STEINLEN
ELEKTRISCHE ANTRIEBSTECHNIK

MOTOX/MOTOX©-N

Operating Instructions

MOTOX

LA/LG, LAI/LGI motors

BA 2320

Edition 5/2022

STEINLEN
ELEKTRISCHE ANTRIEBSTECHNIK

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Operating Instructions

Motors for mounting onto MOTOX gearboxes

Translation of the original instructions
03/2021
A5E38106348A/RS-AD-ST

Legal information

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.

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 Steinlen products

Note the following:

⚠WARNING

Steinlen 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 Steinlen. 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.

Trademarks

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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.

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A5E38106348A/RS-AD-ST
℗ 03/2021 Subject to change

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General information and safety notes

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1.1 General information

Note

Steinlen Elektromaschinenbau GmbH does not accept any liability for damage and failures that result from the non-observance of these operating instructions.

These operating instructions are part of the motor delivery. Store the operating instructions near the gearbox.

These operating instructions apply to the standard version of the motors for mounting on the MOTOX gearbox series:

- MODULOG motors sizes 71 to 200
- Motor sizes 225 to 315

Table 1- 1 Order number code

Motor	Structure of the order number position					
	1	2	3	4	11	12
Motor LA/LG or LAI/LGI	S	T	3	1	1	3

Note

In addition to these operating instructions, special contractual agreements and technical documentation apply to these special motor designs and the associated supplementary equipment.

Please refer to the other operating instructions supplied with the product.

The described motors correspond to the state-of-the-art at the time these operating instructions were printed.

Steinlen Elektromaschinenbau GmbH reserves the right to change individual components and accessory parts in the interest of further development. The changes serve to improve the performance and safety. The significant features are retained. The operating instructions are updated regularly with new contents.

The latest versions of the operating instructions, the declaration of incorporation and the declarations of conformity are available in electronic form in the Industry Online Support (https://www.steinlen.eu).

Valid operating instructions for MOTOX

- BA 2010 - operating instructions for MOTOX gearboxes
- BA 2011 - operating instructions for MOTOX worm gearbox SC
- BA 2012 - operating instructions for MOTOX worm gearbox S
- BA 2019 - operating instructions for MOTOX input units
- BA 2310 - operating instructions for three-phase and single-phase AC motors and motors equipped with brake with accessories
- BA 2320 - operating instructions for LA/LG and LAI/LGI motors
- BA 2330 - operating instructions for LA/LE/LES motors
- BA 2510 - operating instructions for MOTOX optional add-on units
- BA 2515 - operating instructions for MOTOX gearboxes for overhead conveyors

1.2 Copyright

The copyright to these operating instructions is held by Steinlen Elektromaschinenbau GmbH.

These operating instructions must not be wholly or partly reproduced for competitive purposes, used in any unauthorized way or made available to third parties without agreement of Steinlen Elektromaschinenbau GmbH.

1.3 Intended use

The motors described in these operating instructions have been designed for stationary use in general engineering applications.

They comply with the harmonized standards of the series EN 60034 (VDE 0530). They are not approved for operation in hazardous zones and areas.

Unless otherwise agreed, the motors have been designed for use in plants and equipment in industrial environments.

The motors have been built using state-of-the-art technology and are shipped in an operationally reliable condition. Changes made by users could affect this operational reliability and are forbidden.

Note

The data on the rating plate assumes an installation altitude of up to 1 000 m above sea level.

The permissible ambient temperature is stamped on the rating plate.

For different installation altitudes and ambient temperatures, contact Technical Support.

The motors are designed only for the area of application described in Section Technical data (Page 59).
Do not operate the gearboxes outside the specified performance limits.
Any different operating conditions require new contractual agreements.

Equipment with degree of protection ≤ IP54 must never be used outdoors. Air-cooled versions are designed for ambient temperatures of -15 °C to +40 °C and for an installation altitude of up to 1 000 m above sea level. Please note any deviations to the data on the rating plate. Conditions at the location of use must comply with all specifications on the rating plate.

Do not climb on the motor. Do not place any objects on the motor.

1.4 Obligations of the user

The operator must ensure that all persons assigned to work on the geared motor have read and understood these operating instructions and that they follow them in all points in order to:

- Eliminate the risk to life and limb of users and other persons.
- Ensure the operational safety of the geared motor.
- Avoid disruptions and environmental damage through incorrect use.

Note the following safety information:

Shut down the geared motors and disconnect the power before you carry out any work on them.

Make sure that the drive unit cannot be turned on accidentally, e.g. lock the key-operated switch. Place a warning notice at the drive connection point which clearly indicates that work is in progress on the geared motor.

Carry out all work with great care and with due regard to "safety".

For all work, observe the relevant regulations for work safety and environment protection.

Read the instructions on the rating plates attached to the geared motor. The rating plates must be kept free from paint and dirt at all times. Replace any missing rating plates.

In the event of changes during operation, switch off the drive unit immediately.

Take appropriate protective measures to prevent accidental contact with rotating drive parts, such as couplings, gear wheels or belt drives.

Take appropriate protective measures to prevent accidental contact with parts and equipment that heat up to over +70 °C during operation.

When removing protective equipment, keep fasteners in a safe place. Re-attach removed protective equipment before commissioning.

Collect and dispose of used oil in accordance with regulations. Remove oil spillages immediately with an oil-binding agent in compliance with environmental requirements.

Do not carry out any welding work on the geared motor. Do not use the geared motor as a grounding point for welding operations.

Carry out equipotential bonding in accordance with applicable regulations and directives by electrotechnology specialists.

Do not use high-pressure cleaning equipment or sharp-edged tools to clean the geared motor.

Observe the permissible tightening torque of the fastening bolts.

Replace damaged bolts with new bolts of the same type and strength class.

Steinlen Elektromaschinenbau GmbH accepts the warranty only for original spare parts.

The manufacturer who installs the geared motors in a plant must include the regulations contained in the operating instructions in its own operating instructions.

1.5 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.
   Also disconnect the auxiliary circuits, for example the anti-condensation heating.
2. Secure against reconnection.
3. Verify absence of operating voltage.
4. Ground and short circuit.
5. Cover or safeguard neighboring live parts.

After the work has been completed, undo the measures taken in the reverse order.

1.6 Particular types of hazards

⚠ WARNING

Extreme surface temperatures

Hot surfaces over +55 °C pose a burn risk.

Cold surfaces below 0 °C pose a risk of damage due to freezing.

Do not touch the gearbox without protection.

⚠ WARNING

Hot, escaping oil

Before starting any work wait until the oil has cooled down to below +30 °C.

⚠ WARNING

Poisonous vapors when working with solvents

Avoid breathing in vapors when working with solvents.

Ensure adequate ventilation.

⚠ WARNING

Risk of explosion when working with solvents

Ensure adequate ventilation.

Do not smoke!

⚠ WARNING

Risk of eye injury

Rotating parts can throw off small foreign particles such as sand or dust.

Wear protective eyewear!

In addition to the prescribed personal protection gear, also wear suitable protective gloves and safety glasses.

Technical description 2

2.1 General description

The motor complies with the following regulations:

Table 2- 1 Overview of standards for the motor

Designation	Standard
Ratings and operating performance	EN 60034-1
Degree of protection	EN 60034-5
Cooling	EN 60034-6
Type of construction according to modular system	EN 60034-7
Terminal marking and direction of rotation	EN 60034-8
Noise emission	EN 60034-9
Thermal protection	EN 60034-11
Starting characteristics for rotating electrical motors	EN 60034-12
Vibration severity levels	EN 60034-14
IEC standard voltages	IEC 60038
Safety of machinery	EN 60204-1

The motor is equipped with grease-lubricated roller bearings. The bearings are permanently lubricated.

The stator winding is designed for temperature class 155(F).

In the standard version, the rotor corresponds to vibration severity level A.

The technical data for the optional monitoring equipment can be viewed in the circuit diagrams, on the rating plate or in the special order documents.

Housing

The stator housing and the rating plate are made from aluminum casting up to size 160, and from cast iron from size 180.

The surface of the stator housing has cooling fins and a mounted terminal box.

The fan cover is made of sheet steel.

2.2 Cooling

NOTICE
Dust deposits prevent heat radiation
Dust deposits prevent heat radiation and cause a high housing temperature.
Keep the motor free from dirt, dust etc.

The motor is designed to be cooled by means of fins. An external fan draws in the cooling air through the aperture in the fan cover and blows the air over the surface of the stator housing.

2.3 Terminal box

In the motor terminal box, alongside the motor connection terminals (terminal board), additional connecting clamps are available for monitoring equipment. The number of available terminals is shown in the circuit diagrams. The circuit diagrams are located in the terminal box.

2.4 Rating plate

The rating plate on the gearbox or geared motor is of coated aluminum foil. It is covered with a special masking film which ensures permanent resistance to UV radiation and media of all kinds, such as oils, greases, salt water and cleaning agents.

The adhesive and the material ensure firm adhesion and long-term legibility within the operating temperature range from -40 °C to +155 °C.

The edges of the rating plate are paint-finished to match the color of the gearbox or motor to which it is affixed.

In special cases, riveted or bolted metal plates are used.

2.5 Surface treatment

2.5.1 General information on surface treatment

All paint finishes are sprayed on.

NOTICE
Failure of the exterior protection If the paint finish is damaged, the geared motor may corrode. Do not damage the paint finish.

Note

Information about the ability to be repainted does not guarantee the quality of the paint product supplied by your supplier.

Only the paint manufacturer is liable for quality and compatibility.

2.5.2 Painted version

The corrosion protection system is classified according to the corrosiveness categories in DIN EN ISO 12944-2.

Table 2- 2 Paint according to corrosiveness categories

Paint system	Description
Corrosiveness category C1, unpainted for gearbox and motor housings made of aluminum	
-	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard
Corrosiveness category C1 for normal environmental stress	
1-component hydro paint, top coat	• Indoor installation • Heated buildings with neutral atmospheres • Resistance to greases and some resistance to mineral oils, aliphatic solvents • Standard paint for gearbox housings made of cast iron

Paint system	Description
Corrosiveness category C2 for low environmental stress	
2-component - polyurethane top coat	• Indoor and outdoor installation • Unheated buildings with condensation, production areas with low humidity, e.g. warehouses and sports facilities • Atmospheres with little contamination, mostly rural areas • Resistance to greases, mineral oils and sulfuric acid (10 %), caustic soda (10 %) and some resistance to aliphatic solvents
Corrosiveness category C3 for medium environmental stress	
2-component epoxy zinc phosphate base coat, 2-component polyurethane top coat	• Indoor and outdoor installation • Production areas with high humidity and some air contamination, e.g. food production areas, dairies, breweries and laundries • Urban and industrial atmospheres, moderate contamination from sulfur dioxide, coastal areas with low salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %)
Corrosiveness category C4 for high environmental stress	
2-component epoxy zinc phosphate base coat, 2-component polyurethane top coat	• Indoor and outdoor installation • Chemical plants, swimming pools, wastewater treatment plants, electroplating shops, and boathouses above seawater • Industrial areas and coastal areas with moderate salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %)

Paint system	Description
Corrosiveness category C5 for very high environmental stress	
2-component epoxy zinc phosphate base coat, 2-component polyurethane intermediate coat, 2-component polyurethane top coat	• Indoor and outdoor installation • Buildings and areas with almost constant condensation and high contamination, e.g. malt factories and aseptic areas • Industrial areas with high humidity and aggressive atmosphere, coastal areas and offshore environments with high salt levels • Resistance to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (20 %)

In case of corrosiveness category C1, overpainting with a 1-component hydrosystem after prior rubbing down is possible.

In case of corrosiveness categories C2 to C5, overpainting with 2-component polyurethane paint, 2-component epoxide paint and 2-component acrylic paint after prior rubbing down is possible.

2.5.3 Primed version

Table 2- 3 Primer according to corrosiveness categories

Paint system	Can be overpainted with
Unpainted (corrosiveness category C1 G)	
Cast iron parts immersion primed, steel parts primed or zinc-plated, aluminum and plastic parts untreated	• Synthetic paint, synthetic resin paint, oil paint • 2-component polyurethane paint • 2-component epoxy paint
Primer according to corrosiveness category C2 G	
2-component metal primer, desired coat thickness 60 µm	• 2-component polyurethane paint • 2-component epoxy paint, acid-hardening paint • 2-component acrylic paint
Primer according to corrosiveness category C4 G	
2-component epoxide zinc phosphate, desired coat thickness 120 µm	• 2-component polyurethane paint • 2-component epoxy paint, acid-hardening paint • 2-component acrylic paint

Incoming goods, transport, and storage 3

3.1 Incoming goods

NOTICE
Transport damage impairs correct functioning
Do not commission faulty gearboxes or geared motors.

Note

Do not open or damage parts of the packaging that preserve the product.

Note

Check that the technical specifications are in accordance with the purchase order.

Inspect the delivery immediately on arrival for completeness and any transport damage.

Notify the freight company of any damage caused during transport immediately (this is the only way to have damage rectified free of charge). Steinlen Elektromaschinenbau GmbH will not accept any claims relating to items missing from the delivery and which are submitted at a later date.

The gearbox or geared motor is delivered in a fully assembled condition. Additional items are sometimes delivered packaged separately.

The products supplied are listed in the dispatch papers.

3.2 Transport

3.2.1 General information on transport

NOTICE
The use of force will damage the gearbox or geared motor
Transport the gearbox or geared motor carefully. Avoid knocks.
Before putting the drive into operation, remove any transport fixtures and keep them safe or render them ineffective. You can then use them again for transporting further items or you can apply them again.

Different forms of packaging may be used, depending on the size of the gearbox or geared motor and the method of transport. Unless contractually agreed otherwise, the seaworthy packaging complies with HPE Packaging Guidelines (Bundesverband Holzpackmittel Paletten Exportverpackungen e.V., the German Federal Association for wooden packaging, pallets, and export packaging).

Note the symbols which appear on the packaging. These have the following meanings:


This way up


Center of gravity


Fragile


Do not use hand hook


Keep dry


Attach here


Keep cool

3.2.2 Fastening for suspended transport

WARNING

Inadequately secured gearbox or geared motors

Observe the maximum load for the transport eye ③ of the bevel helical gearbox or the eyebolt axis ④.

Use only the transport eye ③ or eyebolt ④ of the gearbox to transport the gearbox or geared motor.

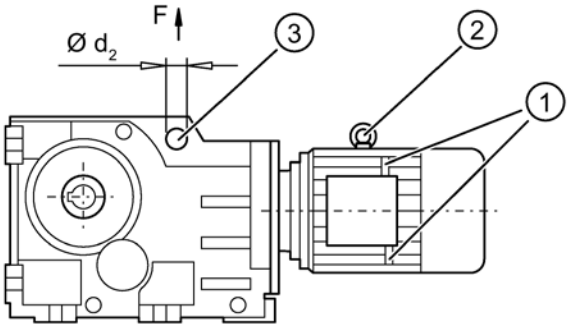
Do not use the integrally cast lifting eyes ① on the motor for transport because of the risk of breaking. Only use the eyebolt ② on the motor to transport the motor prior to mounting or following removal.

If necessary, use additional, suitable lifting accessories for transport or during installation.

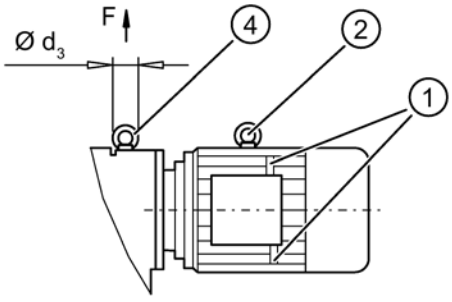
When attaching by a number of chains and ropes just two strands must be sufficient to bear the entire load. Secure lifting accessories against slipping.

NOTICE
Do not rig eyebolts to the front threads at the shaft ends for transportation purposes

Transport eye on the bevel helical gearbox



Eyebolt on the helical gearbox, parallel shaft gearbox, helical worm gearbox



① Integrally cast eye on the motor
② Eyebolt on the motor
③ Transport eye on the bevel helical gearbox
④ Eyebolt on the gearbox

Figure 3-1 Fastening the gearbox or geared motor for suspended transport

The maximum load m in kg generated by the geared motor to be attached, with pull ↑ in direction F is listed in the following tables:

Table 3- 1 Maximum load of the transport eye on the bevel helical gearbox

Size	m	d_2	Size	m	d_2
	[kg]	[mm]		[kg]	[mm]
K.38	200	22	K.128	800	40
K.48	250	22	K.148	1 300	44
K.68	350	26	K.168	1 800	55
K.88	600	30	K.188	2 300	55
K.108	750	35			

Table 3- 2 Maximum load of the eyebolt on the gearbox

Thread size	m	d_3	Thread size	m	d_3
	[kg]	[mm]		[kg]	[mm]
M8	140	36	M20	1 200	72
M10	230	45	M24	1 800	90
M12	340	54	M30	3 600	108
M16	700	63			

Procedure

1. Mount the geared motor on the transport device by the heaviest permissible weight to be attached. This will normally be on the main gearbox.
2. Check that the eyebolt is firmly seated.

The geared motor is slung for transport.

3.3 Storage

WARNING

Danger of serious injuries caused by falling objects

Danger of damage to the motor when stacked

Do not stack gearboxes or geared motors on top of each other.

NOTICE

Failure of the exterior protection

Mechanical damage, chemical damage and thermal damage, such as scratches, acids, alkalis, sparks, welding beads and heat cause corrosion.

Do not damage the paint finish.

Unless contractually agreed otherwise, the guarantee period for the standard preservative lasts 6 months from the date of delivery.

In the case of storage in transit over 6 months, special arrangements must be made for preservation. Please contact Technical Support.

Store the gearbox or geared motor in dry, dust-free rooms that are maintained at a constant temperature.

The storage location must be vibration- and shock-free.

The free shaft ends, sealing elements and flange surfaces must have a protective coating.

Do not store the geared motor on the fan cover.

Storage up to 36 months

Store the gearbox or geared motor in dry, dust-free rooms that are maintained at a constant temperature. Special packing is then not necessary.

If such premises are not available, pack the gearbox or the geared motor in plastic film or air-tight sealed film and materials. The films and materials must be able to accept moisture. Cover them to provide protection against heat, direct sunlight and rain.

The permissible ambient temperature is -25° C to +50° C.

The life of the corrosion protection is 36 months from delivery.

Mounting 4

4.1 Unpacking

NOTICE
Transport damage impairs the correct function of the geared motor
Never commission faulty or defective motors.

Check the motor for completeness and damage. Report any missing parts or damage immediately.

Remove and dispose of the packaging material and transport equipment in compliance with regulations.

4.2 General information concerning the installation

⚠ WARNING
Assembly work with the system under load
Under load, the system can start or reverse in an uncontrolled fashion.
The entire system must be load-free so that there is no danger during this work.

NOTICE
Destruction caused by welding
Welding destroys the geared parts and bearings.
Do not weld on the gearbox. The gearbox must not be used as a grounding point for welding operations.

NOTICE
Overheating caused by solar radiation
Overheating of the gearbox due to exposure to direct sunlight.
Provide suitable protective equipment such as covers or roofs. Prevent heat accumulation.

NOTICE
Malfunction resulting from foreign objects
The operator must ensure that no foreign objects impair the function of the gearbox.

NOTICE
Damaged components impair the correct function of the gearbox If any components are damaged, the correct function of the gearbox will no longer be ensured. Do not install any damaged gearbox components.

NOTICE
Violation of the maximum permissible oil sump temperature The oil sump temperature may be exceeded if the temperature monitoring equipment is incorrectly set. A warning must be given when the maximum permissible oil sump temperature is reached. The geared motor must be switched off when the maximum permissible temperature is exceeded. If the geared motor is shut down, then this can cause the machine to come to a stop.

Exercise particular care during mounting and installation. The manufacturer cannot be held liable for damage caused by incorrect mounting and installation.

Make sure that there is sufficient space around the gearbox or geared motor for mounting, maintenance and repair.

On geared motors with a fan, leave sufficient free space for the entry of air. Observe the installation conditions for the geared motor.

Provide sufficient lifting gear at the start of mounting and fitting work.

Observe the mounting position specified on the rating plate. This ensures that it will be provided with the correct quantity of lubricant.

Use all the fastening means that have been assigned to the particular mounting position and mounting type.

Cap bolts cannot be used in some cases due to a lack of space. In such cases, please contact Technical Support quoting the type of gearbox.

4.3 Thread sizes and tightening torques for fastening bolts

The general tolerance for the tightening torque is 10 %. The tightening torque is based on a friction coefficient of μ = 0.14.

Table 4- 1 Tightening torques for fastening bolts

Thread size	Tightening torque for strength class		
	8.8	10.9	12.9
	[Nm]	[Nm]	[Nm]
M4	3	4	5
M5	6	9	10
M6	10	15	18
M8	25	35	41
M10	50	70	85
M12	90	120	145
M16	210	295	355
M20	450	580	690
M24	750	1 000	1 200
M30	1 500	2 000	2 400
M36	2 500	3 600	4 200

4.4 Installation conditions for the motor

CAUTION

Danger of overheating due to insufficient cooling

Protect intake and outlet ports against blockages and coarse dust.

The cooling air must be able to enter the air inlets unimpeded and be discharged once more through the air outlets. Exhaust air should not be drawn back in again.

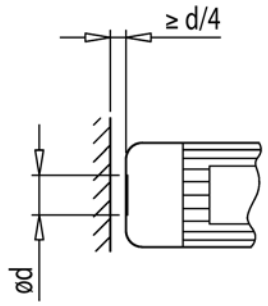


Figure 4-1 Installation condition for the motor

The permissible coolant temperature (ambient temperature at installation location) is -15 °C to +40 °C for an installation altitude of up to 1 000 m above sea level.

For types of construction with a motor shaft end facing upwards, a suitable cover must be fitted to prevent foreign objects from falling into the fan.

4.5 Condensation drain holes (optional)

When installing the surface-cooled motor, take care that the condensation drain holes are at the lowest point.

4.6 Mounting the input or output element on the motor shaft

⚠ WARNING

Danger of burns due to hot parts

Do not touch the geared motor without protection.

NOTICE

Damage to shaft sealing rings caused by solvent

Avoid any contact of solvent or benzine with the shaft sealing rings.

NOTICE

Damage to shaft sealing rings caused by heating

Use thermal shields to protect shaft sealing rings from heating above 100 °C due to radiant heat.

NOTICE

Premature wear or material damage due to misalignment

Misalignment caused by excessive angular or axis displacement of the shaft ends to be joined.

Ensure precise alignment of the individual components.

NOTICE

Damage caused by improper handling

Bearings, housing, shaft and locking rings are damaged due to improper handling.

Do not use impacts or knocks to force the input and output elements to be mounted onto the shaft.

Note

Deburr the parts of elements to be fitted in the area of the hole or keyways.

Recommendation: 0.2 x 45°

Where couplings are to be fitted in a heated condition, observe the specific operating instructions for the coupling. Unless otherwise specified, the heat can be applied inductively, using a torch or in a furnace.

Use the centering holes in the shaft end faces.

Use a fitting device to fit the input or output elements.

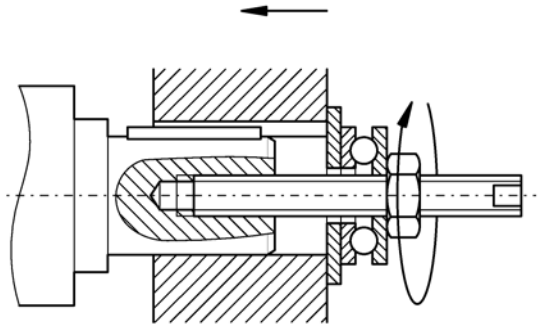


Figure 4-2 Example of a fitting device

The motor's rotor is dynamically balanced. The balance status is specified in the keyway: H = Half-key balancing, F = Full-key balancing.

Adjust the balance of the transmission parts to be fitted to the rotor balancing. For half-key balancing H, remove projecting, visible parts of the feather key.

4.7 Connecting the motor in the terminal box

4.7.1 General information on motor connection

⚠ DANGER

Unintentional starting of the drive unit

Any work on the stationary machine must be performed with the machine isolated from the supply and secured so that it cannot be switched back on again. This also applies to auxiliary circuits, e.g. anti-condensation heating.

Check that the unit is in a no-voltage condition.

Deviations in the voltage, frequency, curve shape and/or symmetry of the line feed increase the heating.
This also affects the electromagnetic compatibility.

Before starting work, make sure that a protective conductor is securely connected.

Connect the motor in such a way that a permanently safe electrical connection is ensured. Wire ends must not protrude. Use matching cable end pieces.

Connect the line supply voltage in the terminal box. Arrange the disconnecting link according to the circuit diagram for star or delta connection in the terminal box.

Select the connection cables according to DIN VDE 0100. Take into account the rated current and the plant-specific conditions.

The following required information for connection is specified in the technical data:

- Direction of rotation
- Number and arrangement of the connections
- Circuit / connection of the motor winding.

4.7.2 Terminal box

NOTICE
Electrical connections can loosen
Please observe the tightening torques for cable glands, nuts and bolts.
When performing a test run, secure the featherkeys without output elements.

NOTICE
Malfunctions
It must be ensured that there are no foreign bodies, dirt or moisture in the terminal box.
The terminal box must be sealed so that dust and water cannot enter.
Seal the terminal box with the original seal. Seal cable entries to the terminal box and other open cable entries with an O-ring or suitable flat gasket.
Do not damage the terminal box or other functional parts inside the terminal box.

Note

For a standard terminal board with 6 terminal studs, the terminal box can be turned 4 x 90 degrees on the terminal base of the stator housing.

The temperature sensor and anti-condensation heating are connected in the terminal box.

Please note that the motor degree of protection is only obtained after correctly connecting up and tightening the cable glands and blanking plugs.

4.7.3 Terminal designations

For terminal designations, the following principle definitions apply to three-phase machines:

Table 4- 2 Terminal designations using the example 1U1-1

1	U	1	-	1	Designation
x					Index showing the pole assignment for pole-changing machines (where applicable, a lower number = lower speed) or, in special cases, for a subdivided winding
	x				Phase designation (U, V, W)
		x			Index showing winding start (1) index showing winding end (2) other indexes if there is more than one connection per winding
				x	Additional index for cases in which it is obligatory to connect parallel power feed cables to several terminals with otherwise identical designations

4.7.4 Direction of rotation

The motors are suitable for clockwise and counter-clockwise rotation.

Connection of the power cables in the phase sequence L1, L2, L3 to U, V, W results in clockwise rotation, when looking at the drive-end shaft end of the motor (D- end). If two of the connections are swapped, the resulting direction of rotation is counter-clockwise, e.g. L1, L2, L3 to V, U, W.

In the case of geared motors intended for only one direction of rotation, e.g. with backstop, the prescribed direction of rotation is marked by a direction arrow on the geared motor.

Clockwise Counter-clockwise

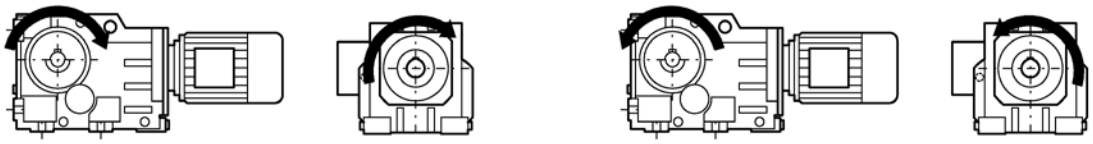


Figure 4-3 Output side A

Figure 4-4 Output side B

Table 4- 3 Direction of rotation of the geared motors with a view of the output shaft

Gearbox type	View of	Direction of rotation	
		Output shaft	Drive shaft
Z18 … 188	Output shaft	Right	Right
		Left	Left
D18 … 188	Output shaft	Right	Left
		Left	Right

Gearbox type	View of	Direction of rotation	
		Output shaft	Drive shaft
FZ28, 38B … 188B, 208	A side of the output shaft	Right	Right
		Left	Left
FD28, 38B … 188B, 208	A side of the output shaft	Right	Left
		Left	Right
B28 … 38	A side of the output shaft	Right	Right
		Left	Left
K38 … 88	A side of the output shaft	Right	Left
		Left	Right
K108 … 188	A side of the output shaft	Right	Right
		Left	Left
K38 … 188	B side of the output shaft	Right	Left
		Left	Right
C28 … 88	A side of the output shaft	Right	Right
		Left	Left

4.7.5 Connecting the cables in the terminal box

Note

Direct contact between the cable lug surfaces and the contact nuts ensures that the connection can carry current.

In the case of terminals with terminal clamps, distribute the conductors in such a way that the clamping heights are about the same on both sides of the fillet. This method of connection requires a single conductor to be bent into a U shape or connected with a cable lug. The same applies to the inner and outer terminals of the ground conductor.

Select the cable lug size according to the required cable cross-section and stud size. A sloped / angular arrangement is permitted if the required clearances and creepage distances are maintained.

Remove the insulation from the conductor ends so that the remaining insulation is almost long enough to reach the cable lug.

4.7.6 External grounding

Note the following when connecting:

- The connecting surface must be clean and bright. Protect the surface against corrosion with a suitable substance, e.g. acid-free Vaseline.
- Insert the cable lug between the contact bracket and the grounding bracket. Do not remove the contact bracket which is pressed into the housing.
- Place the spring washer under the screw head.
- Observe the tightening torque for the locking screw, see Installation and routing (Page 30).

Table 4- 4 Maximum conductor connection of the external grounding

Motor size	Thread size
63 - 90	M4
100 - 112	M5
132 - 160	M6

4.7.7 Installation and routing

Note

Match the screw connection to the connection cable used:

- Seal insert
- Armor
- Braid
- Shielding

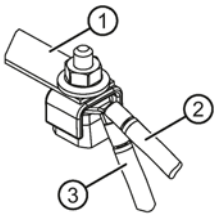
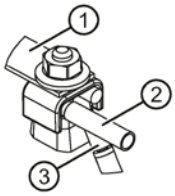
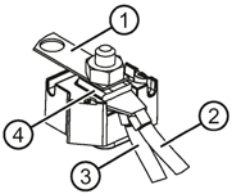
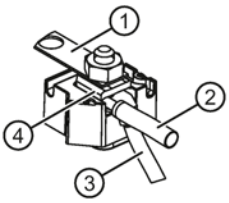
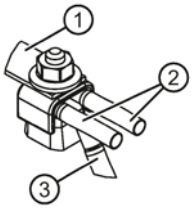
Screw the screw connection into the housing. Or secure the screw connection with a locknut.

Terminal board connection

Table 4- 5 Tightening torque for terminal board connection

Thread size	Tightening torque		Thread size	Tightening torque	
	Min.	Max.		Min.	Max.
	[Nm]	[Nm]		[Nm]	[Nm]
M4	0.8	1.2	M10	9	13
M5	1.8	2.5	M12	14	20
M6	2.7	4	M16	27	40
M8	5.5	8	-	-	-

Type of conductor connection

Angle DIN cable lug down for connection. DIN 46234			Conductor cross section
			... 25 mm²
Connecting an individual conductor with terminal clamp.			
			... 10 mm²
Connecting two conductors of approximately the same thickness with terminal clamp.			
			... 25 mm²

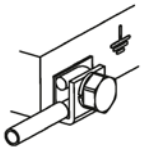
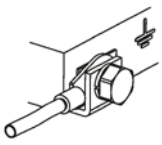
① Link rail

② Line connecting cable

③ Motor connecting cable

④ Cover washer

Grounding connection type

Connecting an individual conductor under the external grounding bracket.	Conductor cross section
	... 10 mm²
Connect with a DIN cable lug under the external grounding bracket DIN 46234.	
	... 25 mm²

Cable gland

NOTICE
Damage to the cable jacket An excessively high tightening torque with a different cable jacket material will damage the cable jacket. When different cable jacket materials are used, apply a lower tightening torque.

For metal or plastic cable glands, please use the following tightening torques for direct mounting. The O-ring cross-section is 2 mm.

Table 4- 6 Tightening torque for cable glands and blanking plugs

Thread size	Tightening torque ±10 %		Thread size	Tightening torque ±10 %	
	Metal	Plastic		Metal	Plastic
	[Nm]	[Nm]		[Nm]	[Nm]
M12 x 1.5	8	1.5	M32 x 1.5	18	6
M16 x 1.5	10	2	M40 x 1.5		
M20 x 1.5	12	4	M50 x 1.5	20	
M25 x 1.5			M63 x 1.5		

4.7.8 External fan (optional)

4.7.8.1 General information for commissioning of forced ventilation

Please note the direction of rotation. It is indicated with an arrow on the forced ventilation unit.

Connect the forced ventilation according to the applicable circuit diagram.

Before commissioning the motor, check that the forced ventilation is working properly.

The forced ventilation must be switched on during motor operation.

After the motor has been switched off, the forced ventilation must continue to run, depending on the temperature.

4.7.8.2 Circuit diagrams for forced ventilation

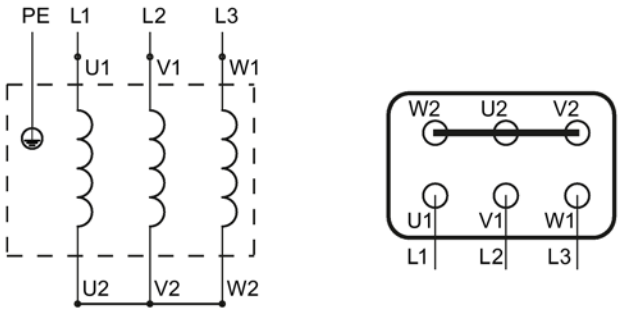


Figure 4-5 3~ Y star connection

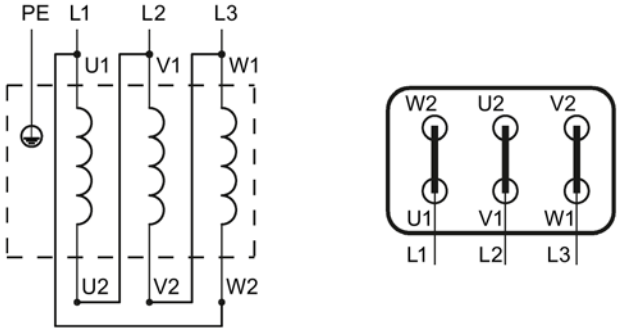


Figure 4-6 3~ Δ delta connection

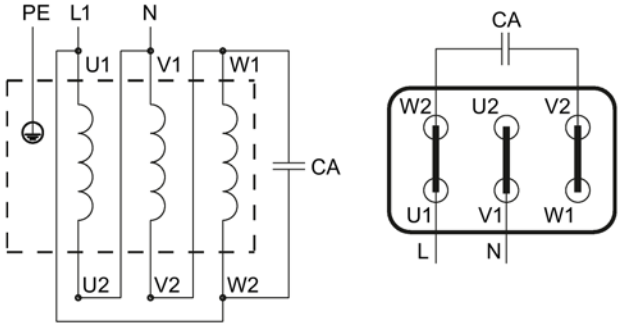


Figure 4-7 1~ ⊥ (Δ) Steinmetz delta connection

U1 (T1)	Black	V1 (T2)	Light blue	W1 (T3)	Brown
U2 (T4)	Green	V2 (T5)	White	W2 (T6)	Yellow

4.7.8.3 Technical data for forced ventilation

Table 4- 7 Technical data for forced ventilation

Size	Frequency	Rated voltage range	Rated current	Input power	Volume flow rate
	[Hz]	Phase	[A]	[W]	[m³/h]
71	50	1AC 3AC	0.12 0.11 / 0.06	84 100	65
	60	1AC 3AC	0.12 0.11 / 0.06	59 103	80
80	50	1AC 3AC	0.14 0.11 / 0.06	84 102	100
	60	1AC 3AC	0.14 0.11 / 0.06	64 104	120
90	50	1AC 3AC	0.29 0.38 / 0.22	82 97	170
	60	1AC 3AC	0.29 0.38 / 0.22	70 101	210
100	50	1AC 3AC	0.30 0.37 / 0.22	86 100	220
	60	1AC 3AC	0.30 0.37 / 0.22	79 105	260
112	50	1AC 3AC	0.37 0.35 / 0.20	85 95	310
	60	1AC 3AC	0.37 0.35 / 0.20	95 102	350
132	50	1AC 3AC	0.57 0.58 / 0.33	115 138	450
	60	1AC 3AC	0.57 0.58 / 0.33	185 148	530
160	50	1AC 3AC	0.91 0.93 / 0.56	225 220	780
	60	1AC 3AC	- 0.93 / 0.56	- 280	880
180	50	1AC 3AC	0.97 0.93 / 0.56	225 220	860
	60	1AC 3AC	- 0.93 / 0.56	- 280	
200	50	1AC 3AC	0.97 0.93 / 0.56	225 220	950
	60	1AC 3AC	- 0.93 / 0.56	- 280	-

Size	Frequency	Rated voltage range	Rated current	Input power	Volume flow rate
	[Hz]	Phase	[A]	[W]	[m³/h]
225	50	3AC	2.00 / 1.15	450	-
	60	3AC	1.05	520	-
250	50	3AC	2.00 / 1.15	450	-
	60	3AC	1.05	520	-
280	50	3AC	2.00 / 1.15	450	-
	60	3AC	1.05	520	-
315	50	3AC	2.00 / 1.15	450	-
	60	3AC	1.05	520	-

Table 4- 8 Rated voltage range of motor

Size	Frequency	Rated voltage range		
	[Hz]	Phase	[V]	Switching
71 … 112	50	1AC	220 … 277	⊥ (Δ)
		3AC	220 … 290 / 380 … 500	Δ / Y
	60	1AC	220 … 277	⊥ (Δ)
		3AC	220 … 332 / 380 … 575	Δ / Y
132 … 200	50	1AC	230 … 277	⊥ (Δ)
		3AC	220 … 290 / 380 … 500	Δ / Y
	60	1AC	230 … 277	⊥ (Δ)
		3AC	220 … 332 / 380 … 575	Δ / Y
225 … 315	50	3AC	220 … 240 / 380 … 420	Δ / Y
	60	3AC	440 … 480	Δ / Y

4.8 Operation on the converter

Permissible voltage stress

NOTICE
Damage to the motor insulation The motor insulation will be damaged by impermissible voltage peaks produced by converters without an output filter. Reduce the maximum motor voltage to noncritical values by using an output filter on the converter.

The table below shows a comparison between the maximum admissible peak-peak voltage at the motor terminal as stipulated by DIN EN 60034-18-41 and the peak-peak voltage tolerance of Steinlen insulation systems.

	Line voltage U_N			
	400 V		480 V	
	IVIC C	Steinlen[1]	IVIC C	Steinlen[1]
$\hat{U}_{phase\text{-}to\text{-}ground}$	1 680	2 200	2 016	2 200
$\hat{U}_{phase\text{-}to\text{-}phase}$	2 360	3 000	2 832	3 000

[1] The information specified refers to the standard (basic) insulation system.

The following applies for the voltage rise time: T_a > 0.3 ± 0.2 µs.

The voltages specified are peak-peak values (Vpk/pk).

Bearing currents

Additional bearing currents due to steep voltage edges when switching. Without output filters, significant voltage variations can occur at the winding terminals. Make sure the drive system is installed in accordance with EMC requirements.

Mechanical stress and grease lifetime

High speeds that exceed the rated speed and the resulting increased vibrations alter the mechanical running smoothness and the bearings are subjected to increased stress. This reduces the service life of the grease and bearings.

Optional add-on units

Connect the temperature sensor of the monitoring system and the anti-condensation heating according to the appropriate circuit diagram. Only switch on the anti-condensation heating after the motor has been switched off.

Commissioning 5

5.1 Checking the insulation resistance

Only qualified personnel may work on power installations.

WARNING

Unintentional starting of the drive unit

Secure the drive unit to prevent it from being started up unintentionally.

Attach a warning notice to the start switch.

WARNING

Hazardous voltage and rotating parts

Before starting commissioning, mount the covers required for the correct air guidance, and prevent contact with active / current-carrying or rotating parts.

WARNING

Hazardous voltage at the terminals

In some cases, the terminals can be at hazardous voltage levels during the measurement and immediately afterwards. The terminals must not be touched.

Carry out a check on the power cables connected to ensure that no voltage can be applied.

Note

The insulation resistance must be checked before commissioning and after lengthy periods of storage or non-use.

Before you begin measuring the insulation resistance, please read the operating manual for the insulation resistance meter you are going to use. Before measuring the insulation resistance, disconnect any main circuit cables that are connected to the terminals.

Note

If the critical insulation resistance is less than or equal to this value, the windings must be dried or, if the fan is removed, cleaned thoroughly and dried.

Note that the insulation resistance of dried, clean windings is lower than that of warm windings. The insulation resistance can only be properly assessed after conversion to the reference temperature of +25 °C.

If the measured value is close to the critical value, you must check the insulation resistance at suitably frequent intervals.

Measure the minimum insulation resistance of the winding to the motor housing at a winding temperature between +20 °C and +30 °C. Other insulation resistance values apply to temperatures outside this range. When making the measurement, wait until the final resistance value is reached, approx. 1 minute.

Measure the critical insulation resistance at the operating temperature of the winding.

Limit values

The following limit values are valid for the insulation resistance at a rated voltage of U_N < 2 kV and a winding temperature of +25 °C.

500 V	Measuring circuit voltage
10 MΩ	Minimum insulation resistance for new, cleaned or repaired windings
0.5 MΩ / kV	Critical specific insulation resistance after a long operating time

Observe the following:

- If you measure a winding temperature other than +25 °C, convert the measured value to the reference temperature +25 °C. The insulation resistance is halved for every 10 K increase in temperature, and it is doubled for every 10 K decrease in temperature.
- If the insulation resistance is close to or below the minimum value, the cause could be humidity and dirt accumulation. Dry the windings.
- During operation, the insulation resistance of the windings can fall to the critical insulation resistance due to ambient and operational influences. To calculate the critical insulation resistance value for a winding temperature of +25 °C, multiply the rated voltage kV by the specific critical resistance value (0.5 MΩ / kV).
  Example: rated voltage U_N 690 V: 690 V x 0.5 MΩ / kV = 0.345 MΩ.

5.2 Commissioning the motor

Note

Protect the motor against overload.

Do not exceed or undershoot limit speeds, e.g. during operation with a backstop.

Note

With a backstop:

Running in the wrong direction of rotation can damage the geared motor.

Check the direction of rotation before commissioning.

Manually rotate the drive end or motor.

Use the phase sequence to check the direction of motor rotation and swap the two external conductors if necessary.

Note

With a brake with manual release:

No braking effect when the manual brake release lever is locked. The brake is then permanently released.

Before commissioning the geared motor, ensure that the brake is not locked.

Unscrew the manual brake release lever and keep it separate from the geared motor.

Note

When starting/prior to switching on, use circuitry to ensure that the motor brake is vented.

Note

With a brake motor:

After maintenance work, check the constancy of the rated air gap of the brake. The brake motor must be current-free. Check the gap between the armature disk and the solenoid at 3 points with a feeler gauge.

Note

Additional tests are also required, depending on the particular plant-specific situation.

After checking and ensuring the following items, you can start commissioning the motor:

- Compare the details on the rating plate with the operating conditions.
- Compare the voltage and frequency of the motor with the line supply values.
- Check the direction of rotation.
- A Y / Δ start is switched from start to delta when the starting current of the star stage has decayed.
- Check the electrical connections are fixed securely.
- Check all the touch protection measures for both moving and live parts.
- Check that the monitoring instruments are connected and set correctly.
- Check the coolant temperature.
- Check any supplementary equipment being used.
- Check that air inlet ports and cooling surfaces are clean.
- Check the clearances from the geared motor to adjacent components, see Installation conditions for the motor (Page 24).
- Create the appropriate connections for grounding and equipotential bonding.
- Properly mount and fix the motor.
- Check that the ventilation is not impeded and that the discharged air - including that from adjacent units - cannot be drawn back in.
- Check the belt tension if a belt drive is being used.
- Seal the terminal box cover and seal the cable entries.

Operation

6

CAUTION
Malfunctions can cause personal injuries or motor damage In the event of changes during operation, the drive unit must be switched off immediately. Determine the cause of the fault using the fault table (Page 43). Remedy faults or have faults remedied.

Check the motor during operation for:

- Excessive operating temperature
- Unusual noises

Faults, causes and remedies

7

Note

Faults and malfunctions that occur during the warranty period and requiring repair work on the motor may only be remedied by Technical Support. If faults occur without a clearly identifiable cause, Steinlen Elektromaschinenbau GmbH recommends using the services of the Technical Support after the warranty period has elapsed.

If you need the help of the Technical Support, please have the following information ready:

- Rating plate data
- Nature and extent of the fault
- Suspected cause

Table 7- 1 Faults, causes and remedies

Faults	Causes	Remedy
Bearing overheated	Too much grease in the bearing	Remove excess grease
	Bearing contaminated	Replace bearing
	Belt tension too high	Reduce belt tension
	Coupling forces pull or push	Align the motor precisely, correct the coupling
	Coolant temperature above +40 °C	Adjust the cooling air to the right temperature
	The bearing grease has a dark color	Check for bearing currents
	Not enough grease in the bearing	Lubricate as prescribed by the manufacturer
	Incorrect motor installation	Check the motor type of construction
Bearing noise	Not enough grease in the bearing	Lubricate as prescribed by the manufacturer
	Incorrect motor installation	Check the motor type of construction
	Brinelling on the inner ring of the bearing, e.g. caused when the motor starts with a locked bearing	Replace bearing, prevent vibration when motor is stationary
Motor running unevenly	Coupling forces pull or push	Align the motor precisely, correct the coupling
	Incorrect motor installation	Check the motor type of construction
	Out of balance due to belt pulley or coupling	Balance precisely
	Motor mounting too weak	Check the mounting

Faults	Causes	Remedy
Motor does not ramp up	Counter torque too high	Check the motor torque and the load torque
	Line voltage too low	Check line conditions
	Phase interruption	Check the line connection
	Circuitry incorrect	Observe the circuit diagram and rating plate
Motor overheated	Circuitry incorrect	Observe the circuit diagram and rating plate
	Overload	Compare data on the rating plate
	Switching frequency too high	Observe the rated duty
	Insufficient ventilation	Check the cooling air ducts, check the direction of rotation
	Cooling air ducts contaminated	Clean cooling air ducts
Significant drop in speed	Counter torque too high	Check the motor torque and the load torque
	Line voltage too low	Check line conditions
	Phase interruption	Check the line connection
	Circuitry incorrect	Observe the circuit diagram and rating plate
	Overload	Compare data on the rating plate
Protective equipment trips	Phase interruption	Check the line connection
	Circuitry incorrect	Observe the circuit diagram and rating plate
	Overload	Compare data on the rating plate
	Switching frequency too high	Observe the rated duty
	Winding and terminal short-circuit	Measure the insulation resistance
	Startup time is exceeded	Check the power-up conditions

Service and maintenance 8

8.1 General notes about maintenance

⚠ WARNING
Unintentional starting of the drive unit
Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch.

NOTICE
Improper maintenance
Only authorized qualified personnel may perform the maintenance and servicing. Only original parts supplied by Steinlen Elektromaschinenbau GmbH may be installed.

Only qualified personnel may perform the inspection, maintenance and servicing work. Note the information in the general notes and safety information (Page 5).

8.2 Description of maintenance and repair work

8.2.1 Locking the manual release of the brake (optional)

⚠ WARNING
Personal injuries and material damage caused by a locked brake
No braking effect when the manual brake release lever is locked. The brake is then permanently released.
Before commissioning the geared motor, ensure that the brake can be applied.
Unscrew the manual brake release lever and keep it separate from the geared motor.

Keep the lockable manual release in the released state for maintenance work.

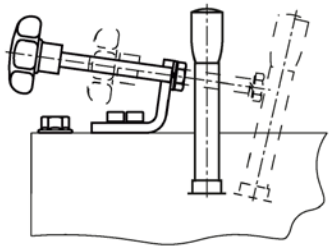


Figure 8-1 Lockable manual release

Locking the manual brake release lever

1. Screw on the manual brake release lever.
2. Bring the manual brake release lever into the position in which the brake is released.
3. Tighten the locking screw far enough so that the manual brake release lever cannot return to the unreleased position.

You have released the brake.

Releasing the lock

1. Unscrew the locking screw far enough so that the brake completely returns to the unreleased position. The gap between the locking screw and the manual brake release lever should be 2 to 5 mm.
2. Unscrew the manual brake release lever and keep the lever separately from the geared motor.

You have ensured that the manual brake release is no longer locked.

8.2.2 Lubrication

The bearings of the standard versions of surface-cooled motors (up to size 200) are permanently lubricated. If this is not the case, this is indicated by a warning notice on the motor.

The specified grease service life values are valid for an ambient temperature of up to a maximum of +40° C. For every 10° C increase in temperature, the grease service life is reduced by a factor of 0.7 of the value in the table (max. +20° C = factor 0.5).

At an ambient temperature of +25° C, the grease service life can be expected to be doubled.

Irrespective of the number of operating hours, renew the roller bearing grease or the bearing (2Z bearing) after 3 or 4 years at the latest.

Table 8- 1 Roller-bearing and shaft-sealing-ring grease

Fields of application	Ambient temperature	Manufacturer	Type
Standard	-40° C to +80° C	Klüber	Petamo GHY 133 N
Foodstuff-compatible for the food industry	-30° C to +40° C	Castrol	Optileb GR UF 1 NSF H1
Biologically degradable, for agriculture, forestry and water industries	-35° C to +40° C	BP	Biogrease EP 2

Horizontal type of construction (IM B.)

Table 8- 2 Grease service life in operating hours [h] for permanent lubrication, grease fill quantity [g] per bearing

Size	Motor speed n_N [rpm]						Grease fill quantity	
	3600	3000	1800	1500	1200	≤ 1000	D end	ND end
	Operating hours [h]						[g]	
71	33000	33000	33000	33000	33000	33000	7	5
80							9	9
90							15	11
100	24000						20	15
112							45	25
132		24000					75	50
160	17000						90	70
180							110	80
200								90
225		20000	20000	40000	40000	40000	-	-
250							-	-
280							-	-
315							-	-

Vertical type of construction (IM V.)

Table 8- 3 Grease service life values in operating hours [h] for permanent lubrication, grease fill quantity [g] per bearing

Size	Motor speed n_N [rpm]						Grease fill quantity	
	3600	3000	1800	1500	1200	≤ 1000	D end	ND end
	Operating hours [h]						[g]	
71	24000	33000	33000	33000	33000	33000	9	9
80		24000						
90							15	11
100	17000						20	15
112		17000	24000				45	25
132	12000			24000			75	50
160							90	70
180		12000			24000		110	60
200								80

8.2.3 Cleaning the motor

NOTICE
Dust deposits cause higher housing temperatures
Dust deposits prevent heat radiation.
Keep the geared motor free from dirt and dust.

NOTICE
Cleaning with a high-pressure cleaning appliance
Water can penetrate into the geared motor. Seals can become damaged.
Do not use a high-pressure cleaning appliance to clean the geared motor.
Do not use tools with sharp edges.

Switch off the power supply to the drive unit before cleaning it.

8.2.4 Checking tightness of fastening bolts

Note

Replace damaged headless screws with new screws of the same type and strength class.

Switch off the power to the drive unit and use a torque wrench to check the seating of all fastening bolts.

The general tolerance for the tightening torque is 10%. The tightening torque is based on a friction coefficient of μ = 0.14.

Table 8- 4 Tightening torques for fastening bolts

Thread size	Tightening torque at strength class		
	8.8	10.9	12.9
	[Nm]	[Nm]	[Nm]
M4	3	4	5
M5	6	9	10
M6	10	15	18
M8	25	35	41
M10	50	70	85
M12	90	120	145
M16	210	295	355
M20	450	580	690
M24	750	1 000	1 200
M30	1 500	2 000	2 400
M36	2 500	3 600	4 200

8.2.5 Inspection of the motor

Carry out a scheduled inspection of the geared motor once a year in accordance with the possible criteria listed in Section Faults, causes and remedies (Page 43).

Check the geared motor in accordance with the criteria set out in Section General information and safety notes (Page 5).

Touch up damaged paintwork carefully.

8.2.6 Servicing the brake

8.2.6.1 Wear of the spring-operated brake

The friction lining and the mechanical components of the brake are subject to wear due to their inherent function. For safe and fault-free operation, the brake must be regularly checked and adjusted, and if necessary, replaced.

The following table describes the different causes of wear and their effects on the spring-operated brake components. The important influencing factors have to be quantified in order

to calculate the service life of the rotor and the brake and determine the stipulated maintenance intervals. Here, the most important factors are the work as a result of the frictional force, the speed at the start of braking and the switching frequency. If several of the listed causes of wear to the friction lining occur at the same time in a single application, the influencing factors should be added together for the wear calculation.

Table 8- 5 Causes of wear to the spring-operated brake

Component	Cause	Effect	Influencing factor
Friction lining	Operational braking	Friction lining wear	Work as a result of the frictional force
	Emergency stops		
	Wear caused by overlap when starting and stopping the geared motor		
	Active braking by the motor supported by the brake (quick stop)		
	Low speed and mounting position 'motor at top'		
	Wear when starting for motor a mounting position with vertical shaft, even when the brake is released		Number of start / stop cycles
Armature disk and flange	Friction of the brake lining	Run-in of armature disk and flange	Work as a result of the frictional force
Braking rotor gear teeth	Relative movement and impacts between rotor and hub	Wear of the teeth (primarily on the rotor side)	Number of start / stop cycles

Component	Cause	Effect	Influencing factor
Support of the armature disk	Load change and impacts in the backlash between the armature disk, sleeve screws and guide pins	Deflection of armature disk, sleeve screws and pins	Number of start / stop cycles, strength of braking torque
Springs	Axial load cycle and shear stresses in the springs due to radial backlash in the armature disk	Decrease in the spring force or fatigue failure	Number of switching operations of the brake

8.2.6.2 Maintenance intervals for the brake

For safe and trouble-free operation, check and maintain the spring-operated brake at regular intervals.

For operational braking, the maintenance intervals depend on the loading on the brake in the application. Take all causes of wear into account when calculating the maintenance intervals. Steinlen Elektromaschinenbau GmbH recommends a regular inspection at fixed time intervals for low loaded brakes, e.g. holding brakes with an emergency stop.

Failure to maintain the brake can lead to operating faults, production outage or damage to the plant. Specify a maintenance plan for each application that is appropriate to the operating conditions and loading of the brake. The maintenance intervals and maintenance work for the pneumatic brake are listed in the table.

Table 8- 6 Maintenance interval for the brake

Brake	Maintenance interval
Operational brake	According to service life calculation
	Otherwise every six months
	After 4 000 operating hours at the latest
Holding brake with emergency stop	Minimum every 2 years
	After 1 million cycles at the latest
	Shorter intervals for frequent emergency stops

8.2.6.3 Adjusting the air gap

WARNING
Unintentional starting of the drive unit
Switch off the power supply to the drive unit.
The brake must be in a torque-free condition.
Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch.

WARNING
Decrease of braking effect due to contamination
Do not allow oil or grease to come into contact with friction surfaces.

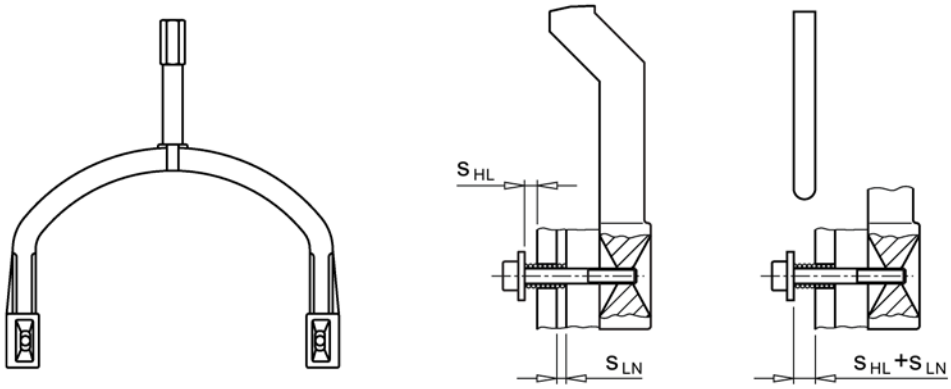


Figure 8-2 Setting dimension for the air gap

Procedure

1. Remove the fan cover.
2. Loosen the fastening screws of the brake.
3. Screw the sleeve screws further into the magnet part using an open-ended spanner.
4. Tighten the fastening screws of the brake.
5. Check the air gap s_{LN} in the vicinity of the screws using a feeler gauge.
6. Correct the air gap s_{LN} if necessary and check it again.

7. When combined with manual brake release:
   Check the setting dimension s_{HL} and correct it if necessary.
8. Mount the fan cover.

You have now set the air gap.

Table 8- 7 Air gap values

Brake type	Rated air gap s_{LN} (+0.1 / -0.05)	Maximum air gap for		Setting dimension s_{HL}
		Standard excitation s_{Lmax}	Overexcitation s_{Lmax}	
	[mm]	[mm]	[mm]	[mm]
L4/1.4	0.2	0.65	0.65	1.0
L4/2		0.6	0.6	
L4/3		0.55	0.55	
L4		0.5	0.5	
L4/5		0.4	0.4	
L8/3, L8/4		0.6	0.6	
L8/5, L8/6.3		0.55	0.55	
L8		0.5	0.5	
L8/10		0.45	0.45	
L16/8, L16/10, L16/13, L16		0.6	0.6	
L16/20		0.5	0.5	
L32/14, L32/18, L60/25	0.3	0.9	0.9	1.5
L32/23, L60/38		0.85	0.85	
L32, L60/50		0.75	0.75	
L32/40, L60		0.65	0.65	
L80/25, L80/35, L80/50, L80/63, L80		0.9	0.9	
L80/100		0.7	0.7	
L150/60, L150/80, L150/100, L150/125, L150, L260/100, L260/145, L260/180, L260/200, L260/240, L260	0.4	1.2	1.2	2.0
L260/315		1.05	1.05	
L400/265, L400/300, L400/360, L400	0.5	1.5	1.5	2.5
L400/600		0.9	0.9	

Table 8- 8 Tightening torque for the brake screw

Brake type		Thread size	Tightening torque
Steinlen	INTORQ BA BFK458		[Nm]
L4	(06E)	3 x M4	2.8
L8	(08E)	3 x M5	5.5
L16	(10E)	3 x M6	9.5
L32	(12E)	3 x M6	9.5

Brake type		Thread size	Tightening torque
Steinlen	INTORQ BA BFK458		[Nm]
L60, L80	(14E), (16E)	3 x M8	23
L150	(18E)	6 x M8	23
L260, L400	(20E), (25E)	6 x M10	46

8.2.6.4 Replacing the friction lining

WARNING

Unintentional starting of the drive unit

Switch off the power supply to the drive unit.

The brake must be in a torque-free condition.

Secure the drive unit to prevent it from being started up unintentionally.

Attach a warning notice to the start switch.

Procedure

1. Remove the fan cover.

   When combined with manual release:
   Unscrew the manual brake release lever.

   With external fan:
   Remove the fan cover together with the external fan.
2. Detach the connection cable.
3. Remove the fan locking ring and pull out the fan.
4. Loosen the brake screws evenly and remove the screws completely. Adjust the solenoid, see.
5. Pull the rotor completely off the hub.
6. Check the teeth on the hub.

7. Check the friction surface on the bearing shield. If there is severe scoring on the friction plate or flange, replace the friction plate or flange. Rework the friction surfaces if there is severe scoring on the bearing shield.
8. Measure the thickness of the new rotor and the head height of the sleeve screws with a caliper gauge.
9. Calculate the gap between the solenoid and the armature disk as follows: Gap = rotor thickness + s_{LN} - head height.
10. Unscrew the sleeve screws evenly until the calculated gap between the solenoid and the armature disk is reached.
11. Mount the new rotor and solenoid. Set the air gap of the brake, see Adjusting the air gap (Page 52).
12. Connect the connection cable.
13. Mount the fan cover.

You have now replaced the friction lining of the brake.

Table 8- 9 Brake data

Brake type	Rated air gap s_{LN} (+0.1 / -0.05)	Min. rotor thickness	Max. permissible			
			Operating speed if max. permissible operating energy utilized		No-load speed with emergency stop function	
			Normal friction lining	Wear-resistant friction lining	Normal friction lining	Wear-resistant friction lining
	[mm]	[mm]	[rpm]	[rpm]	[rpm]	[rpm]
L4	0.2	4.5	4 000	3 600	6 000	6 000
L8	0.2	5.5	4 000	3 600	5 000	4 500
L16	0.2	7.5	3 600	3 600	4 000	3 600
L32	0.3	8	3 600	3 600	3 600	3 600
L60	0.3	7.5	3 600	3 000	3 600	3 000
L80	0.3	8	3 600	3 000	3 600	3 000
L150	0.4	10	3 600	1 800	3 600	1 800
L260	0.4	12	3 600	1 800	3 600	1 800
L400	0.5	15.5	3 000	1 800	3 000	1 800

Disposal

9

Recycling and disposal of MOTOX geared motors

For environmentally friendly recycling and disposal of your old device, please contact a company certified for the disposal of old electrical and/or electronic devices and dispose of the device in accordance with the regulations in your country.

⚠ WARNING
Incorrect used oil disposal Incorrect disposal of used oil is a threat to the environment and health. After use, oil must be taken to a used oil collection point. The addition of foreign substances such as solvents, brake and cooling fluid is prohibited. Avoid prolonged contact with the skin.

Empty the used oil from the gearbox. The used oil must be collected, stored, transported and disposed of in accordance with regulations. Do not mix polyglycols with mineral oil. Dispose of polyglycols separately.

Please observe country-specific laws. Under German law, to allow optimal treatment of the oil (§4 VI Used Oil), oils with different disposal codes must not be mixed with one another.

Collect and dispose of used oil in accordance with regulations.

Remove oil spillages immediately with an oil-binding agent in compliance with environmental requirements.

Dispose of the housing parts, motor parts, gear wheels, shafts and roller bearings of the geared motor as scrap metal.

The worm wheels are made partly from non-ferrous metal. Dispose of them accordingly.

Dispose of packaging material in accordance with regulations.

Table 9- 1 Disposal codes for gear oils

Type of oil	Designation	Disposal code
Mineral oil	CLP ISO VG220	13 02 05
Polyglycols	CLP ISO PG VG220, CLP ISO PG VG460, CLP ISO H1 VG460	13 02 08
Polyalphaolefins	CLP ISO PAO VG68, CLP ISO PAO VG220	13 02 06
Biologically degradable oils	CLP ISO E VG220	13 02 07

Technical data

10

10.1 Type designation

Table 10- 1 Example of the type designation structure

Example:	**LA**	**100L**	**4/2**	**F -**	**L16NH**
Motor type	LA				
Size		100L			
Number of poles			4/2		
Special features				F	
Mounted unit					L16NH

Table 10- 2 Type designation code

Motor type	
LA / LG	AC induction motor, integrated
LAI / LGI	AC induction motor with IEC flange
Special features	
E	High efficiency
F	Forced ventilation
I	High inertia fans
W	Protective canopy
IN	Incremental encoder
IR	Resolver
IA	Absolute encoder
IV	Encoder mount prepared
D	Handwheel
Mounted unit	
L, KFB	Spring pressure single disk DC brake
16	Size = rated braking torque
../10	Set braking torque
N	Standard version
G	Enclosed version
H, HA	Manual brake release, lockable manual brake release
M	Microswitch

10.2 General technical data

The most important technical data appears on the rating plate of the gearboxes and geared motors.

This data, together with the contractual agreements for the geared motors, determines the limits of intended use.

In the case of geared motors, a rating plate attached to the motor usually indicates the data for the entire drive.

In certain cases separate rating plates are mounted on the gearbox and the motor.

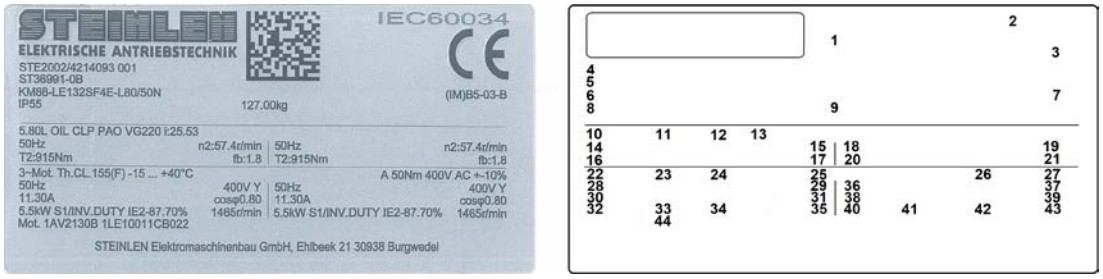


Figure 10-1 Rating plate example

1 Data matrix code
2 Applicable standard
3 CE marking or other marking, if required
4 Factory serial number
5 Article number
6 Type designation
7 Mounting position
8 Degree of protection acc. to IEC 60034-5
9 Weight m [kg]
10 Oil quantity [l] main gearbox / intermediate gearbox + extruder flange
11 Type of oil
12 Oil viscosity ISO VG class to DIN 51519 / ISO 3448
13 Total transmission ratio i

Frequency 1

14 Rated frequency f [Hz]
15 Gearbox output speed n_2 [rpm]

16 Geared motor output torque T_2 [Nm]
17 Service factor f_B

Frequency 2

18 Rated frequency f [Hz]
19 Gearbox output speed n_2 [rpm]
20 Geared motor output torque T_2 [Nm]
21 Service factor f_B

Motor and brake data

22 Phase number and type of current for the motor
23 Temperature class Th.Cl.
24 Ambient temperature
25 Motor protection
26 Rated braking torque T_{Br} [Nm]
27 Brake supply voltage U [V]

Frequency 1

28 Rated frequency f [Hz]
29 Rated voltage / range U [V]
Circuit, graphic symbols according to DIN EN 60617 Part 6 / IEC 60617-6
30 Rated current I_N [A]
31 Power factor cos φ
32 Rated output P_N [kW]
33 Duty type
34 Efficiency class marking according to IEC 60034-30
35 Rated speed n_N [rpm]

Frequency 2

36 Rated frequency f [Hz]
37 Rated voltage / range U [V]
Circuit, graphic symbols according to DIN EN 60617 Part 6 / IEC 60617-6
38 Rated current I_N [A]
39 Power factor cos φ
40 Rated output P_N [kW]
41 Duty type
42 Efficiency class marking according to IEC 60034-30
43 Rated speed n_N [rpm]
44 Motor designation

10.3 Weight

The weight of the entire geared motor is given in the shipping papers.

The weight is stated on the rating plate of the motor, gearbox or geared motor.

The weight specification refers only to the product in the delivery state.

11 Spare parts

11.1 Stocking of spare parts

By stocking the most important spare and wearing parts on site, you can ensure that the gearbox or geared motor is ready for use at any time.

NOTICE
Safety impairment caused by inferior products The installation and/or use of inferior products can have a negative impact on the design characteristics of the geared motor and might consequently impair the active and/or passive safety features of the machine. Steinlen Elektromaschinenbau GmbH states explicitly that only spare parts and accessories supplied by Steinlen have been tested and approved by Steinlen Elektromaschinenbau GmbH. If you do not use original spare parts and original accessories, Steinlen Elektro-maschinenbau GmbH excludes every liability and warranty. Steinlen Elektromaschinenbau GmbH accepts the warranty only for original spare parts.

Note that special manufacturing and delivery specifications often apply to individual components. All spare parts offered by Steinlen Elektromaschinenbau GmbH are state-of-the-art and conform to the latest legal regulations.

Please supply the following data when ordering spare parts:

- Serial number shown on the rating plate ③
- Type designation shown on the rating plate ⑥
- Part number
  - 3-digit position number from the spare parts list
  - 6-digit part number
  - 7-digit article number
  - 14-digit material number
- Quantity

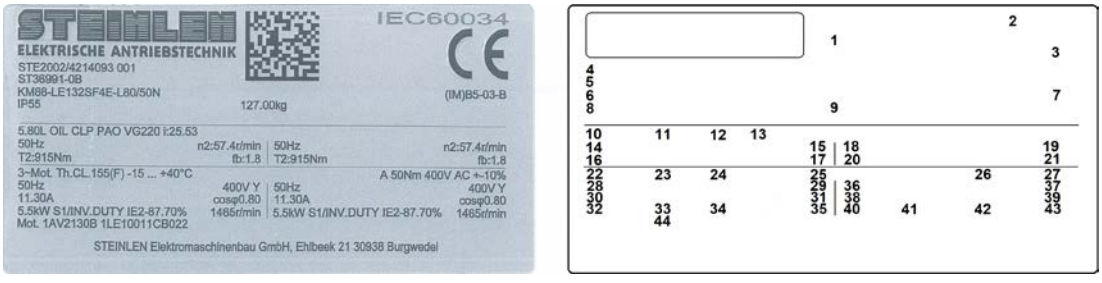
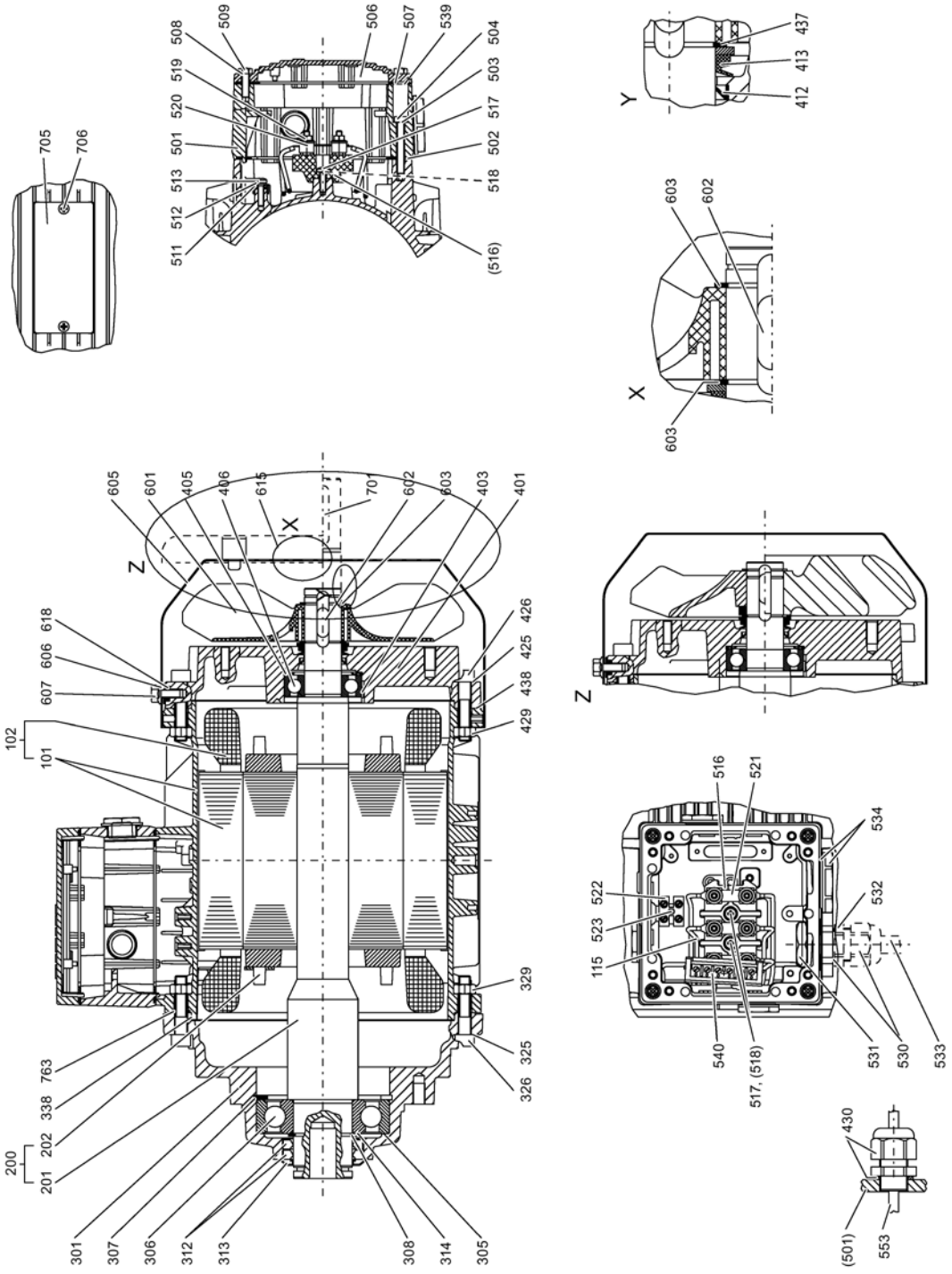


Figure 11-1 Example of a MOTOX rating plate

For motors with their own rating plate, the spare parts documentation in the original operating instructions applies.

11.2 Spare parts lists

11.2.1 MODULOG motor sizes 71 - 200



101 Stator frame with core, unwound
102 Stator frame with core, wound
115 End sleeve / lug
200 Rotor
201 Shaft
202 Rotor core
301 Bearing shield
305 Supporting disk / shim
306 Bearing
307 Locking ring
308 Locking ring
312 Shaft sealing ring
313 Oil splasher
314 Supporting disk / shim
325 Screw lock
326 Bolt
329 Nut
338 Seal
401 Bearing shield
403 Bolt
405 Supporting disk / shim
406 Bearing
412 Shaft sealing ring
413 Shaft sealing ring
425 Screw lock
426 Bolt
429 Nut
430 Complete cable gland
437 Grub screw
438 Seal
501 Terminal box
502 Seal
503 Screw lock
504 Bolt
506 Terminal box
507 Seal
508 Screw lock
509 Bolt
511 Bolt
512 Screw lock
513 Supporting disk / shim
516 Connecting terminal plate
517 Bolt
518 Screw lock
519 Nut
520 Supporting disk / shim
521 Terminal connector
522 Terminal block
523 Bolt
530 Cable gland
531 Nut
532 Seal
533 Cable / line
534 Screw plug
539 Screw lock
540 Rectifier
553 Cable / line
601 Fan
602 Supporting disk / shim
603 Locking ring
605 Fan cover
606 Screw lock
607 Bolt
615 Protective canopy
618 Damping disk
701 Featherkey
705 Rating plate
706 Bolt
763 O-ring

Figure 11-2 MODULOG motor sizes 71 - 200

11.2.2 MODULOG brake motor sizes LA71 - LA160

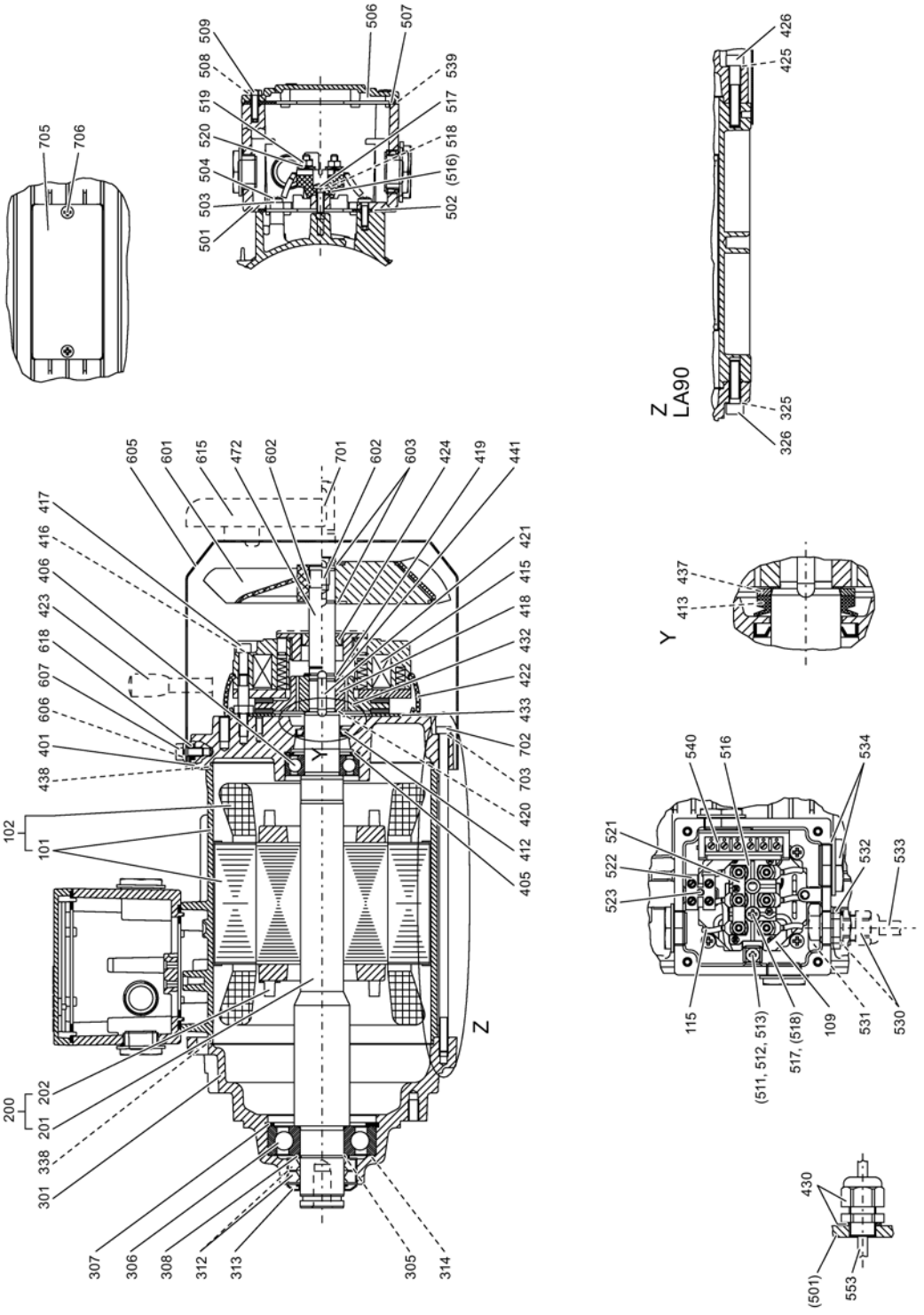


Figure 11-3 MODULOG brake motor sizes LA71 - LA90

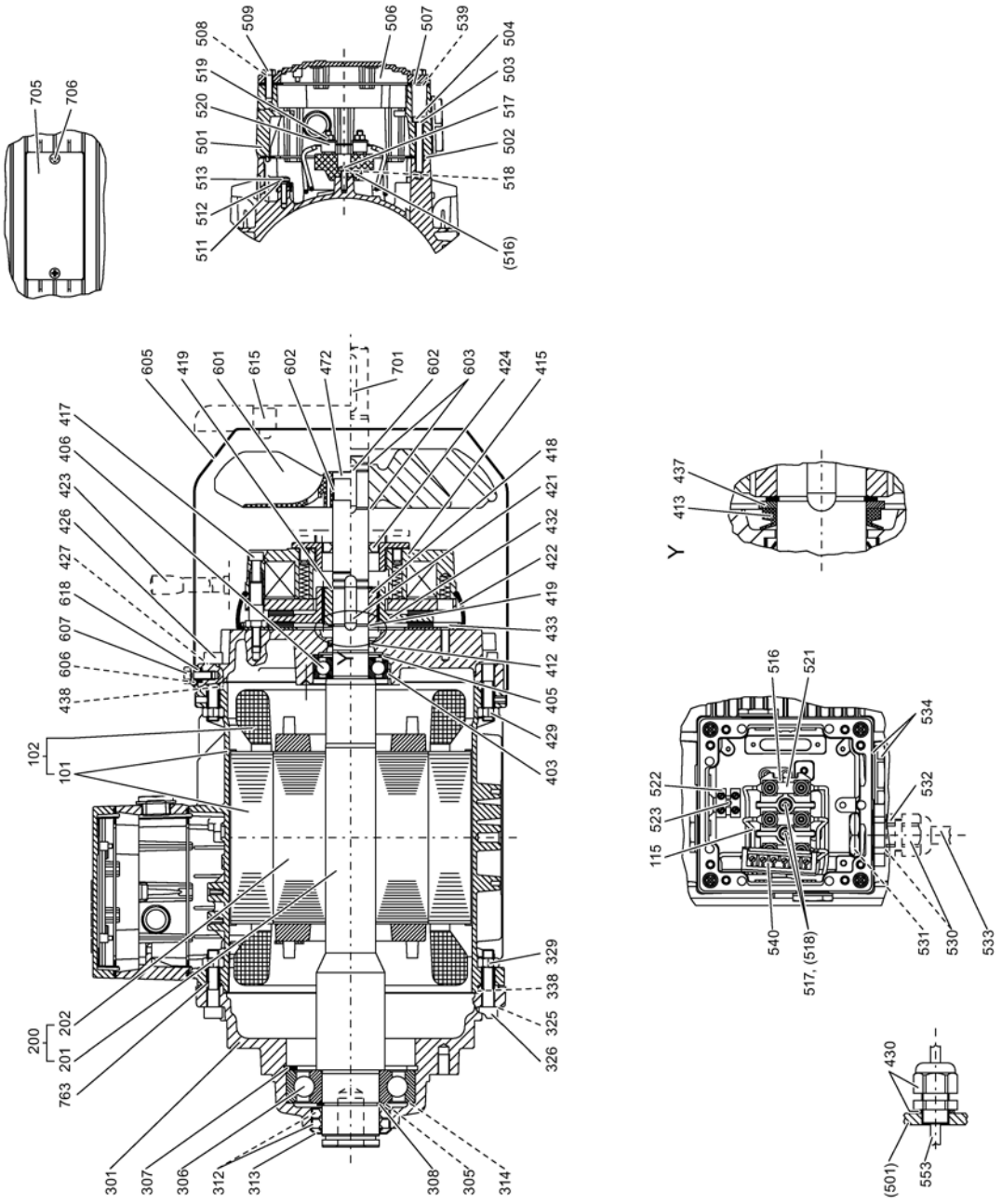


Figure 11-4 MODULOG brake motor sizes LA100 - LA160

Spare parts list for MODULOG brake motor sizes LA71 - LA160

101 Stator frame with core, unwound
102 Stator frame with core, wound
109 Plugs for cable slot
115 End sleeve / lug
200 Rotor
201 Shaft
501 Terminal box base
502 Seal

202 Rotor core
301 Bearing shield
305 Supporting disk / shim
306 Bearing
307 Locking ring
308 Locking ring
312 Shaft sealing ring
313 Oil splasher
314 Supporting disk / shim
325 Screw lock
326 Bolt
329 Nut
338 Seal
401 Bearing shield
403 Bolt
405 Supporting disk / shim
406 Bearing
412 Shaft sealing ring
413 Shaft sealing ring
415 Brake
416 Screw lock
417 Bolt
418 Coupling driver
419 Locking ring
420 Supporting disk / shim
421 Featherkey
422 Supporting disk / shim
423 Manual release
424 Shaft sealing ring
425 Screw lock
426 Bolt
427 Fuse
429 Nut
430 Complete cable gland
432 Friction disk
433 Friction plate
437 Grub screw
438 Seal
441 Supporting disk / shim
472 Shaft end
503 Screw lock
504 Bolt
506 Terminal box cover
507 Seal
508 Screw lock
509 Bolt
511 Bolt
512 Screw lock
513 Supporting disk / shim
516 Complete terminal board
517 Bolt
518 Screw lock
519 Nut
520 Supporting disk / shim
521 Terminal connector
522 Terminal block
523 Bolt
530 Cable gland
531 Nut
532 Seal
533 Cable / line
534 Screw plug
539 Screw lock
540 Rectifier
553 Cable / line
601 Fan
602 Tolerance ring
603 Locking ring
605 Fan cover
606 Screw lock
607 Bolt
615 Protective canopy
618 Damping disk
701 Featherkey
702 Bolt
703 Screw lock
705 Rating plate
706 Bolt
763 O-ring

11.2.3 MODULOG brake motor sizes LA71 - LA160 with backstop

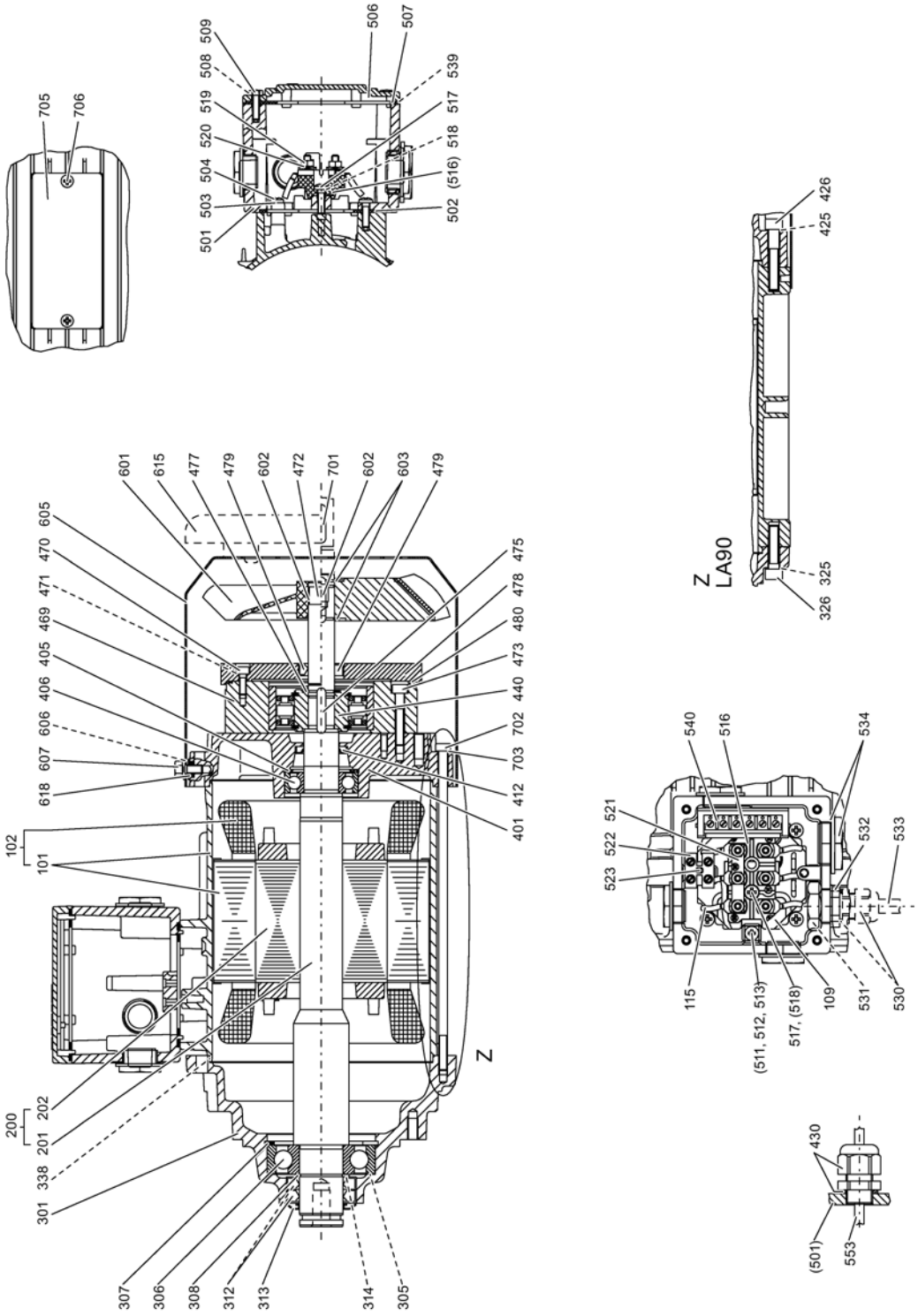


Figure 11-5 MODULOG brake motor sizes LA71 - LA90 with backstop

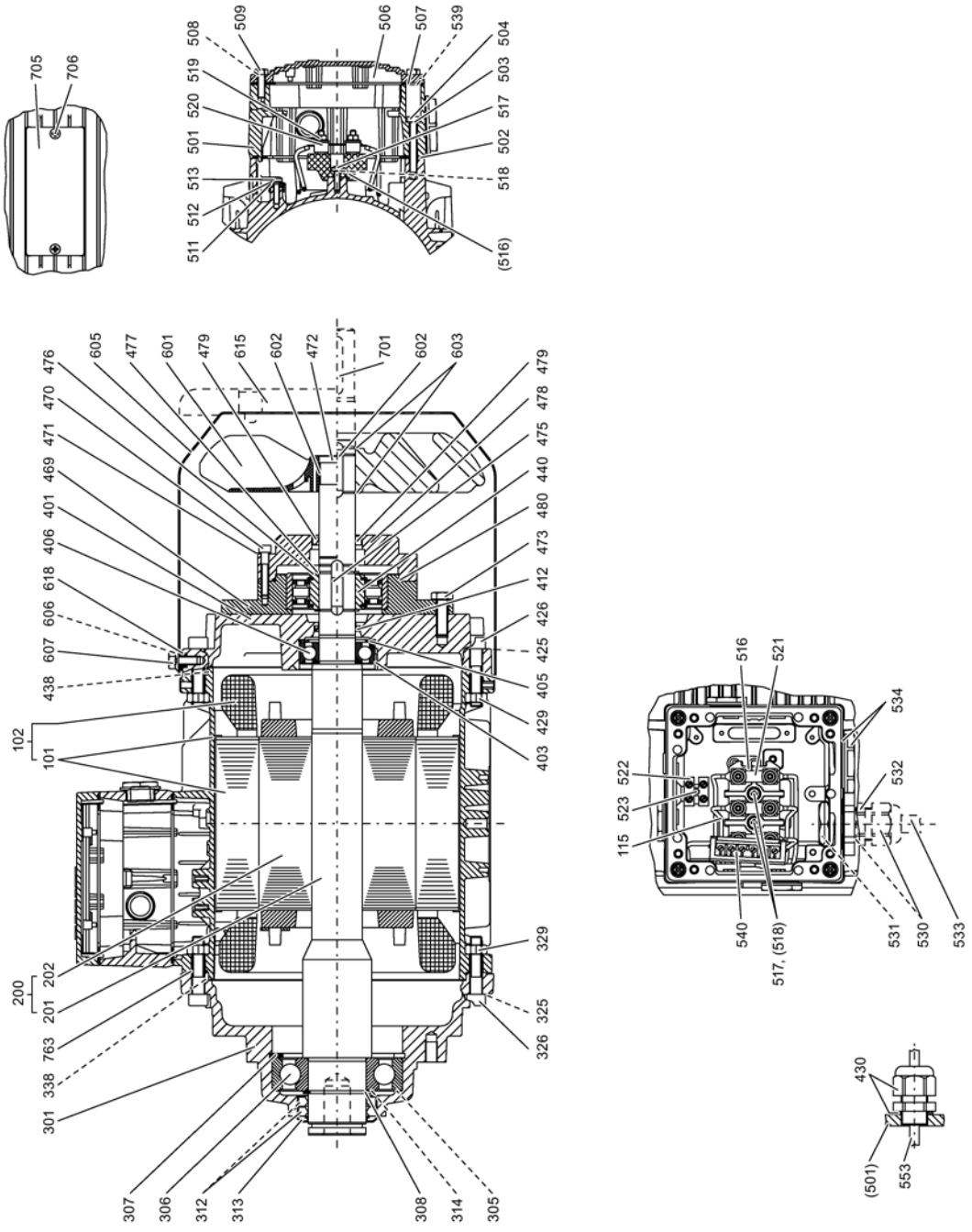


Figure 11-6 MODULOG brake motor sizes LA100 - LA160 with backstop

Spare parts list for MODULOG brake motor sizes LA71 - LA160 with backstop

101 Stator frame with core, unwound

102 Stator frame with core, wound

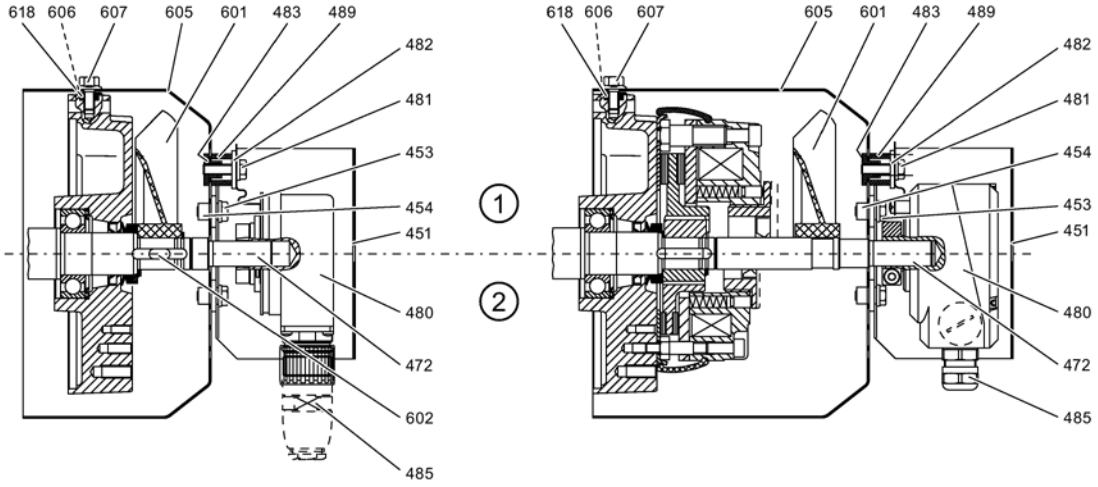
109 Plugs for cable slot

115 End sleeve / lug

200	Rotor
201	Shaft
202	Rotor core
301	Bearing shield
305	Supporting disk / shim
306	Bearing
307	Locking ring
308	Locking ring
312	Shaft sealing ring
313	Oil splasher
314	Supporting disk / shim
325	Screw lock
326	Bolt
329	Nut
338	Seal
401	Bearing shield
403	Bolt
405	Spring washer
406	Bearing
412	Shaft sealing ring
425	Screw lock
426	Bolt
429	Nut
430	Complete cable gland
438	Seal
440	Backstop
469	Adapter
470	Bolt
471	Screw lock
472	Shaft end
473	Bolt
475	Featherkey
476	Supporting disk / shim
477	Locking ring
478	Protection cover
479	Sealing ring
480	Incremental encoder
501	Terminal box
502	Seal
503	Screw lock
503	Screw lock
504	Bolt
506	Terminal box
507	Seal
508	Screw lock
509	Bolt
511	Bolt
512	Screw lock
513	Supporting disk / shim
516	Connecting terminal plate
517	Bolt
518	Screw lock
519	Bolt
520	Washer
521	Terminal connector
522	Terminal block
523	Bolt
530	Cable gland
531	Nut
532	Seal
533	Cable / line
534	Screw plug
539	Screw lock
540	Rectifier
553	Cable / line
601	Fan
602	Tolerance ring
603	Locking ring
605	Fan cover
606	Screw lock
607	Bolt
615	Protective canopy
618	Damping disk
701	Featherkey
702	Bolt
703	Screw lock
705	Rating plate
706	Bolt
763	O-ring

11.2.4 Encoder

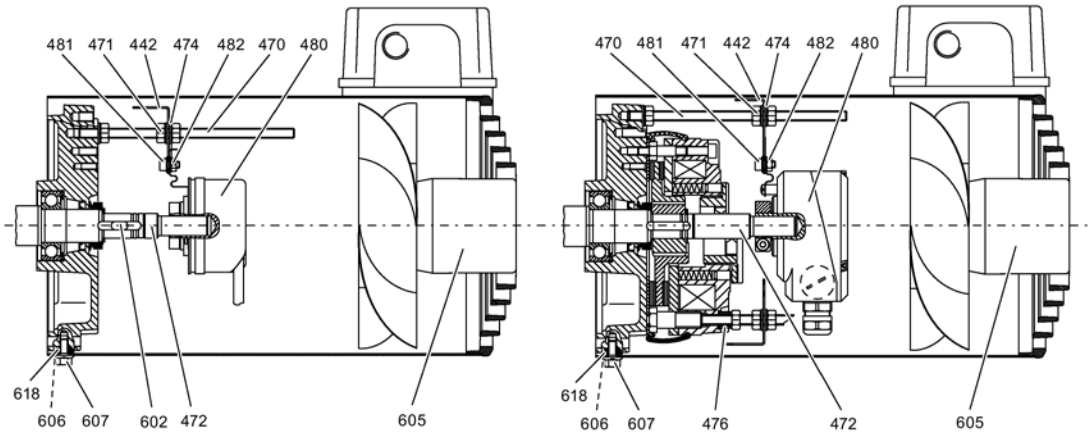
11.2.4.1 Encoder on fan cover



① Self-ventilated motor
② Unventilated motor
451 Cover
453 Bolt
454 Nut
472 Shaft end
480 Encoder
481 Bolt
482 Screw lock
483 Nut
485 Coupling
489 Spacer / bush
601 Fan
602 Featherkey
605 Fan cover
606 Screw lock
607 Bolt
618 Damping disk

Figure 11-7 Encoder on fan cover

11.2.4.2 Encoder in motor with forced ventilation



442 Torque arm
470 Bolt
471 Screw lock
472 Shaft end
474 Screw lock
476 Supporting disk / shim
480 Encoder
481 Bolt
482 Screw lock
602 Featherkey
605 Fan cover
606 Screw lock
607 Bolt
618 Damping disk

Figure 11-8 Encoder in motor with forced ventilation

STEINLEN

12

Original EU-Konformitätserklärung

Original EU-declaration of conformity

Nr. / *No.* EK-10B

Produktbezeichnung: *Product identification:*	Getriebemotor ST36 Geared motor ST36
	A .. – BCD .. E .. – F .. – G ..
Getriebe: *Gearbox:*	A .. = [A = E, Z, D, F, B, K, C, S]
Motor: *Motor:*	BCD .. E .. = [B = L; C = E; D = _, S; E = _, F, I, U]
Bremse: *Brake:*	F .. = [F = _, L, F]
Drehgeber: *Encoder:*	G .. = [G = _, I]
Hersteller: *Manufacturer*	Steinlen Elektromaschinenbau GmbH .....
Anschrift: *Address*	Ehlbeek 21 DE-30938 Burgwedel .....

Name, Anschrift bevollmächtigte Person für technische Unterlagen:
Name, address of authorised person for technical file

Axel Brinkmann
Steinlen Elektromaschinenbau GmbH
Ehlbeek 21, DE-30938 Burgwedel

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:

Niederspannungsrichtlinie:

2014/35/EU Richtlinie des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt ; Amtsblatt der EU L96, 29/03/2014, S. 357–374

RoHS-Richtlinie:

2011/65/EU Richtlinie des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten; Amtsblatt der EU L174, 1/07/2011, S. 88–110

Verordnung (EG) Nr. 640/2009:

Verordnung der Kommission vom 22.Juli 2009 zur Durchführung der Richtlinie 2005/32/EG des Europäischen Parlaments und des Rates im Hinblick auf die Festlegung von Anforderungen an die umweltgerechte Gestaltung von Elektromotoren

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Low Voltage Directive:

2014/35/EU *Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available of electrical equipment designed for use within certain voltage limits; Official Journal of the EU L96, 29/03/2014, p. 357–374*

RoHS Directive:

2011/65/EU *Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment; Official Journal of the EU L174, 1/07/2011, p. 88–110*

Regulation (EC) No 640/2009:

Commission Regulation of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration is an attestation of conformity with the indicated Directive(s) but does not imply any guarantee of quality or durability. The safety instructions of the accompanying product documentation shall be observed.

Die Übereinstimmung des bezeichneten Produkts mit den Vorschriften der angewandten Richtlinie(n) wird nachgewiesen durch die vollständige Einhaltung folgender Normen / Vorschriften:
The conformity of the designated product with the provisions of the applied Directive(s) is proved by full compliance with the following standards / regulations:

Harmonisierte Normen / *Harmonized standards*:

Referenznummer *Reference number*	Ausgabedatum *Date of issue*
EN 60034-1	**2010+AC:2010**
EN 60034-2-1	**2014**
EN 60034-5	**2001+A1:2007**
EN 60034-8	**2007+A1:2014**
EN 60034-30-1	**2014**
EN 60529	**1991+A1:2000+A2: 2013**

Zusatzinformation:
Additional Information:

Kurzschlussläufermotoren fallen laut Leitfaden nicht unter die EMV-Richtlinie 2014/30/EU, somit ist keine CE-Kennzeichnung zur EMV-Richtlinie nötig.
According to the guideline, squirrel-cage induction motors do not fall under the directives of EMC Guideline 2014/30/EC, and thus no CE identification for the EMC guideline is required.

Unterzeichnet für und im Namen von:/ *Signed for and on behalf of:*

Steinlen Elektromaschinenbau GmbH

Burgwedel
Ort / *place*

01.08.2021
Datum der Ausstellung / *Date of issue*

Axel Brinkmann
Name / *name*

Unterschrift / *signature*

Managing Director
Funktion / *function*

Barbara Reinke
Name / *name*

Unterschrift / *signature*

Quality Manager
Funktion / *function*

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration is an attestation of conformity with the indicated Directive(s) but does not imply any guarantee of quality or durability. The safety instructions of the accompanying product documentation shall be observed.

EU-Konformitätserklärung / *EU Declaration of Conformity* DIN EN 80079-36

Dokument Nr. / *Document no.* EK 20 – 04/21

Hersteller: / *Manufacturer:*	Steinlen Elektromaschinenbau GmbH, Ehlbeek 21, D-30938 Burgwedel, Germany
Produktbezeichnung: / *Product designation:*	Getriebereihe ST3...
Getriebetypen: / *Gearbox types:*	E, Z, D, F, B, K, C
Baugrößen: / *Sizes:*	18 bis 208
Antriebsgruppen: / *Drive groups:*	A, K, P

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinie überein: / *The product referred to complies with the provisions of the following European directive:*

> Richtlinie 2014/34/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten in Bezug auf Ausrüstungen und Schutzsysteme zur Verwendung in explosionsgefährdeten Bereichen, ABl. L 96/309 vom 29.03.2014 / *Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres, OJ. L 96/309 of 29.03.2014*

Die Übereinstimmung mit den Vorschriften dieser Richtlinie wird nachgewiesen durch die Einhaltung folgender Normen: / *The compliance with the provisions of this regulation is proven by the adherence to the following standards:*

- DIN EN 1127-1: 2011
- DIN EN 80079-36: 2016
- DIN EN 80079-37: 2016
- DIN EN 80079-34: 2012
- DIN EN 60079-0: 2014
- DIN EN 15198: 2007

Zündschutzart für Gerätegruppe II der Kategorien 2 und 3: / *Ignition protection type for device group II of categories 2 and 3:*

- II 2G Ex h IIB T4 Gb
- II 2G Ex h IIC T4 Gb • II 2D Ex h IIIB T120° C Db
- II 2D Ex h IIIC T120° C Db
- II 3G Ex h IIB T4 Gc • II 3G Ex h IIC T4 Gc
- II 3D Ex h IIIB T120° C Dc
- II 3D Ex h IIIC T120° C Dc

Die spezifische Kennzeichnung des Getriebes ist auf dem Leistungsschild vermerkt. / *The specific marking of the gearbox is noted on the rating plate.*

Die technische Dokumentation für Getriebe der Kategorie 2 ist hinterlegt bei der benannten Stelle / **Hinterlegungsnummer**: / *The technical documentation for gearboxes of the category 2 is deposited at the notified body / **accession number**:*

TÜV Nord Cert GmbH, Am TÜV 1, 30519 Hannover, Germany / **35295208**.

Unterzeichnet für und im Namen von: / *Signed for and on behalf of:*

Steinlen Elektromaschinenbau GmbH

Burgwedel, 26.04.2021
Ort / *place*, Datum der Ausstellung / *Date of issue*

Axel Brinkmann _____
Name / *Name* Unterschrift / *Signature*

Managing Director
Funktion / *Function*

Barbara Reinke _____
Name / *Name* Unterschrift / *Signature*

Quality Manager
Funktion / *Function*

UK Declaration of Conformity BS EN 80079-36

Document no. EK 21 – 04/22

Manufacturer:	Steinlen Elektromaschinenbau GmbH, Ehlbeek 21, D-30938 Burgwedel, Germany
Product designation:	Gear series ST3...
Gearbox types:	E, Z, D, F, B, K, C
Sizes:	18 to 208
Drive groups:	A, K, P

The product referred to complies with the provisions of the following European directive:

Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres, OJ. L 96/309 of 29.03.2014

The compliance with the provisions of this regulation is proven by the adherence to the following standards:

- EN 1127-1:2011
- EN 80079-37:2016
- EN 60079-0:2014
- EN 80079-36:2016
- EN 80079-34:2012
- EN 15198:2007

Ignition protection type for device group II of categories 2 and 3:

- II 2G Ex h IIB T4 Gb
- II 2D Ex h IIIC T120° C Db
- II 3D Ex h IIIB T120° C Dc
- II 2G Ex h IIC T4 Gb • II 2D Ex h IIIB T120° C Db
- II 3G Ex h IIB T4 Gc • II 3G Ex h IIC T4 Gc
- II 3D Ex h IIIC T120° C Dc

The specific marking of the gearbox is noted on the rating plate.

The technical documentation for gearboxes of the category 2 is deposited at the notified body / **Firm Quotation Ref**:

Element Materials Technology, Unit 1 Pendle Place, Skelmersdale, WN8 9PN, United Kingdom / **TRA-058512-00**.

Signed for and on behalf of:

Steinlen Elektromaschinenbau GmbH

Burgwedel, 28.04.2022
Place, Date of issue

Axel Brinkmann
Name

Signature

Managing Director
Function

Barbara Reinke
Name

Signature

Quality Manager
Function

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