzeit und verkürzt die Lüftzeit.

2.4 Maximal zulässige Drehzahlen

Die Bremse ist für den Einsatz als Haltebremse mit **Not-Stop-Funktion** dimensioniert

Der Einsatz als Betriebsbremse ist bei geringer Reibearbeit möglich (Lebensdauer, siehe Instandhaltung).

Die max. Drehzahlen sind Fig. 4 zu entnehmen.

Bei **Not-Stop-Funktion** ist mit erhöhten Temperaturen (bis 130° C) und größerem Verschleiß zu rechnen.

3 Instandhaltung

Für normale Einsatzfälle als Haltebremse ist die Bremse wartungsfrei.

Lediglich bei Einsatzfällen als Betriebsbremse, in denen Reibarbeit zu verrichten ist, muß der Luftspalt "s_u" in bestimmten Zeitabschnitten kontrolliert und spätestens beim Erreichen des max. Luftspalt "s_Lü max." wieder auf den Nennluftspalt "s_Lü Nenn" nachgestellt werden (s. Fig. 2).

Nachstellung des Luftspaltes wie folgt vornehmen:

Lüfterhaube (8.85) entfernen.

Befestigungsschrauben (8.01) etwas lösen, Nachstellhülsen (1.07) mittels Maulschlüssel in das Magnetteil (1.01) hineinschrauben und Befestigungsschrauben wieder anziehen. Anschließend nochmals Kontrolle des Luftspaltes.

Wenn Handlüfthebel vorhanden, dann Maß "s" gemäß Fig. 2a nachstellen.



HINWEIS

Reibflächen nicht mit Öl oder Fett in Berührung bringen!

Auswechseln des Reibbelages

Bei verbrauchtem Reibbelag ist der Rotor (2.00) auszutauschen. Minimale Rotorstärke s. Fig. 2.

Demontage / Montage (s. Fig.3)

Wenn mechanische Handlüftung vorhanden ist, Handlüfthebel vor dem Abnehmen der Haube herausschrauben.

Lüfterhaube (8.85) abnehmen.

Lüftersicherungsring entfernen und Lüfter abziehen (entfällt bei fremdbelüfteten Motoren).

Bei Kombinationen mit Impulsgeber: Drehmomentenstütze (8.31) lösen und Geberwelle mit Maulschlüssel SW 10 (bei 1LG4/6-Motoren SW 13) aus Motorwelle herausschrauben. Befestigungsschrauben (8.01) herausschrauben.

Magnetteil komplett (1.00) abnehmen. Ggf. hierzu Bremsenanschlußleitung am Gleichrichter lösen.

Rotor mit Reibbelag (2.00) wechseln.

Montage in umgekehrter Reihenfolge. Luftspalt auf Nennmaß einstellen.

Wenn Handlüfthebel vorhanden, dann Maß "s" gemäß Fig. 2a nachstellen.

Bei Motoren mit Impulsgeber: Geberwelle mit 7 bis 9 Nm in Motorwelle einschrauben.

Zulässige Rundlauftoleranz siehe Betriebsanleitung Geber.



HINWEIS

Nach der Instandsetzung muß und vor Inbetriebnahme sollte die Gleichmäßigkeit des Nennluftspalts im stromlosen Zustand mittels Fühlerlehre zwischen Ankerscheibe und Magnetteil an 3 Stellen des Umfanges kontrolliert werden. Bei Wiederinbetriebnahme des Motors ist die einwandfreie Funktion der Bremse zu prüfen!



A

WARNING



All work involved in the transport, connection, commissioning and regular maintenance must be carried out by **qualified**, **responsible specialists** (note VDE 0105; IEC 364). Improper behaviour may result in serious **injury** and **damage to property**. The applicable **national**, **local** and **works regulations** and **requirements** must be complied with.



GENERAL NOTE

In addition to these instructions, compliance with the safety and commissioning information or operating instructions for the associated motors is always necessary.

1 Description

1.1 Application

Intended use: The spring-operated, DC-energized disk brakes are used for three-phase induction motors of sizes 63 to 225L. The brake (spring-loaded brake) must not be operated in areas where there is risk of explosion or under corrosive atmospheric conditions. With high humidity and low temperatures, suitable measures (such as a heater) must be implemented to prevent the armature plate and rotor from freezing up.

To ensure reliable operation of the spring-loaded brake, suitable measures, such as the use of a cover ring, shaft seal or cap, must be implemented when the brake is operated in a dusty environment, if there is a possible ingress of dirty water or if the distribution of the abrasion dust is to be prevented.

Ambient temperature: -20° C to 40° C

1.2 Design and mode of operation (see Fig. 3)

The brake is a single disk brake with two friction surfaces. In the de-energized state, more preloading springs generate the braking torque due to frictional locking. The brake is then activated electromagnetically.

During the braking process, the axially movable rotor (2.00) on the hub (3.00) is pressed by the preloading springs (1.04) via the armature disk (1.02) onto the opposing friction surface (8.22).

In the braked state, the air-gap $s_{L\bar{u}}$ exists between the armature disk (1.02) and the magnetic section (1.01).

The brake is released by exciting the coil of the magnetic section (1.01) with a DC voltage. The generated magnetic force pulls the armature disk (1.02) against the spring force onto the magnetic section.

The rotor is therefore relieved of the force of the spring and is able to rotate freely.

The design that includes **mechanical manual** releasing enables the brake to be released at motor standstill by pulling the release lever (6.00).

1.3 Approved use:



2 Operation



WARNING

All work must be carried out on the equipment in the de-energized state!

2.1 Electrical wiring

Wire up the brake motor in accordance with the circuit diagram in the motor terminal box. For the brake connections (standard design), s. Fig. 1.

The motors are fitted with the rating plates standard and in

addition, on the opposite side of the motor, there is a second rating plate with the brake data.

The AC voltage for the excitation winding of the brake must be connected to the two spare terminals (\sim) of the rectifier block (see Fig. 1).

High-speed brake application

When the brake is disconnected from the supply voltage, braking takes place.

The application time of the brake disk is delayed due to the induction of the magnetic coil (AC-side switch-off). In this case, there is a long delay in brake application.

This type of switching is not suitable for lifting drives.

Shorter application times are obtained if the DC side is switched off. The coil and contacts should be protected in the case of DC-side switch-off by connecting a spark trap (VDE 0580, Paragraph 26, see Fig. 1).

Releasing the brake with the motor switched off

Due to separate excitation of the magnet, it is possible to release the brake at motor standstill. For this purpose, the appropriate AC voltage must be applied to the terminals of the rectifier block (see brake rating plate). The brake remains released as long as voltage is applied.

The rectifiers are protected against overvoltage by varistors connected to the input and output.

Voltage and frequency

| rectifier | (H) | ~ | | | |
|----------------|---------------------|---------------------|--|--|--|
| connection | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz | | | |
| magnetic coils | 205 V DC | 180 V DC | | | |

At 60 Hz, the voltage for the brake must not be increased! 24 V DC - Brake - Connection in terminal box

2.2 Operating values (see Fig. 4)

2.3 Changing the braking torque (see Fig. 2)

The brakes are supplied with the braking torque as set by the

It is possible to reduce this by unscrewing the adjustment ring with a hook spanner to a maximum of "o₁". At each notch of the adjustment ring, the braking torque changes in accordance with Figure 2. In this manner, the braking torque can be reduced to "M".

reduced to "M_{pr min."}.
Reducing the braking torque by means of the setting ring lengthens the brake delay time and the release time.

2.4 Maximum permissible RPM

The brake is dimensionally designed for use as a holding brake with a **not-stop feature**.

The use as a service brake is possible in case of low frictional work (service life: see Maintenance).

The maximum rotational speeds are given in Fig. 4.

With use of the **not-stop feature** increased temperatures (up to 130° C) and greater wear must be expected.

3 Maintenance

When normally used as a holding brake the brake requires no maintenance.

Only when used as service brake, involving frictional work, does the air gap " $s_{\rm air}$ " have to be monitored at certain intervals and at the latest when the maximum air gap " $s_{\rm air,max.}$ " is reached reset to the nominal air gap " $s_{\rm air,nom.}$ " (see Fig. 2).

The air gap is adjusted as follows:

Remove fan cover (8.85).

Loosen fixing screws (8.01), screw adjustment bushes (1.07) into the magnetic section (1.01) using a fixed spanner and tighten the fixing screws again. Then check the air-gap again. If there is a manual release lever, then readjust "s" in accordance with Fig. 2a.

ENGLISH



FRANÇAIS



NOTE

Frictional surfaces must not come into contact with oil or grease!

Replacing the friction coating

When the friction coating has been consumed, the rotor (2.00) must be replaced. See Figure 2 for the minimum rotor thickness.

Disassemby / assembly (see Fig. 3)

If there is a manual mechanical release device, unscrew the manual release lever before removing the cowl.

Remove fan cover (8.85).

Remove fan securing ring and lift the fan off (not necessary for motors with external fans).

In combinations with pulse transmitters: Remove torque arm (8.31) and screw the pulse transmitter shaft out of the motor shaft using an SW 10 (1LG4/6 SW 13) fixed spanner.

Remove fixing screws (8.01).

Remove the magnetic section complete (1.00). If necessary remove the brake connection leads at the rectifier.

Replace rotor with friction coating (2.00).

Install in the reverse sequence. Adjust air gap to rated size. If there is a manual release lever, then readjust "s" in accordance with Fig. 2a.

In the case of motors with a pulse encoder, screw in encoder shaft with 7 to 9Nm.

For permissible radial eccentricity tolerance, see operating instructions for encoder.



NOTE

Before commissioning, it must be checked in the de-energized state that the air-gap is uniform and equal to the nominal size using a feeler gauge between the armature disk and magnetic section at 3 points on the circumference.

When the motor is recommissioned, the brake must be checked for correct operation!



ATTENTION



Tous les travaux de manutention, raccordement, mise en service et entretien régulier sont à exécuter par des **personnes qualifiées responsables** (respecter VDE 0105; CEI 364). Un comportement inapproprié peut occasionner des **blessures** graves et des **dommages matériels** importants. Il convient de respecter les **normes et dispositions nationales**, **locales** et **spécifiques de l'établissement**.



REMARQUE GÉNÉRALE

Pour les moteurs équipés des freins mentionnés ci-dessus, observer les présentes instructions en complément aux règles de sécurité et aux instructions de service relatives au moteur.

1 Description

1.1 Domaine d'utilisation

Utilisation conforme : Les freins à disque actionnés par ressort, à courant continu sont utilisés pour les moteurs asynchrones à courant triphasé de la taille de 63 à 225L.

Le frein (frein à élasticité) ne doit pas être mis en service dans des atmosphères soumises aux explosions ou dans des atmosphères agressives. En cas d'humidité relative élevée et de basses températures, il faut prendre les mesures adaptées contre le gel du disque et du rotor (par ex. chauffage).

Afin d'assurer un fonctionnement sûr du frein à élasticité, il faut prendre, dans le cas d'une utilisation dans un environnement poussiéreux, en cas d'éventuelle pénétration d'eau sale ou d'empêchement de la répartition de la poussière de friction, des mesures adaptées par ex. bague de recouvrement, bague à lèvres en caoutchouc ou couvercle de fermeture.

Température environnante : -20° C à 40° C

1.2 Constitution et fonctionnement (voir Fig. 3)

Il s'agit de freins monodisque à deux faces de friction.

Le couple de freinage est engendré à l'état hors tension par l'action des ressorts sur le disque de freinage. Le desserrage du frein est électromagnétique.

Au freinage, les ressorts (1.04) agissent sur le disque d'armature (1.02) qui repousse le disque de freinage (2.00) le long du moyeu (3.00) pour l'appliquer contre la surface de friction (8.22).

Lorsque le frein est serré, le disque d'armature (1.02) est séparé de la culasse électromagnétique par l'entrefer $s_{L\bar{U}}$.

Le frein est desserré par application d'une tension continue à la bobine de la culasse (1.01). L'effort électromagnétique produit attire le disque d'armature (1.02) contre la culasse en sens opposé à la pression des ressorts.

Le rotor du moteur est ainsi libéré de la pression des ressorts et peut tourner librement.

La version à desserrage manuel permet d'ouvrir le frein à l'arrêt par traction sur le levier de desserrage (6.00).

1.3 Approbation:



2 Mise en oeuvre



ATTENTION



Intervention sur la machine uniquement à l'état hors tension.

2.1 Raccordement électrique

Intervention sur la machine uniquement à l'état hors tension. Procéder au raccordement du moteur conformément au schéma



collé dans la boîte à bornes. Raccordement du frein (version standard), voir Fig. 1.

Les moteurs présentent la plaque signalétique habituelle. Une plaque signalétique supplémentaire comportant les données de freinage est apposée du côté opposé. La tension alternative d'alimentation du moteur est amenée sur les bornes libres du bloc redresseur (~) (voir Fig. 1).

Serrage rapide du frein

Le serrage du frein est commandé par la coupure de la tension. Le retard au serrage est déterminé par l'inductance de la bobine. La coupure de la tension côté alternatif entraîne un retard important.

Ce type de coupure n'est pas adapté aux systémes de levage. Un serrage rapide peut être obtenu par commande côté continu. Dans ce cas, la bobine et les contacts doivent être protégés par un dispositif d'antiparasitage (VDE 0580 § 26 ; voir Fig. 1).

Desserrage du frein sur moteur hors tension

Le desserrage du frein lorsque le moteur est à l'arrêt est réalisé par application de la tension alternative d'alimentation du frein (voir plaque signalétique de freinage) aux bornes du redresseur. Le frein reste desserré aussi longtemps que la tension est appliquée.

Les redresseurs sont protégés en entrée et en sortie par des varistances.

Tension et fréquence

| redresseurs | (H) | ~ | | | |
|--------------|---------------------|---------------------|--|--|--|
| raccordement | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz | | | |
| bobine | 205 V DC | 180 V DC | | | |

A 60 Hz, la tension d'alimentation du frein ne doit pas dépasser la valeur prescrite.

24 V DC - Frein - raccordement dans boîte à bornes

2.2 Caractéristiques de service (voir Fig. 4)

2.3 Modification du couple de freinage (voir Fig. 2) Le couple de freinage est réglé en usine.

Il peut être réduit en desserrant l'anneau de réglage avec une clé à ergots jusqu'à la cote maximale «o₁». Chaque cran de l'anneau de réglage correspond à une modification du couple de freinage selon le tableau de la Fig. 2. Le couple de freinage minimal est «M. . . ».

minimal est «M_{Br min.}». Une réduction du couple de freinage à l'aide de l'anneau de réglage rallonge le temps d'activation du frein et réduit le temps de desserrage du frein.

2.4 Vitesses maximales admissibles

Le frein est dimensionné pour un service comme frein d'arrêt avec fonction d'arrêt d'urgence.

L'utilisation comme frein de service est possible en cas de friction minime (durée de service, voir remise en état).

Les vitesses de rotation max. sont indiquées à l'**illustration 4**. Pour la **fonction d'arrêt d'urgence**, il faut s'attendre à des températures plus élevées (jusqu'à 130° C) et à une grande usure.

3 Entretien

Pour les cas d'utilisation normaux comme frein d'arrêt, le frein ne demande pas de maintenance.

Seuls dans les cas d'utilisation comme frein de service où un travail de friction doit être fourni, la fente d'aération « $s_{L\ddot{u}}$ » doit être contrôlée à certains intervalles de temps et de nouveau réglée sur la fente d'aération nominale " $s_{L\ddot{u}}$ Nenn" au plus tard quand on atteint la fente d'aération maximale de " $s_{L\ddot{u}}$ max." (voir ill. 2).

Ajustage de l'entrefer

Déposer le capot (8.85) du ventilateur. Desserrer légèrement les vis de fixation (8.01), resserrer les douilles d'ajustage (1.07) en direction de la culasse (1.01) à l'aide d'une clé plate. Resserrer les vis de fixation. Contrôler l'entrefer.

Si une manette de desserrage du frein est présente, la cote "s" doit être ajustée selon la fig. 2a.



NOTE

Eviter tout contact des surfaces de freinage avec de la graisse ou de l'huile.

Remplacement des garnitures

Lorsque les garnitures sont usées, le disque de freinage (2.00) doit être remplacé. Epaisseur totale minimale du disque de freinage, voir Fig. 2.

Démontage/remontage (voir Fig. 3)

Si un mécanisme de desserrage manuel est prévu, la manette de desserrage du frein doit être dévissées avant le retrait du capot.

Déposer le capot (8.85) du ventilateur.

Enlever la bague d'arrêt du ventilateur et déposer le ventilateur (ne concerne pas les moteurs à refroidissement séparé).

Sur les moteurs avec générateur d'impulsion : dévisser l'étrier d'immobilisation en rotation (8.31) et dévisser l'arbre du générateur de l'arbre du moteur à l'aide d'une clé plate de 10 (1LG4/6 plate de 13).

Dévisser les vis de fixation (8.01).

Déposer la culasse magnétique (1.00) complète. Au besoin déconnecter auparavant le câble de liaison au redresseur.

Remplacer le disque de freinage (2.00).

Le montage s'effectue dans le sens inverse. L'interstice doit être réglé sur la cote assignée.

Si une manette de desserrage du frein est présente, la cote «s» doit être ajustée selon la fig. 2a.

Dans le cas des moteurs avec générateur d'impulsions : l'axe de l'encodeur doit être vissé avec un couple de serrage de 7 à 9 Nm. Pour la tolérance de régularité de rotation, voir les instructions de service de l'encodeur.



NOTE

On doit après la remise en état et il serait bon avant la mise en service de contrôler la régularité de la fente d'aération nominale quand le courant est coupé, à l'aide d'une jauge d'épaisseur, entre le disque et la pièce magnétique, à 3 endroits de l'étendue.

A la remise en service du moteur, vérifier le bon fonctionnement du frein!





ADVERTENCIA



Todos los trabajos de transporte, conexión, puesta en marcha y mantenimiento periódico han de ser realizados por personal especializado y cualificado responsable (observar VDE 0105; IEC 364). Un comportamiento inadecuado puede producir graves lesiones y daños materiales. Es necesario respetar las normas y disposiciones vigentes nacionales, locales y específicas de la instalación.

A

INDICACIONES GENERALES



Observar siempre, junto con estas instrucciones, las instrucciones de seguridad y de puesta en marcha o de servicio de los motores correspondientes.

1 Descripción

1.1 Campo de aplicación

Uso reglamentario: Los frenos de disco activados por resorte, excitados con corriente continua se usan para motores asincrónicos trifásicos de los tamaños de construcción del 63 al 225L.

No esta permitido que el freno (freno de fuerza elástica) trabaje en ambientes expuestos a explosiones ni agresivos. Con una alta humedad del aire y bajas temperaturas, tienen que tomarse las medidas apropiadas contra el agarrotamiento por heladas del disco del rotor y del rotor mismo (p, ej., calefacción).

Para garantizar que el freno de fuerza elástica funcione con seguridad, al utilizarlo en un entorno polvoriento, al ser posible que penetre agua sucia o si se quiere evitar que se reparta el polvo producido por la abrasión, se deben tomar medidas apropiadas, p. ej., mediante anillo cobertor, retén de árbol o tapa.

Temperatura ambiente: de -20° C a 40° C cerrado

1.2 Construcción y funcionamiento (v. fig. 3)

Son frenos con un solo disco y dos superficies de fricción. Más resortes de compresión generan el par (torque) de frenado por fricción. El freno se abre con un electroimán.

Durante el frenado el rotor, desplazable axialmente (2.00) y situado sobre el cubo (3.00), es presionado contra la superficie de fricción (8.22) por medio del disco del inducido (1.02).

Cuando está abrir el freno hay un entrehierro S_{LÜ} entre el disco del inducido (1.02) y el electroimán (1.01).

Para abrir el freno se aplica tensión a la bobina de c.c. del electroimán (1.01). Se genera un campo magnético el cual vence la presión del resorte y atrae el disco del inducido (1.02) al electroimán.

Con ello el rotor se libera de la presión del resorte y puede moverse libremente.

Tirando de la palanca (6.00) en la ejecución con **apertura manual mecánica** es posible soltar el freno cuando está parado el motor.

1.3 Aprobación:



2 Servicio



ADVERTENCIA



¡Efectuar cualquier trabajo sólo cuando la instalación esté sin tensión!

2.1 Conexión eléctrica

Conectar el motor del freno siguiendo el esquema en la caja de bornes del motor. Para la conexión de los frenos (ejecución estándar), v. la fig. 1. Los motores disponen de las placas de características usuales y adicionalmente, en el lado contrario del motor, de una segunda placa de características con los datos de los frenos.

La tensión alterna para los devanados de excitación del freno se conecta a los dos bornes libres del bloque rectificador (~) (v. fig. 1).

Aplicación rápida del freno

El freno actúa tan pronto como se corte la alimentación.

El tiempo de cierre del disco de freno se retarda debido a la inductancia de la bobina del electroimán (desconexión por el **lado de corriente alterna**). El retardo resultante es apreciable. Este tipo de circuito no es apropiado para mecanismos de elevacion.

Si se requieren tiempos de cierre cortos, deberá desconectarse por **el lado de corriente continua**. En este caso se recomienda conectar en paralelo un dispositivo supresor (v. fig. 1) con objeto de proteger a la bobina y a los contactos durante la desconexión (VDE 0580§26).

Abrir el freno cuando está desconectado el motor

Como el electroimán es excitado por separado, es posible abrir el freno cuando está parado el motor. A este efecto se correspondiente tensión alterna (v. la placa de características del freno). El freno se mantiene abierto mientras esté aplicada la tensión.

Varistores a la entrada y salida protegen a los rectificadores contra sobretensiones.

Tensión y frecuencia

| rectificador | (A) | ~ |
|--------------|---------------------|---------------------|
| concebido | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz |
| bobinas | 205 V DC | 180 V DC |

¡En redes de 60 Hz, es inadmisible aumentar la tensión del freno!

24 V DC - el freno - concebido en caja de bornes

2.2 Valores de servicio (v. fig. 4)

2.3 Modificación del par de frenado (v. fig. 2)

El freno se suministra con el par (torque) de frenado ajustado. Es posible reducirlo desatornillando el tornillo de ajuste mediante una llave de gancho hasta «o₁» como máx. En la fig. 2 se indican las variaciones del par (torque) de frenado por cada muesca del anillo de ajuste. Con ello es posible reducir el par (torque) de frenado a «M₀, mío».

El anillo de ajuste permite reducir el par de frenado, con lo que se prolonga el tiempo de cierre del freno y se acorta el tiempo de apertura del freno.

2.4 Velocidad de giro máxima

El freno está dimensionado para trabajar con función de paradade emergencia.

Su uso como freno de servicio es posible si es bajo el trabajo de fricción (duración, véase Mantenimiento).

Las velocidades máxima admisibles pueden verse en la **Fig. 4**. En la **función de stop de emergencia** se tiene que contar con temperaturas aumentadas (hasta de 130° C) y un mayor desgaste.

3 Mantenimiento

Para los casos de aplicación normales como freno de parada, no necesita mantenimiento.

Sólo y exclusivamente en los casos de aplicación como freno de servicio, en el que tiene que rendirse un trabajo de fricción, en ciertos intervalos se tiene que controlar el entrehierro "s $_{\text{Lü}}$ " y, lo más tardar al alcanzar el entrehierro máximo "s $_{\text{Lü}\,\text{max}}$ ", se tiene que reajustar al entrehierro nominal "s $_{\text{Lü}\,\text{Nenn}}$ " (véase la Fig. 2).





Reajustar el entrehierro como sigue:

Retirar la caperuza del ventilador (8.85)

Soltar ligeramente los tornillos de fijación (8.01), atornillar al electroimán (1.01) los casquillos de reajuste (1.07) mediante una llave de boca y volver a apretar los tornillos de fijación.

A continuación volver a controlar el entrehierro.

Si existe palanca de apertura manual de freno, entonces reajustar la dimensión "s" según la figura 2a.



INDICACION

¡Evitar que entren en contacto con aceite o grasa las superficies de fricción!

Recambio de la quarnición de fricción

Deberá sustituirse el rotor (2.00) cuando se haya desgastado la quarnición de fricción. Espesor mínimo del rotor: v. fig. 2.

Desmontaje / montaje (ver fig. 3)

Si existe sistema de apertura mecánica de freno, entonces destornillar la palanca de apertura antes de retirar la cubierta. Retirar la caperuza del ventilador (8.85)

Quitar el clip de seguridad del ventilador y retirar el ventilador (no procede en el caso de motores con ventilación independiente).

En motores con emisor de impulsos acoplado: soltar el brazo de reacción (8.31) y desatornillar el eje del emisor del eje del motor con la llave de boca ancho 10 (1LG4/6 boca ancho 13).

Desatornillar los tornillos de fijación (8.01).

Retirar por completo el electrolmán (1.00). En caso dado soltar en el rectificador los cables de conexión del freno. Sustituir el rotor con guarnición de fricción (2.00).

Efectuar el montaje en sentido inverso. Ajustar el entrehierro a la dimensión nominal.

Si existe palanca de apertura manual de freno, entonces reajustar la dimensión "s" según la figura 2a.

En motores con generador de impulsos: enroscar el eje del generador de impulsos en el eje del motor aplicando un par de 7 a 9 Nm.

Para tolerancia con concentricidad permitida, ver instrucciones del emisor de impulsos.



INDICACION

Después de la reparación se tiene que y antes de la puesta en marcha se debe controlar la homogeneidad del entrehierro nominal en un estado sin corriente y usando un calibre sonda que se introduce entre el disco del rotor y la unidad magnética en 3 lugares de la periferia.

¡Al reponer en marcha se tiene que controlar si el freno funciona perfectamente!

A

ATTENZIONE



Tutte le operazioni di trasporto, collegamento, messa in servizio e manutenzione devono essere eseguite da personale addestrato (cfr. VDE 0105; IEC 364). La non osservanza di tali norme può provocare gravi lesioni alle persone ed ingenti danni materiali. Si raccomanda di rispettare i regolamenti nazionali e locali e di attenersi alle istruzioni relative all'impianto.



AVVERTENZE GENERALI

A completamento di queste istruzioni tecniche attenersi sempre alle norme di sicurezza e di messa in servizio, nonchè alle istruzioni di impiego dei relativi motori.

1 Descrizione

1.1 Campo di impiego

Impiego conforme alla destinazione: ifreni a disco a pressione di molle alimentati a corrente continua vengono impiegati per i motori trifase asincroni delle serie da 63 a 225L.

Il freno (freni a pressione di molle) non deve essere utilizzato in atmosfera aggressiva o esplosiva. In presenza di elevata umidità dell'aria o di basse temperature si dovrà provvedere con misure opportune in modo che il disco dell'ancora e il rotore non gelino (p. es. riscaldamento).

Per assicurare il funzionamento ineccepibile del freno a pressione di molle in ambienti polverosi, con pericolo di infiltrazione di acqua sporca o quando si deve evitare l'emissione della polvere di frizione, occorre prendere misure adeguate, p. es. con anello di protezione, anello di tenuta per alberi o coperchio.

Temperatura ambiente: -20° C ... 40° C

1.2 Costruzione e funzionamento (vedere Figura 3)

Si tratta di freni monodisco con due superfici di attrito.

Utilizzando più molle di pressione viene prodotto il momento frenante tramite attrito in assenza di corrente. L'apertura del freno viene effettuata con elettromagneti.

Durante la frenatura il rotore (2.00), che scorre assialmente sul mozzo (3.00), viene premuto sulla superficie di contrasto (8.22) mediante le molle di pressione (1.04) agenti sul disco dell'indotto (1.02).

Nello stato di frenatura, fra il disco dell'indotto (1.02) e il magnete (1.01) è presente un traferro d'aria s_{in} .

Per allentare il freno la bobina del magnete (1.01) viene eccitata con corrente continua. La forza magnetica che si produce attira il disco dell'indotto (1.02) vincendo le forze delle molle applicate sul magnete.

Il rotore pertanto non subisce più la forza elastica delle molle e ruota liberamente.

L'esecuzione con disinnesto meccanico manuale consente l'allentamento del freno a motore fermo, che viene effettuato tirando la leva di disinnesto (6.00).

1.3 Autorizzazione:



2 Utilizzazione



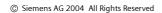
ATTENZIONE



Tutti i lavori sull'impianto devono essere effettuati in assenza di tensione!

2.1 Collegamento elettrico

Eseguire il collegamento del motore con freno secondo lo schema indicato sulla scatola dei morsetti del motore. Per il collegamento del freno (esecuzione standard), vedere Figura 1.





Questo tipo di circuito non è idoneo per meccanismi di sollevamento.

Per tempi di innesto brevi occorre disinserire l'alimentazione del lato della corrente continua. Per la protezione della bobina e dei contatti, con la disinserzione del lato di corrente continua è opportuno collegare in parallelo un elemento antiscintilla (vedere Figura 1) (VDE 0580§2G).

Sblocco del freno con motore non alimentato

Disinserendo l'eccitazione del magnete è possibile sbloccare il freno a motore fermo. Sui morsetti del gruppo del raddrizzatore deve essere pertanto collegata l'opportuna tensione alternata (vedere targhetta dati del freno). Il freno rimane allentato fino a quando è applicata la tensione.

I raddrizzatori sono protetti all'ingresso e all'uscita dalle sovratensioni mediante varistori

Tensione e frequenza

| raddrizzatori | (H) | ~ | | |
|---------------|----------------------------------|----------|--|--|
| collegamento | collegamento 230V ± 10% 50/60 Hz | | | |
| bobine | 205 V DC | 180 V DC | | |

Con frequenza pari a 60 Hz la tensione elettrica del freno non deve superare i limiti massimi ammessi!

24 V DC - il freno - collegamento scatola morsetti

2.2 Parametri di utilizzo (vedere Figura 4)

2.3 Modifica della coppia frenante (vedere Figura 2)

Il freno viene fornito con la coppia frenante già regolata. E' possibile ridurre la coppia allentando verso l'esterno l'anello di regolazione con la chiave a denti fino al valore massimo corrispondente a "o₁". Con l'impegno dell'anello di regolazione la coppia di frenatura viene modificata come indicato in Figura 2. In tal modo è possibile ridurre la coppia di frenatura a "M_{Brmi}". Una diminuzione del momento frenante tramite l'anello di regolazione prolunga il tempo di incidenza e riduce il tempo di ventilazione.

2.4 Numero di giri massimo ammesso

Per l'impiego come freno di stazionamento, il freno è dimensionato con **funzione di arresto di emergenza** E' possibile impiegare il freno come freno di esercizio solo con

sollecitazioni ridotte (Durata, vedi Manutenzione). Rilevare alla **fig. 4** il numero di giri massimo.

Con la **funzione di arresto di emergenza** a temperature elevate (fino a 130° C) si dovrà calcolare un'usura maggiore.

3 Manutenzione

Per il normale impiego come freno di stazionamento, non è prevista una manutenzione.

Solo se impiegato come freno di esercizio in cui si svolge un lavoro di frizione, si dovrà controllare ad intervalli regolari il traferro "s_ $_{\text{L}\text{\'{i}}}$ " e, al più tardi, al raggiungimento del traferro max. "s_ $_{\text{L}\text{\'{i}}\,\text{max.}}$ " , regolarlo in modo da raggiungere di nuovo il traferro nominale "s_ $_{\text{L}\text{\'{i}}\,\text{Nenn}}$ " (v. fig. 2).

La regolazione del traferro si effettua come segue:

Smontare la cuffia del ventilatore (8.85).

Allentare leggermente le viti di fissaggio (8.01), inserire le bussole di regolazione (1.07) nel magnete (1.01) utilizzando la chiave fissa e riserrare le viti di fissaggio.

Successivamente effettuare ancora un controllo del traferro. Se è presente una leva di ventilazione manuale, regolare la misura "s" secondo la figura 2a.



AVVERTENZA

Non applicare olio o grasso sulle superfici di contatto!

Sostituzione della pastiglia del freno

Quando la pastiglia è usurata si deve sostituire il rotore (2.00). Per lo spessore minimo del rotore vedere Figura 2.

Smontaggio/montaggio (vedere la figura 3)

Se è presente una ventilazione meccanica ad azionamento manuale, svitare e rimuovere la leva di ventilazione manuale prima di aprire il coperchio.

Smontare la cuffia del ventilatore (8.85).

Estrarrela rondella di sicurezza del ventilatore ed estrarre il ventilatore (non è previsto per motori a ventilazione esterna). Nelle costruzioni con datore di impulsi: allentare i supporti del misuratore del braccio di reazione (8.31) e svitare l'albero del datore con la chiave fissa Ch 10 (1LG4/6 Ch13) dall'albero del motore.

Svitare le viti di fissaggio (8.01).

Estrarre completamente il magnete (1.00). Eventualmente allentare il cavo di collegamento del freno sul raddrizzatore. Sostituire il rotore con la relativa pastiglia (2.00).

Il montaggio avviene nella sequenza inversa. Impostare il traferro al valore nominale.

Se è presente una leva di ventilazione manuale, regolare la misura "s" secondo la figura 2a.

Nei motori con trasduttore a impulsi: avvitare l'alberino del trasduttore nell'albero motore per 7...9 Nm

Eccentricità ammessa: vedere il manuale operativo del trasduttore.



INDICACION

Prima della messa in esercizio e dopo operazioni di manutenzione si deve controllare la regolarità del traferro nominale, senza tensione, tra disco ancora ed elemento magnete su 3 punti della circonferenza, impiegando uno spessimetro.

Quando si rimette in funzione il motore verificare prima il funzionamento ineccepibile del freno!



VARNING



Allt arbete i samband med transport, anslutning, idrifttagning och regelbundet underhåll måste utföras av kvalificerade, ansvariga yrkesmän (VDE 0150; IEC 364). Osakkunnig hantering kan medföra svåra personoch materialskador. Uppmärksamma gällande svenska, lokala och anläggningsspecifika bestämmelser och krav.



ALLMÄNNA ANVISNINGAR

laktta förutom denna anvisning alltid anvisningarna för säkerhet och idrifttagande resp. driftsanvisningen för de tillhörande

Beskrivning

Användningsområde

Föreskriven användning: De fjädermanövrerade, likströmsmagnetiserade skivbromsarna är avsedda för trefasasynkronmotorer storlek 63 till 225L.

Bromsen (fjäderkraftbroms) får inte användas på ställen där det finns risk för explosion eller i aggressiv atmosfär. Om man har hög luftfuktighet och låga temperaturer måste lämpliga åtgärder vidtas som förhindrar att ankarskivan och rotorn fryser fast (t ex med hjälp av ett värmeaggregat).

För att säkerställa fjäderkraftbromsen fullgoda funktion även om fjäderkraftbromsen används i dammig miljö, där det finns risk att smutsvatten kan tränga in eller om man vill förhindra att friktionsdamm sprids måste lämpliga åtgärder vidtas t ex genom att montera en skyddsring, en axeltätningsring eller ett skyddslock.

Omgivningstemperatur: -20° C till 40° C

Konstruktion och arbetssätt (se fig. 3)

Det är enskivsbromsar med två friktionsytor. Bromsmomentet alstras i strömlöst tillstånd genom att friktionen upphör orsakat av flera tryckfjädrar. Bromsen lossas elektromagnetiskt.

Vid bromsning trycks den på navet (3.00) axialt förskjutbara rotorn (2.00) genom tryckfjädrarna (1.04) över ankarskivan (1.02) mot den andra friktionsytan (8.22).

I bromstillstånd finns mellan ankarskivan (1.02) och magnetdelen (1.01) luftgapet s_{in}.

För att lufta bromsen magnetiseras magnetdelens (1.01) spole med likström. Den uppkomna magnetkraften drar ankarskivan (1.02) till magnetdelen mot fjäderkraften. Rotorn är därmed avlastad från fjäderkraften och kan rotera fritt.

Utförandet med mekanisk handluftning gör att bromsen kan luftas när motorn står stilla genom att dra i luftningsspaken (6.00).

1.3 Behörighet:



2 Drift



VARNING



Varning Genomför arbeten på anläggningen endast när denna ej står under elektrisk spänning!

Elektrisk anslutning

Anslut bromsmotorn enligt kopplingsschemat i motorns uttagslåda. Anslutning av bromsen (standardutförande) se fig. 1.

Motorerna har de vanliga effektskyltarna och erhåller på den sida som ligger mittemot motorn en skylt till med bromsdata.

Växelspänningen för bromsens magnetlindning ansluts till de båda lediga uttagen i likriktarblocket (~) (se fig. 1).

Snabbt infall hos bromsen

Skiljs bromsen från nätet sker bromsningen. Bromsskivans insfallstid fördröjs av magnetspolens induktivitet (frånkoppling på växelströmssidan). Härvid uppstår en kraftig infallsfördröjning.

Denna kopplingsmetod är inte lämplig för lyftdrifter.

För att uppnå korta infallstider måste likströmssidan kopplas från. För att skydda spole och kontakter skall, när likströmssidan kopplas från, en gnistsläckningskomponent (se fig. 1) kopplas parallellt (VDE 0580§26).

Luftning av bromsen vid avstängd motor

Genom åtskild magnetisering av magneten kan bromsen luftas när motorn står still. Härför måste motsvarande växelspänning (se

bromseffektskylt) anslutas till uttagen i likriktarblocket.

Bromsen förblir luftad så länge spänningen är tillkopplad.

Likriktarna är skyddade mot överspänning av varistorer vid in- och utgång.

Spänning och frekvens

| spanning con makenis | | | | | | |
|----------------------|---------------------|---------------------|--|--|--|--|
| spänningar | ⟨ ₩ | | | | | |
| inmonterade | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz | | | | |
| Magnetspolarna | 205 V DC | 180 V DC | | | | |

Vid 60 Hz får bromsens spänning inte höjas! 24 V DC - broms - inmonterade i uttagslåda

2.2 **Driftsvärden** (se fig. 4)

Ändring av bromsmomentet (se fig. 2)

Bromsen levereras med inställt bromsmoment. En reducering genom att skruva ur inställningsringen med en haknyckel till max måttet "o,1" är möjligt. För varje spår i inställningsringen ändrar sig bromsmomentet enligt fig. 2. Härigenom kan bromsmomentet reduceras till "M_{Br mir} En bromsmomentreducering via inställningsringen förlänger frånkopplingstiden och förkortar tillkopplingstiden.

Maximalt tillåtna varvtal

Bromsen är dimensionerad för användning som hållbroms med Nöd-Stopp-funktion.

En användnings som driftbroms är möjlig om friktionen är liten (livslängd, se Underhåll). Max. varvtal, se fig. 4.

I samband med en Nöd-Stopp-funktion måste man räkna med högre temperaturen (upp till 130°C) och ökat slitage.

3 Underhåll

Om bromsen används normalt som hållsbroms kräver den inget underhåll.

Om den emellertid används som driftbroms och utsätts för friktion måste luftspalten " $s_{_{\text{Li}}}$ " kontrolleras i regelbundan intervaller. Om en max luftspalt " $s_{_{\text{Li}}}$ " uppnås måste luftspalten justeras så att man max luftspalt "s_{Lu max}" uppnås måste luftspalten jusi återigen får en nominell luftspalt "s_{Lu Nom}" (se fig. 2). **Efterinställning av luftgapet sker enligt följande**:

Ta bort fläktkåpan (8.85).

Lossa befästningsskruvarna (8.01) något, skruva in justerhylsorna (1.07) med en skruvnyckel i magnetdelen (1.01) och dra åter fast fästskruvarna.

I anslutning härtill kontrolleras luftgapet än en gång.

När handluftingsspak finns efterjustera måttet "s" enligt Fig. 2a.



ANVISNING

Friktionsytorna får inte komma i kontakt med olja eller fett!

Utbyte av friktionsbeläggningen

Rotorn (2.00) måste bytas ut när friktionsbeläggningen är utsliten. Minsta rotorstyrka se fig. 2.

Isärtagning / ihopsättning (se fig. 3).

När mekanisk handluftning finns, skruva ut handluftningsspaken innan kåpan tas av.

Ta bort fläktkåpan (8.85).

Ta bort fläktens säkringsring och dra av fläkten (bortfaller vid motorer med separat fläkt).

I kombination med pulsgivare: lossa vridmomentstödet (8.31) och skruva ur givaraxeln med skruvnyckel NV 10 (1LG4/6 NV 13)ur motoraxeln.

Skruva ur fästskruvarna (8.01)

Ta bort magnetdelen komplett (1.00). Lossa härför eventuellt bromsanslutningen på likriktaren.

Byt rotor med friktionsbeläggning (2.00).

Montering i omvänd ordningsföljd. Ställ in luftspalten på nominellt

När handluftingsspak finns efterjustera måttet "s" enligt Fig. 2a. På motorer med impulsgivare: Skruva in givaraxeln med 7 till 9 Nm i motoraxeln. Tillåten rotationstolerans se bruksanvisningen för givaren.



OBSERVERA

Efter underhållsarbeten måste och före idrifttagandet bör man strömlöst tillstånd kontrollera att den nominella luftspalten är lika stor mellan anskarskivan och magnetdelen. Kontrollen ska ske med hjälp av ett slitsmått på tre ställen på periferiytan. När motorn tas i drift igen måste man kontrollera att bromsen fungerar felfritt!





POZOR



Všechny práce k přepravě, připojení a uvedení do provozu, jakož i pravidelnou údržbu smí provádět pouze kvalifikovaný, zodpovědný odborný personál (dodržovat VDE 0105, IEC 364). Neodborný postup může způsobit těžké škody na zdraví a věcné škody.

Dodržovat platná národní, místní a pro zařízení specifická ustanovení a požadavky.



Všeobecné pokyny

Kromě tohoto návodu vždy dbejte bezpečnostních pokynů a pokynů na uvedení do provozu event. návodu na uvedení do provozu příslušných motorů.

1 **Popis**

1.1 Rozsah použití

Použití v souladu s ustanoveními:

Pružinou ovládané kotoučové brzdy se stejnosměrným buzením se používají pro trojfázové asynchronní motory osových výšek 63 až 225L. Brzda (pružinou ovládaná brzda) nesmí být provozována v prostředích s nebezpečím výbuchu nebo v agresivním prostředí. Při vysoké vlhkosti vzduchu a nízkých teplotách musejí být přijata vhodná opatření proti přimrznutí kotouče kotvy a rotoru (např. vyhřívání).

Aby byla zaručena bezpečná funkce pružinou ovládané brzdy, musí se, při použití v prašném prostředí, při možném vniknutí špinavé vody nebo když se má zabránit roznášení prachu z opotřebení otěrem, přijmout vhodná opatření, např. použití krycího kruhu, hřídelového těsnicího kroužku nebo uzavíracího víka.

Teplota okolí:

- 20 °C až 40 °C

1.2 Konstrukce a způsob práce (viz obrázek 3)

Jedná se o jednokotoučové brzdy se dvěma třecími plochami. Několik tlačných pružin vyvíjí v bezproudovém stavu třením brzdný moment. Uvolnění brzdy je prováděno elektromagneticky.

Při brždění se rotor (2.00) axiálně posuvný po náboji (3.00) tlačnými pružinami (1.04) přitlačuje přes kotvu (1.02) na protilehlou třecí plochu (8.22).

V zabržděném stavu je mezi kotoučem kotvy (1.02) a magnetem

(1.01) vzduchová mezera $s_{L\bar{U}}$. K odbrždění brzdy se cívka magnetu (1.01) vybudí stejnosměrným napětím. Vznikající magnetická síla přitáhne kotouč kotvy (1.02) proti síle pružin k magnetické části.

Rotor je tak uvolněn od síly pružin a může se volně otáčet. Provedení s mechanickým ručním odbržděním umožňuje odbrždění brzdy v klidovém stavu motoru zatažením za odbrzďovací páku (6.00).

1.3 Schválení:



2 Provoz



POZOR



Všechny práce musejí být prováděny v bezproudovém stavu zařízení.

Elektrické připojení

Proveďte připojení brzdového motoru podle schématu zapojení v připojovací svorkovnici motoru (standardní provedení), viz obr. 1.

Motory mají běžné výkonnostní štítky a budou navíc na protilehlé straně motoru nebo na krytu ventilátoru opatřeny druhým výkonnostním štítkem s údaji brzdy.

Střídavé napětí pro budicí vinutí brzdy je připojeno na obou volných svorkách bloku usměrňovače (~) (viz obr. 1).

Rychlá reakce brzdy

Dojde-li k oddělení brzdy od sítě, nastane brždění.

Doba reakce brzdy je zpožděna indukčností magnetické cívky (odpojení na straně střídavého proudu).

Přitom dochází k výraznému zbrždění reakce brzdy. Tento druh zapojení není vhodný pro pohony zdvihadel.

Pro krátké časy reakce se musí vypínat na straně stejnosměrného proudu. K ochraně cívky a kontaktů je třeba při vypnutí na straně stejnosměrného proudu paralelně připojit zhášecí člen (viz obr. 1) (VDE 0580§26).

Odbrždění brzdy při vypnutém motoru

Díky samostatnému buzení magnetu je možné odbrzdit brzdu v klidovém stavu motoru. K tomu se musí na svorky bloku usměrňovače přivést odpovídající střídavé napětí (viz výkonnostní štítek brzdy). Brzda zůstává odbržděna tak dlouho, dokud je přiváděno napětí.

Usměrňovače jsou chráněny proti předpětí varistory na vstupu a výstupu.

Napětí a kmitočet

| • | | |
|-------------------------|---------------------|---------------------|
| Usměrňovač | $\langle h \rangle$ | ==_~ |
| Přípoj | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz |
| Cívka elektromagnetu | 205 V DC | 180 V DC |

Při 60 Hz nesmí být napětí brzdy zvýšeno! 24 VDC – brzda – přípoj ve skříni svorkovnice

2.2 Provozní hodnoty (viz obr. 4)

Změna brzdného momentu (viz obr. 2)

Brzda se dodává s nastaveným momentem. Je možné jej snížit odšroubením nastavovacího kroužku pomocí hákového klíče až na max. "o,". Každé zapadnutí nastavovacího kroužku znamená změnu brzdného momentu dle obrázku 2. Takto se dá zmenšit brzdný moment na "M_{Br min.}". Snížení brzdicího momentu pomocí seřizovacího kroužku

prodlužuje dobu dopadu a zkracuje dobu větrání.

2.4 Maximální přípustný počet otáček

Brzda je dimenzována pro použití jako brzda se zajištěním polohy s funkcí nouzového zastavení.

Použití jako provozní brzdy je možné při velmi nízkém tření (životnost, viz návod k obsluze).

Maximální počty otáček najdete na obrázku 4.

U funkce nouzového zastavení je třeba počítat se zvýšenými teplotami (do 130 °C) a větším opotřebením

3 Údržba

Pro normální případy použití jako brzda se zajištěním polohy nepotřebuje brzda údržbu.

Pouze v případech použití jako provozní brzdy, při nichž je třeba konat třecí práci, se v určitých časových intervalech musí kontrolovat vzduchová mezera "s_{Lü}" a nejpozději při dosažení maximální vzduchové mezery "S_{Lū max}" znovu nastavit na jmenovitou vzduchovou mezeru "S_{Lū Nenn}" (viz obrázek 2).



Dodatečné nastavení vzduchové mezery se provede následovně:

Sejměte kryt ventilátoru (8.85).

Poněkud uvolněte upevňovací šrouby (8.01), pomocí otevřeného klíče zašroubujte do magnetu (1.01) seřizovací pouzdra a upevňovací šrouby znovu dotáhněte.

Následně ještě jednou zkontrolujte vzduchovou mezeru. Pokud je páka ručního větrání k dispozici, pak nastavit rozměr

"s" podle obr. 2a.



Upozornění!

Třecí plochy nesmějí přijít do styku s olejem nebo tukem!

Výměna třecího obložení

Je-li třecí obložení opotřebeno, musí se vyměnit rotor (2.00). Minimální tloušťka rotoru viz obr. 2.

Demontáž/montáž (viz obr. 3)

Pokud je k dispozici mechanické větrání, páku ručního větrání před sejmutím krytu vyšroubovat.

Sejměte kryt ventilátoru (8.85).

Odstraňte pojistný kroužek ventilátoru a stáhněte ventilátor (odpadá u motorů s cizí ventilací).

U kombinací se snímačem impulzů: Uvolněte momentové rameno (8.31) a pomocí otevřeného klíče vyšroubujte hřídel snímače z hřídele motoru.

Vyšroubujte upevňovací šrouby (8.01).

Sejměte celou magnetovou část (1.00). Je-lito nutné, uvolněte případně připojovací vodiče brzdy na usměrňovači.

Vyměňte rotor s třecím obložením (2.00).

Montáž v opačném pořadí. Vzduchovou mezeru nastavit na jmenovitý rozměr.

Pokud je páka ručního větrání k dispozici, pak nastavit rozměr "s" podle obr. 2a.

U motorů se synchronizátorem: hřídel čidla zašroubovat do hřídele motoru se 7 až 9 Nm.

Přípustná tolerance obvodového házení viz návod k provozu čidla.



Upozornění!

Po opravě se před uvedením do provozu musí ve vypnutém stavu (bez proudu) zkontrolovat rovnoměrnost vzduchové mezery mezi kotoučem kotvy a magnetovou částí na 3 místech pomocí spárové měrky.

Při opětovném uvedení motoru do provozu se musí přezkoušet bezchybná funkce brzdy!

Α

осторожно!



Все работы, связанные с транспортировкой, подключением для пуска в эксплуатацию, а также регулярное техническое обслуживание должны проводиться только квалифицированными, ответственными специалистами (соблюдать предписания VDE 0150, IEC 364). Ненадлежащее обращение может стать причиной тяжёлых несчастных случаев и материального ущерба. Следует придерживаться действующих национальных, местных и специфических для установок предписаний и требований.

A

Общие указания

Кроме этого руководства по эксплуатации необходимо всегда соблюдать также инструкции техники безопасности или руководство по эксплуатации соответствующих двигателей.

1 Описание

1.1 Область применения

Применение согласно назначению: Пружинные дисковые тормоза с возбуждением от постоянного тока применяются для асинхронных двигателей переменного тока от ВОВ 63 до ВОВ 225L. Пружинный тормоз не позволено применять во взрывоопасной или агрессивной атмосфере. В случае высокой влажности воздуха и низкойтемпературы необходимо принять подходящие меры против примерзания диска якоря и ротора (напр. нагревание).

Для гарантирования безопасного функционирования пружинного тормоза необходимо в случае применения в запыленном помещении, при возможности проникновения грязной воды или если нужно помешать распространению возникающей вследствие истирания тонкой пыли, принять подходящие меры, напр. установка защитного кольца, уплотнительного кольца у вала или запорной крышки.

Температура окружающей среды: от -20° С до 40° С

1.2 Сборка и способ работы (см. рис. 3)

Описываемые тормоза имеют один диск и две фрикционные накладки. Одна или несколько пружин сжатия генерируют в бестоковом состоянии трением тормозной момент. Тормоз активируется при помощи электромагнита.

Во время процесса торможения пружины (1.04) толкают аксиально перемещаемый ротор (2.00) по заряду (3.00) через якорь (1.02) в направлении противоположной фрикционной накладки (8.22). В заторможенном состоянии находится между шкивом якоря (1.02) и магнитом (1.01) воздушный зазор s_{1.5}.

Тормоз отпускается возбуждением катушки электромагнита (1.01) постоянным напряжением. Возникающая магнитная сила притягивает шкив якоря (1.02) против силы пружины к магниту. Благодаря этому ротор освобожден от силы пружины и может свободно вращаться.

Исполнение с **механическим ручным растормаживанием** делает возможным отпуск тормоза в состоянии покоя двигателя, если потянуть рычаг растормаживания (6.00).

1.3 Апробация:



или на покрытие

© Siemens AG 2004 All Rights Reserved



2 Эксплуатация



осторожно!



Все работы производить не под электрическим напряжением.

2.1 Электрическое присоединение

Тормозный двигатель присоединить согласно электрической схеме двигателя в клеммной коробке. Присоединение тормоза (стандартное исполнение) смотри рисунок 1.

На двигателях имеются стандартные щитки с номинальными данными, и вдобавок есть на противоположной стороне двигателя или на колпаке вентилятора еще один щиток с даннымитормоза

К двумя свободным клеммам выпрямителя (~) присоединить переменное напряжение для обмотки возбуждения тормоза (см. рис. 1).

Быстрое торможение

Если тормоз отключен от питающего напряжения, происходит торможение.

Длительность применения тормозного шкива замедляется индуктивностью катушки электромагнита (выключение на стороне переменного тока). При этом происходит сильное замедление применениятормоза.

Этот вид переключения не предназначен для привода подъема. Чтобы достичь более коротких длительностей применения, необходимо выключать на стороне постоянного тока. Рекомендуется защищать катушку и контакты во время выключения стороны постоянного тока с помощью параллельного включения искрогасительного устройства (VDE 0580§26, см. рис. 1).

Отпуск тормоза при выключенном двигателе

Благодаря отдельному возбуждению магнита можно отпускать тормоз в состоянии покоя двигателя. Для этого необходимо присоединить к клеммам выпрямителя подходящее переменное напряжение (см. щиток с номинальными данными тормоза). Тормоз остается отпущенным до тех пор, пока присоединено напряжение.

Выпрямители защищены от перенапряжения варисторами, подключенными к вводу и выводу.

Напряжение и частота

| Выпрямитель | $\langle \mathfrak{h} \rangle$ | ==_~ | | | |
|-------------------|--------------------------------|---------------------|--|--|--|
| Подключение | 230V ± 10% 50/60 Hz | 400V ± 10% 50/60 Hz | | | |
| Магнитные катушки | 205 V DC | 180 V DC | | | |

При 60 Hz не позволено повышать напряжение для тормоза! 24 V DC — тормоз — подключение в распределительном шкафу

2.2 Эксплуатационные данные (см. рис. 4)

2.3 Изменение тормозного момента (см. рис. 2)

Тормоз поставляется с установленным моментом. Вывинтив регулировочный кружок при помощи крюкового ключа, его можно понизить максимально до "о $_1$ ". Каждое заскакивание регулировочного кружка значит изменение тормозного момента (см. рис. 2). Этим образом можно понизить тормозной момент до " $M_{\rm Br \, min}$ ". У меньшение момента торможения через кольцо настройки

Уменьшение момента торможения через кольцо настройки увеличивает время от момента отключения питания электромагнита тормоза до момента наложения тормоза и сокращает время отпускания тормоза.

2.4 Максимально допустимая скорость вращения

Размеры тормоза определены для применения в роде стопорного тормоза с функцией аварийной остановки.

Применение в роде рабочего тормоза возможно при маленьком трении (срок службы см. технический уход).

Максимальная скорость вращения см. рисунок 4.

В случае режима работы «аварийная остановка» надо рассчитывать на повышенную температуру (до 130° C) и более высокую степень истирания.

3 Технический уход

В случае нормального применения в роде стопорного тормоза не нужен никакой технический уход за тормозом.

Лишь в случаях применения в качестве рабочего тормоза, когда возникает трение, необходимо с определенными итервалами проверять воздушный зазор " S_{Ls} " и наипоздее при достижении макс. воздушного зазора " $S_{Ls \, max}$ " нужно опять отрегулировать его на номинальный воздушный зазор " $S_{Ls \, Nenn}$ " (см. рисунок 2).

Воздушный зазор устанавливается следующим образом: Снять покрытие вентилятора (8.85).

Чуть-чуть отпустить крепежные винты (8.01), при помощи ключа ввинтить в магнит (1.01) регулировочную втулку (1.07) и винты опять подтянуть.

После этого вновь проверить воздушный зазор.

Если имеется рычаг для ручного отпускания тормоза, то следует отъюстировать размер "s" согласно рис. 2a.



Указание

Необходимо обеспечить, чтобы поверхности трения не встречались с маслом или смазкой.

Замена фрикционной накладки

Если фрикционная накладка изношенная, ротор (2.00) необходимо заменить. Мин. толщина ротора см. рис. 2.

Разборка/Сборка (см. рис. 3)

Если имеется рычаг для механического ручного отпускания тормоза, то перед снятием колпака следует вывинчивать рычаг. Снять покрытие вентилятора (8.85).

Устранить кружок для фиксирования вентилятора и снять вентилятор (этого не нужно при двигателях с внешними вентиляторами).

В сочетании с импульсным передатчиком: Отпустить плечо момента (8.31) и при помощи ключа SW 10 вывинтить вал импульсного передатчика из вала электродвигателя.

Отпустить крепежные винты (8.01).

Отпустить целую магнитную часть (1.00). В случае надобности расслабить кабельное присоединение тормоза на выпрямителе.

Заменить ротор с фрикционной накладкой (2.00).

Монтаж в обратном порядке. Настроить номинальный размер воздушного зазора.

Если имеется рычаг для ручного отпускания тормоза, то следует отъюстировать размер "s" согласно рис. 2a.

Для двигателей с импульсным датчиком: Ввинтить вал датчика в вал двигателя с моментом вращения 7 – 9 Hм.

Допустимое радиальное биение датчика указано в Инструкции по эксплуатации датчика



Внимание

После ремонта необходимо и перед введением в эксплуатацию следует проверить при помощи щупа в состоянии отсутствия тока равномерность номинального воздушного зазора между диском якоря и магнитной частью на 3 местах периметра.

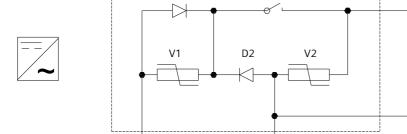
Перед пуском в ход двигателя проверить правильную работу тормоза!



Fig. 1 Schaltung der Bremse / Brake circuit / Commande du frein / Circuito del freno / Collegamento del freno / Koppling av bromsen / Zapojení brzdy / Соединение тормоза

Magnetspule/Magnetic coil / Bobine / Bobina del electroimán /

Gehäuse / housing / logement / albergar / Bobina del magnete / Magnetspole / Cívka elektromagnetu / l'alloggio / hus / kryt / корпус Катушка электромагнита 2+ D2 Funkenlöschglied / Spark suppressor / Suppresseur / Dispositivo supresor / Elemento antiscintilla / Gnistsläckningskomponent / L1 N Omezovač jiskření / Ограничитель искрения Magnetspule/Magnetic coil / Bobine / Bobina del electroimán / Gehäuse / housing / logement / albergar / Bobina del magnete / Magnetspole / Cívka elektromagnetu / l'alloggio / hus / kryt / корпус Катушка электромагнита D₁ 2+ 2+ 1+



L2

Funkenlöschglied / Spark suppressor / Suppresseur / Dispositivo supresor / Elemento antiscintilla / Gnistsläckningskomponent / Omezovač jiskření / Ограничитель искрения

Für kurze Einfallzeiten nach Fig. 4 muß gleichstromseitig abgeschaltet werden. Hierzu wird die am Gleichrichter zwischen den Kontakten 1+ und 2+ angebrachte Drahtbrücke entfernt und durch die Kontakte eines externen Schalters ersetzt (vgl. Schaltbilder). Zum Schutz der Spule und Kontakte sollte bei gleichstromseitigem Abschalten parallel ein Funkenlöschglied geschaltet werden.

L1

The direct-current side must be switched off to achieve short application times in conformity with fig. 4. For this purpose the wire jumper between contacts 1+ and 2+ on the rectifier must be removed and replaced with an external switch (see circuit diagrams). To protect the coil and contacts, a spark-quenching device should be switched in parallel with direct-current side switch-off.

Pour les temps de réaction courts selon l'illustration 4, déconnecter du côté du courant continu. Enlever à cet effet les fils de liaison placés au redresseur de courant entre les contacts 1+ et 2+ et remplacer par les contacts d'un commutateur externe (compare schémas des connexions). Pour protéger la bobine et les contacts, il est bon de mettre en circuit parallèlement un souffleur d'étincelles pour la déconnexion du côté du courant continu.

Para tiempos cortos de cierre según la Fig. 4, se tiene que desconectar por el lado de CC. Para este fin se quita el puente de alambre instalado en el rectificador entre los contactos 1+ y 2+ y se sustituyen por contactos de un interruptor externo (compárese con los esquemas de conexiones). Para proteger la bobina y los contactos, en la desconexión por el lado de CC se tiene que conectar paralelamente un elemento apagachispas (supresor).

Per brevi tempi di reazione come da fig. 4, si deve spegnere sul lato della corrente uniforme. Allo scopo, i jumper applicati sul raddrizzatore devono essere tolti e sostituiti con i contatti di un interruttore esterno (cfr. schema di circuito). Per proteggere la bobina ed i contatti, spegnendo sul lato della corrente uniforme, si dovrebbe inserire parallelamente un elemento di soppressione delle scintille.

För korta reaktionstider enligt fig 4 måste frånkoppling ske på likströmssidan. För att iordningställa denna frånkoppling tar man bort den på likriktaren mellan kontakterna 1+ och 2+ installerade trådbryggan och byter ut den mot kontakterna på en extern brytare (jmf kopplingsbilderna). För att skydda spolen och kontakterna bör man parallellt med frånkopplingen på likströmssidan tillkoppla en gnistsläckningsdetalj.

Pro krátké časy zareagování podle obr. 4 se musí vypínat na straně stejnosměrného proudu. K tomu se odstraní drátový můstek umístěný na usměrňovači mezi kontakty 1+ a 2+ a nahradí se kontakty externího spínače (porovnej schéma zapojení). K ochranně cívky a kontaktů se při vypnutí na straně stejnosměrného proudu musí paralelně připojit zhášecí člen.

Чтобы сократить время включения тормоза согласно рис. 4, необходимо отключить постоянный ток. Для этого нужгно устранить проволочный мостик прикрепленный на выпрямителе между контактами 1+ и 2+ и заменить его контактами экстерного выключателя (см. электрические схемы).

Для охраны катушки и контактов рекомендуется при отключении постоянного тока параллельно включить дугогасительное устройство.

© Siemens AG 2004 All Rights Reserved

| \sim | \sim | \sim | | | |
|--------|--------|---------------|-------|-------|-----|
| DE EN | (FR)(F | s)(IT) | (sv)(| (cs)(| RU) |
| | シビン | 5) () | マ・ノ、 | ~~~· | ··· |

| Bremsentyp Brake type Туре Туро de freno Tipo feno Bromstyp Тур brzdy Тип тормоза | Reduzierung pro Rasterung Reduction per notch Réduction per cran Réduccion por rmuesca Riduzione per tacca Reducering per raster Redukce na 1 vrub Редукция на 1 защелку | Maß max Dimension Max. Cote max. Dimensiones máx Dimensione max. max Dimensioner Max. Rozměř Макс. Размер | min Bremsmoment Min. braking torque Couple de freinage min. Par (torque) de frenado mín. Coppia min. frenatura min broms-moment Мин. тор моз ной момент | torque lorque leinage le tritefer nominal en le | | min. Rotorstärke Min. rotor width Epaisseur min. Espesor min. del rotor Spessore min. rotore min rotorstyrka Min. tloušťka rotoru Мин. толщина ротора |
|--|---|--|---|---|----------------------|--|
| | | O ₁ | M Br min. | S _{Lü Nenn} | S _{Lü max.} | h _{min.} |
| 2LM8 005 | 0,17 Nm | 7,0 mm | 3,7 N m | 0,2 mm | 0,4 mm | 4,5 mm |
| 2LM8 010 | 0,35 Nm | 8,0 mm | 7,0 Nm | 0,2 mm | 0,45 mm | 5,5 mm |
| 2LM8 020 | 0,76 Nm | 7,5 mm | 18,2 N m | 0,2 mm | 0,55 mm | 7,5 mm |
| 2LM8 040 | 1,29 Nm | 12,5 mm | 21,3 Nm | 0,3 mm | 0,65 mm | 8,0 mm |
| 2LM8 060 | 1,66 Nm | 11,0 mm | 32,8 Nm | 0,3 mm | 0,75 mm | 7,5 mm |
| 2LM8 100 | 1,55 Nm | 13,0 mm | 61,1 Nm | 0,3 mm | 0,75 mm | 8,0 mm |
| 2LM8 260 | 5,6 Nm | 17,0 mm | 157,5 Nm | 0,4 mm | 1,2 mm | 12,0 mm |
| 2LM8 315 | 5,6 Nm | 17,0 mm | 178,4 Nm | 0,4 mm | 1,0 mm | 12,0 mm |
| 2LM8 400 | 6,15 Nm | 21,0 mm | 248,7 Nm | 0,5 mm | 1,5 mm | 15,5 mm |

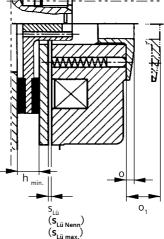
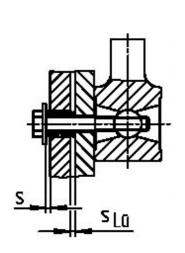


Fig. 2 Änderung des Bremsmomentes / Adjusting the braking torque / Modification du couple de freinage Modificación del par (torque) de frenado / Variazione della coppia frenante / Ändring av bromsmomentet / Změna brzdného momentu / Изменение тормозного момента



| Größe Size Cote Dimensión Dimensioni Storhet Velikost Pазмер | s _{Lü} (mm) | s ^{+0,1} (mm) | s + s _{Lü} (mm) | |
|--|----------------------|------------------------|--------------------------|--|
| 06 | | | | |
| 08 | 0,2 | 1 | 1,2 | |
| 10 | | | | |
| 12 | | | 1,8 | |
| 14 | 0,3 | 1,5 | | |
| 16 | | | | |
| 18 | 0,4 | 2 | 2.4 | |
| 20 | 0,4 | 2 | 2,4 | |
| 25 | 0,5 | 2,5 | 3 | |

Fig. 2a

ACHTUNG / WARNING/ AVERTISSEMENT / ATENCIÓN / AVVERTENZA / VIKTIGT / POZOR / BHUMAHUE!

Maß "s" muß eingehalten werden! - Luftspalt "s "i" überprüfen!
The dimension "s" must be adhered to! Check air gap "s "i".
La cote "s" doit être respectée - Vérifier l'interstice "s "i".
¡La dimensión "s" debe respetarse imprescindiblemente! ¡Comprobar el entrehierro "s "i"!
La misura "s" deve essere rispettata! - Verificare il traferro "s "i"!
Måttet "s" måste respekteras! – Kontrollera luftspalten "s "i"!
Rozměr "s" musí být dodržen – vzduchovou mezeru "s "i" překontrolovat!
Следует соблюдать размер "s"! Проверить воздушный зазор "s "i"!



DEUTSCH



ENGLISH

Available spare parts *):

FR

FRANÇAIS

Disponible pièces detachées:

Lieferbare Ersatzteile *):

| 1.00 1.02 1.03 1.04 1.05 1.07 2.00 3.00 6.00 | Magnetteil komplett *) Ankerscheibe Druckstück Druckfeder Einstellring Hülse Rotor komplett *) Nabe Handlüftung, komplett *) | 1.00 1.02 1.03 1.04 1.05 1.07 2.00 3.00 6.00 | Magnetic section (complete) *) Armature disk Clamping member Preloading spring Adjustment ring Bush Rotor (complete) *) Hub Manual release unit (complete) *) | 1.00 1.02 1.03 1.04 1.05 1.07 2.00 3.00 6.00 | culasse magnétique, complète *) disque d'armature pièce de pression ressort de pression anneau de réglage douille d'ajustage disque de freinage, complet *) moyeu desserrage manuel, complet *) |
|--|--|--|---|--|---|
| 7.00 7.12 7.41 7.58 | Fremdbelüftung Lüfter Haltewinkel Klemmenkasten | 7.00 7.12 7.41 7.58 | External fan Fan Bracket Terminal box | 7.00 7.12 7.41 7.58 | motoventilateur ventilateur coude de fixation boîte à bornes |
| 8.00 | Federkraftbremse | 8.00 | Spring-operated brake | 8.00 | frein prolongement d'arbre face de friction |
| 8.20 | Wellenverlängerung | 8.20 | Shaft extension | 8.20 | |
| 8.22 | Gegenreibfläche | 8.22 | Opposing friction surface | 8.22 | |
| 8.30 | Impulsgeber | 8.30 | Pulse transmitter | 8.30 | générateur d'impulsions |
| 8.31 | Drehmomentstütze | 8.31 | Torque arm | 8.31 | étrier d'immobilisation en rotation |
| 8.85 | Lüfterhaube | 8.85 | Fan cover | 8.85 | capot de ventilateur |

Ersatzteile sind über den Vertrieb bei den jeweiligen Produktionsstätten zu bestellen.

Bad Neustadt / D UD Mohelnice / Cz UC Frenstat / Cz

Spare parts can be ordered from the Sales Les pièces de rechange doivent être departments of the particular production sites.

Ε Bad Neustadt / D UD Mohelnice / CZ UC Frenstat / CZ

commandées auprès du service de vente des lieux de production respectifs.

Bad Neustadt / D UD Mohelnice / Cz UC Frenstat / Cz

Bestellbeispiel:

Motor 1LA....

No E0109 / 123456 02 001

2LM8 040-5NL10

Magnetteil komplett 1.00

205 V 40 Nm 8.85 Lüfterhaube

HINWEIS: Die Angaben auf dem Zusatzleistungsschild (2LM8 ...) sind bei Ersatzteilbestellung immer mit anzugeben!

Ordering example:

Motor 1LA....

No E0109 / 123456 02 001

2LM8 040-5NL10

1.00 Magnetic section (complete)

205 V 40 Nm

8.85 Fan cover

NOTE: On ordering spare parts, the information on the additional rating plate (2LM8 ...) must always be specified!

Exemple de commande :

Moteur 1LA....

No E0109 / 123456 02 001

2LM8 040-5NL10

1.00 culasse magnétique, complète

205 V 40 Nm 8.85 capot de ventilateur

NOTA : à la commande de pièces de rechange, reprendre les indications de la plaque signalétique additionnelle (2LM8...).

Normteile sind nach Abmessung, Werkstoff und Oberfläche im freien Handel zu beziehen.

Standard commercially available parts are to be purchased in accordance with the specified dimensions, material and surface finish.

Les pièces normalisées peuvent être obtenues dans le commerce d'après leur dimensions, le matériau et l'état de surface.

15

© Siemens AG 2004 All Rights Reserved



ESPAÑOL



8.31

8.85

ITALIANO

SVENSKA

Rekvireras reservdelar *):

Disponible repuestos *):

| 1.00 | Electroimán completo *) |
|------|-------------------------|
| 1.02 | Disco del inducido |
| 1.03 | Pieza de presión |
| 1.04 | Resorte de presión |
| 1.05 | Anillo de ajuste |
| 1.07 | Casquillo |
| 2.00 | Rotor completo *) |
| 3.00 | Cubo |
| 6.00 | Palanca de apertura man |
| | completa *) |

| 6.00 | Palanca de apertura manual, completa *) |
|------|---|
| 7.00 | Ventilador independiente |

Ventilador independiente

| 7.12 | Ventilador |
|-------------|----------------------------------|
| 7.41 | Escuadra de retención |
| 7.58 | Caja de bornes |
| 8.00 | Freno de disco de resorte |
| 8.20 | Prolongación del eje |
| 8.22 | Guarnición de fricción |
| 8.30 | Emisor de impulsos |
| 8.31 | Brazo de reacción |
| 8.85 | Caperuza del ventilador |

Disponibilie pezzi di ricambio *):

| 1.00 1.02 1.03 1.04 1.05 1.07 2.00 3.00 6.00 | Magnete completo *) Disco dell'indotto Elemento di pressione Molla di pressione Anello di regolazione Bussola Rotore completo *) Mozzo Sblocco manuale completo *) | 1.00 1.02 1.03 1.04 1.05 1.07 2.00 3.00 6.00 | magnetdel komplett *) ankarskiva tryckstycke tryckfjäder inställningsring hylsa rotor komplett *) nav handluftning, komplett *) |
|--|--|--|---|
| 7.00 7.12 7.41 7.68 | Ventilatore esterno Ventilatore Squadra di sostegno Scatola morsetti | 7.00 7.12 7.41 7.68 | separat fläkt fläkt Fästvinkel uttagslåda |
| 8.00 8.20 8.22 | Freno con molle di innesto Prolunga albero Superficie di attrito di contrasto | 8.00 8.20 8.22 | fjäderbroms axelförlängning friktionsyta (mittemot) |
| 8.30 | Datore di impulsi | 8.30 | pulsgivare |

Los recambios se piden a través de la distribución de las plantas de producción respectivas.

| E | Bad Neustadt / |
|----|----------------|
| UD | Mohelnice / Cz |
| UC | Frenstat / Cz |

I pezzi di ricambio vanno ordinati presso i centri di distribuzione dei rispettivi stabilimenti di produzione.

Braccio di reazione

Cuffia del ventilatore

| E | Bad Neustadt / D |
|----|------------------|
| UD | Mohelnice / Cz |
| UC | Frenstat / Cz |

Reservdelar ska beställas på respektive fabriks distributionsavdelning.

| Ε | Bad Neustadt / D |
|----|------------------|
| UD | Mohelnice / Cz |
| UC | Frenstat / Cz |

fläktkåpa

vridmomentstöd

8.31

8.85

Ejemplo de pedido:

Motores 1LA.... No E0109 / 123456 02 001 2LM8 040-5NL10

1.00 Electroimán completo 205 V 40 Nm 8.85 Caperuza del ventilador

INDICACION: Hande indicarse siempre los datos de la placa adicional (2LM8 ...) al pedir piezas de repuesto

Esempio di ordinazione:

Motori 1LA.... No E0109 / 123456 02 001 2LM8 040-5NL10

1.00 Magnete completo 205 V 40 Nm 8.85 Cuffia del ventilatore

AVVERTENZA: Per l'ordinazione dei pezzi di ricambio indicare sempre i dati riportati sulla targhetta aggiuntiva (2LM8 ...)!

Beställningsexempel:

Motorerna 1LA.... No E0109 / 123456 02 001 2LM8 040-5NL10 1.00 magnetdel komplett

205 V 40 Nm 8.85 fläktkåpa

ANVISNING: Ange alltid uppgiftera på den extra effektskylten (2LM8...) vid beställning av reservdelar!

Las **piezas estándar** se comprarán en comercios del ramo según las dimensiones, material y superficie especificados.

Le **parti standard** sono reperibili sul mercato secondo le dimensioni, il materiale e la finitura della superficie.

Normerade detaljer kan erhållas i öppna handeln, och skall specificeras beträffande storlek, material och ytbehandling.



ČeskY

K dodání jsou náhradní díly *):

Magnetová část komplet *) 1.00 Kotouč kotvy

1.02

1.03 Svěrka

1.04 Tlačná pružina

1.05 Nastavovací kroužek

1.07 Pouzdro

2.00 Rotor komplet *)

3.00 Náboj

Ruční odbrzdění komplet *) 6.00

7.00 Cizí ventilátor

Ventilátor 7.12

Přidržovací úhelník 7.41

7.58 Svorkovnicová skříň

8.00 Pružinová brzda

Prodloužení hřídele 8.20 8.22 Protilehlá třecí plocha

8.30 Vysílač impulsů

Momentové rameno 8.31

8.85 Kryt ventilátoru RU рўсский

Поставляемые запчасти *):

1 00 Магнитная часть *)

1.02 Шкив якоря

1.03 Зажим

1.04 Пружина сжатия

1.05 Регулировочный кружок

1.07 Втулка

2.00 Ротор часть *)

3.00 Ступица

6.00 Ручной отпуск тормоза часть *)

7.00 Посторонний вентилятор

7.12 Вентилятор

7.41 Прижим

7.58 Клеммная коробка

8.00 Пружинный тормоз

8.20 Удлинение вала

8.22 Противоположная поверхность трения

8.30 Импульсный передатчик

8 31 Плечо момента

8.85 Покрытие вентилятора

Náhradní díly je třeba objednat přes odbyt u příslušných výrobních závodů.

Bad Neustadt /D UD Mohelnice / CZ UC Frenštát / CZ

Příklad objednávky: Motor 1LA... No E0109 / 123456 02 001 2LM8 040-5NL10 1.00 Magnetová část komplet *) 205 V 40 Nm 8.85 Kryt ventilátoru

Upozornění: Při objednávání náhradních dílů vždy uvádějte údaje z přídavného výkonového štítku (2LM8 ...)

Заказы на запасные части принимают отделения продажи соответствующих производственных заводов.

Бад Нейштадт / Германия UD Мохельнице / Чехия UC Френштат / Чехия

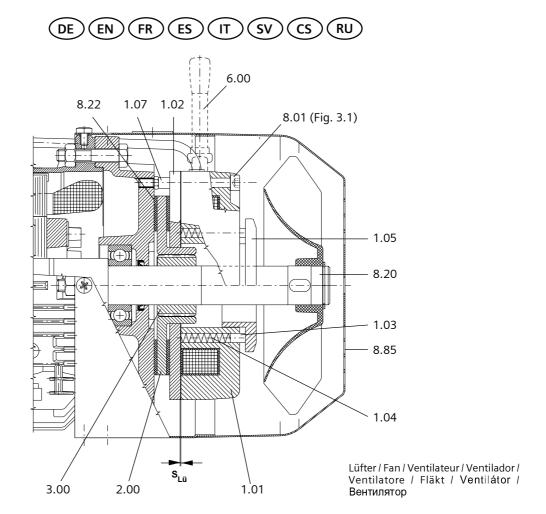
Пример заказа: Двигатель 1LA... No E0109 / 123456 02 001 2LM8 040-5NL10 1.00 Магнитная часть *) 205 V 40 Nm 8.85 Покрытие вентилятора

Указание: В случае заказа запчастей указывать данные дополнительного щитка с номинальными данными (2LM8 ...)

Normované díly se nakupují podle rozměru, materiálu a povrchu volně v obchodě.

Стандартные детали соответственных размеров, материала и поверхности нужно приобрести в свободной торговле.

© Siemens AG 2004 All Rights Reserved



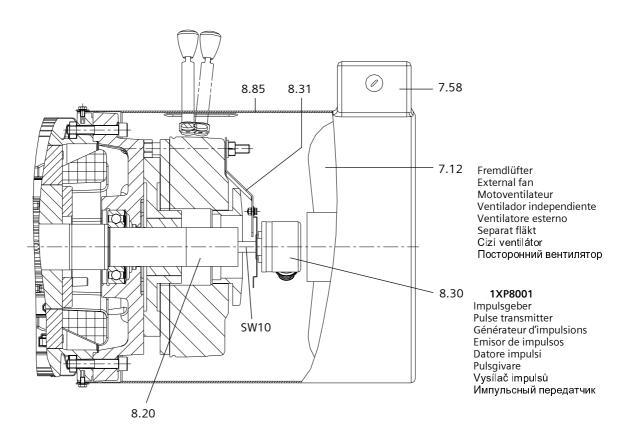


Fig. 3 1LA ...

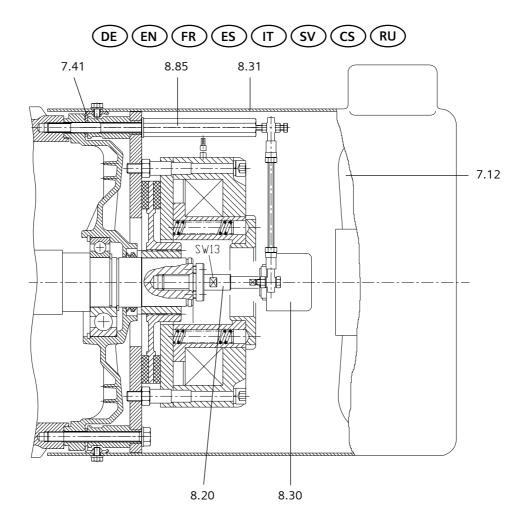


Fig. 3 1LG4/6

| Bremsentyp Brake type Type du frein Tipo de freno Tipo di freno Bromstyp Typ brzdy Тип тормоза | DIN EN ISO 4762 (DIN 6912) Schraube (8.01) Bolt (8.01) Vis (8.01) Tornillo (8.01) Vite (8.01) Skruv (8.01) šroub (8.01) винта (8.01) | Anziehdrehmoment Schraube (8.01) Tightening torque bolt (8.01) Couple de serrage vis (8.01) Par de apriete tornillo (8.01) Coppia di serragio vite (8.01) Ädragningsmoment skruv (8.01) Utahovací moment šroub (8.01) Момент затяжки винта (8.01) |
|---|--|---|
| 2LM8 002-1NA10 | 3 x M4 | 2,8 |
| 2LM8 005-2NA10 | 3 x M4 | 2,8 |
| 2LM8 010-3NA10 | 3 x M5 | 5,5 |
| 2LM8 020-4NA10 | 3 x M6 | 9,5 |
| 2LM8 040-5NA10 | 3 x M6 | 9,5 |
| 2LM8 060-6NA10 | 3 x M8 | 23 |
| 2LM8 100-7NA10 | 3 x M8 | 23 |
| 2LM8 260-8NA10 | 6 x M10 | 46 |
| 2LM8 315-0NA10 | 6 x M10 | 46 |
| 2LM8 400-0NA10 | 6 x M10 | 46 |

Fig. 3.1

| \bigcirc | | | $\overline{}$ | |
|------------|-------|--------|---------------|------|
| DE EN FR | (FS) | (IT)(S | (CS) | (RU) |
| | | | | |

| | | \sim | | | | | | |
|---|--|--|---|--|---|--|--|---|
| Achshöhe Shaft height Hauteur d'axe Altura eje Altezza asse Axelhöjd Os ová výška BOB | Bremsentyp Brake type Type du frein Tipo de freno Tipo freno Bromstyp Typ brzdy Тип тормоза | Größe (Fa. Lenze) Size (Lenze) Taille (Sté. Lenz) Таmaño (marca Lenze) Grandezza (Ditta Lenze) Storlek (Fa Lenze) Velikost (firma Lenze) Размер (фирма Lenze) | Bremsmoment bei Brake torque at Couple de freinage sous Par de frenado hasta Momento frenante a Bromsmoment vid Brzdný moment při Тормозной момент при | Reduced brake to Réduit couple de Reducido par (to Ridotto momen Redusert Bromsn Redukovaný toč | freinage à la vitess rque) de frenado po to frenante da nur | e or velocidad nero di giri t pñ počtu otáčel | | ble en service . de servicio di rotazione vtal otáčky |
| | | | 100 min ⁻¹ | 1500 min ⁻¹ | 3000 min ⁻¹ | max. | | |
| 63 | 2LM8 005-1NA10 | 06 | 5 Nm | 87% | 80% | | | |
| 71 | 2LM8 005-2NA10 | 06 | 5 Nm | 87% | 80% | | | |
| 80 | 2LM8 010-3NA10 | 08 | 10 Nm | 85% | 78% | | | |
| 90 | 2LM8 020-4NA10 | 10 | 20 Nm | 83% | 76% | | 3000 | min ⁻¹ |
| 100 | 2LM8 040-5NA10 | 12 | 40 Nm | 81% | 74% | 65% | | |
| 112 | 2LM8 060-6NA10 | 14 | 60 Nm | 80% | 73% | • | | |
| 132 | 2LM8 100-7NA10 | 16 | 100 Nm | 79% | 72% | | | |
| 160 | 2LM8 260-8NA10 | 20 | 260 Nm | 75% | 68% | | | |
| 180 | 2LM8 315-0NA10 | 20 | 315 Nm | 75% | 68% | | 1500 ו | min ⁻¹ |
| 200 | 2LM8 400-0NA10 | 25 | 400 Nm | 73% | 68% | | | |
| Achshöhe Shaft height Hauteur d'axe Altura eje Altura eje Altezza asse Axelhöjd Osová výška BOB | Bremsentyp Brake type Type du frein Tipo de freno Tipo freno Bromstyp Typ brzdy Tun тормоза | emergencia max. numero di giri a vuoto c max tillåtet tomgångsvarvtal Max. přípustné otáčky v chodu | lencystop pour arrêt d'urgence o sin carga, incl. parada de on arresto di emergenza med nödstoppsfunktion naprázdno s nouzovou slopkou остых оборотов с аварийным | Assorbimento potenza a Effektförbrukning Příkon při | tion at bée à Temps de s Tiempo de di Tempo app Bromsens i Doba brzd | cierre del freno ¹⁾ vlicazione freno ¹⁾ nfallstid ¹⁾ ění ¹ ильность | Lüftzeit der Bremse Brake realease time Temps de desserrage Tiempo de apertura del freno Tempo sblocco freno Bromsens luftningstid Doba uvolnění brzdy Длительность отпуска тормоза | Schaltgeräusch Sound preassure le Emission acoustiq Nivel de presi acústica Rumorosi tà Ljudnivă vid koppl Hlučnost Шум |
| 63 | 2LM8 005-1NA10 | | | 20 W | 2 | ?5 ms | 56 ms | 77 dB (A) |
| 71 | 2LM8 005-2NA10 | | | | | | | |
| 80 | 2LM8 010-3NA10 | 6000 min ⁻¹ | 6000 min ⁻¹ | 25 W | 2 | !6 ms | 70 ms | 75 dB (A) |
| 90 | 2LM8 020-4NA10 | | | 32 W | 3 | 7 ms | 90 ms | |
| 100 | 2LM8 040-5NA10 | | | 40 W | 4 | 3 ms | 140 ms | 80 dB (A) |
| 112 | 2LM8 060-6NA10 | | | 53 W | 6 | 60 ms | 210 ms | 77 dB (A) |
| 132 | 2LM8 100-7NA10 | 5300 min ⁻¹ | 5000 min ⁻¹ | 55 W | 5 | 60 ms | 270 ms | |
| 160 | 2LM8 260-8NA10 | 3700 min ⁻¹ | 3200 min ⁻¹ | 100 W | | 55 ms | 340 ms | 79 dB (A) |
| 100 | 21 MO 21 F ON A 10 | 3700 111111 | 3200 111111 | | I | 52 mc | 410 ms | / 9 UD (A) |

³⁰⁰⁰ min⁻¹

3000 min⁻¹

110 W

Fig. 4 Betriebswerte / Operating values / Caractéristiques de service / Valores de servicio / Valori dei parametri / Driftsvärden / Provozní hodnoty / Эксплуатационные данные

Automation & Drives Standard Drives

180

200

2LM8 315-0NA10

2LM8 400-0NA10

D-91056 Erlangen

Änderungen vorbehalten / Subject to change without prior notice / Sous réserve de modifications / Sujeto a modificaciones/ Con riserva di eventuali modifiche/ Förbehåll för ändringar / Změny vyhrazeny / сохраняется право на изменения

410 ms

390 ms

93 dB (A)

152 ms

230 ms

Schaltzeiten für gleichstromseitiges Schalten. Bei wechselstromseitigem Schalten ca. um den Faktor 6 größer!
Switching times listed are for DC-side switching; they increase by a factor of 6 for AC-side switching!
Les temps de serrage et de desserrage sont donnés pour commande côté continu. Ces temps augmentent d'un facteur 6 en cas de commande côté alternatif.
Tiempos de maniobra por el lado de c.c. ¡Aumentar aprox. en el factor 6 en caso de maniobra por el lado de c.a!
I tempi di inserzione sono validi per l'inserzione del lato a corrente continua. Per l'inserzione del lato a corrente alternata i tempi sono maggiori di un multiplo del fattore 6.
Kopplingstider på likströmssidan. Vid koppling på växelströmssidan ca 6 gånger större!
Uvedené spinaci Časy įsou pro spinání na straně slejnosměrného proudu. U spinání na straně střídavého proudu jsou přibližně 6x delší!
Указанные длительности включения предназначены для включения на стороне постоянного тока. В случае включения на стороне переменного тока их необходимо повысить приблимательно на фактор 6! приблизительно на фактор 6!

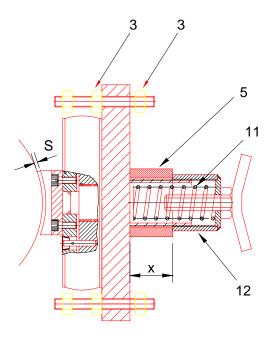


SPRING-APPLIED BRAKE WITH ELECTROMAGNETIC RELEASE

Service

Slewing brake type :

Part number : 16.00045720



K

Pos 5

| X | Part No. | | | |
|------|-------------|--|--|--|
| [mm] | | | | |
| 32 | 43.00039657 | | | |
| 34 | 43.00039754 | | | |
| 38 | 43.00039656 | | | |

Adjustment of K-brake

The air gap (S) should be between 1.0 and 1.5 mm and is set by adjusting the nuts (3) equally while the brake is energized.

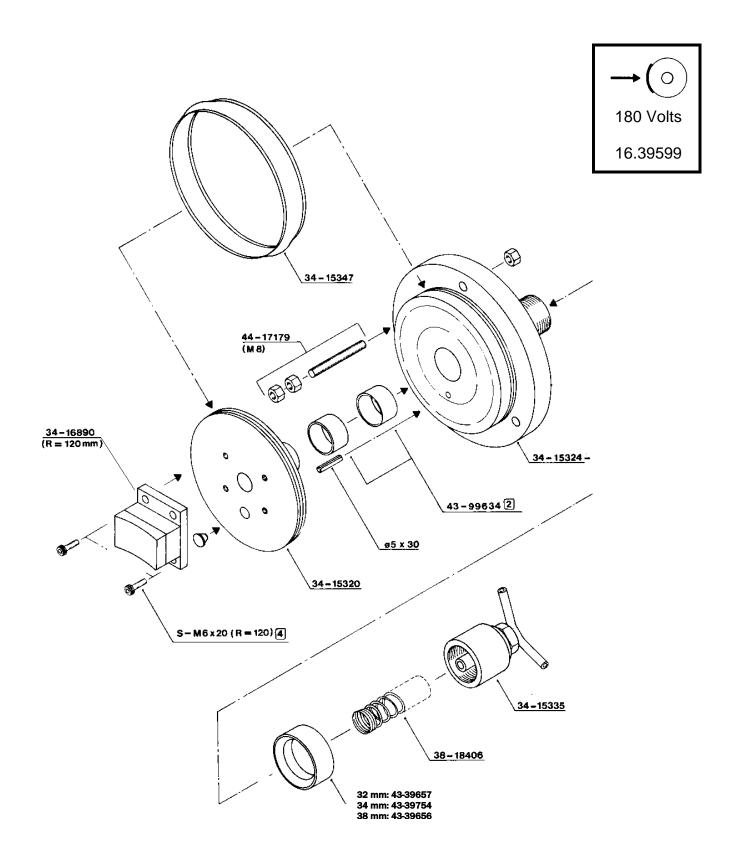
The distance ring (5) for the respective brake torque – according to the crane data sheet – should always be fitted.

The maximum brake torque is obtained by turning the adjusting nut (12) up against the ring (5). If required, the brake torque can be reduced by loosening the adjusting nut (12), thus releasing the compression of the spring (11).

When used as a slewing brake, the adjusting nut (12) must be loosened when the crane is out of service to allow the jib to weather-vane.

The internal parts of the brake are greased with light ball bearing grease before leaving the works. It is advisable to keep these parts well greased.





KRØLL GIANT CRANES A/S AND MAY NOT BE REPRODUCED IN WHOLE OR PART WITHOUT PERMISSION Gevind indfedtes Thread to be greased _Fedtfyldes Grease filled No. 42.4 9 D.B.I. Dut Type M 50421 42.89505030 Ascending pipe Ø5 x 30 0.1 8 7 MB 3020 DU 2 43.00099634 Bushing 4-06.20018406 6 0.1 Spring No. 15 S 5 D.B.I. Dut 4 C2-34.00045719 180 Volt DC Magnet 4-34.00015347 Rubber muff 0.1 2 3-34.00015320 Armature 42.10006014 Insex M6 x 14 10.9 Længde Type-Kvalitet Stk Vægt Vægt Tegning Nr. Titel Bemærkninger PROJ. KRANTYPE STK. SAML. TEGN. KONST.: 071129 JL TEGN.: 071129 JL K100L GODK.: 071129 JL KH100L ERSTATTER: OVERF. AREAL: SKALA: OVERFLADE-BEHANDLING: MATR.: 1:2 DIM.: ERSTATTET AF: TOTALVÆGT: ANT. TEGNING .: ANT. STYKL.: TITEL 10,5 kgTRANSPORTMÅL: OPRINDELSE: K-brake 180 V KRØLL CRANES A/S TEGN. NR. NORDKRANVEJ 2 DK-3540 LYNGE PHONE: +45 48 18 74 00 FAX: +45 48 18 88 07

G

