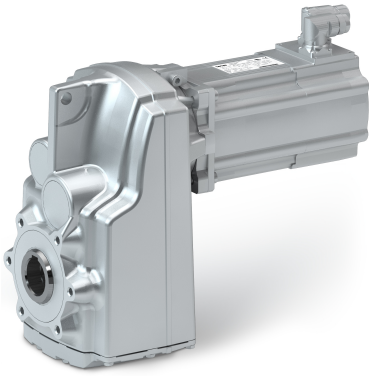




Geared servo motors

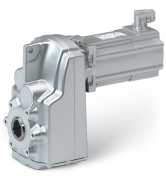
g500-S / MCS shaft-mounted helical geared servo motor

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About this document

WARNING!

Read this documentation carefully before starting any work.

► Please observe the safety instructions!

Document description

This document is intended for skilled personnel who work with the products described.

The data and information compiled in this document serve to support you in the electrical and mechanical installation and commissioning.

- The document is only valid together with the complete documentation of the product!
- For safety-rated attachments observe the enclosed operating instructions of the manufacturer!
- The document includes safety instructions which must be observed.
- All persons working on and with the drives must have the documentation at hand during work and observe the information and notes relevant for it.
- The documentation must always be complete and in a perfectly readable state.

Further documents

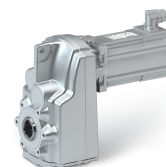


Information and tools with regard to the Lenze products can be found on the Internet:

www.Lenze.com → Downloads

About this document

Notations and conventions



Notations and conventions

Conventions are used in this document to distinguish between different types of information.

Numeric notation		
Decimal separator	Point	Generally shown as a decimal point. Example: 1 234.56
Warnings		
UL Warnings	UL	Are used in English and French.
UR warnings	UR	
Text		
Engineering Tools	" "	Software Example: "Engineer", "EASY Starter"
Icons		
Page reference		Reference to another page with additional information. Example:  16 = see page 16
Documentation reference		Reference to other documentation with additional information. Example:  EDKxxx = see documentation EDKxxx

Layout of the safety instructions

DANGER!

Indicates an extremely hazardous situation. Failure to comply with this instruction will result in severe irreparable injury and even death.

WARNING!

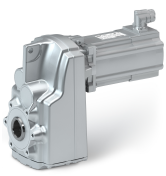
Indicates an extremely hazardous situation. Failure to comply with this instruction may result in severe irreparable injury and even death.

CAUTION!

Indicates a hazardous situation. Failure to comply with this instruction may result in slight to medium injury.

NOTICE

Indicates a material hazard. Failure to comply with this instruction may result in material damage.



Safety instructions

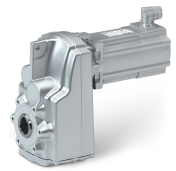
Basic safety instructions

Disregarding the following basic safety instructions and safety information may lead to severe personal injury and damage to property!

- Only use the product as directed.
- Never commission the product in the event of visible damage.
- Never modify the product technically.
- Never commission the product before assembly has been completed.
- Never operate the product without the required covers.
- Connect/disconnect all pluggable connections only in deenergized condition!
- Only remove the product from the installation in the deenergized state.
- The product can – depending on their degree of protection – have live, movable or rotating parts during or after operation. Surfaces can be hot.
- Observe all specifications of the corresponding documentation supplied. This is the condition for safe and trouble-free operation and the achievement of the specified product features.
- The procedural notes and circuit details given in the associated documentation are suggestions and their transferability to the respective application has to be checked. The manufacturer of the product does not take responsibility for the suitability of the process and circuit proposals.
- All work with and on the product may only be carried out by qualified personnel.
IEC 60364 and CENELEC HD 384 define the qualifications of these persons:
 - They are familiar with installing, mounting, commissioning, and operating the product.
 - They have the corresponding qualifications for their work.
 - They know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

Application as directed

- The product is a professional equipment intended for use by trades, specific professions or industry and not for sale to the general public. IEC 60050 [IEV 161-05-05]
- To prevent personal injury and damage to property, higher-level safety and protection systems must be used!
- All transport locks must be removed.
- Mounted eye bolts on the motor are not suitable for transporting geared motors.
- The product may only be operated under the specified operating conditions and in the specified mounting positions.
- The product may only be operated on the inverter.
- Built-in brakes must not be used as safety brakes.
- The product must not be operated in private areas, in potentially explosive atmospheres and in areas with harmful gases, oils, acids and radiation.



Residual hazards

Even if notes given are taken into consideration and protective measures are implemented, the occurrence of residual risks cannot be fully prevented.

The user must take the residual hazards mentioned into consideration in the risk assessment for his/her machine/system.

If the above is disregarded, this can lead to severe injuries to persons and damage to property!

Product

Observe the warning labels on the product!



Dangerous electrical voltage:

Before working on the product, make sure there is no voltage applied to the power terminals! After mains disconnection, the power terminals will still carry the hazardous electrical voltage for the time given next to the symbol!



High leakage current:

Carry out fixed installation and PE connection in compliance with:
EN 61800-5-1 / EN 60204-1



Hot surface:

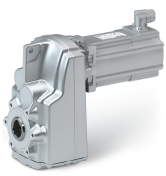
Use personal protective equipment or wait until the device has cooled down!

Protection of persons

- The power terminals may carry voltage in the switched-off state or when the motor is stopped.
 - Before working, check whether all power terminals are deenergized.
- Voltages may occur on the drive components (e.g. capacitive, caused by inverter supply).
 - Careful earthing in the marked positions of the components must be carried out.
- There is a risk of burns from hot surfaces.
 - Provide protection against accidental contact.
 - Use personal protective equipment or wait until the device has cooled down.
 - Prevent contact with flammable substances.
- There is a risk of injury due to rotating parts.
 - Before working on the drive system, ensure that the motor is at a standstill.
- There is a risk of accidental start-up or electric shock.

Motor protection

- Installed temperature sensors are no full protection for the machine.
 - If necessary, limit the maximum current. Parameterize the inverter so that it will be switched off after some seconds of operation with $I > I_{rated}$, especially if there is a risk of blocking.
 - Integrated overload protection does not prevent overloading under all conditions.
- The fuses are no motor protection.
 - Use a current-dependent motor protection switch.
 - Use the built-in temperature sensors.

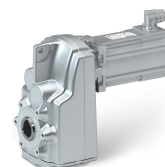


Gearbox protection

- Excessive vibration accelerations and resonances will damage the gearbox.
 - Do not operate the gearbox at vibration accelerations $> 2 \text{ g}$ (20 m/s^2) of the machine.
 - Do not operate the gearbox in the resonance range of the machine.
- Excessive torques will damage the gearboxes.
 - Do not exceed the output torques specified on the nameplate.
- Excessive input speeds lead to increased temperatures.
 - Do not exceed the input speeds specified on the nameplate.
- Avoid excessive lateral forces on the gearbox shaft.
 - Align the shafts of the gearbox and driven machine exactly with each other.
- Machine elements can be damaged by a lack of lubricant.
 - Mount the gearbox only in the mounting position indicated on the nameplate.
 - When changing the lubricant, use the lubricant type and quantity specified on the nameplate.

Product information

Identification of the products
Nameplates



Product information

Identification of the products

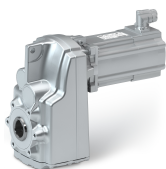
Nameplates



The nameplate is attached to the motor.

Lenze										1		DE		17			
3					2					8.2		16		7.6			
4				8.1		7.1		7.4		7.7		7.5					
9			14			7.2		18		7.8							
10		10.1		10.2		10.3		10.4		7.3		8.3		15			
11		11.1		11.2		11.3						5.7					
12.1			12.2			5.9		5.8		5.4							
13					12.3		19										

Pos.	Contents	Pos.	Contents
1	Manufacturer/production location	9	Encoder type designation
2	Motor type/standard	10	Brake data
3	Gearbox type	10.1	Brake type
4	Motor type	10.2	AC/DC brake voltage
5.4	Ratio (gearbox)	10.3	Performance
5.7	Load capacity (gearbox)	10.4	Braking torque
5.8	Output speed (geared motor)	11	Fan specifications
5.9	Output torque (geared motor)t	11.1	AC/DC fan voltage
7.1	Rated voltage/motor voltage	11.2	Rated frequency
7.2	Rated current/motor current	11.3	Electrical power input
7.3	Rated power/motor power	12.1	Material number
7.4	Output torque (motor)	12.2	Serial number
7.5	Motor speed [rpm]	12.3	Year of manufacture/week of manufacture
7.6	Motor code for controller parameterization (C86 Y 1. Frequency)	13	Bar code
7.7	Rated frequency	14	Permissible ambient temperature
7.8	Cos phi 1. Frequency	15	Weight
8.1	Temperature class (motor)	16	UL file number
8.2	Degree of protection (motor)	17	Conformity/approvals
8.3	Motor protection	18	Continuous standstill torque M ₀ [Nm]
		19	Additional customer data



Product information

Identification of the products
Product codes

Product codes

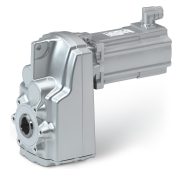
Gearbox product code

Example		G	50	B	S	113	M	H	D	R	2	C	1B
Product type	Gearbox	G											
Product family			50										
Version				B									
Gearbox type	Shaft-mounted helical gearbox				S								
Output torque	130 Nm					113							
	220 Nm					122							
	400 Nm					140							
	660 Nm					166							
	950 Nm					195							
	2100 Nm					221							
	3100 Nm					231							
	4500 Nm					245							
	8000 Nm					280							
	14000 Nm					314							
	19000 Nm					319							
Type of construction	Geared motor						M						
	Gearbox						N						
Shaft design	Solid shaft with featherkey							V					
	Hollow shaft with keyway							H					
	Hollow shaft with shrink disc							S					
Housing type	Foot mounting + centering								A				
	Foot mounting								B				
	With centering								C				
	Threaded pitch circle								D				
Flange mounting	Without flange									R			
	Flange with through holes									K			
Number of stages	2-stage										2		
	3-stage										3		
	4-stage										4		
Motor mounting	Integrated motor											C	
	IEC adapter with jaw coupling											N T	
	IEC adapter with plug-in hollow shaft											H	
	NEMA adapter with jaw coupling											A	
	NEMA adapter with plug-in hollow shaft											B	
	Servo motor adapter with plug-in hollow shaft											S	
	Servo motor adapter with jaw coupling											E D G	
Drive size													1A ... □H 08 ... 82

Product information

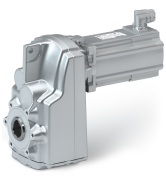
Identification of the products

Product codes



Product code of MCS synchronous servo motor

Example		M	C	S	06	C	41	-	RS0	B0
Meaning	Variant	Product code								
Product family	Motor	M								
Type	Compact servo motors		C							
Version	Synchronous			S						
Motor frame size	Square dimension 62 mm				06					
	Square dimension 89 mm				09					
	Square dimension 116 mm				12					
	Square dimension 142 mm				14					
	Square dimension 192 mm				19					
Overall length						C ... P				
Rated speed	rpm x 100						11 ... 60			
Inverter mains connection	3 x 230 V							L		
	3 x 400 V							-		
Feedback	SinCos absolute value encoder, single-turn, EnDat AS2048-5V-E								ECN	
	Digital absolute value encoder, multi-turn, Hiperface DSL® AM20-8V-D								EKM	
	SinCos absolute value encoder, multi-turn, EnDat AM32-5V-E								EQI	
	SinCos absolute value encoder, multi-turn, EnDat AM2048-5V-E								EQN	
	Digital safety absolute value encoder, multi-turn, Hiperface DSL® AM20-8V-D2								EVM	
	Resolver p=1								RS0	
	Safety resolver, p=1 RV03								RV0	
	SinCos absolute value encoder, multi-turn, Hiperface® AM128-8V-H								SKM	
	SinCos absolute value encoder, multi-turn, Hiperface® AM1024-8V-H								SRM	
	SinCos absolute value encoder, single-turn, Hiperface® AS1024-8V-H								SRS	
	SinCos safety absolute value encoder, multi-turn, Hiperface® AM128-8V-K2								SVM	
	SinCos safety absolute value encoder, multi-turn, Hiperface® AM1024-8V-K2								SVM	
	SinCos safety absolute value encoder, single-turn, Hiperface® AS1024-8V-K2								SVS	
Brake	Without brake									B0
	Permanent magnet brake DC 24V									P1
	Permanent magnet brake DC 24V, reinforced									P2

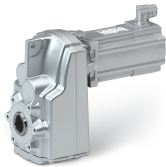


Product information

Identification of the products
Product codes

Product code feedbacks

Example		AS	1024	-	8 V	-	K	2	
Meaning	Variant	Product code							
Product family	Resolver	RS							
	Resolver for safety function	RV							
	Incremental encoder	IG							
	Incremental encoder with commutation signal	IK							
	Absolute value encoder, singleturn	AS							
	Absolute value encoder, multiturn	AM							
Number	2-pole Resolver for servo motors		0						
	2-pole Resolver for three-phase AC motors		1						
	Number of pole pairs for resolvers		2						
			3						
			4						
			...						
	Number of bits, steps or increments per revolution		20						
			32						
			128						
			512						
		1024							
		2048							
		...							
Supply voltage					5 V 8 V 15 V 24 V ...				
Interface or signal level	Standard								
	TTL						T		
	HTL (for incremental encoders)						H		
	Hiperface (for absolute value encoders)						H		
	EnDat						E		
	SinCos 1 Vss						S		
	Digital						D		
	For safety function								
	TTL						U		
	HTL (for incremental encoders)						K		
	Hiperface (for absolute value encoders)						K		
	EnDat						F		
	SinCos 1 Vss						V		
	Digital						D		
	Safety Integrity Level (SIL)								1 2 3 4



Equipment

The following figure provides an overview of the elements and connections on the product. Their position, size and appearance may vary.

Ventilation

(depending on the mounting position)

Oil filler plug

(depending on the mounting position)

Remove oil control plug

(depending on the mounting position)

Torque plate

Output flange

Output shaft

Oil drain plug

(depending on the mounting position)

Housing type

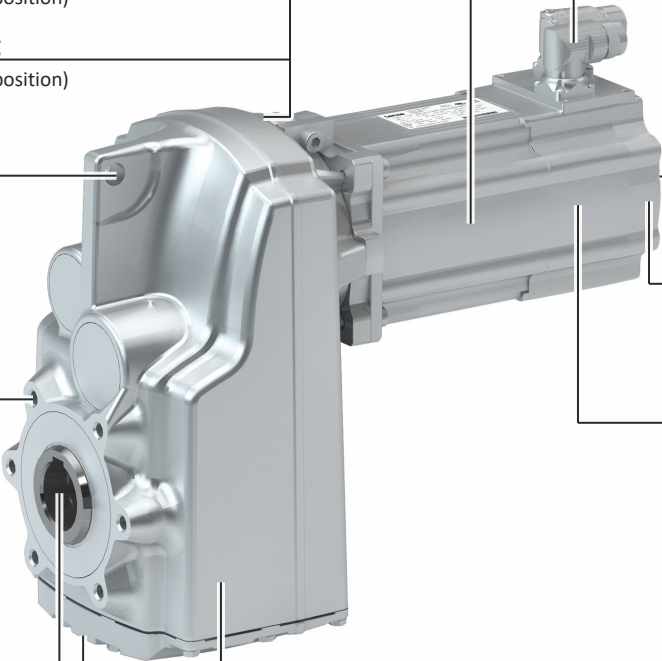
Temperature monitoring

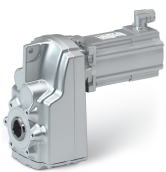
Motor connection

Cooling

Feedback

Permanent magnet brake





Transport

- Ensure appropriate handling.
- Make sure that all component parts are securely mounted. Secure or remove loose component parts.
- Only use safely fixed transport aids (e.g., eye bolts or support plates).
- Do not damage any components during transport.
- Avoid electrostatic discharges on electronic components and contacts.
- Avoid impacts.
- Check the carrying capacity of the hoists and load handling devices. The weights can be found in the shipping documents.
- Secure the load against tipping and falling down.
- Standing beneath suspended loads is prohibited.



The transport weights can be found in the shipping documents!



The motors mounted on the gearbox are sometimes equipped with ears. These are exclusively intended for mounting the motor on/removing the motor from the gearbox and must not be used for the complete geared motor!

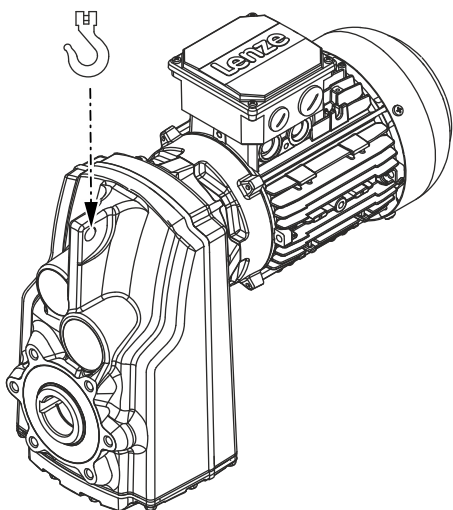
CAUTION!

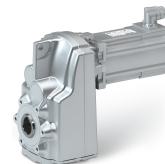
Danger from tipping or falling loads!

Standing beneath suspended loads is prohibited!

- ▶ Use additional appropriate lifting aids, if required, to achieve a direction of loading which is as vertical as possible (highest load carrying capacity). Secure lifting aids against shifting!
- ▶ Screw in the transport aids completely. They must have even and full-surface contact!
- ▶ Transport aids must be loaded vertically in the direction of the screw axis! Diagonal or lateral tension reduces the load carrying capacity! Observe data in standard DIN 580!

Position of the ring bolts





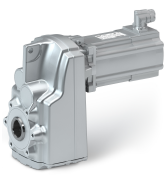
Storage

Storage up to one year:

- Observe the climatic conditions according to the technical data
 - ▶ [Environmental conditions](#) 55
- Store in a dry, low-vibration environment ($V_{\text{eff}} < 0.2 \text{ mm/s}$) without aggressive atmosphere in the interior
- Protect from dust, shocks and sunlight
- Avoid temperature changes with condensate formation.
- Store gearboxes with a ventilation unit with the ventilation element on top.
- Do not activate ventilation unit, in order to prevent air exchange with the ambient air.
- Treat damaged corrosion protection on shafts and bare surfaces subsequently

Storage for more than one year, up to two years:

- Apply a long-term corrosion preventive (e.g. Anticorit BW 366 from the Fuchs company) to the shafts and uncoated surfaces before storing the motor away.
- Do not activate ventilation element
- Install gearbox in mounting position M1 (A)
- Fill gearbox with the lubricant type filled in (see nameplate) up to the filling/venting bore for mounting position M1 (A)
 - ▶ [Nameplates](#) 10
 - ▶ [Ventilation](#) 19



Mechanical installation

Important notes

- Install the product according to the information in the chapter "Standards and operating conditions".
 - ▶ [Standards and operating conditions](#) 54
- The technical data and the data regarding the supply conditions can be found on the nameplate and in this documentation.
- Ambient media – especially chemically aggressive ones – may damage shaft sealing rings, lacquers and plastics.
- Lenze offers special surface and corrosion protection in this case.
- Only install the gearbox in the mounting position shown.
 - ▶ [Mounting positions](#) 18

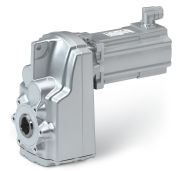
Preparation

- Protect shaft sealing rings from contact with solvents.
- Remove protection covers from shafts.
- Thoroughly remove anticorrosion agents from the shaft and from flange faces.
- Draw the transmission elements onto the output shaft only by using the centering thread.
- Align the output shaft and transmission elements exactly to avoid tensions.
- Mount belt pulleys, sprockets, or gear wheels as close as possible to the shaft shoulder in order to keep the bending load of the shaft and the bearing forces at a minimum level.
- Tighten all screw connections with the specified torques and secure them with standard screw locking adhesive.
- Check paint for damage and repair professionally.

Mechanical installation

Installation

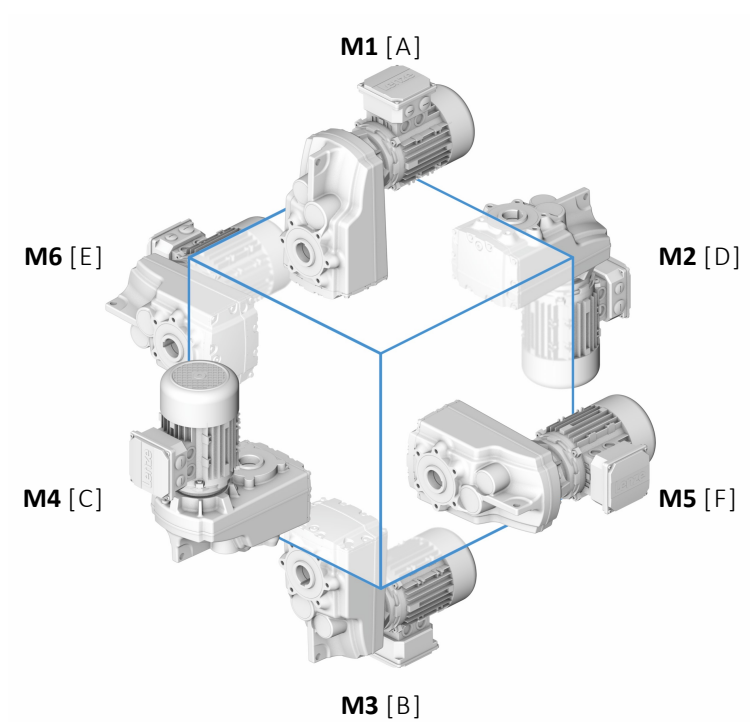
Mounting positions

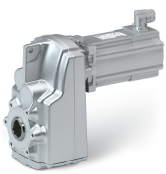


Installation

- The mounting surfaces must be plane, torsionally rigid and free from vibrations.
- The mounting areas must be suited to absorb the forces and torques generated during operation.
- Ensure an unhindered ventilation.
- For versions with a fan, keep a minimum distance of 10 % from the outside diameter of the fan cover in intake direction.

Mounting positions





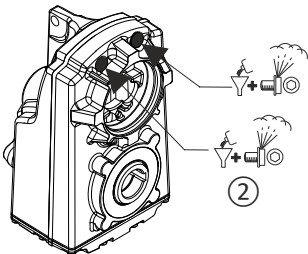
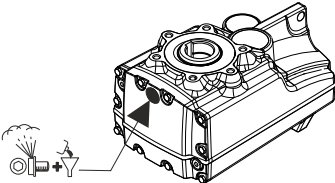
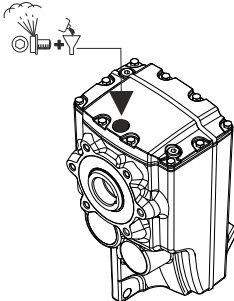
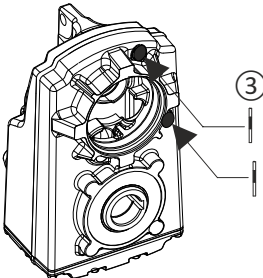
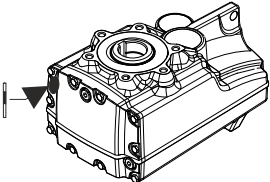
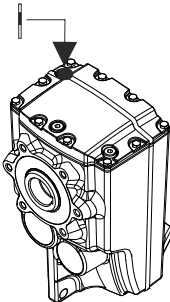
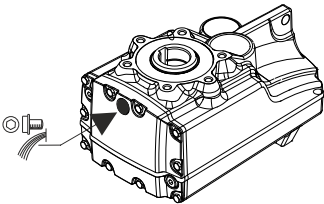
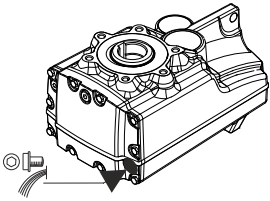
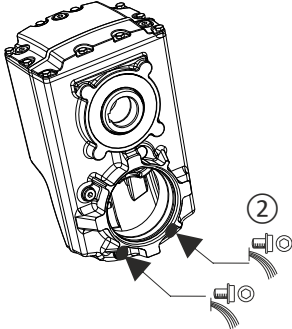
Ventilation



No venting measures are required for the G50BS113 ... BS122 gearboxes.
The G50BS122 gearbox can optionally be equipped with a breather element.
From G50BS140 onwards, the gearboxes are supplied with breather elements as standard.

Gearboxes that are delivered with a ventilation unit are provided with a label.
Remove the transport locking device on the vent valve before initial commissioning.
Loosely enclosed vent valves must be mounted in accordance with the mounting position.

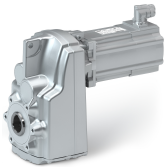
G50BS122 ... BS166

Mounting position M1 (A)	Mounting position M2 (D)	Mounting position M3 (B)
Filling and ventilation		
		
Check		
		
Drain		
		

- ② G50BS122
- ③ G50BS140

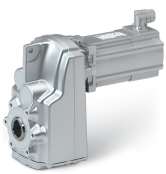
Mechanical installation

Installation
Ventilation



Mounting position M4 (C)	Mounting position M5 (F)	Mounting position M6 (E)
Filling and ventilation		
Check		
Drain		

- ② G50BS122
- ③ G50BS140
- ④ G50BS166

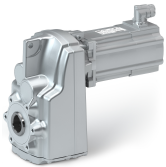


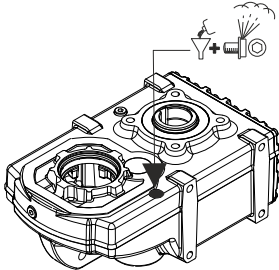
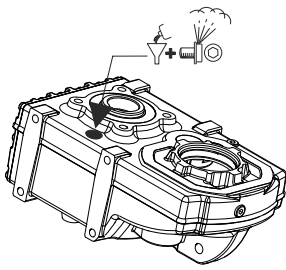
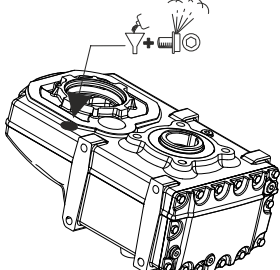
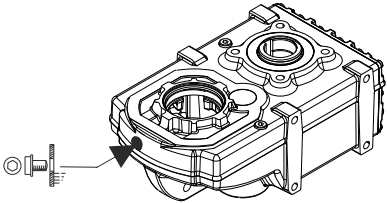
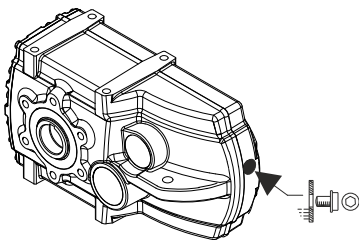
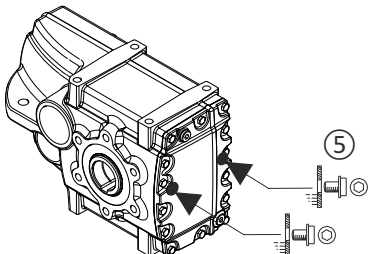
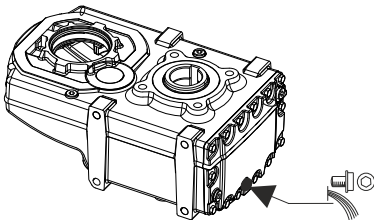
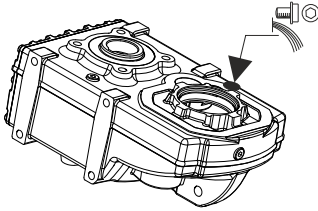
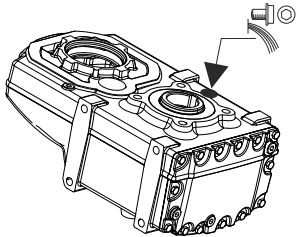
G50BS195 ... BS245

Mounting position M1 (A)	Mounting position M2 (D)	Mounting position M3 (B)
Filling and ventilation		
Check		
Drain		

Mechanical installation

Installation
Ventilation



Mounting position M4 (C)	Mounting position M5 (F)	Mounting position M6 (E)
Filling and ventilation		
		
Check		
		
Drain		
		

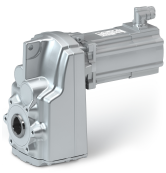
⑤ G50BS231

Gearbox with oil compensation reservoir for mounting position M4 (C)

In order to guarantee a reliable lubrication of the toothed parts in mounting position M4 (C) (motor is on the gearbox vertical from the top), a high filling level is required in the gearbox. As a result of the reduced volume of air in the gearbox, this may lead to oil escaping from the ventilation at higher input speeds. The oil compensation reservoir increases the expansion space for the lubricant.

The oil compensation reservoir can be ordered as a mounting set for fastening to the gearbox.

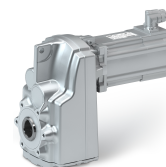
If insufficient space is available, the oil compensation reservoir can also be mounted over the gearbox hose connection on nearby system parts.



Dimensions



Dimensions are contained in the configuration document.



Mounting

Transmission elements

- Fit or remove transmission elements only using suitable equipment.
- For fitting the transmission elements use the center hole in the shaft.
- Avoid impacts and shocks.
- In case of a belt drive, tension the belt in a controlled manner according to manufacturer information.
- Be sure to carry out mounting in a manner free from distortion.
- Compensate minor inaccuracies by suitable flexible couplings.

Fastening

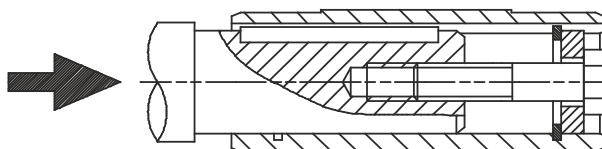
- Use screws with a minimum property class of 8.8.
- Observe prescribed tightening torques.
- Secure against unintended loosening.
- For alternating loads, we recommend applying anaerobic curing adhesive between flange and mounting surface.

Thread		M3	M4	M5	M6	M8	M10	M12	M16	M20	M24	M27	M30
Strength		Tightening torque Nm $\pm 10\%$											
8.8	Nm	1.3	3.0	5.9	10.1	24.6	48	84	206	415	714	1050	1428
10.9	Nm	1.9	4.6	8.6	14.9	36.1	71	123	302	592	1017	1496	2033

Gearbox with hollow shaft and shrink disk

- Use fitting grease in the area of the contact surfaces of machine shaft and hollow shaft bore.
- Be sure to carry out mounting in a manner free from distortion.
- Lead forces only across the hollow shaft and not across the housing.
- For axial fastening, use the snap ring grooves in the hollow shaft.

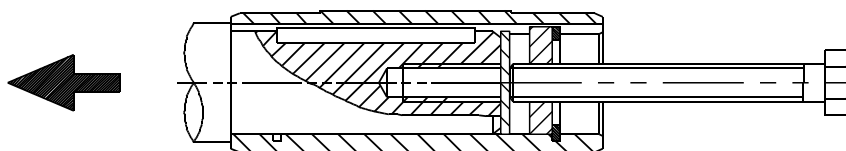
Proposed solution for axial fastening

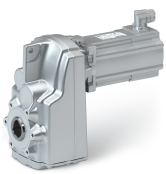


Dismounting

- Undo axial gearbox locking in the hollow shaft
- Extract the gearbox from the motor shaft using an appropriate auxiliary tool

Proposed solution for dismounting



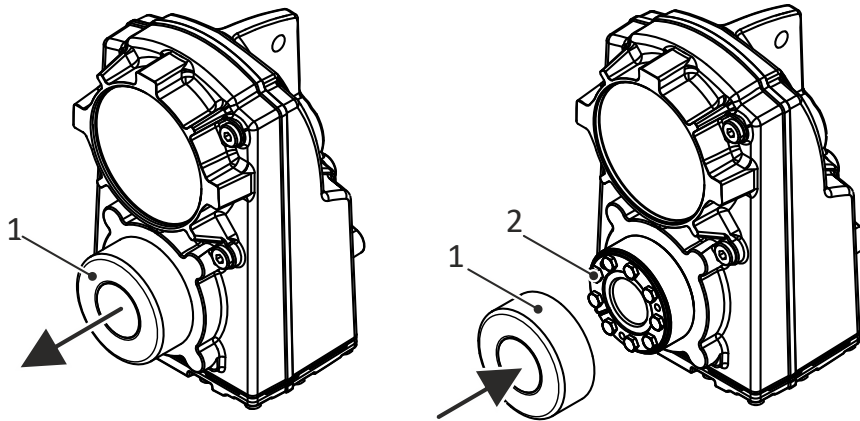


Gearbox with hollow shaft and shrink disc

NOTICE

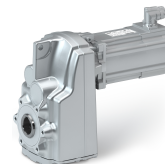
- ▶ Never disassemble the new shrink disc.
- ▶ Thoroughly clean and degrease hollow shaft bore and machine shaft!
- ▶ Do not tighten clamping screws before the machine shaft has been inserted, the hollow shaft may undergo plastic deformation.
- ▶ Cover the shrink disc during operation so that it is secured against contact by implementing suitable measures (e.g. cover).

Mounting the machine shaft



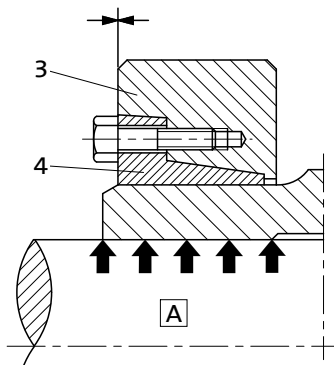
- 1 Rotating cover
- 2 Clamping screws

1. Check machine shaft
 - Diameter in fit tolerance h6
 - Material yield point $Re \geq 360$ MPa
 - E-module approx. 210000 MPa
 - Surface roughness $R_z \leq 15$ μm
 - Concentricity (to prevent unnecessary additional forces caused by tensioning)
2. Remove rotating cover (1) from the shrink disc
3. Thoroughly clean and degrease hollow shaft bore and machine shaft.
4. Slightly loosen clamping screws (2) one after the other, do not unscrew.
5. Push gearbox onto machine shaft.
6. Slightly tighten clamping screws manually.
7. Tighten clamping screws (2) one after the other (approx. 5) in several passes, with rising torque, evenly until the indicated screw-tightening torque is reached at all screws.
8. Pull the co-rotating cover (1) over the shrink disc.



NOTICE

- The shrink disc is mounted correctly and fixed when the faces of the outer ring and the inner ring are aligned. Minimum misalignments are permissible.



- 3 Outer ring
4 Inner ring
[A] Free of grease

NOTICE

- If a different tightening torque is indicated on the shrink disc, this tightening torque has priority over the value indicated in the table.

Tightening torques of clamping screws

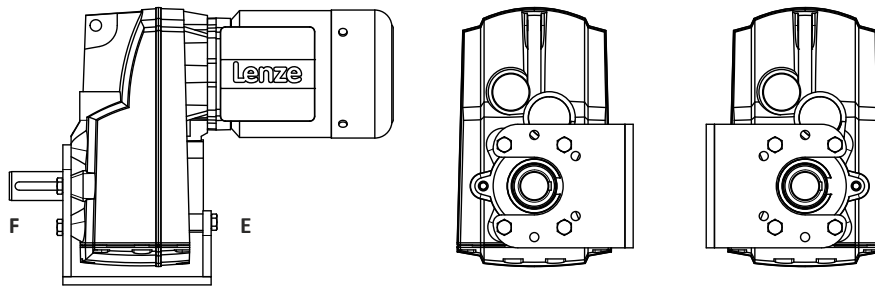
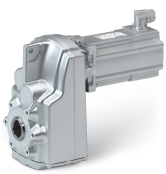
Hollow shaft bore	mm	20	25		30		35		40	
Thread	mm	M6	M5	M6	M6	M8	M6	M8	M6	M8
Key size	mm	10	8	10	10	13	10	13	10	13
Tightening torque	Nm	12	6	14	14	30	14	30	14	34

Hollow shaft bore	mm	50	65	75	80	85	105	125
Thread	mm	M8	M10	M10	M10	M12	M14	M14
Key size	mm	13	17	17	17	19	22	22
Tightening torque	Nm	34	70	70	70	121	193	193

Gearbox foot mounting

NOTICE

- For gearboxes G50BS113 ... G50BS166, the foot is supplied loose and can be mounted to the gearbox in three positions. Depending on the installation situation and installation space, the foot can first be screwed to the machine housing and then to the gearbox or vice versa. Lenze recommends using studs when mounting the gearbox with the foot mounted on the machine housing.
- For gearboxes G50BS195 ... G50BS245, the foot is integrated in the housing.



NOTICE

- Independent of the mounting order, the output shaft must be aligned with the machine shaft.

How to mount the foot to the gearbox:

1. Fasten foot to gearbox with 4 screws in "Position F" and 2 screws in "Position E"
2. Fasten gearbox with foot to machine housing with 4 screws

How to mount the foot to the machine housing:

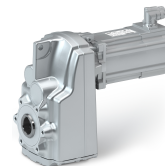
1. Fasten foot to machine housing with 4 screws
2. Fasten foot to gearbox with 4 screws in "Position F" and 2 screws in "Position E"

How to align the gearbox shaft with the machine shaft:

1. Loosen fixing screws "foot on gearbox" and "foot on machine housing" until the foot can be moved on both the gearbox and the machine housing
2. Output shaft aligned with machine shaft
3. Tighten the fixing screws "foot on gearbox" and "foot on machine housing"
4. Check alignment of gearbox shaft to machine shaft, improve alignment if necessary and repeat steps 1 to 3

Tightening torques for mounting the foot to the gearbox

Product code	Tightening torque
	Nm
G50BS113 + G50BS122	10
G50BS140 + G50BS166	48



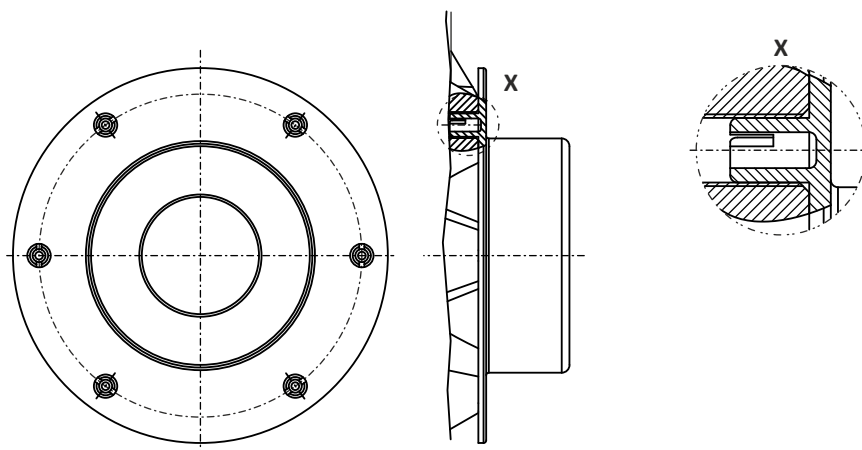
Product extensions

Mounting instructions for shrink disc cover

NOTICE

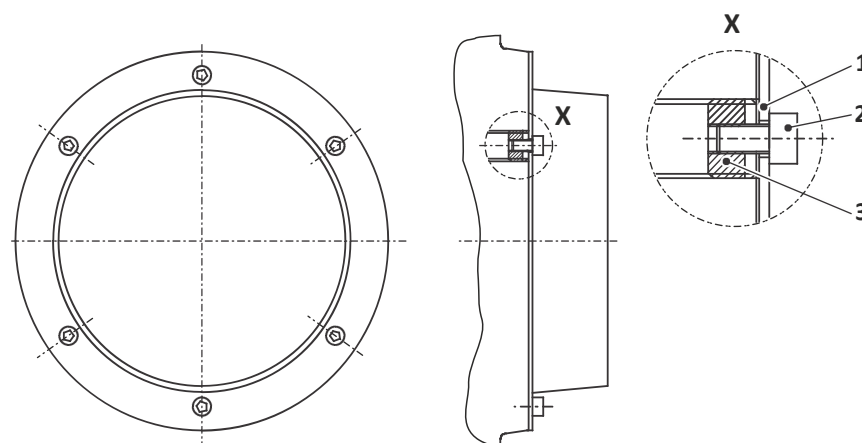
- The loosely enclosed cover is mounted as a protection against accidental contact with the shrink disc.

Gearboxes G50BS113 ... G50BS195



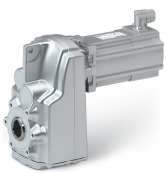
Press the cover with integrated mounting pins into the bore holes on the housing flange

Gearboxes G50BS221 ... G50BS245



- 1 Shrink disc cover
- 2 Cheese head screw
- 3 Reducing bush

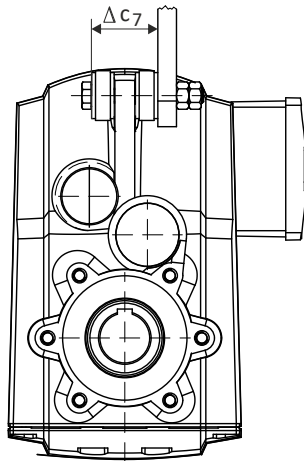
1. Screw reducing bushes (3) into the threaded holes on the housing flange so that they are flush using a screwdriver.
2. Fasten the cover over the reducing bushes (3) using cheese head screws (2).



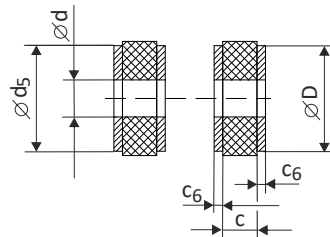
Torque plate mounting

NOTICE

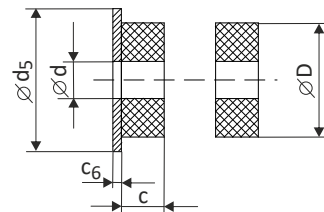
- Screw, nuts and the fixing strap on the machine are not included in the scope of supply.
- Use screws and nuts of property class 8.8.
- Use washers and fixing strap with a surface roughness of approx. $R_z = 25 \mu\text{m}$.
- Solvents, oils, greases and fuels damage the rubber elements. Avoid contact!



g50BS113...g50BS245

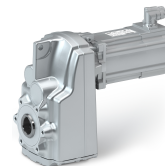


g50BS280...g50BS319



1. Install rubber buffers with washers on both sides of the gearbox torque arm and fixing strap of the machine as shown.
2. Tighten nuts until the rubber buffers are pretensioned by the Δc_7 dimension.
3. Counter the screw connection with a second nut.

Gearbox	Pretension	Rubber buffers			Washer	
	Δc_7	d	D	c	d ₅	min c ₆
	mm	mm	mm	mm	mm	mm
G50BS113	1	11	30	12	30	2.5
G50BS122	1	11	30	12	30	2.5
G50BS140	1	13	40	12	37	3
G50BS166	1	13	40	12	37	3
G50BS195	1	13	40	12	37	3
G50BS221	2	17	50	2x 12	50	3
G50BS231	2	21	60	2x 12	60	4
G50BS245	2	26	72	2x 12	72	5
G50BS280	7	25	80	40	100	10
G50BS314	5	31	120	50	140	12
G50BS319	7	31	120	50	140	12



Electrical installation

Important notes

DANGER!

Risk of injury and risk of burns from dangerous voltage

Power terminals may also carry voltage in the switched-off state or when the motor is stopped and may cause life-threatening cardiac arrhythmia and serious burns.

- ▶ Disconnect the product from the mains.
- ▶ Check that the power terminals are deenergized before starting work.

- When working on energized products, comply with the applicable national accident prevention regulations.
- The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, fuses, PE connection).
- The manufacturer of the system or machine is responsible for adherence to the limits required in connection with EMC legislation.

Operation on an external inverter

A max. pulse voltage amplitude of $U_{pk} = 1560 \text{ V}$ at the motor terminals must not be exceeded. Here, the minimum pulse rise time must be $t_R = 0.1 \text{ } \mu\text{s}$.

If it cannot be ruled out that the permissible voltage peaks will be exceeded or that the minimum pulse rise time will not be reached, the following measures must be initiated:

- Reduction of the DC-bus voltage (threshold for brake chopper voltage)
- Use of filters, chokes
- Use of special motor cables

Preparation

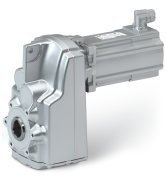


The notes for the electrical connection can be found in the enclosed mounting instructions.

EMC-compliant wiring



The EMC-compliant wiring is described in detail in the documentation of the Lenze inverters.



Motor connection

Connection via terminal box

Observe the notes on wiring, data on the nameplate, and the connection diagram in the terminal box.

The connection must ensure a continuous and safe electrical supply:

- No protruding wire ends
- Use assigned cable end fittings
- Ensure good electrical conductivity of the contact (remove paint residues) if an additional PE connection is used
- Establish a safe protective earth connection
- After the connection is completed, make sure that all connections on the terminal board are firmly tightened
- The terminal box has to be free of foreign bodies, dirt, and humidity
- All unused cable entries and the terminal box itself must be sealed so that they are dust-tight and waterproof

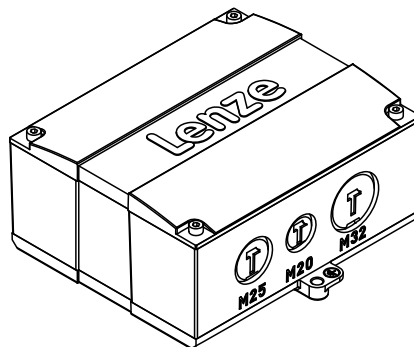
The smallest air gaps between uncoated, live parts and against earth must not fall below the following values:

Minimum requirements for basic insulation according to IEC/EN 60664-1 (CE)	Higher requirements for UL design	Motor diameter
3.87 mm	6.4 mm	<178 mm
	9.5 mm	> 178 mm

Cable glands



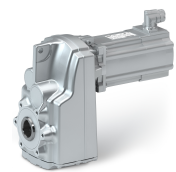
The bore holes for the cable glands M25, M20 and M32 are located on both sides and closed. They can be opened according to need.



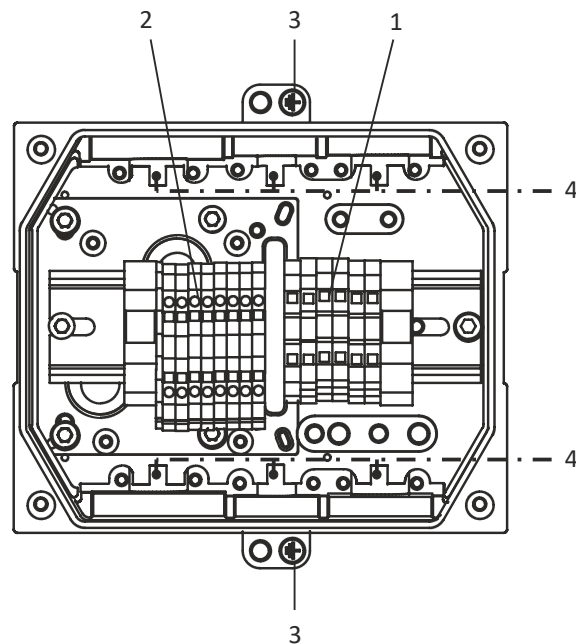
Motor		MCS09 MCS12 MCS14H	MCS14L15 MCS14P14 MCS19F15 MCS19J15	MCS14L32 MCS14P32 MCS19F13 MCS19J30 MCS19P
Screwed connections		2x M20 2x M25 2x M32		
cable cross-section	mm ²	0.08 ... 2.5 4 (without wire end ferrule)		0.2 ... 10
Stripping length	mm	10 ... 11		
Terminal design		Spring-loaded terminal		

Electrical installation

Motor connection
Connection via terminal box



Position of the connections

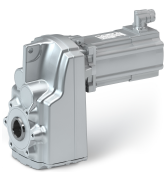


Position	Meaning
1	Power connection Brake connection
2	Feedback connection Connection of temperature monitoring
3	PE connection
4	Large area shield contact.

Terminal box, power		
Contact	Name	Meaning
U1	L1	Motor winding phase
V1	L2	
W1	L3	
PE	PE	PE conductor

Terminal box, DC brake		
Contact	Name	Meaning
BD1	+	Brake +
BD2	-	Brake -

Terminal box, resolver		
Contact	Name	Meaning
B1	+Ref	Transformer windings (reference windings)
B2	-Ref	
B3	+VCC ETS	Supply: Electronic nameplate (only for variant with electronic nameplate ETS)
B4	+COS	Stator windings cosine
B5	-COS	
B6	+SIN	Sine stator windings
B7	-SIN	
B8		Not assigned



Electrical installation

Motor connection
Connection via terminal box

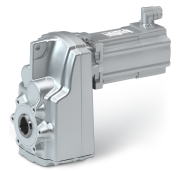
Terminal box, SinCos absolute value encoder with Hiperface		
Contact	Name	Meaning
B1	+ UB	Supply +
B2	GND	Mass
B3	A	Track A / + COS
B4	A ⁻	Track A inverse /-COS
B5	B	Track B /+SIN
B6	B ⁻	Track B inverse/-SIN
B7	Z	Zero track /+RS485
B8	Z ⁻	Zero track inverse /-RS485
B10		Incremental encoder shield

Terminal box, SinCos absolute value encoder with EnDat		
Contact	Name	Meaning
B1	+ UB	Supply +
B2	GND	Mass
B3	A	Track A / + COS
B4	A ⁻	Track A inverse /-COS
B5	B	Track B /+SIN
B6	B ⁻	Track B inverse/-SIN
B7	Daten	EnDat interface data
B8	Daten ⁻	Data inverse EnDat interface
B20	Takt	EnDat interface cycle
B21	Takt ⁻	Inverse EnDat interface cycle
B22	Up Sensor	Up Sensor
B23	0 V Sensor	0 V sensor
B24	Schirm	Encoder housing shield
B25		Not assigned

Terminal box with temperature monitoring R		
Contact	Name	Meaning
R1	+	Temperature sensor +
R2	-	Temperature sensor -

Electrical installation

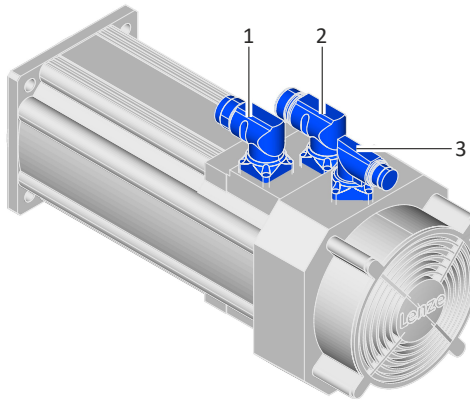
Motor connection
Connection via ICN connector



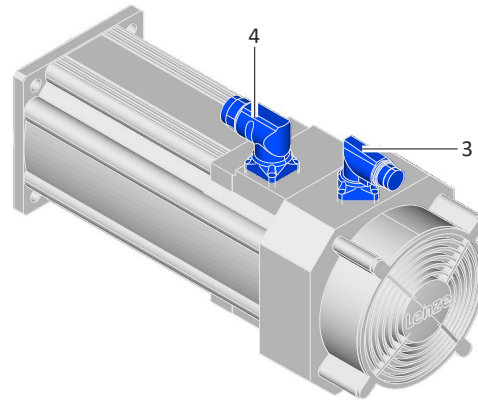
Connection via ICN connector

Position of the connections

Standard connection



One Cable Technology (OCT)



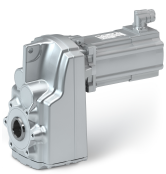
Position	Meaning	Position	Meaning
1	ICN-M23 connector, 6-pole ICN-M40 connector, 8-pole - Power connection - Brake connection - PE connection	4	For One Cable Technology (OCT) ICN-M23 connector, hybrid ICN-M40 connector, hybrid - Power connection - Brake connection - PE connection - Connection of digital absolute value encoder - Connection of temperature monitoring
2	ICN-M23 connector - Feedback connection - Connection of temperature monitoring		
3	ICN-M17 connector Blower connection		

Motor/ICN connector assignment

Standard connection: Power and brake

One Cable Technology (OCT): Power connection, brake, feedback and temperature monitoring

Motor	Connector	Motor	Connector	Motor	Connector	Motor	Connector
MCS06...	ICN-M23	MCS14H15-	ICN-M23	MCS14P14-	ICN-M23	MCS19J14-	ICN-M23
MCS09...	ICN-M23	MCS14H28-	ICN-M40	MCS14P26-	ICN-M40	MCS19J29-	ICN-M40
MCS12...	ICN-M23	MCS14H32-	ICN-M23	MCS14P32-	ICN-M40	MCS19J30-	ICN-M40
MCS14D14-	ICN-M23	MCS14L14-	ICN-M23	MCS19F12-	ICN-M23	MCS19P12-	ICN-M40
MCS14D15-	ICN-M23	MCS14L15-	ICN-M23	MCS19F14-	ICN-M23	MCS19P14-	ICN-M40
MCS14D30-	ICN-M23	MCS14L30-	ICN-M40	MCS19F29-	ICN-M40	MCS19P29-	ICN-M40
MCS14D36-	ICN-M23	MCS14L32-	ICN-M40	MCS19F30-	ICN-M40	MCS19P30-	ICN-M40
MCS14H12-	ICN-M23	MCS14P11-	ICN-M23	MCS19J12-	ICN-M40		



Electrical installation

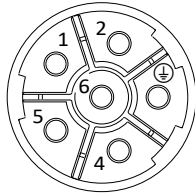
Motor connection
Connection via ICN connector

Standard connection

Connection of power and brake

ICN-M23 connector assignment

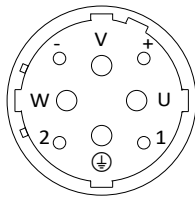
6-pole



ICN M23 6-pole		
Contact	Name	Meaning
PE	PE	PE conductor
1	BD1	Brake DC +/AC
2	BD2	Brake DC -/AC
4	U	Power phase U
5	V	Power phase V
6	W	Power phase W

ICN-M40 connector assignment

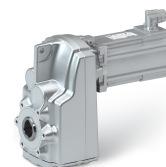
8-pole



ICN M40 8-pole		
Contact	Name	Meaning
U	U	Power phase U
+	BD1	Holding brake +
-	BD2	Holding brake -
W	W	Power phase W
V	V	Power phase V
PE	PE	PE conductor
1		Not assigned
2		Not assigned

Electrical installation

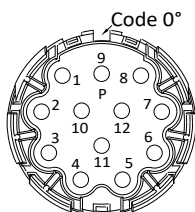
Motor connection
Connection via ICN connector



Feedback and temperature monitoring connection

ICN-M23 connector assignment

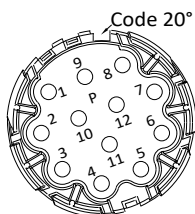
Resolver



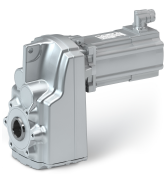
ICN M23 for resolvers		
Contact	Name	Meaning
1	+Ref	Transformer windings
2	-Ref	Transformer windings
3	+VCC ETS	Supply: Electronic nameplate (Only for motors and inverters that support this function)
4	+COS	Stator windings cosine
5	-COS	Stator windings cosine
6	+SIN	Sine stator windings
7	-SIN	Sine stator windings
8		Not assigned
9		Not assigned
10	Schirm	Encoder housing shield
11	+	Temperature monitoring: PT1000
12	-	Temperature monitoring: PT1000

ICN-M23 connector assignment

Incremental and SinCos absolute value encoder Hiperface©



ICN M23 for incremental and SinCos absolute value encoder Hiperface		
Contact	Name	Meaning
1	B	Track B /+SIN
2	A ⁻	Track A inverse /-COS
3	A	Track A / + COS
4	+UB	Supply +
5	GND	Mass
6	Z ⁻	Zero track inverse /-RS485
7	Z	Zero track /+RS485
8		Not assigned
9	B ⁻	Track B inverse/-SIN
10	Schirm	Encoder housing shield
11	+	Temperature monitoring: PT1000
12	-	Temperature monitoring: PT1000

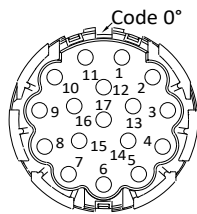


Electrical installation

Motor connection
Connection via ICN connector

ICN-M23 connector assignment

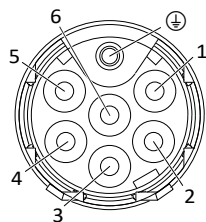
SinCos absolute value encoder with EnDat interface



ICN M23 SinCos absolute value encoder with EnDat		
Contact	Name	Meaning
1	UP Sensor	Up Sensor
2		Not assigned
3		Not assigned
4	0 V Sensor	0 V sensor
5	+	PT1000/KTY temperature sensor
6	-	PT1000/KTY temperature sensor
7	+UB	Supply +
8	Takt	EnDat interface cycle
9	Takt-	Inverse EnDat interface cycle
10	GND	Mass
11	Schirm	Encoder housing shield
12	B	Track B
13	B-	Track B inverse/-SIN
14	Daten	EnDat interface data
15	A	Track A
16	A-	Track A inverse /-COS
17	Daten-	Data inverse EnDat interface

Blower

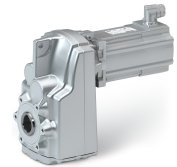
Pin assignment ICN-M17



ICN M17 for blowers 1-ph		
Contact	Name	Meaning
PE	PE	PE conductor
1	U1	Fan
2	U2	Fan
3		Not assigned
4		Not assigned
5		Not assigned
6		Not assigned

Electrical installation

Motor connection
Connection via ICN connector

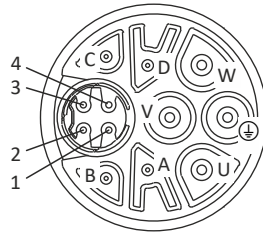


One Cable Technology (OCT)

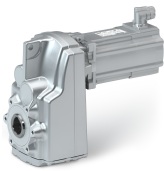
Connection of power, brake, feedback and temperature monitoring

ICN-M23 connector assignment, hybrid

For One Cable Technology (OCT) with digital absolute value encoder



ICN M23 Hybrid for One Cable Technology (OCT) with digital absolute value encoder		
Contact	Name	Meaning
U	U	Power phase U
V	V	Power phase V
W	W	Power phase W
PE	PE	PE
A	BD1	Holding brake +
B	BD2	Holding brake -
C	+	Optional temperature monitoring: PTC +
D	-	Optional temperature monitoring: PTC -
1		Not assigned
2	+	VCC/data +
3	-	GND/data -
4		Not assigned

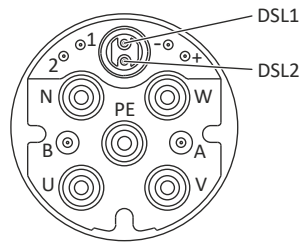


Electrical installation

Motor connection
Connection via ICN connector

ICN-M40 connector assignment, hybrid

For One Cable Technology (OCT) with digital absolute value encoder

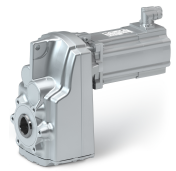


ICN M40 Hybrid for One Cable Technology (OCT) with digital absolute value encoder		
Contact	Name	Meaning
U	U	Power phase U
V	V	Power phase V
W	W	Power phase W
A	BD1	Holding brake +
B	BD2	Holding brake -
PE	PE	PE
N		Not assigned
DSL1	+	VCC/data +
DSL2	-	GND/data -
+		Not assigned
-		Not assigned
1	+	Optional temperature monitoring: PTC +
2	-	Optional temperature monitoring: PTC -

Electrical installation

Motor connection

Connection via ICN connector



Assembly of ICN connectors

NOTICE

Live cables!

Possible destruction of the connector.

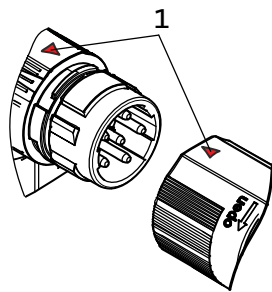
- ▶ Never remove connector when voltage is being applied!
- ▶ Disable inverter before removing the connector!

NOTICE

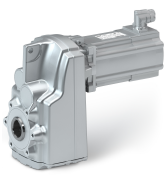
Loss of the protection class due to incorrect mounting!

Malfunctions may occur.

- ▶ ICN connector with screwed connection: Do not remove O-ring
- ▶ ICN connector with bayonet lock: remove O-ring and dispose of it.



1. When connecting the connector to the motor connector, make sure that the aids to orientation (pos. 1) are facing each other.
2. Tighten the box nut of the connector!



Commissioning

Important notes

NOTICE

Do not brake the motor by short-circuit operation.

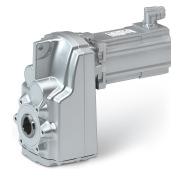
Short-circuit braking may damage the motor.

Before initial switch-on

- That the drive does not show any visible signs of damage.
- Is the mechanical fixing o.k.?
- Is the electrical connection ok?
- Are all rotating parts and surfaces that may become hot protected against contact?
- Is the featherkey radially secured during the test run without output elements?
- Have all screwed connections of the mechanical and electrical parts been tightened?
- Is it ensured that the cooling air can be freely supplied and discharged?
- Has the PE conductor been connected correctly?
- Are the protective devices against overheating (e.g. thermal sensor evaluation) working?
- Has the inverter been parameterized suitably for the motor?
- Is the phase sequence of the motor connection correct?
- Is the contact of good electrical conductivity if a PE connection on the motor housing is used?

After a long period of downtime or after overhauling the motor, check the insulation resistance prior to initial switch-on, as condensation may have formed.

- If the values measured are $\leq 1 \text{ k}\Omega$ per volt of the rated voltage, the insulation resistance is inadequate and no voltage is to be applied.
- Dry the winding until the insulation resistance is $> 1 \text{ k}\Omega$ per volt of the rated voltage.



Functional test

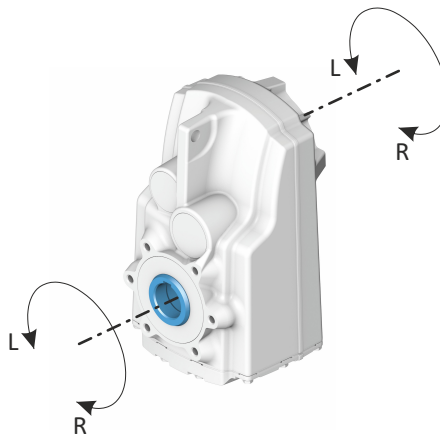
After commissioning, check all individual functions of the drive:

- Rotating direction in decoupled state
- Torque behavior and current consumption
- Function of the feedback system
- Brake function

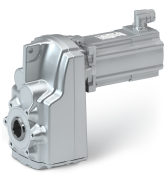
During operation, carry out inspections on a regular basis. Pay special attention to:

- Unusual noises
- Irregular running
- Increased vibration
- Loose fixing elements
- Condition of electrical cables
- Speed variations
- Deposits on the drive and in the cooling channels

Direction of rotation of the output shaft



Motor rotating direction	L	R
Direction of gearbox rotation		
2-stage	L	R
3-stage	R	L
4-stage	L	R



Maintenance

WARNING!

Risk of injury due to non-compliance with the following safety measures

Disregarding the following safety measures may lead to severe personal injury and damage to property.

- ▶ Only work on the drive system when it is de-energised.
 - ▶ Wait for the surfaces to cool down.
 - ▶ Put the drive system in a load-free state or secure any loads acting on the drive.
 - ▶ Protect the motors against the ingress of foreign bodies.
-

Brake

- The brakes are not accessible from the outside.
- Maintenance work of the brake must only be carried out by Lenze Service personnel.

Feedback

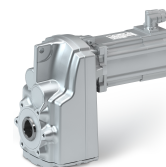
WARNING!

Functional safety

Certain feedback systems support safety functions according to the requirements of the 2006/42/EC: Machinery Directive [UKCA: S.I. 2008/1597 - The Supply of Machinery (Safety) Regulations 2008] .

Any work on the safety encoder which has not been executed professionally will cause a loss of the safety functions.

- ▶ The safety encoder may only be repaired or replaced by the Lenze service or its authorised persons.
-



Maintenance intervals

Geared motor/gearbox

Time interval	Measures	Description of the operations
After assembly and after 3 hours	, check fastening.	Check all fixing screws on the gearbox (foot, flange and shrink disc fixing ...) for tightness.
On the first day, then every month	General check	Pay attention to unusual operating noises, vibrations and impermissibly high temperatures
	Check tightness	In case of leakage, eliminate cause of leakage and check lubricant level.
Every 6 months	Clean geared motor/gearbox	Remove dirt and dust deposits. Clean more frequently in the case of heavy dirt accumulation
	Check rubber buffer	Check rubber buffer of the torque plate and replace it in the event of visible wear or damage
	Relubricate roller bearings	For gearboxes with adapter and grease nipple: Relubricate the roller bearings in the adapter using a grease gun. Grease: Klüber Microlube GLY 92, amount approx. 5 grams
Annually	Check vent valve	Check whether air can pass through the breather element. If it shows blockages, replace it
According to diagram; at the latest as specified in the lubricant table	Change lubricant	Change lubricant For type and amount of lubricant see nameplate ▶ Nameplates 10
	Replace roller bearing grease filling	Rolling bearing greases should also be renewed when changing the lubricant

The following gearboxes are lubricated for life:

- G50BS113

Lubricants

For gearboxes not lubricated for life, change the lubricant at regular intervals.

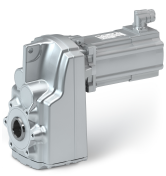
The type of lubricant is indicated on the nameplate. Only use the same type of lubricant.

[▶ Nameplates](#) [10](#)

The change interval depends on the lubricant temperature during operation.

The replacement intervals listed in the lubricant table are reference values for normal ambient conditions. Shorter periods are required for more difficult operating conditions (e.g. aggressive ambient media).

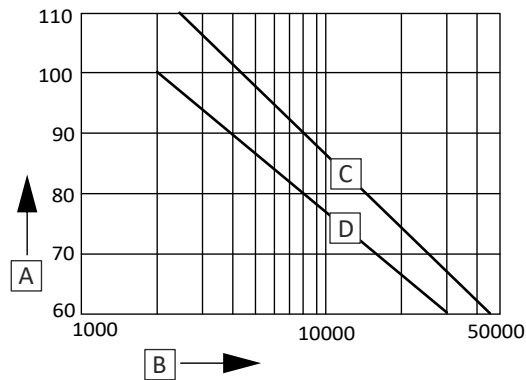
At higher oil temperatures, determine the change interval from the following lubricant diagram.



Determine change intervals for lubricants

1. Measure the lubricant temperature at the drain plug
2. Add 10 °C
3. Determine the change interval from the diagram

Position Of the drain plug ► [Ventilation](#) 19

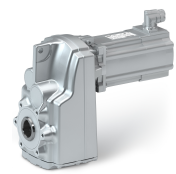


A Oil sump temperature [°C]

B Change interval in operating hours [h]

C Synthetic oil: CLP HC/CLP PG

D Mineral oil: CLP



Maintenance work

Check the oil level

NOTICE

► Check the oil level in cold condition!

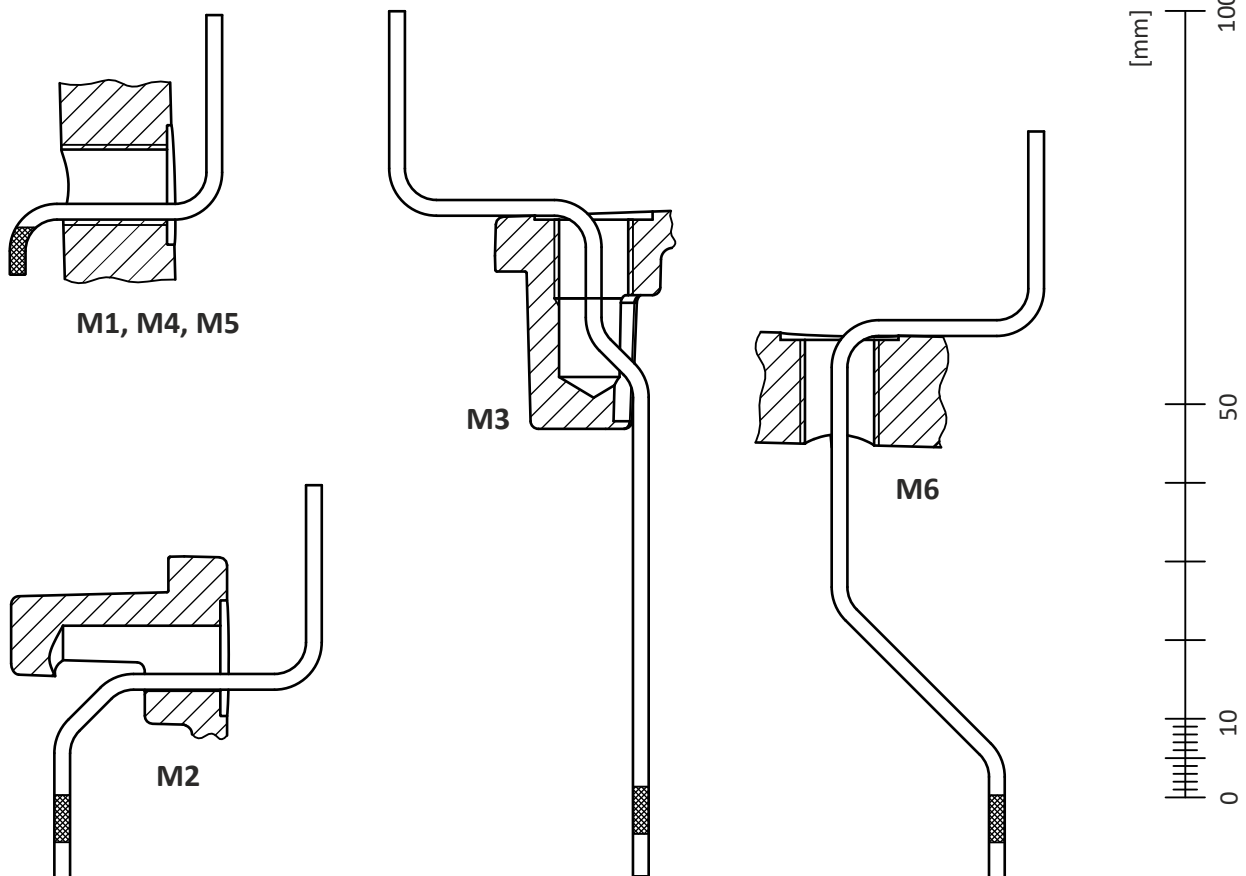
Check the oil level by means of the displayed dipsticks. Depending on the gearbox type and the mounting position (M1 ... M6), make these according to the following templates. The gearbox type and mounting position are indicated on the nameplate.

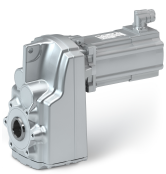
► [Nameplates](#) 10

The oil level must be within the marked range of the dipstick.

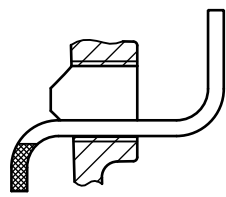
Gearbox G50BS113 ... S166

Template: Dipsticks for G50BS113

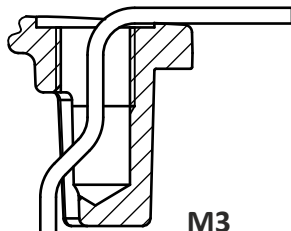




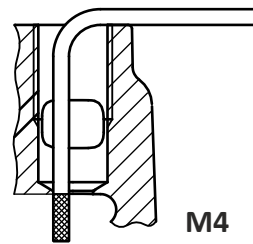
Template: Dipsticks for G50BS122



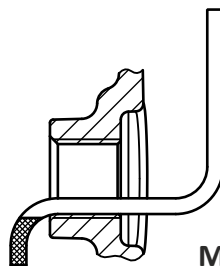
M1



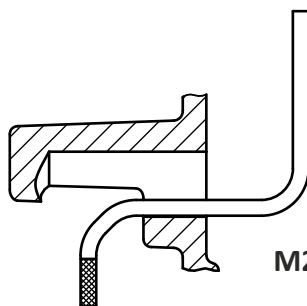
M3



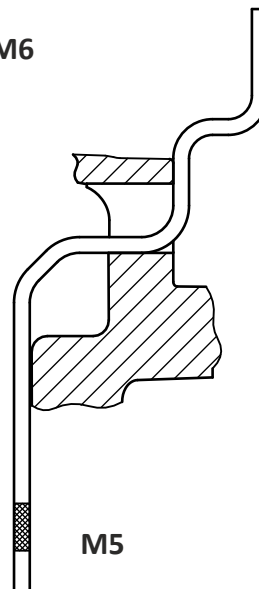
M4



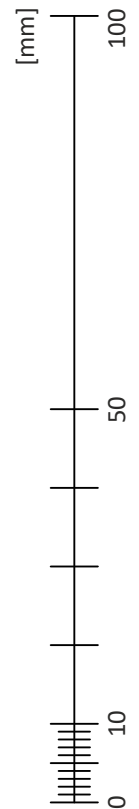
M6

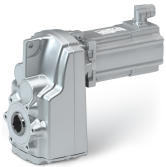


M2

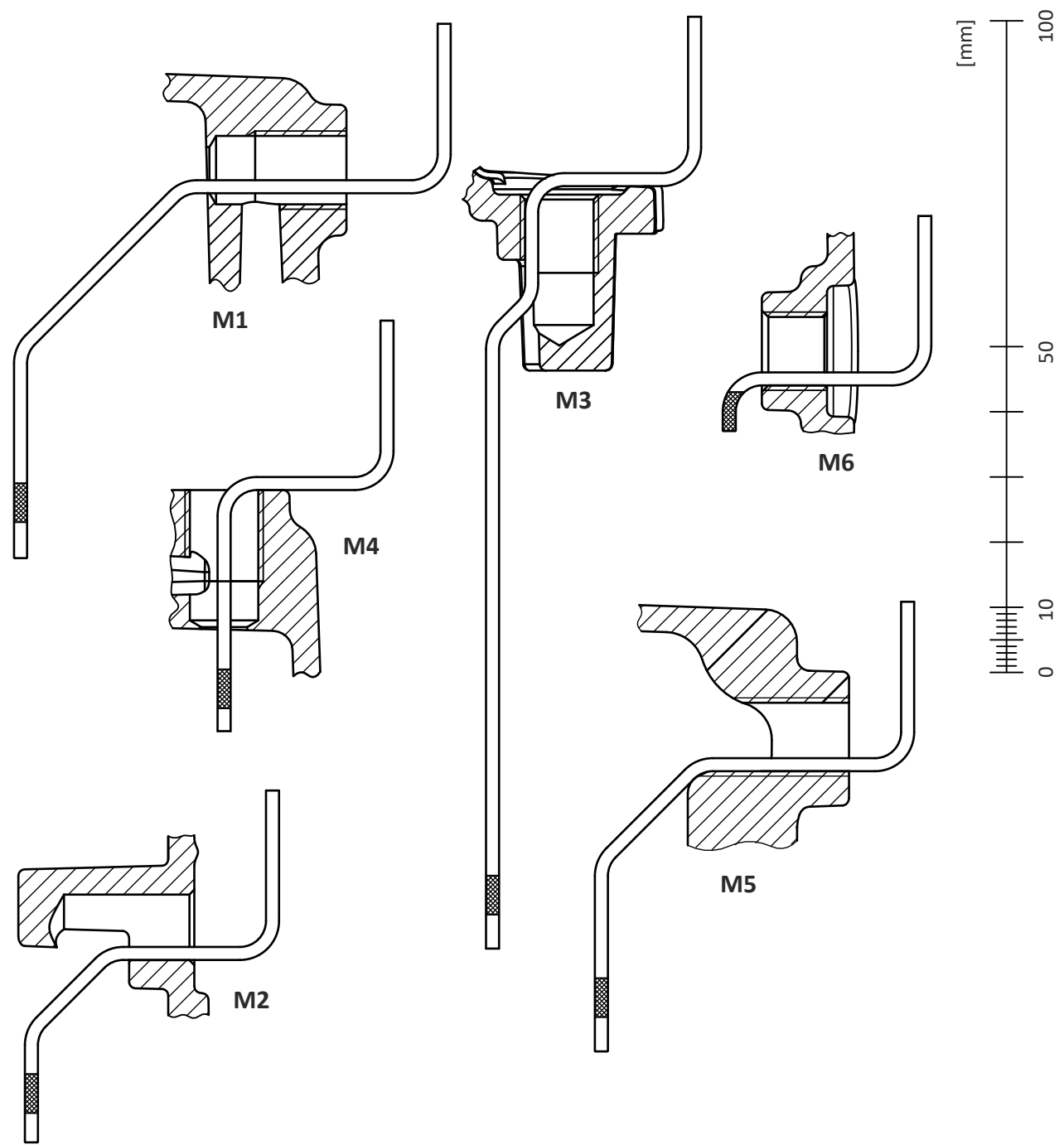


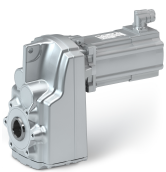
M5



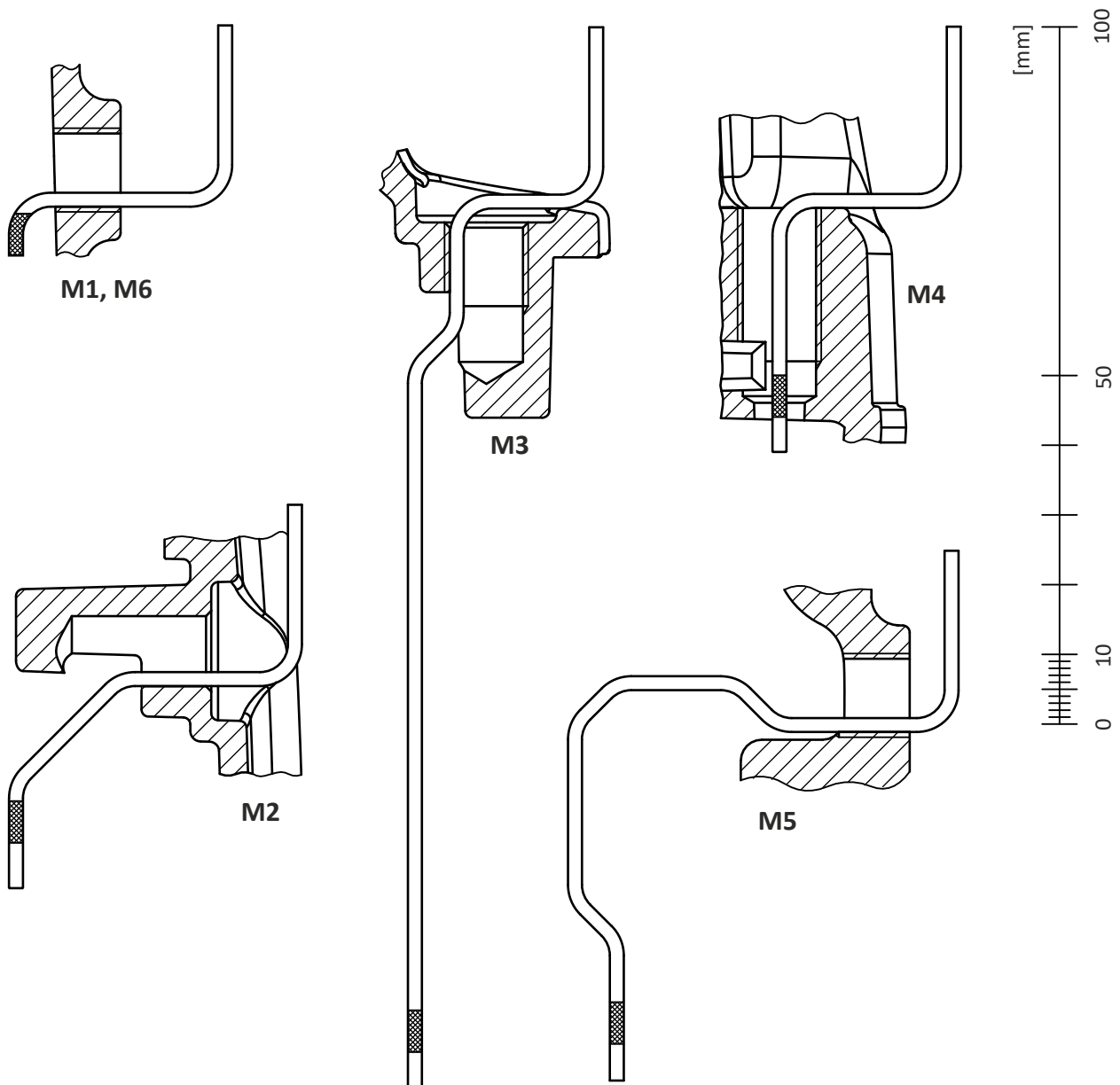


Template: Dipsticks for G50BS140



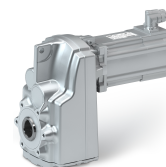


Template: Dipsticks for G50BS166



How to check the lubricant level:

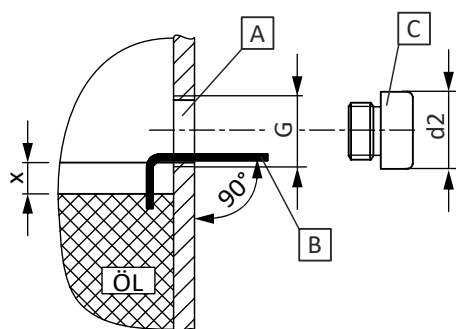
1. Remove the control screw at the marked position. ▶ [Ventilation](#) 19
2. Insert the dipstick through the threaded hole. Observe the position of the dipstick in the template!
3. Carefully pull out the dipstick and determine the lubricant level. The lubricant level must be within the marked range of the dipstick.
4. If the lubricant level is too low, top up lubricant until the lubricant level is in the marked area of the dipstick. If the loss is greater, determine the cause.
5. Insert the control screw and tighten it to the specified torque.



Gearbox G50BS195 ... G50BS319

How to check the lubricant level:

1. Remove the control screw at the marked position. ▶ [Ventilation](#) 19
2. Insert auxiliary tool through the threaded hole.
3. Carefully pull out the auxiliary tool and determine the lubricant level. The lubricant level may be between the threaded hole and dimension "x".
4. If the lubricant level is too low, top up lubricant until the lubricant level is in the marked area. If the loss is greater, determine the cause.
5. Insert the control screw and tighten it to the specified torque.



- A Check bore hole
 B Auxiliary tool, e. g. angled wire (not included in the scope of supply)
 C Control screw

Threaded hole G	Screw head d2	Filling height x
	mm	mm
M10 x 1	14	2
M12 x 1.5	17	3
M16 x 1.5	21	4
M20 x 1.5	25	5

Change lubricant

NOTICE

Change from standard lubricant CLP or CLP HC to food grade lubricant CLP ... USDA H1.

The drain holes do not always allow complete draining of the gearbox. A residual amount of the lubricant may remain in the gearbox.

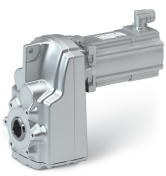
- ▶ Carefully flush the gearbox with the food grade lubricant before changing the lubricant.

NOTICE

- ▶ The gearbox should be lukewarm in order that the oil flows well but there is no risk of scalding.

How to change the lubricant:

1. Place a sufficiently large container (lubricant quantity indicated on the nameplate) under the drain plug. ▶ [Nameplates](#) 10
2. Remove filler and drain plug at the marked position and drain lubricant completely. ▶ [Ventilation](#) 19
3. Insert the drain plug with a new sealing ring and tighten to the prescribed torque.
4. Fill in defined amount of lubricant through the inlet.
5. Insert the filler plug and tighten it to the specified torque.
6. Dispose of waste oil according to the applicable regulations.



Tightening torques for venting elements and screw plugs

Threaded hole	Tightening torque
	Nm
M10 x 1	10
M12 x 1.5	20
M16 x 1.5	34
M20 x 1.5	50

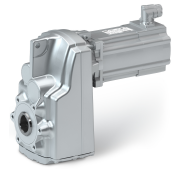
Change roller bearing lubricant

Recommended lubricants:

	Ambient temperature	Manufacturer	Type
Gearbox roller bearing	-30 °C ... +50 °C	Fuchs	Renolit H 443
	-30 °C ... +80 °C	Klüber	Petamo 133 N
	-40 °C ... +60 °C	Klüber	Microlube GLY 92
Motor roller bearing	-30 °C ... +70 °C	Lubcon	Thermoplex 2TML
	-40 °C ... +80 °C	Klüber	Asonic GHY 72
Biolubricant (lubricant for forestry, agriculture and water supply and distribution)	-40 °C ... +50 °C	Fuchs	Plantogel 0120S

How to change the lubricant:

- Clean rolling bearings before lubricating
- For fast-running bearings (gearbox drive end): Fill one third of the hollow spaces between the roller bearings with grease.
- For slow-running bearings (within gearbox and driven side of gearbox): fill two-thirds of the hollow spaces between roller bearings with grease.



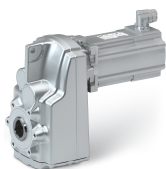
Repair

NOTICE

We recommend having all repairs carried out by the Lenze service department.

If faults occur during the operation of the drive system:

- First check the possible causes of malfunction according to the [► Diagnostics and fault elimination](#)  53
- If the fault cannot be remedied using one of the measures listed, please contact the Lenze service department. The contact data can be found on the rear of this documentation.



Diagnostics and fault elimination

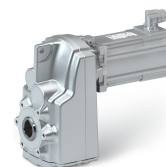
Malfuncions

If faults occur during the operation of the drive, the table below helps you to identify the causes. If it is not possible to remedy the fault using the measures listed, please contact the Lenze service department.

Error	Possible cause	Remedy
Drive is not running	Voltage supply interrupted	Check connection
	Faulty electrical connection	Check external voltage supply.
	Load too high	Reduce load Check assignment drive - machine
Motor runs, gearbox does not	Coupling components are missing or defective	Check mounting
	Gearbox is defective	Inform Lenze Service
	Clutch disengaged	Engage the clutch
Unusual running noises	Overload	Reduce load Check assignment drive - machine
Excessive temperature	Overload	Reduce load
	Inadequate heat dissipation	Improve cooling air supply, clean gearbox / motor
	Lack of lubricant	Top up lubricant according to regulations
Vibrations, noise	Loose fixing elements	Tighten fixing elements
Shrink disc connection is spinning	Correct screw tightening torque has not been reached - Insufficient number of passes, not all screws are tightened correctly.	Specifications for assembly, dimensions and material must be observed
	Machine shaft and hollow shaft bore not sufficiently degreased	
	Wrong component part dimensions - Fits, roughnesses	
	Yield point of machine shaft material is too low - $R_e > 300 \text{ N/mm}^2$ required	
	Friction factors are too low - Surface roughness $R_z \leq 15 \mu\text{m}$ required	
	The shrink disc itself has been degreased so that the screws and the bevels are dry. Due to incorrect friction factors, the shrink disc cannot be tightened correctly.	
Oil is leaking	Wrong oil level for the applied mounting position	Check mounting position (see nameplate) and oil level
	Initially slight leakage at the shaft seal	Optimum sealing conditions only arise after the running-in phase
	Overpressure due to lacking ventilation	Install ventilation according to the mounting position
	Overpressure due to polluted ventilation	Clean ventilation
	Worn-out shaft sealing rings	Check condition of sealing lip contact area, repair if necessary.
	Cover / flange screws are loose	Check that the fixing screws are tightly fastened. Continue to monitor the gearbox
Oil discharge at the gearbox ventilation unit	Incorrect oil level for the mounting position applied and/or incorrect position of ventilation unit	Check mounting position (see nameplate) and oil level Check position of ventilation unit Use oil compensation reservoir

Technical data

Standards and operating conditions
Conformities and approvals



Technical data

Standards and operating conditions

Conformities and approvals

More information and certificates of approval can be found under

[g500 + MCS shaft-mounted helical geared motors](#)

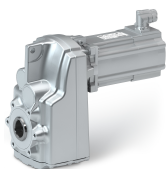
Europa		
Country	Conformity/approval	Product representation
European Union	CE	CE mark
Great Britain	UKCA	UKCA mark
America		
Country	Conformity/approval	Product representation
Canada	CSA	cURus mark
USA	UL	
Asia		
Country	Conformity/approval	Product representation
China	-	CEL mark
		EFUP mark

Protection of persons and device protection

Protection class			
-	EN IEC 60529,EN IEC 60034-5	IP54	Self-ventilated: MCS06 ... MCS19
			Forced ventilated: MCS12 ... MCS19
		IP65	Self-ventilated: MCS06 ... MCS19
Temperature class			
-	EN IEC 60034-1	F (155 °C)	Insulation system
Permissible voltage			
-	IEC 60034-18-41	IVIC C	At 500 V
	IEC/TS 60034-25:2007	Limit curve A	Of the pulse voltage

EMC data

Noise emission		
-	EN IEC 60034-1	A final overall assessment of the drive system is indispensable
Noise immunity		
-	EN IEC 60034-1	A final overall assessment of the drive system is indispensable



Technical data

Standards and operating conditions

Environmental conditions

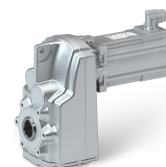
Environmental conditions

Climate			
Storage	EN 60721-3-1:1997	1K3 (-20 ... +40 °C)	>3 months
		1K3 (-20 ... +60 °C)	<3 months
Transport	EN 60721-3-2:1997	2K3 (-20 ... +70 °C)	
Operation	EN 60721-3-3:1995 + A2:1997	3K3 (-10 ... +40 °C)	Operation, without brake
		3K3 (-15 ...+40 °C)	Operation without brake, forced ventilated
		3K3 (-20 ...+40 °C)	Operation without brake, self-ventilated
Site altitude			
0 ... 1000 m amsl	-	Without current derating	
1000 ... 4000 m amsl		Reduce rated output current by 5 %/1000 m	
Air humidity			
-	-	Average relative humidity 85 %	Without condensation

Technical data

Motor data

Rated data

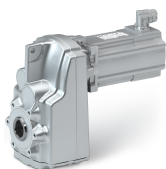


Motor data

Rated data

Inverter power supply 400 V, self-ventilated motors

Motor			MCS06C60-	MCS06C41-	MCS06F60-	MCS06F41-	MCS06I60-	MCS06I41-
Standstill torque	M_0	Nm	0.800	0.800	1.50	1.50	2.00	2.00
Rated torque	M_{rated}	Nm	0.500	0.600	0.900	1.20	1.20	1.50
Max. torque	M_{max}	Nm	2.40	2.40	4.40	4.40	6.20	6.20
Rated speed	n_{rated}	rpm	6000	4050	6000	4050	6000	4050
Max. speed	n_{max}	rpm	8000	8000	8000	8000	8000	8000
Rated power	P_{rated}	kW	0.31	0.25	0.57	0.51	0.75	0.64
Standstill current	I_0	A	2.50	1.30	2.90	1.50	3.40	1.70
Rated current	I_{rated}	A	2.40	1.30	2.50	1.50	2.90	1.60
Max. current	I_{max}	A	10.8	5.40	10.5	5.30	11.8	5.90
Rated voltage	V_{rated}	V	135	225	180	320	190	325
Rated frequency	f_{rated}	Hz	400	270	400	270	400	270
Moment of inertia	J	kgcm ²	0.140	0.140	0.220	0.220	0.300	0.300
Efficiency	η		0.7	0.65	0.81	0.77	0.84	0.81
Torque constant	$K_{t0\ 150}$ °C	Nm/A	0.320	0.615	0.517	1.00	0.588	1.18
Voltage constant	$K_{E\ LL\ 150}$ °C	V/ (1000/ min)	17.89	35.79	29.33	58.76	35.88	71.77
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	6.8	27	5.4	21.8	4.6	18.8
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	10.248	40.689	8.138	32.853	6.932	28.332
Stator inductance	L	mH	12.8	51.0	15.9	63.5	15.1	60.2
Weight	m	kg	2.30	2.30	2.70	2.70	3.40	3.40



Technical data

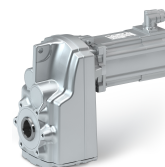
Motor data
Rated data

Motor			MCS09D60-	MCS09D41-	MCS09F60-	MCS09H60-	MCS09F38-	MCS09L51-
Standstill torque	M_0	Nm	3.30	3.30	4.20	5.50	4.20	7.50
Rated torque	M_{rated}	Nm	1.80	2.30	2.40	3.00	3.10	3.60
Max. torque	M_{max}	Nm	9.50	9.50	15.0	20.0	15.0	32.0
Rated speed	n_{rated}	rpm	6000	4050	6000	6000	3750	5100
Max. speed	n_{max}	rpm	7000	7000	7000	7000	7000	7000
Rated power	P_{rated}	kW	1.1	1	1.5	1.9	1.2	1.9
Standstill current	I_0	A	5.30	2.60	6.00	8.50	3.00	12.4
Rated current	I_{rated}	A	3.80	2.30	4.50	6.00	2.50	6.90
Max. current	I_{max}	A	20.0	10.0	30.0	40.0	15.0	64.0
Rated voltage	V_{rated}	V	210	320	230	190	330	180
Rated frequency	f_{rated}	Hz	400	270	400	400	250	340
Moment of inertia	J	kgcm ²	1.10	1.10	1.50	1.90	1.50	2.80
Efficiency	η		0.87	0.82	0.9	0.91	0.9	0.91
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	0.623	1.27	0.700	0.647	1.40	0.605
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	34.81	69.62	39.01	36.96	78.02	35.1
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	1.8	7	1.2	0.8	5.2	0.44
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	2.713	10.549	1.808	1.206	7.836	0.663
Stator inductance	L	mH	6.30	25.1	6.15	4.02	24.6	2.50
Weight	m	kg	4.80	4.80	5.70	6.60	5.70	8.40

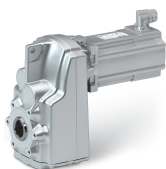
Technical data

Motor data

Rated data



Motor			MCS09H41-	MCS09L41-	MCS12D41-	MCS12D20-	MCS12H35-	MCS12H15-
Standstill torque	M_0	Nm	5.50	7.50	6.40	6.40	11.4	11.4
Rated torque	M_{rated}	Nm	3.80	4.50	4.30	5.50	7.50	10.0
Max. torque	M_{max}	Nm	20.0	32.0	18.0	18.0	29.0	29.0
Rated speed	n_{rated}	rpm	4050	4050	4050	1950	3525	1500
Max. speed	n_{max}	rpm	7000	7000	6000	6000	6000	6000
Rated power	P_{rated}	kW	1.6	1.9	1.8	1.1	2.8	1.6
Standstill current	I_0	A	4.30	6.20	5.50	2.70	8.20	4.10
Rated current	I_{rated}	A	3.40	4.20	4.50	2.60	5.70	3.80
Max. current	I_{max}	A	20.0	32.0	20.0	10.0	24.0	12.0
Rated voltage	V_{rated}	V	300	295	310	345	325	300
Rated frequency	f_{rated}	Hz	270	270	270	130	235	100
Moment of inertia	J	kgcm ²	1.90	2.80	4.00	4.00	7.30	7.30
Efficiency	η		0.91	0.91	0.84	0.85	0.91	0.88
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	1.28	1.21	1.16	2.37	1.39	2.78
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	74.02	70.1	67.07	133.95	84.58	169.15
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	3.2	1.8	2.2	8.7	1.4	5.8
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	4.822	2.713	3.315	13.111	2.11	8.741
Stator inductance	L	mH	16.1	9.90	13.0	52.2	10.5	42.1
Weight	m	kg	6.60	8.40	7	7	10.1	10.1



Technical data

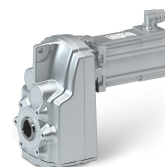
Motor data
Rated data

Motor			MCS12L41-	MCS12L20-	MCS14D36-	MCS14D15-	MCS14H32-	MCS14H15-
Standstill torque	M_0	Nm	15.0	15.0	11.0	11.0	21.0	21.0
Rated torque	M_{rated}	Nm	11.0	13.5	7.50	9.20	14.0	16.0
Max. torque	M_{max}	Nm	56.0	56.0	29.0	29.0	55.0	55.0
Rated speed	n_{rated}	rpm	4050	1950	3600	1500	3225	1500
Max. speed	n_{max}	rpm	6000	6000	6000	6000	6000	6000
Rated power	P_{rated}	kW	4.7	2.8	2.8	1.45	4.7	2.5
Standstill current	I_0	A	12.4	6.20	10.0	5.00	16.9	8.50
Rated current	I_{rated}	A	10.2	5.90	7.50	4.50	11.9	6.60
Max. current	I_{max}	A	56.0	28.0	33.0	16.5	51.5	25.8
Rated voltage	V_{rated}	V	300	330	295	305	295	325
Rated frequency	f_{rated}	Hz	270	130	240	100	215	100
Moment of inertia	J	kgcm ²	10.6	10.6	8.10	8.10	14.2	14.2
Efficiency	η		0.91	0.9	0.92	0.88	0.93	0.92
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	1.21	2.42	1.10	2.20	1.24	2.47
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	72.94	145.69	62.77	126.13	74.6	149.6
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	0.6	2.2	1	4	0.52	2.08
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	0.904	3.315	1.507	6.028	0.784	3.135
Stator inductance	L	mH	5.45	21.8	12.5	49.8	8.53	34.1
Weight	m	kg	13.2	13.2	11.4	11.4	16.2	16.2

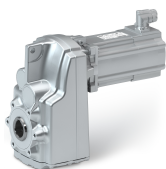
Technical data

Motor data

Rated data



Motor			MCS14L32-	MCS14P32-	MCS14L15-	MCS14P14-	MCS19F30-	MCS19F14-
Standstill torque	M_0	Nm	28.0	37.0	28.0	37.0	32.0	32.0
Rated torque	M_{rated}	Nm	17.2	21.0	23.0	30.0	21.0	27.0
Max. torque	M_{max}	Nm	77.0	105	77.0	105	86.0	86.0
Rated speed	n_{rated}	rpm	3225	3225	1500	1350	3000	1425
Max. speed	n_{max}	rpm	6000	6000	6000	6000	4000	4000
Rated power	P_{rated}	kW	5.8	7.1	3.6	4.2	6.6	4
Standstill current	I_0	A	24.0	24.3	12.0	12.2	19.8	9.90
Rated current	I_{rated}	A	15.0	15.6	9.70	10.8	14.0	8.60
Max. current	I_{max}	A	74.5	92.0	37.3	46.0	62.5	31.3
Rated voltage	V_{rated}	V	275	315	315	340	300	335
Rated frequency	f_{rated}	Hz	215	215	100	90	200	95
Moment of inertia	J	kgcm ²	23.4	34.7	23.4	34.7	65.0	65.0
Efficiency	η		0.93	0.93	0.9	0.9	0.93	0.92
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	1.17	1.52	2.33	3.03	1.62	3.23
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	74.5	87.41	148.62	175.02	95.04	190.66
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	0.4	0.28	1.2	1.2	0.32	1.3
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	0.603	0.422	1.808	1.808	0.482	1.959
Stator inductance	L	mH	5.51	5.99	22.0	23.9	5.20	20.8
Weight	m	kg	20.8	25.6	20.8	25.6	24	24



Technical data

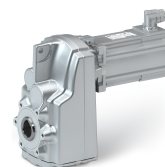
Motor data
Rated data

Motor			MCS19J30-	MCS19P30-	MCS19J14-	MCS19P14-
Standstill torque	M_0	Nm	51.0	64.0	51.0	64.0
Rated torque	M_{rated}	Nm	29.0	32.0	40.0	51.0
Max. torque	M_{max}	Nm	129	190	129	190
Rated speed	n_{rated}	rpm	3000	3000	1425	1350
Max. speed	n_{max}	rpm	4000	4000	4000	4000
Rated power	P_{rated}	kW	9.1	10	6	7.2
Standstill current	I_0	A	30.5	34.9	15.2	17.5
Rated current	I_{rated}	A	18.5	19.0	12.3	14.3
Max. current	I_{max}	A	89.6	120	44.8	60.0
Rated voltage	V_{rated}	V	300	320	330	330
Rated frequency	f_{rated}	Hz	200	200	95	90
Moment of inertia	J	kgcm ²	105	160	105	160
Efficiency	η		0.93	0.93	0.92	0.92
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	1.67	1.83	3.36	3.66
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	97.29	105.6	194.57	211.19
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	0.16	0.14	0.66	0.54
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	0.241	0.211	0.995	0.814
Stator inductance	L	mH	3.20	2.40	12.8	9.60
Weight	m	kg	31	41	31	41

Technical data

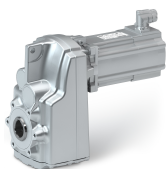
Motor data

Rated data



Inverter power supply 400 V, forced ventilated motors

Motor			MCS12H34-	MCS12H14-	MCS12L39-	MCS12L17-	MCS12D35-	MCS12D17-
Standstill torque	M_0	Nm	12.8	12.8	19.0	19.0	7.50	7.50
Rated torque	M_{rated}	Nm	10.5	12.0	14.0	17.0	6.00	7.00
Max. torque	M_{max}	Nm	29.0	29.0	56.4	56.4	17.7	17.7
Rated speed	n_{rated}	rpm	3375	1350	3900	1650	3525	1650
Max. speed	n_{max}	rpm	6000	6000	6000	6000	6000	6000
Rated power	P_{rated}	kW	3.7	1.7	5.7	2.9	2.2	1.2
Standstill current	I_0	A	8.50	4.60	14.4	7.20	6.40	3.20
Rated current	I_{rated}	A	7.50	4.10	11.7	6.70	5.60	3.00
Max. current	I_{max}	A	24.0	12.0	57.0	28.0	20.0	10.0
Rated voltage	V_{rated}	V	320	310	295	300	300	330
Rated frequency	f_{rated}	Hz	225	90	260	110	235	110
Moment of inertia	J	kgcm ²	7.30	7.30	10.6	10.6	4.00	4.00
Efficiency	η		0.86	0.8	0.94	0.9	0.85	0.75
Torque constant	$K_{t_{0.150}}$	Nm/A	1.51	2.78	1.32	2.64	1.17	2.34
Voltage constant	$K_{E_{LL 150}}$	V/(1000/min)	84.58	169.15	72.94	145.69	67.07	133.95
	°C							
Stator terminal resistance	$R_{UV 20}$	Ω	1.4	5.8	0.6	2.2	4.4	17.4
Stator terminal resistance	$R_{UV 150}$	Ω	2.11	8.741	0.904	3.315	6.631	26.222
	°C							
Stator inductance	L	mH	10.5	42.1	5.45	21.8	13.0	52.2
Weight	m	kg	12.2	12.2	15.3	15.3	9.1	9.1



Technical data

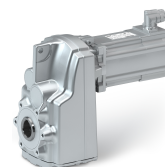
Motor data
Rated data

Motor			MCS14D30-	MCS14D14-	MCS14H28-	MCS14H12-	MCS14L30-	MCS14L14-
Standstill torque	M_0	Nm	12.5	12.5	25.5	25.5	34.5	34.5
Rated torque	M_{rated}	Nm	10.5	12.0	20.5	23.5	25.5	30.5
Max. torque	M_{max}	Nm	29.0	29.0	54.8	54.8	77.1	77.1
Rated speed	n_{rated}	rpm	3000	1350	2775	1200	3000	1350
Max. speed	n_{max}	rpm	6000	6000	6000	6000	6000	6000
Rated power	P_{rated}	kW	3.3	1.7	6	3	8	4.3
Standstill current	I_0	A	11.4	5.70	18.4	9.30	26.7	13.4
Rated current	I_{rated}	A	9.70	5.40	15.0	8.30	20.8	11.8
Max. current	I_{max}	A	33.0	16.5	51.5	25.8	74.5	37.3
Rated voltage	V_{rated}	V	325	345	325	335	310	335
Rated frequency	f_{rated}	Hz	200	90	185	80	200	90
Moment of inertia	J	kgcm ²	8.10	8.10	14.2	14.2	23.4	23.4
Efficiency	η		0.92	0.84	0.93	0.87	0.92	0.88
Torque constant	$K_{t0\ 150}$ °C	Nm/A	1.10	2.19	1.39	2.74	1.29	2.57
Voltage constant	$K_{E\ LL\ 150}$ °C	V/ (1000/ min)	62.77	126.13	74.6	149.6	74.5	148.62
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	1	4	0.52	2.08	0.4	1.2
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	1.507	6.028	0.784	3.135	0.603	1.808
Stator inductance	L	mH	12.5	49.8	8.53	34.1	5.51	22.0
Weight	m	kg	15.2	15.2	20.2	20.2	24.7	24.7

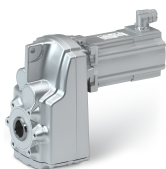
Technical data

Motor data

Rated data



Motor			MCS14P26-	MCS14P11-	MCS19F29-	MCS19F12-	MCS19J29-	MCS19P29-
Standstill torque	M_0	Nm	43.5	43.5	41.5	41.5	70.5	86.0
Rated torque	M_{rated}	Nm	33.0	42.0	32.5	38.0	50.5	53.0
Max. torque	M_{max}	Nm	105	105	86.0	86.0	129	190
Rated speed	n_{rated}	rpm	2625	1050	2850	1200	2850	2850
Max. speed	n_{max}	rpm	6000	6000	4000	4000	4000	4000
Rated power	P_{rated}	kW	9.1	4.6	9.7	4.8	15.1	15.8
Standstill current	I_0	A	28.3	14.1	24.5	12.2	40.6	44.7
Rated current	I_{rated}	A	21.9	13.4	20.1	11.3	31.0	29.5
Max. current	I_{max}	A	92.0	46.0	62.5	31.3	89.6	120
Rated voltage	V_{rated}	V	325	330	320	320	315	315
Rated frequency	f_{rated}	Hz	175	70	190	80	190	190
Moment of inertia	J	kgcm ²	34.7	34.7	65.0	65.0	105	160
Efficiency	η		0.92	0.86	0.95	0.9	0.93	0.93
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	1.54	3.09	1.69	3.40	1.74	1.92
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	87.41	175.02	95.04	190.66	97.29	105.6
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	0.28	1.2	0.32	1.3	0.16	0.14
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	0.422	1.808	0.482	1.959	0.241	0.211
Stator inductance	L	mH	5.99	23.9	5.20	20.8	3.20	2.40
Weight	m	kg	29.7	29.7	30	30	37	47



Technical data

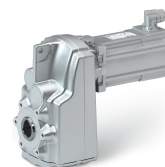
Motor data
Rated data

Motor			MCS19J12-	MCS19P12-
Standstill torque	M_0	Nm	70.5	86.0
Rated torque	M_{rated}	Nm	62.5	72.0
Max. torque	M_{max}	Nm	129	190
Rated speed	n_{rated}	rpm	1200	1200
Max. speed	n_{max}	rpm	4000	4000
Rated power	P_{rated}	kW	7.9	9
Standstill current	I_0	A	20.3	22.4
Rated current	I_{rated}	A	18.3	21.3
Max. current	I_{max}	A	44.8	60.0
Rated voltage	V_{rated}	V	320	310
Rated frequency	f_{rated}	Hz	80	80
Moment of inertia	J	kgcm ²	105	160
Efficiency	η		0.89	0.9
Torque constant	$K_{t0\ 150}$ °C	Nm/A	3.47	3.84
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	194.57	211.19
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	0.66	0.54
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	0.995	0.814
Stator inductance	L	mH	12.8	9.60
Weight	m	kg	37	47

Technical data

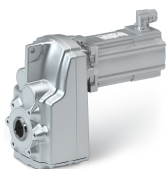
Motor data

Rated data



Inverter power supply 230 V, self-ventilated motors

Motor			MCS06C60L	MCS06C41L	MCS06F60L	MCS06F41L	MCS06I60L	MCS06I41L
Standstill torque	M_0	Nm	0.800	0.800	1.50	1.50	2.00	2.00
Rated torque	M_{rated}	Nm	0.500	0.600	0.900	1.20	1.20	1.50
Max. torque	M_{max}	Nm	2.40	2.40	4.40	4.40	6.20	6.20
Rated speed	n_{rated}	rpm	6000	4050	6000	4050	6000	4050
Max. speed	n_{max}	rpm	8000	8000	8000	8000	8000	8000
Rated power	P_{rated}	kW	0.31	0.25	0.57	0.51	0.75	0.64
Standstill current	I_0	A	4.30	2.50	3.80	2.90	4.20	3.10
Rated current	I_{rated}	A	4.00	2.50	3.40	2.90	3.60	2.90
Max. current	I_{max}	A	18.5	10.8	16.5	10.5	16.0	11.8
Rated voltage	V_{rated}	V	85	125	125	165	150	175
Rated frequency	f_{rated}	Hz	400	270	400	270	400	270
Moment of inertia	J	kgcm ²	0.140	0.140	0.220	0.220	0.300	0.300
Efficiency	η		0.7	0.65	0.82	0.81	0.84	0.81
Torque constant	$K_{t_{0.150}}$ °C	Nm/A	0.186	0.320	0.395	0.517	0.476	0.645
Voltage constant	$K_{E_{LL 150}}$ °C	V/ (1000/ min)	12.22	21.02	21.71	33.73	27.87	37.15
Stator terminal resistance	$R_{UV 20}$ °C	Ω	2.148	5.926	2.222	5.481	2.519	4.593
Stator terminal resistance	$R_{UV 150}$ °C	Ω	3.237	8.93	3.349	8.26	3.796	6.922
Stator inductance	L	mH	4.30	12.8	6.90	15.9	9.30	15.1
Weight	m	kg	2.30	2.30	2.70	2.70	3.40	3.40



Technical data

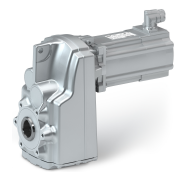
Motor data
Rated data

Motor			MCS09D60L	MCS09D41L	MCS09F60L	MCS09H60L	MCS09F38L	MCS09H41L
Standstill torque	M_0	Nm	3.30	3.30	4.20	5.50	4.20	5.50
Rated torque	M_{rated}	Nm	1.80	2.30	2.40	3.00	3.10	3.80
Max. torque	M_{max}	Nm	9.50	9.50	15.0	20.0	15.0	20.0
Rated speed	n_{rated}	rpm	6000	4050	6000	6000	3750	4050
Max. speed	n_{max}	rpm	7000	7000	7000	7000	7000	7000
Rated power	P_{rated}	kW	1.1	1	1.5	1.9	1.2	1.6
Standstill current	I_0	A	10.3	5.30	10.5	12.0	6.00	8.50
Rated current	I_{rated}	A	7.00	4.60	7.90	8.00	5.00	6.80
Max. current	I_{max}	A	39.0	20.0	52.5	57.0	30.0	40.0
Rated voltage	V_{rated}	V	110	165	125	145	160	160
Rated frequency	f_{rated}	Hz	400	270	400	400	250	270
Moment of inertia	J	kgcm ²	1.10	1.10	1.50	1.90	1.50	1.90
Efficiency	η		0.87	0.87	0.9	0.91	0.9	0.91
Torque constant	$K_{t_{0\ 150}}$ °C	Nm/A	0.320	0.623	0.400	0.458	0.700	0.647
Voltage constant	$K_{E_{LL\ 150}}$ °C	V/ (1000/ min)	17.89	34.81	22.29	26.01	39.01	36.96
Stator terminal resistance	$R_{UV\ 20}$ °C	Ω	0.45	1.75	0.415	0.356	1.333	0.889
Stator terminal resistance	$R_{UV\ 150}$ °C	Ω	0.678	2.637	0.625	0.536	2.009	1.34
Stator inductance	L	mH	1.70	6.30	2.00	2.00	6.20	4.00
Weight	m	kg	4.90	4.90	5.80	6.70	5.80	6.70

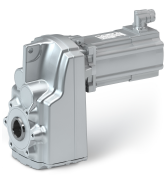
Technical data

Motor data

Rated data



Motor			MCS09L41L	MCS12H15L	MCS12L20L	MCS12D41L	MCS12D20L	MCS12H30L
Standstill torque	M_0	Nm	7.50	11.4	15.0	6.40	6.40	11.4
Rated torque	M_{rated}	Nm	4.50	10.0	13.5	4.30	5.50	8.00
Max. torque	M_{max}	Nm	32.0	29.0	56.0	18.0	18.0	29.0
Rated speed	n_{rated}	rpm	4050	1500	1950	4050	1950	3000
Max. speed	n_{max}	rpm	7000	6000	6000	6000	6000	6000
Rated power	P_{rated}	kW	1.9	1.6	2.8	1.8	1.1	2.5
Standstill current	I_0	A	12.4	8.20	12.4	10.7	5.50	13.5
Rated current	I_{rated}	A	8.40	7.60	11.8	8.80	5.20	10.5
Max. current	I_{max}	A	64.0	24.0	57.0	40.0	20.0	39.0
Rated voltage	V_{rated}	V	145	158	165	155	175	165
Rated frequency	f_{rated}	Hz	270	100	130	270	130	200
Moment of inertia	J	kgcm ²	2.80	7.30	10.6	4.00	4.00	7.30
Efficiency	η		0.91	0.86	0.9	0.84	0.85	0.87
Torque constant	$K_{t_{0\ 150}}^{\circ C}$	Nm/A	0.605	1.39	1.21	0.598	1.16	0.844
Voltage constant	$K_{E_{LL\ 150}}^{\circ C}$	V/ (1000/ min)	35.1	84.58	75.19	34.22	67.07	51.82
Stator terminal resistance	$R_{UV\ 20}^{\circ C}$	Ω	0.44	1.41	0.548	0.55	2.2	0.489
Stator terminal resistance	$R_{UV\ 150}^{\circ C}$	Ω	0.663	2.125	0.826	0.829	3.315	0.737
Stator inductance	L	mH	2.50	10.5	5.50	3.40	13.0	4.00
Weight	m	kg	8.50	10.2	13.3	7.10	7.10	10.2



Environmental notes and recycling

Lenze has been certified to the worldwide environmental management standard for many years (DIN EN ISO 14001). As part of our environmental policy and the associated climate responsibility, please note the following information on hazardous ingredients and the recycling of Lenze products and their packaging:



Lenze products are partly subject to the EU Directive on the restriction of certain hazardous substances in electrical and electronic equipment 2011/65/EU: RoHS Directive [UKCA: S.I. 2012/3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012] . This is documented accordingly in the EU declaration of conformity and with the CE mark.



The crossed-out wheeled bin symbol is located on the equipment. This information indicates that used electrical and electronic products must not be disposed of with normal household waste.

The EU Directive 2012/19/EU: Directive on waste electrical and electronic equipment (WEEE) [UKCA: S.I. 2013/3113 - The Waste Electrical and Electronic Equipment Regulations 2013] , which has been transposed into national law by the respective EU member states, applies to the disposal of equipment. As a customer, you have the option of disposing of the electrical and electronic equipment that you have purchased from us and that is subject to WEEE via the Lenze branch in your country.

Lenze addresses in Europe: <https://www.lenze.com/en-de/company/global-presence>

Some Lenze products contain batteries/rechargeable batteries in accordance with EU Directive 2006/66/EC: Battery Directive [UKCA: S.I. 2009/890 - The Waste Batteries and Accumulators Regulations 2009] . Any batteries/rechargeable batteries included are designed to last the life of the product and do not need to be replaced or otherwise removed by the end user.



Lenze products are usually sold with cardboard or plastic packaging. This packaging complies with EU Directive 94/62/EC: Directive on packaging and packaging waste [UKCA: S.I. 1997/648 - The Producer Responsibility Obligations (Packaging Waste) Regulations 1997] . The required disposal route is indicated by material-specific labels with the "recycling triangle". Example: "21 - other cardboard"

REACH

Lenze products are subject to REGULATION (EC) No 1907/2006: REACH Regulation [UKCA: S.I. 2008/2852 - The REACH Enforcement Regulations 2008] . When used as intended, exposure of substances to humans, animals and the environment is excluded.

Lenze products are industrial electrical and electronic products and are disposed of professionally. Both the mechanical and electrical components such as electric motors, gearboxes or inverters contain valuable raw materials that can be recycled and reused. Proper recycling and thus maintaining the highest possible level of recyclability is therefore important and sensible from an economic and ecological point of view.

- Coordinate professional disposal with your waste disposal company.
- Separate mechanical and electrical components, packaging, hazardous waste (e.g. gear oils) and batteries/rechargeable batteries wherever possible.
- Dispose of the separated waste in an environmentally sound and proper manner (no household waste or municipal bulky waste).

What?	Material	Disposal instructions
Pallets	Wood	Return to manufacturers, freight forwarders or reusable materials collection system
Packaging material	Paper, cardboard, pasteboard, plastics	Collect and dispose of separately
Products		
Electronic devices	Metal, plastics, circuit boards, heatsinks	As electronic waste give to professional disposer for recycling
Gearbox	Oil	Drain oil and dispose of separately
	Casting, steel, aluminium	Dispose as metal scrap
Motors	Casting, copper, rotors, magnets, potting compound	As engine scrap give to professional disposer for recycling
Dry-cell batteries/rechargeable batteries		As used batteries give to professional disposer for recycling



Further information on Lenze's environmental and climate responsibility and on the topic of energy efficiency can be found on the Internet:

www.Lenze.com → search word: "Sustainability"

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