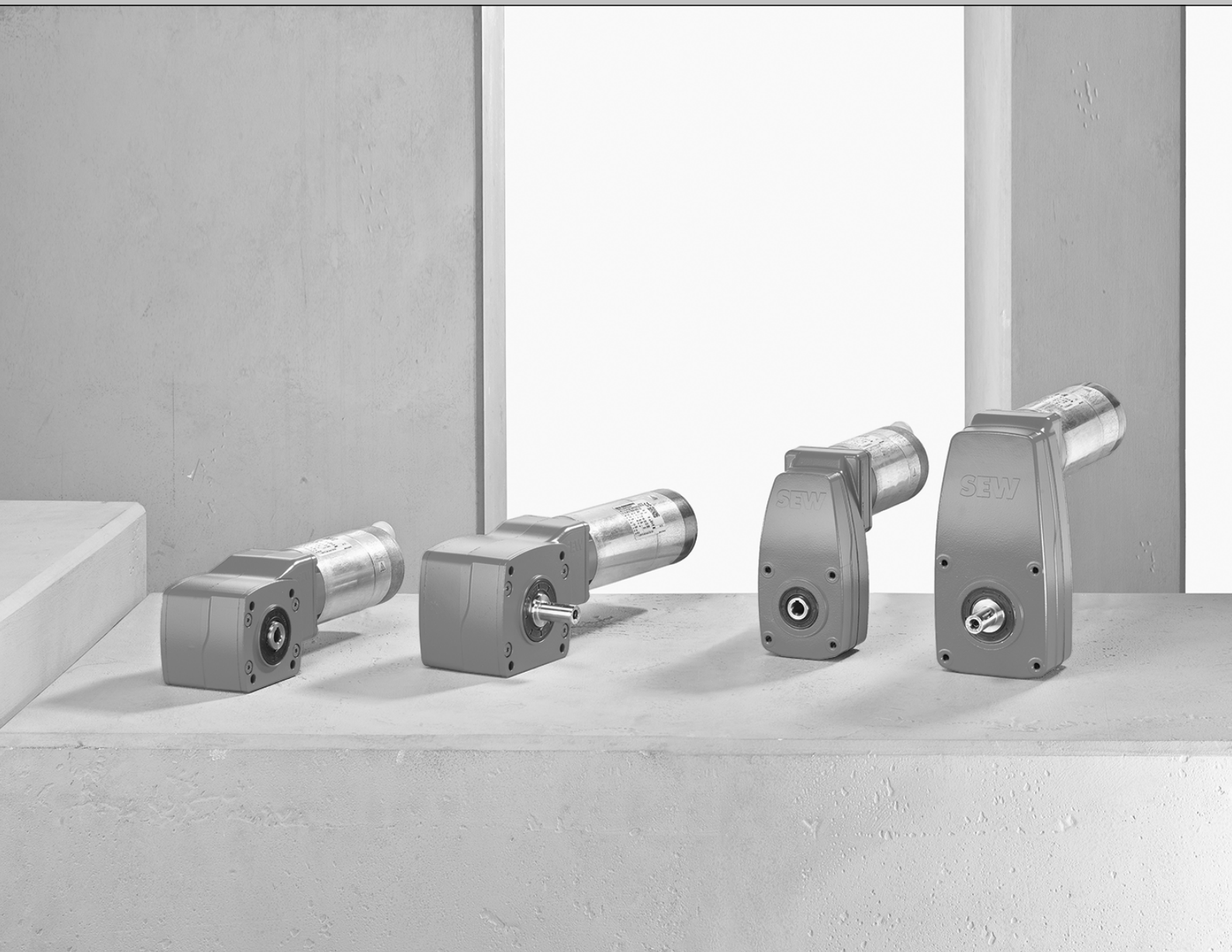




Assembly and operating instructions



Gear unit series F.O, W.O, FL09



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1 General information

1.1 Structure of the safety notes

1.1.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes.

Signal word	Meaning	Consequences if not observed
▲ DANGER	Imminent danger	Death or severe injuries
▲ WARNING	Possibly dangerous situation	Death or severe injuries
▲ CAUTION	Possibly dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment

1.1.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:



SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of hot surfaces
	Warning of automatic startup

1.1.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous step.

This is the formal structure of an embedded safety note:

▲ SIGNAL WORD! Type and source of danger. Possible consequence(s) if disregarded. Measure(s) to prevent danger.

2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- The national and regional regulations governing safety and the prevention of accidents
- Product safety label on the product
- All other associated project planning documents, installation and startup instructions, as well as connection and wiring diagrams
- Do not assemble, install, or operate damaged products
- All system-specific specifications and regulations

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

2.3 Target group

Specialist for mechanical work

All mechanical work must only be carried out by qualified specialists with appropriate training. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications:

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrical work	All electrical work must only be carried out by electrically skilled persons with appropriate training. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of electrical engineering in accordance with the national regulations • Familiarity with this documentation
Additional qualifications	In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.
Instructed persons	All work in the areas of transport, storage, installation, operation and waste disposal must only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 Designated use

The product is intended for use in industrial and commercial systems.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply.

Use in potentially explosive atmospheres is prohibited, unless specifically designated otherwise.

2.5 Creating a safe working environment

Before you work on the product, ensure a safe working environment. Observe the following basic safety notes:

2.5.1 Performing work on the product safely

Defective or damaged product

Never install defective or damaged products. Observe the following information to avoid injuries or damage:

- Before installation, check the product for external damage and replace a damaged product.

Use of hazardous substances, lubricants, adhesives

Observe the following information to avoid poisoning or fire hazards:

- Observe the safety data sheets of the used hazardous substances, lubricants and adhesives.
- Wear safety gloves.

Hot surfaces

The surfaces of the product can become very hot during operation. Observe the following information to avoid burns:

- Let the product and its accessories cool down before touching it.
- Do not touch any surfaces of the product during operation, except for the control elements.
- Observe the information signs and product safety labels on the product.

Falling load

Observe the following information to avoid death or severe injury due to falling loads:

- Do not stand under the load.
- Secure the area where loads can fall down.
- Use personal protective equipment (such as helmet and safety shoes).
- Use a suitable lifting tool (chain hoist, forklift) and transport protection.

Rotating parts

When working on the product, there may be a risk of exposed rotating parts and uncontrolled movement of the components. Observe the following information to avoid body parts getting crushed or pulled in:

- Switch off the product before you start working on it.
- Observe all technical data of the product.
- Do not reach into the hazard zone.

Sharp edges

Observe the following information to avoid cuts caused by sharp or non-deburred cutting edges:

- Wear safety gloves.

Toxic vapors due to heating of fluorocarbon rubber

Fluorocarbon rubber is very stable and safe under normal operating conditions and temperatures < 200 °C. However, if fluorocarbon rubber is heated to more than 300 °C, e.g. by fire or the flame of a cutting torch, harmful gases, vapors, and residues can form. The following components can contain elastomers made of fluorocarbon rubber: Oil seals, breather valves, screw plugs. Observe the following information:

- Make sure that components made of fluorocarbon rubber are not exposed to thermal loads > 200 °C. Remove the components, if necessary.
- Observe the temperature ranges specified in the operating instructions when heating components with fluorocarbon rubber.
- Avoid inhaling fluorocarbon rubber gases and vapors, as well as contact with cooled fluorocarbon rubber, as hazardous residues form during thermal load.

2.6 Transportation/storage

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.

If the product is not immediately installed, it must be stored in a dry and dust-free location. The product can be stored for up to 9 months without requiring any special measures before startup. Do not store the product outdoors.

The permissible storage temperature is -30 °C to +50 °C.

Use suitable, sufficiently rated and reusable handling equipment.

2.7 Installation/assembly

Ensure that the product is installed and cooled according to the regulations in the documentation.

Protect the product from strong mechanical strain. The product and its mounting parts must never protrude into the path of persons or vehicles. Ensure that components are not deformed, particularly during transportation and handling. Electrical components must not be mechanically damaged or destroyed.

The following applications are prohibited unless the device is explicitly designed for such use:

- Use in applications with impermissibly high mechanical vibration and shock loads
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.

Before using a stainless steel shrink disk or stainless steel output shaft, check if the ambient conditions are compatible with the stainless steel material. For information on the material, refer to the order confirmation.

2.8 Startup/operation

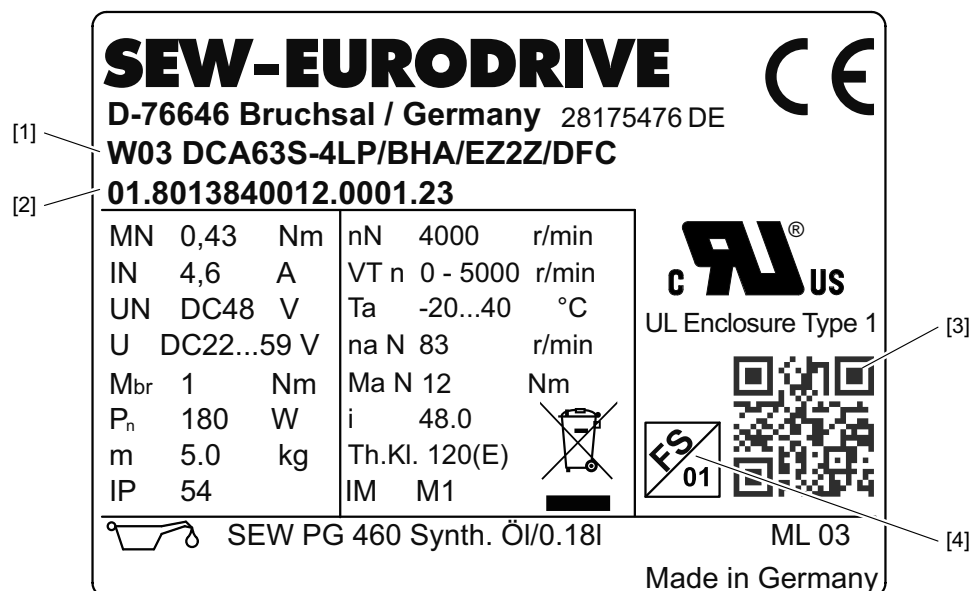
In the event of deviations from normal operation, switch off the product. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

2.9 Cleaning

When using a stainless steel shrink disk or stainless steel output shaft, check if the cleaning agents and chemicals are compatible with the stainless steel material. For information on the material, refer to the order confirmation.

3.1 Nameplate and type designation

The following figure shows an example of a drive unit nameplate. For the structure of the type designation, refer to chapter "Type designation".



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- [1] Type designation
 - [2] Unique serial number
 - [3] Product label with QR code. The QR code can be scanned. You will be redirected to the digital services of SEW-EURODRIVE. There, you have access to product-specific data, documents, and further services.

Digital Services
 - [4] FS logo

3.1.2 Type designation of the MOVIMOT® performance ELV drive unit with gear unit

The following table shows an example of a type designation:

WA03 DCA63S-4LP/BHA/EZ2Z/DSI/C/P	
W	Gear unit series W = Right-angle gear unit with SPIROPLAN® gearing F = Parallel-shaft helical gear unit FL = parallel-shaft helical gear unit for high load capacity
A	Shaft design A = Shaft-mounted gear unit with hollow shaft (not FL09) Without code letter = Solid shaft (W.. and F.. only)
03	Gear unit size 02 03 09
DC	DC compact drive
A	Motor design
63	Motor size 63 80
S	Motor length S M L
4	Speed class 4 = 4000 min ⁻¹
L	System voltage 48 V DC
P	Integrated controller
BHA	Brake
EZ2Z	Encoder EZ2Z = Single-turn encoder with MOVILINK® DDI connection AZ2Z = Multi-turn encoder with MOVILINK® DDI connection
DSI	Communication version DFC = D irect F ieldbus C ommunication DSI = D irect S ystem bus I nstallation
C	Customer-specific design
P	Plant-specific parameters

3.2 Designs and options

3.2.1 ELV compact extra-low voltage drives

F.0 parallel-shaft helical gearmotor

Designation	Description
F..	Solid shaft with key
FA..	Hollow shaft with keyway

FL09 parallel-shaft helical gearmotor

Designation	Description
FL..	• Solid shaft with or without key, on the A-side • Optionally with a 2nd shaft end for encoder mounting on the B-side • Optionally with a second oil seal

W.0 right-angle gearmotor

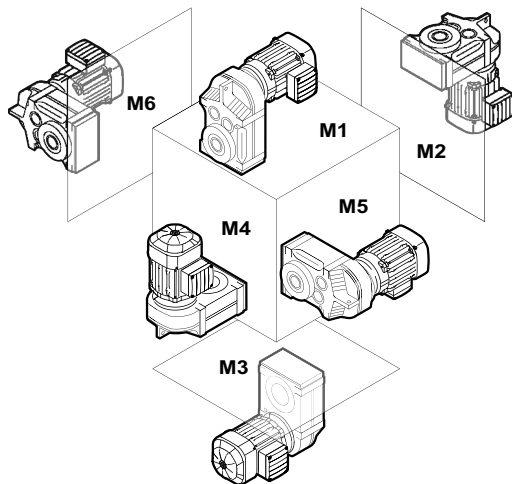
Designation	Description
W..	Solid shaft with key
WA..	Hollow shaft with keyway

3.3 Mounting positions

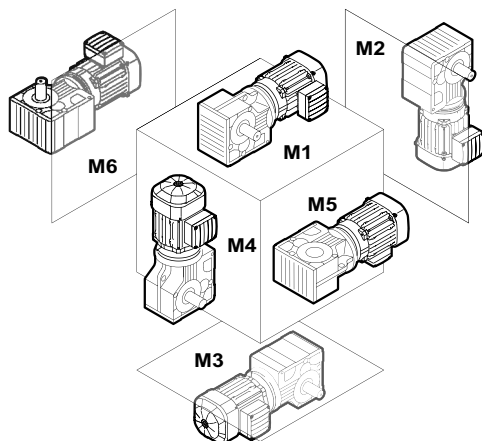
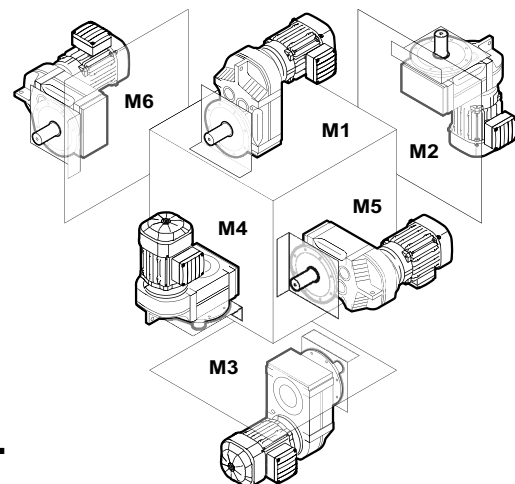
3.3.1 Designation of the mounting positions

The following illustrations show the mounting positions M1 – M6 from SEW-EURODRIVE:

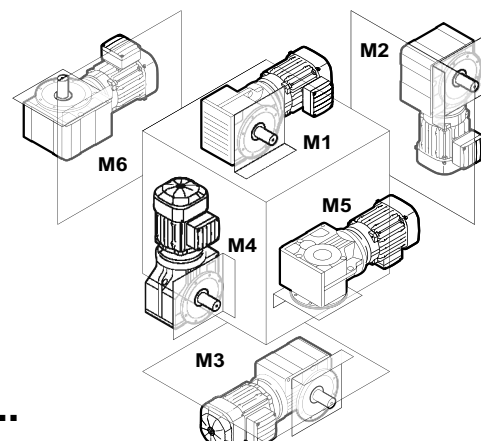
FL09 gear units are only available in mounting position M6.



F..



W..



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3.3.2 Churning losses and thermal rating

Churning losses may occur with the following conditions. They must be considered during the thermal check:

- A high mean input speed and consequently a high circumferential speed of the gear wheels of the input gear stage.

The thermal rating of the gear unit can be increased by appropriate measures, such as by using a synthetic lubricant with higher thermal endurance properties.

To keep churning losses to a minimum, use the gear unit preferably in mounting position M1.

3.3.3 Gear units in pivoted mounting position (dynamic)

Gear units of types F.02, F.03, W.02 and W.03 are delivered with a universal fill quantity and sealed. These gear units can be pivoted during operation to the mounting positions required by the customer.

3.3.4 Universal mounting position M0

The F.02 and F.03 parallel-shaft helical gear units as well as the W.02 and W.03 SPIROPLAN® right-angle gear units are available in universal mounting position M0. Due to their compact size, they are fully enclosed and do not have a breather valve. You can use them in any mounting position from M1 to M6 without needing to make any adjustments to the gear unit.

All gear units mentioned above of a particular size have the same oil fill quantity.

3.3.5 Mounting position sheets

Dimension sheet information

Representation of the shaft

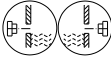
For gear units with solid shaft, the shaft shown is always on the A-side. For shaft-mounted gear units, the customer shaft is shown as a dashed line. The output end (position of the output shaft) is always shown on the A-side.

Mounting position M0

Some gear units can be supplied in mounting position M0. In this case, the gear unit is delivered in a universal mounting position and can be used in various mounting positions without adjustments.

Symbols used

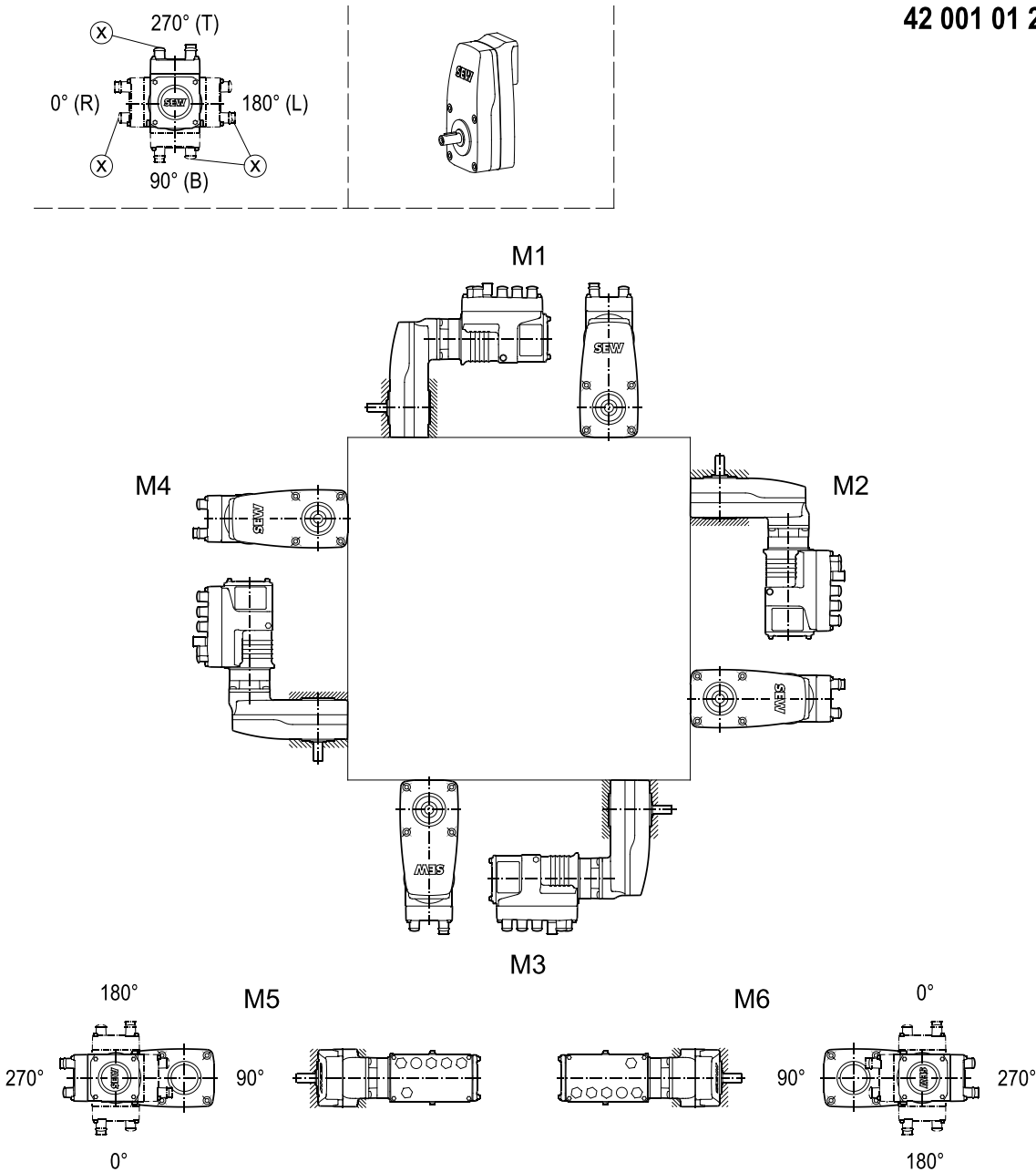
The following table shows the symbols used in the mounting position sheets.

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug

Mounting positions of parallel-shaft helical gear units

F.DCA..

42 001 01 26

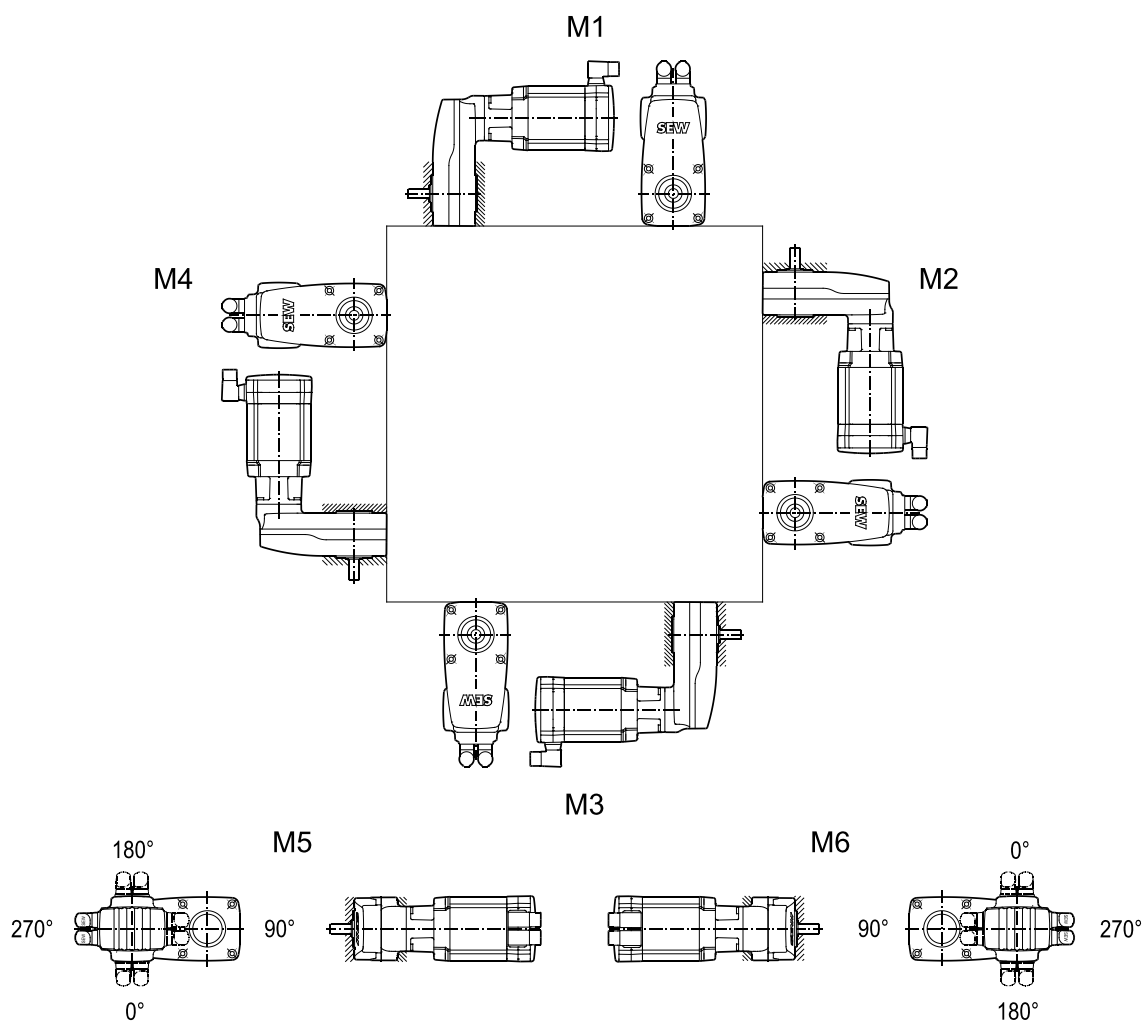
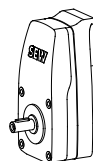
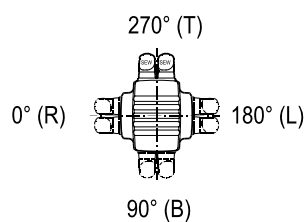


3 Device structure

Mounting positions

F.CM3C..

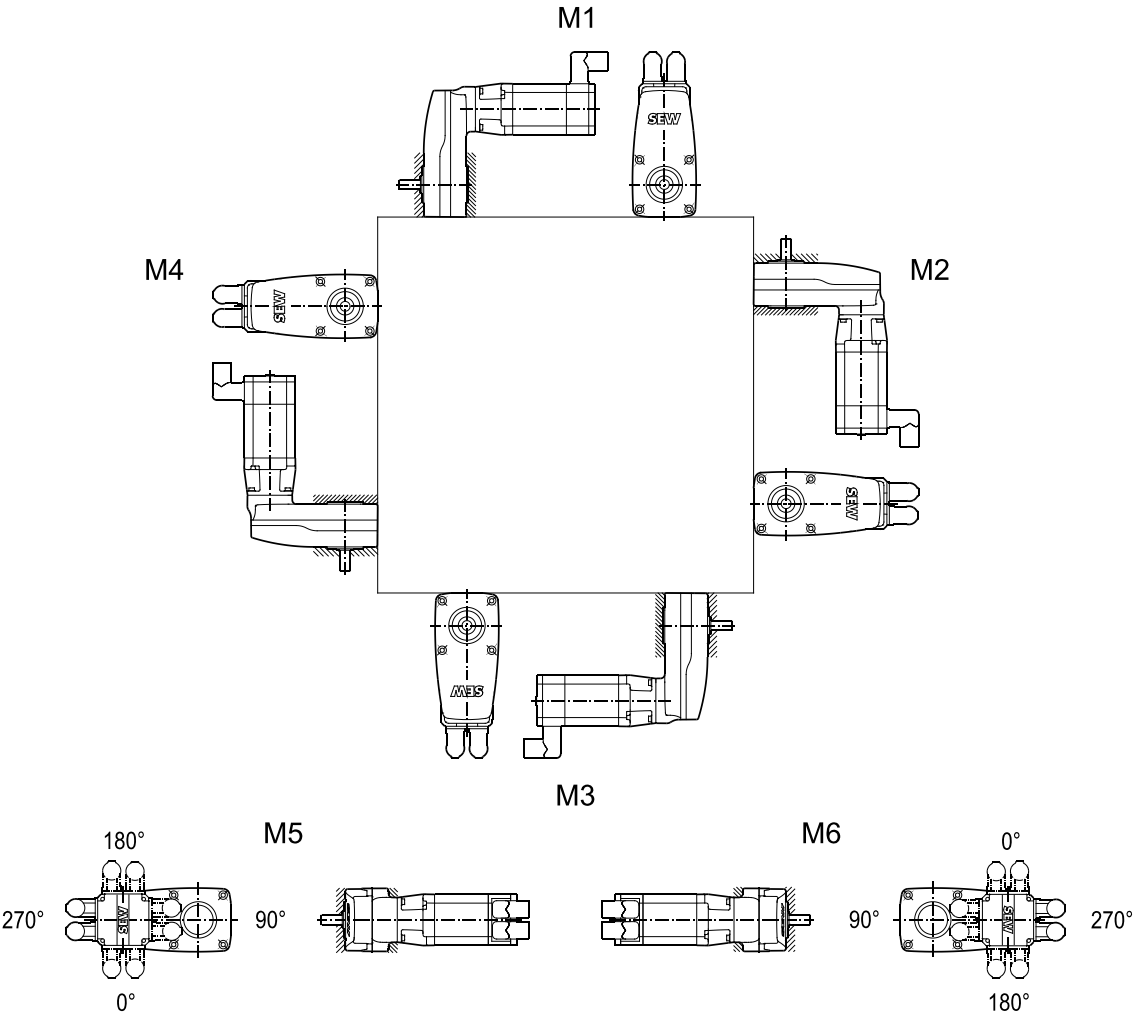
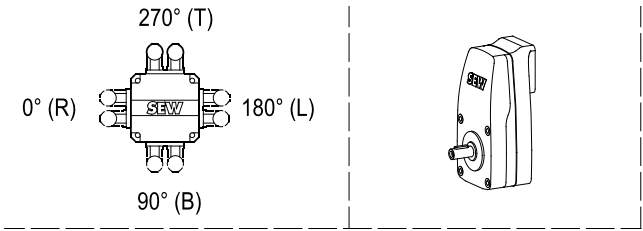
42 002 01 26



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F.CMP..

42 003 01 26



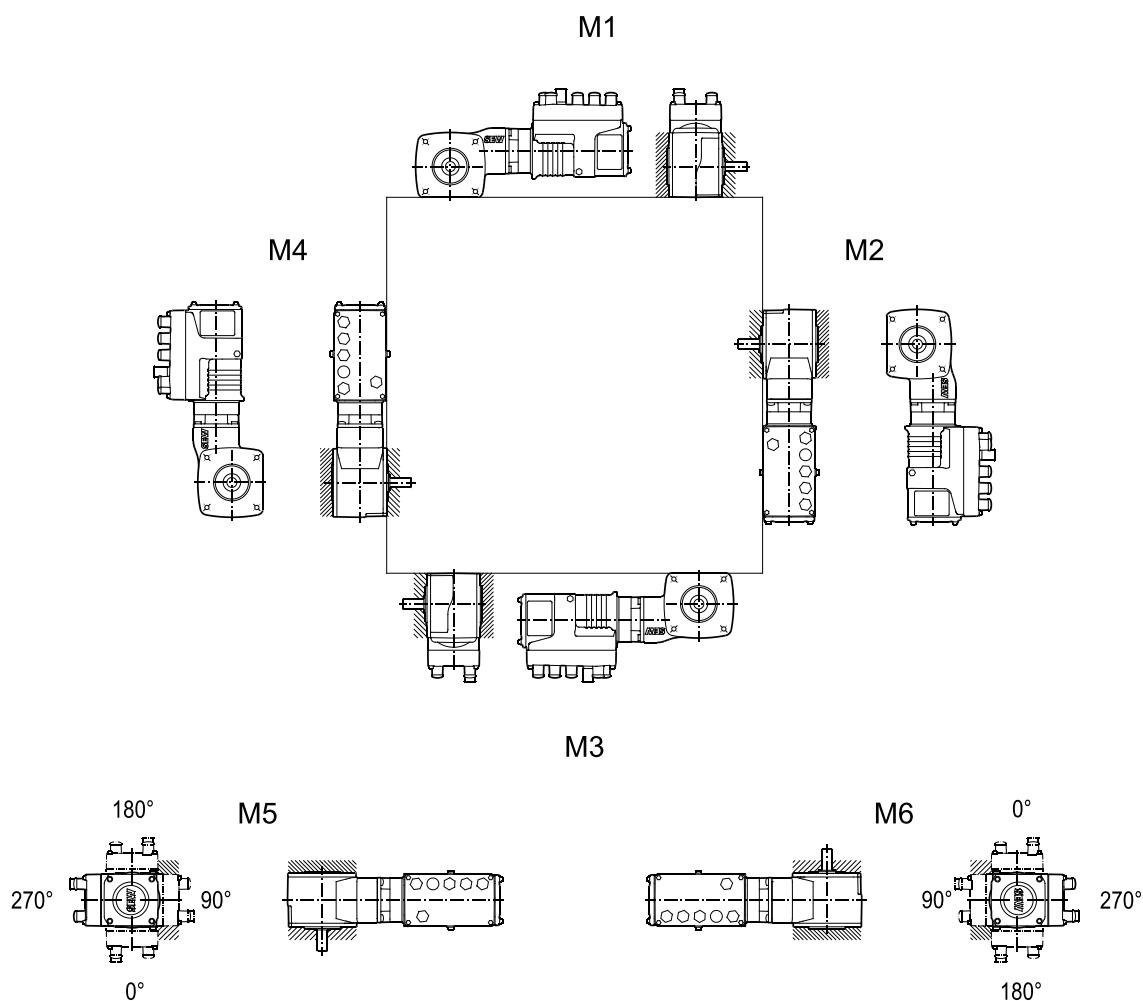
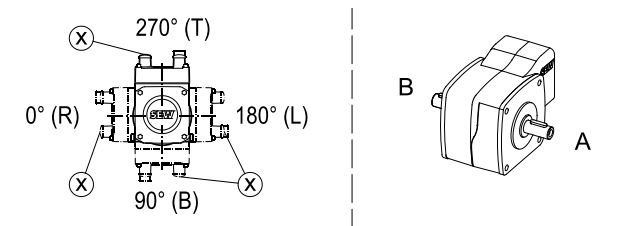
3 Device structure

Mounting positions

Mounting positions SPIROPLAN® right-angle gear units

W.DCA..

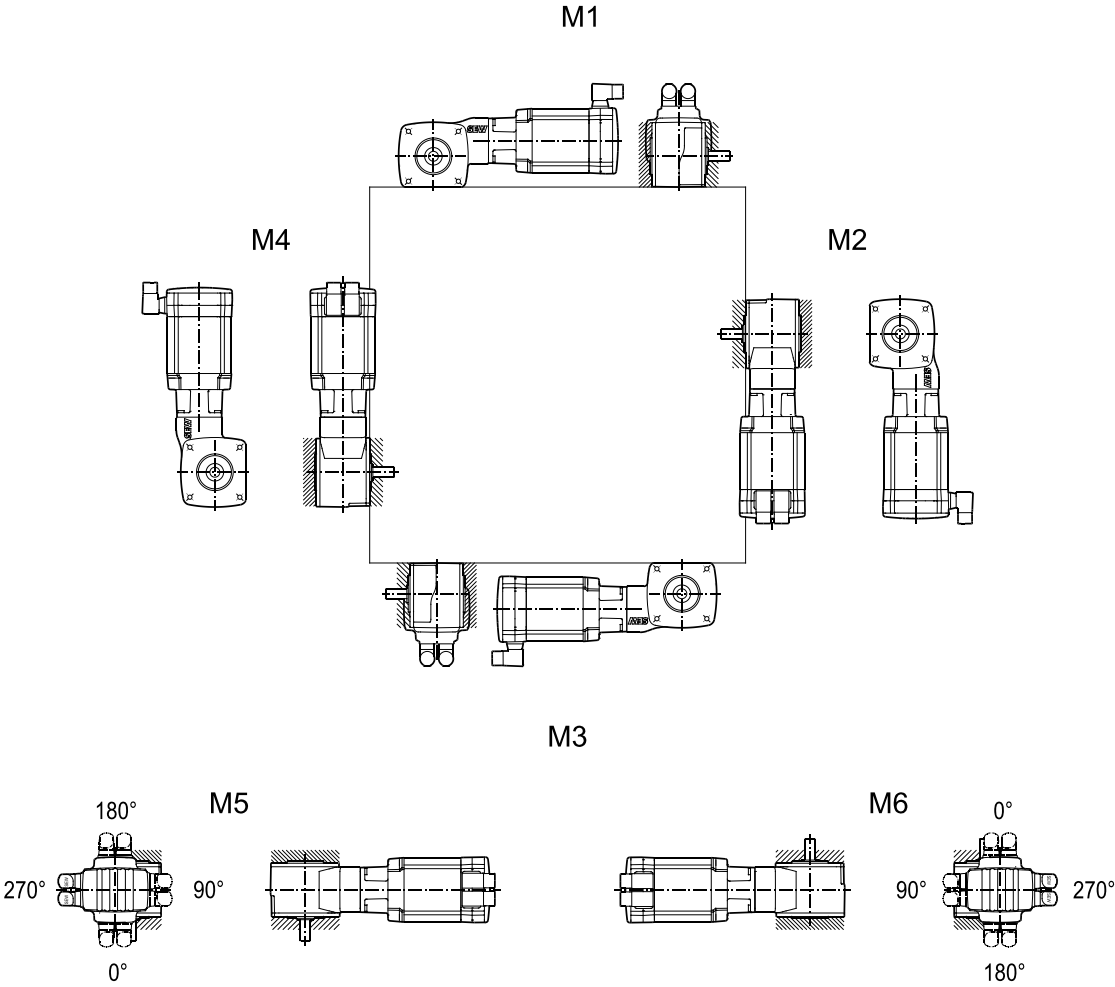
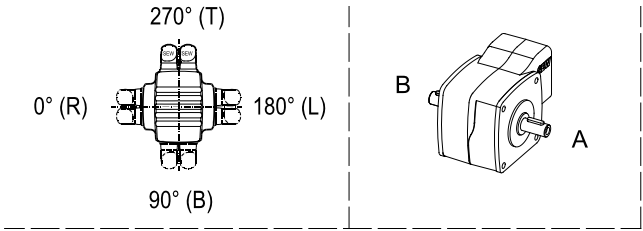
20 001 01 26



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W.CM3C..

20 003 01 26

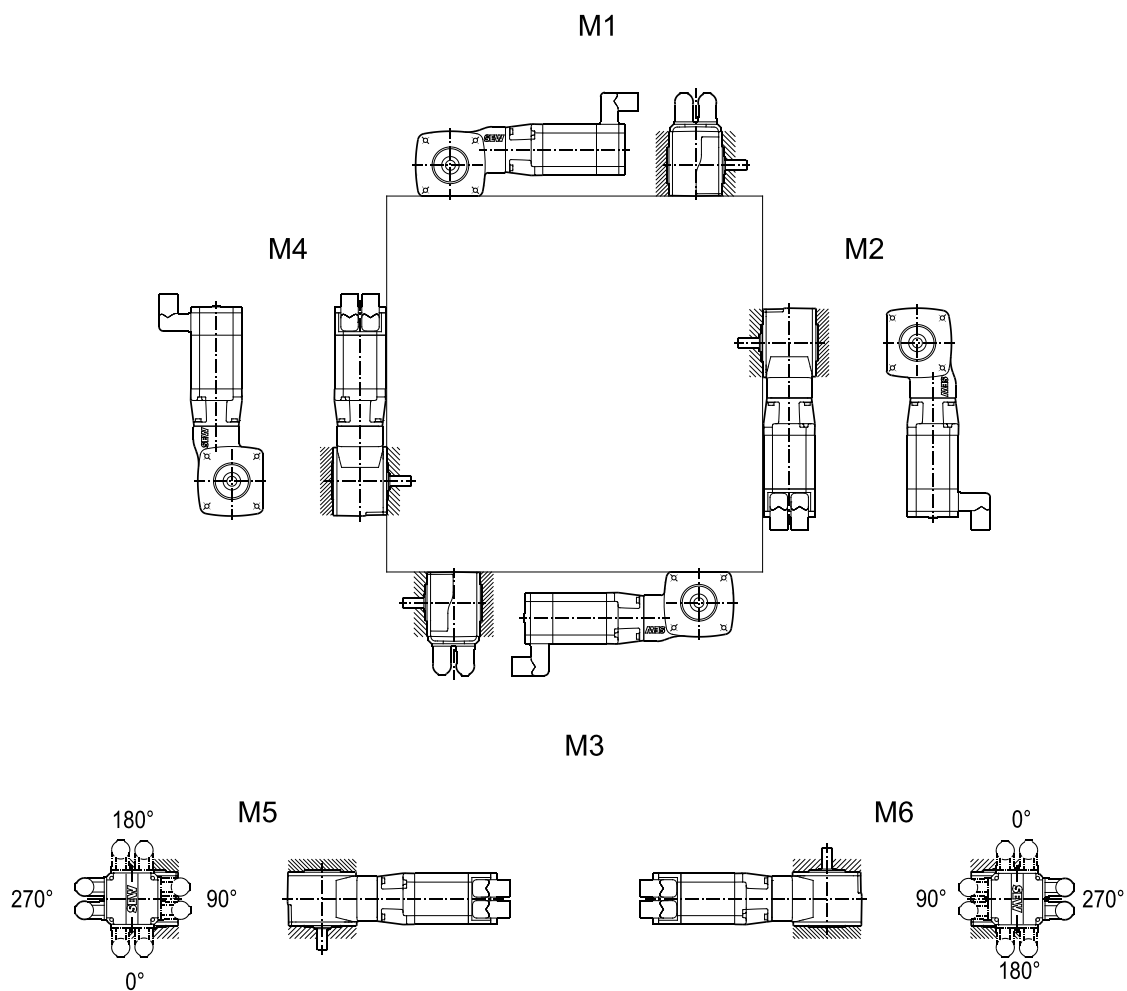
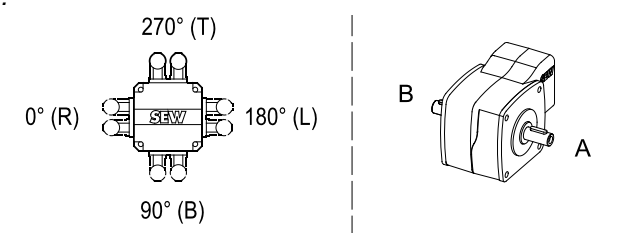


3 Device structure

Mounting positions

W.CMP..

20 002 01 26



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4 Mechanical installation

4.1 Before you start

Observe the following points before installing the device:

- The drive is undamaged (no damage caused by transportation or storage).
- The entries on the nameplate of the gearmotor match the voltage supply system.
- When the drive is installed in abrasive ambient conditions, protect the output end oil seals against wear.
- Motor shaft ends, output shafts, and flange surfaces must be thoroughly cleaned of anti-corrosion agents, contamination, or similar. Use a commercially available solvent for this purpose. The solvent must not get into the bearings or sealing rings as this can damage the material.
- The gear unit/gearmotor is designed for the ambient temperature. For the application limits refer to the technical documentation, the nameplate, or the lubricant table.
- You have ensured that there are no oils, acids, gases, vapors, radiation, etc. present.

For W.0 SPIROPLAN®right-angle gear units:

- Note that no large external mass moments of inertia which could exert a retrodriving load on the gear unit must be present.
- Note the self-locking at η' (retrodriving) < 0.5 .

Calculating η' :

$$\eta' = 2 - 1/\eta$$

4.1.1 Required tools/resources

You require the following tools and resources for mechanical installation:

- Set of wrenches
- Torque wrench for:
 - Gear unit mounting
 - Shrink disks
- Mounting device (recommended)
- Compensation elements (washers, spacing rings), if necessary
- Fasteners for input and output elements
- Lubricant (e.g. NOCO-Paste)
- Thread locking compound for input shaft assembly with centering shoulder (e.g. Loctite® 243)

Standard parts are not included in the delivery.

4.1.2 Installation tolerances

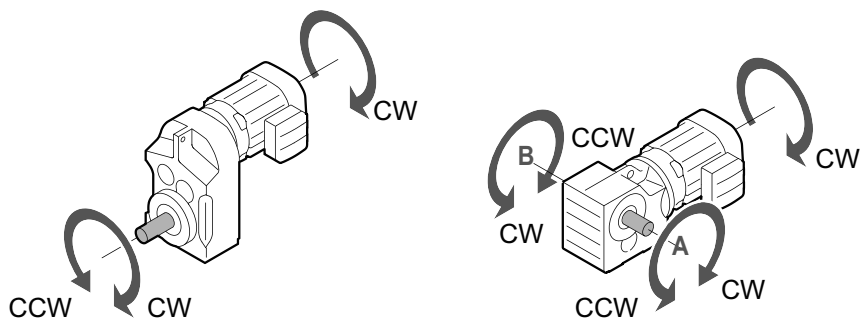
Shaft end	Flange
Diameter tolerance according to DIN 748 • ISO h6 for solid shafts with $\varnothing \leq 24$ mm • ISO k6 for solid shafts with $\varnothing \leq 50$ mm • ISO H7 for hollow shafts • Centering bore according to DIN 332, shape DR	Centering shoulder tolerance for F.02, F.03, W.02, W.03 • ISO h11

4.2 Directions of rotation

4.2.1 Direction of rotation of the output shaft

Standard direction of rotation when looking onto the output shaft of the gear unit:

- CW (clockwise)
Clockwise direction of rotation
- CCW (counterclockwise)
Counterclockwise direction of rotation



4.2.2 Direction of rotation of the gear unit

Shaft position A, B, or AB (shaft output at both ends) is possible for W.. SPIROPLAN® gear units. The direction of rotation is indicated according to the shaft position when looking onto the output end A or B or onto A and B respectively.

The following table specifies the standard direction of rotation for the CW direction of rotation of the motor.

Series	Size	Gear unit stages	Shaft position	Standard direction of rotation when looking onto output shaft ¹⁾
F FL	02, 03, 09	3	—	CCW

1) CW = clockwise; CCW = counterclockwise.

Series	Size	Gear unit stages	Shaft position	Standard direction of rotation when looking onto output shaft ¹⁾	
				View onto output end A	View onto output end B
W	02, 03	1	A	CCW	–
			AB	CCW	CW
			B	–	CW

1) CW = clockwise; CCW = counterclockwise.

4.3 Installing the gear unit



⚠ CAUTION

Risk of injury due to improper installation/disassembly.

Severe injury and damage to property.

- Work on the gear unit only when the machine is in an idle state.
- Secure the drive unit against unintentional power-up.
- Attach an information sign near the ON switch to warn that the gear unit is being worked on.
- Prevent heavy component parts (e.g. shrink disks) against falling during installation/disassembly.



⚠ CAUTION

Risk of injury due to protruding gear unit parts.

Severe injury.

- Keep a sufficient safety distance from the gear unit/gearmotor.



⚠ CAUTION

Health hazard due to dangerous gases, vapors and residue created by heating fluorocarbon rubber to > 200 °C.

Damage to health.

The following gear unit components may contain fluorocarbon rubber: Oil seals, breather valves, screw plugs.

- Make sure that components made of fluorocarbon rubber are not exposed to thermal loads > 200 °C. Remove the components, if necessary.
- Avoid inhaling fluorocarbon rubber gases and vapors as well as skin and eye contact.
- Also avoid contact with cooled fluorocarbon rubber, as dangerous residues form when exposed to a thermal load.

NOTICE

Damage to the gear unit due to cold air currents. Condensed water in the gear unit can cause damage.

Damage to property.

- Protect the gear unit from direct cold air currents.

When setting up the gear unit, make sure that the oil level and drain plugs as well as the breather valves are easily accessible.

Mounting position

The gear unit or the gearmotor may only be installed in the specified mounting position. Observe the information on the nameplate. The W.02 and W.03 SPIROPLAN® right-angle gear units, as well as the F.02 and F.03 parallel-shaft helical gear units are independent of the mounting position.

Support structure

The support structure must have the following characteristics:

- Evenness
- Vibration damping
- Torsionally rigid

The following table shows the maximally permitted flatness defects for foot and flange mounting (guide values based on DIN ISO 1101):

Gear unit size	Flatness defect
02	Max. 0.3 mm
03 – 09	Max. 0.4 mm

4.3.1 Installing the gear unit

Permitted overhung and axial loads

Observe the permitted overhung and axial loads. For the calculation of the permitted overhung and axial loads, refer to the gearmotor catalog, as well as to chapter "Configuration" in the "MOVIMOT® performance ELV" catalog.

Strength class of the screws

Always mount gearmotors using screws of strength class 8.8.

Tightening torques for retaining screws

Mount the gearmotors with the following tightening torques:

Screw/nut	Tightening torque $\pm 15\%$ Strength class 8.8 Nm
M6	12
M8	28
M10	56

Foot-mounted gear units

The following table shows the thread sizes of the foot-mounted gear units depending on the gear unit type and size:

Screw	Gear unit type FL
M8	09

For FL09 gear units with foot mounting, the mounting of parallel pins is mandatory.

Gear units with B14 flange-mounted design and/or hollow shaft

The following table shows the thread sizes of the gear units with B14 flange and/or hollow shaft depending on the gear unit type and size:

Screw	Gear unit type	
	F	W
M6	02/03	02/03

4.3.2 Painting the gear unit

NOTICE

Paint can damage the sealing lips of the oil seals.

Damage to property

- Thoroughly cover the sealing lip of the oil seals with strips prior to painting/re-painting.
- Remove the adhesive strips after painting.

4.4 Gear units with solid shaft

4.4.1 Assembling input and output elements

Mounting is easier if you first apply lubricant to the output element or heat it briefly to 80 °C (max 100 °C).

NOTICE

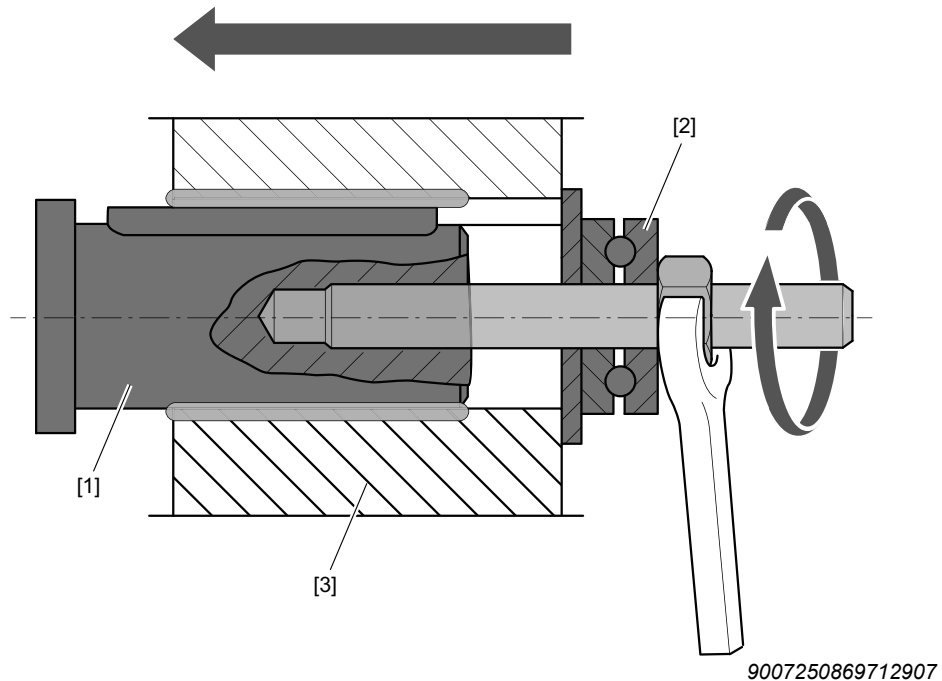
Damage to bearing, housing or shafts due to incorrect mounting.

Possible damage to property.

- Only mount the input and output elements using a mounting device (see chapter "Using a mounting device" (→ 26)). Use the threaded centering bore at the shaft end.
- Never force belt pulleys, couplings, pinions, carrying wheels, etc. onto the shaft end by hitting them with a hammer.
- When installing the belt pulleys, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.
- Make sure the transmission elements are balanced after fitting and do not give rise to any impermissible radial or axial forces. For the permitted values, refer to the "Gearmotors" or "Explosion-Protected Drives" catalog.

Using a mounting device

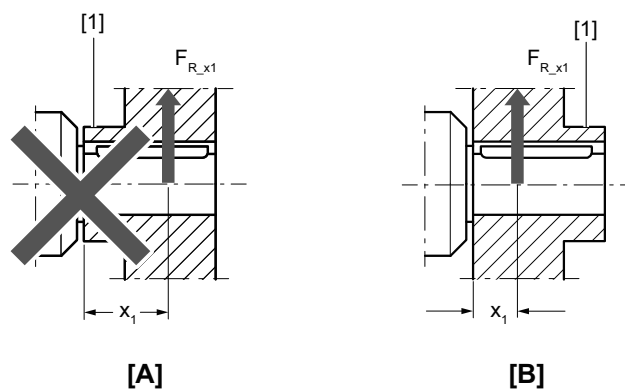
The following figure shows a mounting device for installing couplings or hubs on gear unit or motor shaft ends. If the screw can be tightened without problem, you may be able to do without the thrust bearing on the mounting device.



- [1] Gear unit shaft end [3] Coupling hub
[2] Thrust bearing

Avoiding high radial loads

To avoid high radial loads, mount gear wheels and sprockets according to figure B.



- [1] Hub
[A] Incorrect assembly $F_{R,x1}$ Radial load at position x_1
[B] Correct assembly

4.4.2 Mounting of couplings

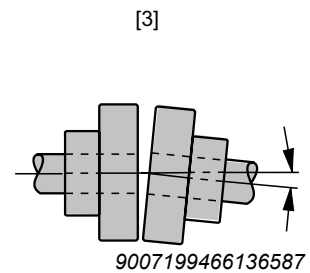
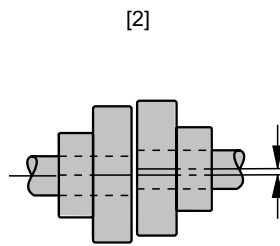
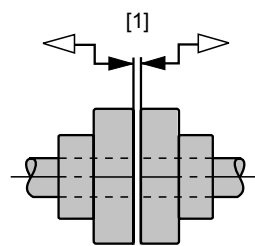
▲ CAUTION

Risk of injury due to moving input and output elements, such as belt pulleys or couplings, during operation.

Risk of jamming and crushing.

- Cover the input and output elements with a touch guard.

When installing couplings, perform the following alignment according to the specifications of the coupling manufacturer:



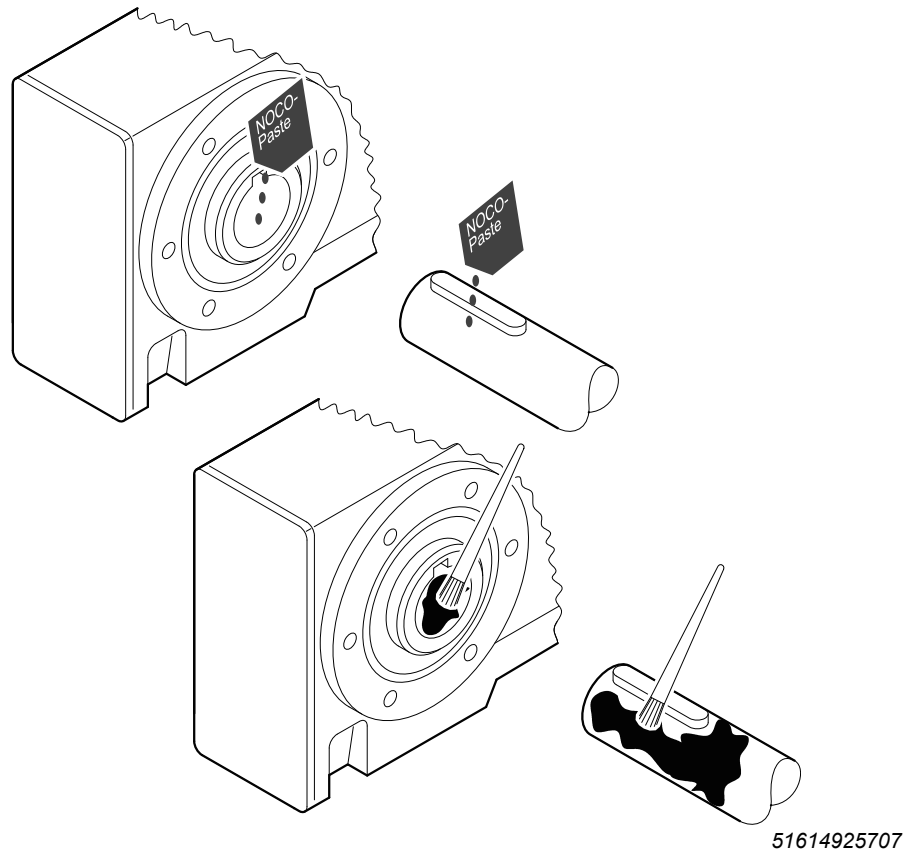
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- 1 Axial misalignment
- 2 Radial misalignment
- 3 Angular misalignment

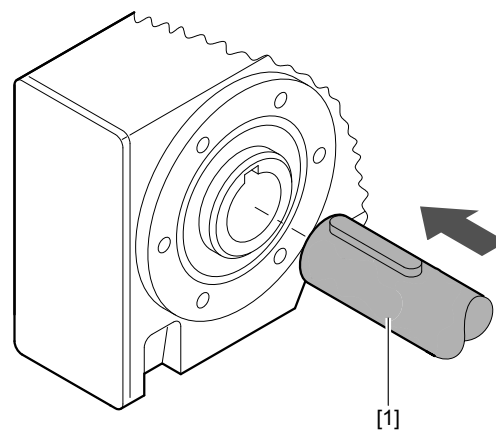
4.5 Shaft-mounted gear units with keyway**4.5.1 Mounting shaft-mounted gear units with keyway**

Proceed as follows:

1. Apply NOCO-Paste. Spread carefully.



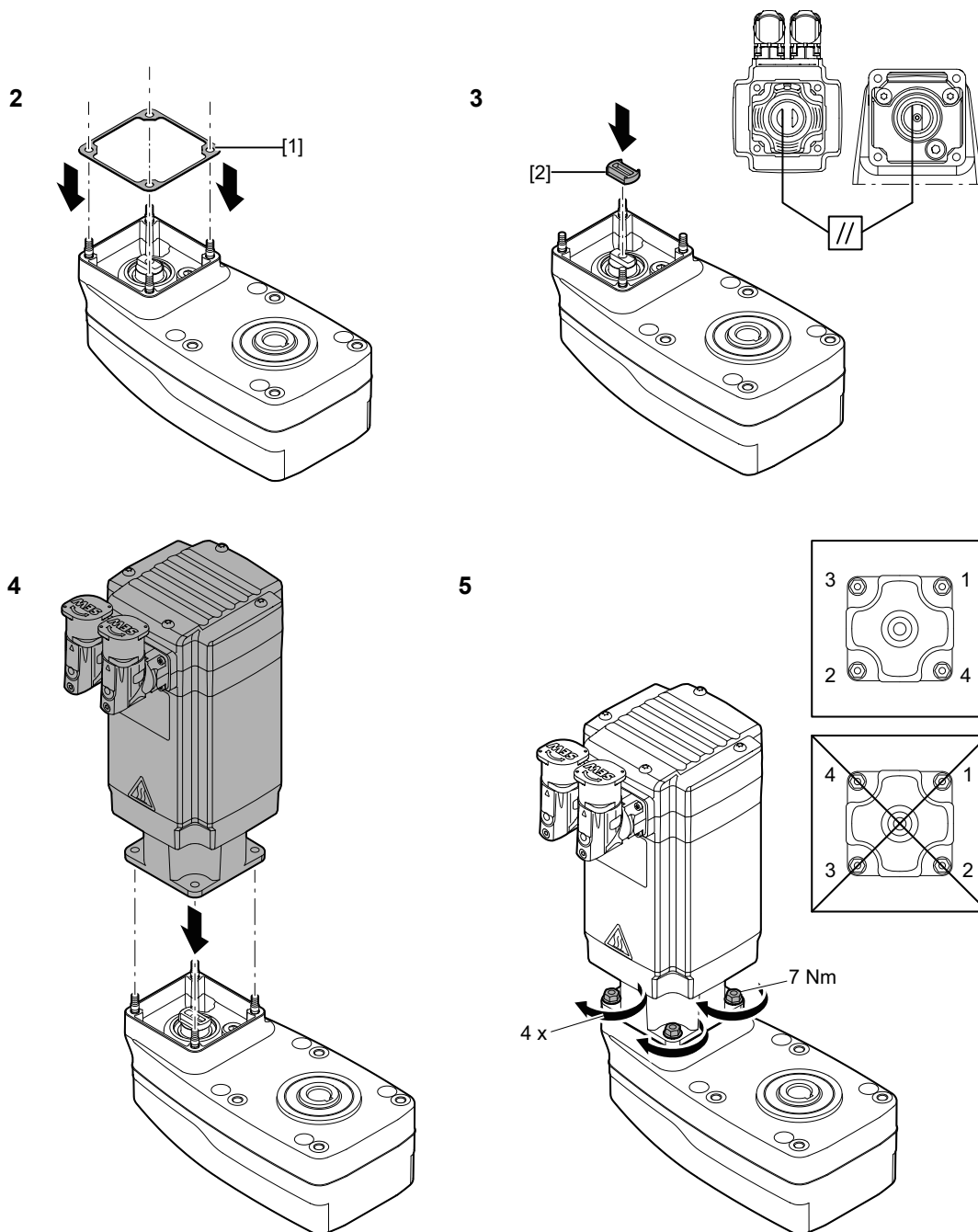
2. Install the shaft and secure it axially. Use a mounting device for easier mounting. Observe the following illustration.



[1] Customer shaft

4.6 Mounting W.0, F.0, and FL09 to CMP, CM3C, CM3P, and DCA motors

1. Clean the coupling half on the motor side and the flange surfaces of the motor and the adapter.
2. Replace the flat gasket [1].
3. Replace the coupling element with the supplied coupling element [2].
4. Mount the motor to the adapter in such a way that the coupling claws of the adapter shaft engage in the coupling element.
5. Tighten the nuts in diametrically opposite sequence according to the figure. Adhere to the tightening torques according to the figure.



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5 Startup

5.1 Before you start

Observe the following points before startup:

- All transport protection has been removed.
- Check that the direction of rotation is correct when in the **uncoupled** state. Listen out for unusual grinding noises as the shaft rotates.
- Secure the key for the test run without output elements.
- Do not deactivate monitoring and protection devices even for a test run.
- Observe the information on the nameplate. Additional data relevant for operation is available in drawings and on the order confirmation.
- After installing the gear unit, check to verify that all retaining screws are tight.
- Make sure that the alignment has not changed after tightening the mounting elements.
- Prior to startup, ensure that rotating shafts and couplings are equipped with suitable protection covers.
- Protect the gear unit from falling objects.

5.2 Inverter-operated gearmotors

Observe the maximum and effective values of project planning during startup of inverter-operated gearmotors. The buyer is obliged to provide the data to the user.

When starting up gear units in combination with controlled motors, activate the "speed" and "torque or current limit" application limit in the frequency inverter. For further details, refer to the respective operating instructions of the motor.

5.3 Pseudo-leakage at shaft seals

Due to the operating principle, seals of moving sealing surfaces on shaft feedthroughs cannot be completely tight because a lubricating film forms during operation. The lubricating film between the shaft and the sealing lip minimizes heat development and wear on the sealing system and provides the prerequisites for the intended service life. The optimum sealing properties are achieved after the run-in phase.

5.4 Helical-worm gear units and W.. SPIROPLAN® right-angle gear units

5.4.1 Run-in period

SPIROPLAN® gear units require a run-in period of at least 48 hours before reaching their maximum efficiency. If the gear unit is operated in both directions of rotation, a separate run-in time applies for each direction of rotation. The table shows the average power reduction during the run-in time.

W.02/W.03	
i range	η reduction
Approx. 35 – 75	Approx. 15%

W.02/W.03	
i range	η reduction
Approx. 20 – 35	Approx. 10%
Approx. 10 – 20	Approx. 8%
Approx. 8	Approx. 5%
Approx. 6	Approx. 3%

6 Operation

6.1 Malfunctions and remedies



⚠ WARNING

Risk of injury if the drive starts up unintentionally.

Death or severe injuries

- Disconnect the drive from the power supply before starting work.
- Prevent the drive from starting up unintentionally (e.g. by locking the key switch or removing the fuses from the current supply) and attach a warning sign that prohibits switching on the drive.



⚠ WARNING

Risk of burns due to hot gear unit and hot gear unit lubricant.

Severe injury.

- Allow the gear unit to cool before commencing work.
- Carefully remove the oil level plug and the oil drain plug.

NOTICE

Damage to the gear unit/gearmotor due to improper installation.

Damage to the gear unit/gearmotor.

- Repair work on SEW-EURODRIVE drives must only be performed by qualified specialists. In the context of this documentation, qualified specialists are persons who are familiar with the "Technical regulations on operating safety" (TRBS).
- Drive and motor may only be disconnected by qualified specialists.
- Contact SEW-EURODRIVE.

6.1.1 Gear units

Fault	Possible cause	Measure
Unusual, regular running noise	• Meshing/grinding noise: Bearing damage • Knocking noise: Irregularity in the gearing • Deformation of the housing upon tightening • Noise generation caused by insufficient rigidity of the gear unit foundation	• Check the oil consistency; change bearings • Contact SEW-EURODRIVE. For a better assessment of the failure, send an audio recording of the noise • Check the gear unit mounting for possible deformation and correct if necessary • Reinforce the gear unit foundation
Unusual, irregular running noises	• Foreign objects in the oil	• Check the oil consistency • Stop the drive, contact SEW-EURODRIVE

Fault	Possible cause	Measure
Oil leaking from gear unit cover	• Seal of the gear unit cover leaking	• Tighten the screws of the gear unit cover and observe the gear unit. Contact SEW-EURODRIVE if oil is still leaking
	• Seal defective	• Contact SEW-EURODRIVE
Small amounts of oil leak from the oil seal during run-in phase	• Function-related pseudo-leakage	• There is no failure. Remove with a soft, lint-free cloth and keep monitoring it.
Film of moisture around the dust lip of the oil seal	• Function-related pseudo-leakage	• There is no failure. Remove with a soft, lint-free cloth and keep monitoring it.
Oil leaking from oil seal	• Oil seal leaking/defective	• Check sealing system. It may be necessary to consult SEW-EURODRIVE
Oil leaking from motor (e.g. terminal box or fan)	• Too much oil	• Check oil level, correct if necessary
	• Gear unit not ventilated	• Vent gear unit
	• Oil seal leaking/defective	• Check sealing system. It may be necessary to consult SEW-EURODRIVE
Oil leaking from flange	• Flange gasket leaking/defective	• Check sealing system. It may be necessary to consult SEW-EURODRIVE
	• Too much oil	• Check oil level, correct if necessary
	• Gear unit not ventilated	• Vent gear unit
Oil emerging from breather valve	• Too much oil	• Check oil quantity, correct if necessary
	• Function-related oil mist	• There is no failure.
	• Drive not installed in proper mounting position	• Install breather valve correctly and adjust the oil level.
	• Frequent cold starts (oil foams) and/or high oil level	• Install oil expansion tank
Output shaft does not turn although the motor is running or the input shaft is rotated	• Shaft-hub connection in the gear unit interrupted	• Send in the gear unit/gearmotor for repair

7 Service

7.1 SEW-EURODRIVE Service

If you are unable to rectify a fault, contact SEW-EURODRIVE Service. For addresses, refer to www.sew-eurodrive.com.

When contacting SEW-EURODRIVE Service, always specify the following information so that our service personnel can assist you more effectively:

- Information on the nameplate (e.g. type designation, serial number, part number, product key, purchase order number)
- Brief description of the application
- Error message on the status display
- Type of fault
- Accompanying circumstances
- Unusual events preceding the problems

7.2 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel, or cast iron
- Stainless steel
- Aluminum
- Copper
- Plastics
- Zinc

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately:

- Oil and grease

Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.

8 Inspection/maintenance

8.1 Before you start

Observe the following points before inspection/maintenance:

- De-energize the drive before starting work.
- Secure the drive against unintended power-up.
- Before releasing any shaft connections, make sure there is no active torsional torque present that could lead to tension within the system.
- Let the unit cool down sufficiently before you start working on it.
- Carefully remove the oil level plug and the oil drain plug.
- Do not mix synthetic lubricants and mineral lubricants.
- Do not mix different synthetic lubricants.
- Do not clean the device with a high-pressure cleaning device.
- Prevent foreign particles from entering into the gear unit during maintenance and inspection work.
- Observe the inspection and maintenance intervals to ensure operational safety.
- Always perform a safety and functional check following any maintenance and repair work.

8.2 Wearing parts

Gearing

If you observe the SEW-EURODRIVE design criteria and the inspection and maintenance intervals, then the gearing components of the gear units will be wear-free after the run-in period.

Rolling bearings

Rolling bearings in the gear unit, adapter, and input shaft assembly have a limited service life, even under ideal operating conditions. This nominal bearing service life is a solely statistical value. The actual service life of an individual bearing may deviate greatly from this value. The main influencing factors are:

- Speed
- Equivalent bearing load
- Operating temperature
- Lubricant (type, viscosity, additives, pollution)
- Lubricant supply of the bearing
- Misalignment under operating load

The rolling bearings must therefore be inspected regularly. Observe the corresponding inspection and maintenance intervals in chapter "Inspection intervals/maintenance intervals" (→ 36).

For information on the nominal bearing service life under certain operating conditions, contact SEW-EURODRIVE.

Lubricants

Lubricants are subject to aging. Their service life is limited depending on the operating conditions.

Oil seals

The service life depends largely on the oil operating temperature.

Oil seals are contact seals that seal unit housings at emerging elements, such as shafts, from the environment. Oil seals are wear parts with a service life that is influenced by the following factors, among others:

- Shaft speed and circumferential speed at the sealing lip
- Ambient conditions (temperature, dust, humidity, pressure, chemicals, radiation)
- Lubricant (type, viscosity, additives, pollution)
- Surface quality of the sealing
- Lubricant supply of the sealing
- Oil seal material

Due to the various influencing factors, it is not possible to predict the service life. Therefore the oil seals must be inspected regularly. Observe the corresponding inspection and maintenance intervals in chapter "Inspection intervals/maintenance intervals" (→ 36).

**Cam ring/
Coupling ring**

The couplings used in the W.02, W.03, F.02, and F.03 gear units are designed to be positive, puncture-proof and low-maintenance claw couplings. They have an impact and vibration-absorbing cam ring. The service life is determined by the following factors, among others:

- Ambient conditions (temperature, chemicals, radiation)
- Operational conditions (switching frequency, impact characteristics)

8.3 Inspection intervals/maintenance intervals

The following table shows the time intervals to be observed and the corresponding measures:

• Every 3000 operating hours, at least every 6 months	• Check running noise for possible bearing damage. • Visual inspection of the seals for leakage.
---	---

F.0, W.0, and FL09 gear units are lubricated for life. A scheduled oil change is not necessary.

8.4 Inspection/maintenance of the gear unit**8.4.1 Replacing the oil seal****⚠ WARNING**

Risk of injury if preloaded shaft connections are loosened.

Severe or fatal injuries.

- Before releasing any shaft connections, make sure there is no active torsional torque present that could lead to tension within the system.

NOTICE

Damage to oil seal due to mounting below 0 °C.

Damage to oil seal.

- Store oil seals at an ambient temperature above 0 °C.
- If necessary, heat the oil seal slightly before mounting it.

Proceed as follows:

1. Make sure that there is a sufficient amount of grease between the dust lip and the sealing lip, depending on the design.
2. If you use double oil seals, fill the space to one-third with grease.

8.4.2 Painting the gear unit**NOTICE**

Paint can damage the sealing lips of the oil seals.

Damage to property

- Thoroughly cover the sealing lip of the oil seals with strips prior to painting/re-painting.
- Remove the adhesive strips after painting.

8.4.3 Reassembly

Note that the thread is already in the gear unit housing during reassembly with the self-tapping screw. Therefore, screw the screw into the thread by hand with approx. two turns and retighten it with a torque wrench according to the table.

Impulse wrenches and impact wrenches are not permitted.

The tightening torques correspond to a metric ISO screw with strength class 8.8.

8.5 Lubricants

Unless a special arrangement has been made, SEW-EURODRIVE supplies the drives with a lubricant fill adapted for the specific gear unit and mounting position. The decisive factor is the specification of the mounting position when ordering the drive. You must adapt the lubricant fill to any subsequent changes made to the mounting position. For quantity information, refer to chapter "Lubricant fill quantities" (→ 45).

8.5.1 Bearing greases

The gear unit rolling bearings are given a factory-fill with the greases described below.

The table shows the lubricants recommended by SEW-EURODRIVE:

Area of application	Ambient temperature	Manufacturer	Type
Standard	-40°C to +80°C	SEW-EURODRIVE	Grease HL 2 E1 ¹⁾
		Fuchs	Renolit CX-TOM 15 ¹⁾
		Klüber	Petamo GHY 133 N

Area of application	Ambient temperature	Manufacturer	Type
 2)	-40°C to +40°C	SEW-EURODRIVE	Grease HL 2 H1 E1
 3)	-20°C to +40°C	Fuchs	Plantogel 2S

1) Bearing grease based on semi-synthetic base oil.

2) Lubricant for the food processing industry.

3) Easily biodegradable lubricant for environmentally sensitive areas.

8.5.2 Lubricant table

NOTICE

Damage to the gear unit due to improper lubricants.

Possible damage to property.

- Do not mix synthetic lubricants.
- Do not mix synthetic lubricants and mineral lubricants.

The lubricant recommendation provided in the lubricant table in no way represents a guarantee as to the quality of the lubricant delivered by each respective supplier. Each lubricant manufacturer is responsible for the quality of their product.

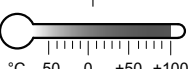
Oils of the same viscosity class from different manufacturers do not have the same characteristics. In particular, the minimum and maximum permitted oil bath temperatures are manufacturer-specific. These temperatures are specified in the lubricant tables.

The oil viscosity and type (mineral/synthetic) to be used are determined by SEW-EURODRIVE specifically for each order. This information is noted in the order confirmation and on the gear unit's nameplate. If you use other lubricants for the gear units and/or use the lubricants at temperatures outside the recommended temperature range, SEW-EURODRIVE does not assume liability.

The values specified in the lubricant tables apply as of the time of printing of this document. The data of the lubricants are subject to dynamic change on the part of the lubricant manufacturers. For the latest information about the lubricants, visit: **www.sew-eurodrive.de/lubricants**.

To avoid gear unit damage, use only one lubricant type.

Information on the table structure

[1]	[2]	[3]
R.. 	 °C -50 0 +50 +100 -15 +40 -25 +30	ISO, SAE NLGI VG 460
	 CLP HC - NSF H1 - PSS	VG 220
	[4]	[5]

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- [1] Gear unit type
- [2] Ambient temperature range
- [3] Viscosity class
- [4] Information about special approvals
- [5] Lubricant type

The specified ambient temperatures are guide values for selecting a suitable lubricant. The exact upper and lower temperature limits for project planning are specified in the table with the respective trade name. Bear in mind during project planning that the viscosity increases at low temperatures and that this might influence the starting behavior.

Information on the various lubricants

		[3]
[1]	-15	+80 [4]
[2]	XYZ108	
	SEW070030014	[5]

- [1] Lowest oil sump temperature in °C, going below this value during operation is not permitted.
- [2] Trade name
- [3] Manufacturer
- [4] Highest oil sump temperature in °C. The service life will be considerably reduced when this temperature is exceeded.
- [5] Approvals regarding compatibility of the lubricant with approved oil seals

F.0, W.0, and FL09 gear units are lubricated for life. A scheduled oil change is not necessary.

Lubricant compatibility with oil seals

Approval	Explanation
SEW07004__13:	A lubricant especially recommended with regard to compatibility with the approved oil seals. The lubricant exceeds the state-of-the-art requirements regarding elastomer compatibility.

In the low temperature range, oil seals can withstand shaft deflections (e.g. through overhung load) only to a limited extent. Take special care to avoid or limit pulsating and changing radial displacements of the shaft. Contact SEW-EURODRIVE if necessary.

Oil seal Material class	Permitted Oil sump temperature
NBR	-40°C to +80°C
FKM	-25°C to +115°C
FKM-PSS	-25°C to +115°C

Limitations of use of oil seals with the specific lubricant are described in the following table:

Material class			Manufacturer		Material	
S	1	NBR	1	Freudenberg		72 NBR 902
			2	Trelleborg		4NV11
	2	FKM	1	Freudenberg	1	75 FKM 585
					2	75 FKM 170055
			2	Trelleborg	1	VCBVR
			3	SKF	1	FKM 00934

Examples:

S11: Only the elastomer 72NBR902 from Freudenberg meets the approval requirements in conjunction with the specific lubricant.

S2: Only the elastomer FKM meets the approval requirements in conjunction with the specific lubricant.

Key

The following table shows the symbols and abbreviations used in the lubricant table and their meaning.

Abbreviation/symbol	Meaning
	Synthetic lubricant (marked gray)
	Mineral lubricant
CLP	Mineral oil
CLP PG	Polyglycol (PG)
rPCF	Reduced Product Carbon Footprint
CLP HC	Synthetic hydrocarbons – polyalphaolefins (PAO)
E	Ester-based oil
	Lubricant for the food processing industry and feed industry. Oils are NSF-H1 registered and compliant in accordance with FDA 21 CFR § 178.3570.
	Lubricants with particularly reduced CO ₂ footprint (cradle-to-gate) with sustainable raw materials
	Lubricants with good bio-degradability for environmentally sensitive areas (> 60% according to OECD 301 or according to appendix A of EPA 2013 VGP)
1)	Helical-worm gear units with CLP-PG: Contact SEW-EURODRIVE.
2)	Low-viscosity grease
3)	With appropriate measures, the gear units can be operated at ambient temperatures as low as -40 °C. Contact SEW-EURODRIVE.
4)	Oils for the food processing industry cannot be combined with the gear unit option "Extended storage" (a VCI anti-corrosion agent is added).
RWDR	Oil seal
PSS	Oil seal of the Premium Sine Seal type. The addendum "PSS" for the lubricant type indicates compatibility with the sealing system.
SPC	Special product classification: Observe the safety data sheet for product classification. Separate handling is required.

Lubricant table for F02–F03 gear units

The lubricant table is valid on the day this document is published. Refer to www.sew-eurodrive.de/lubricants for the latest tables.

Observe the thermal application limit of the oil seal materials under "Lubricant compatibility with oil seals" (→ 40).

[3] °C -15 0 +50 +100	[1]	[2]	ISO, SAE NLGI	SEW EURODRIVE	brenner & leguit	Castrol	FUCHS	Mobil	KILBER LUBRICATION	Shell	SINOPEC	TotalEnergies
[4] -15		CLP	VG 220	GearOil Base 220 E1/US1/CN1/BR1 SEW 070040313		Optigear BM 220 SEW 070040313	Rendolin CLP 220 Plus SEW 070040313	Mobilgear 600 XP 220 SEW 070040313	Kilberoil GEM 1-220 N SEW 070040313	Shell Omala S2 GX Plus 220 SEW 070040313	AP-SGO 220 SEW 070040313	Carter EP 220 -15 +80
-20			VG 150	GearOil Base 150 E1/US1/CN1/BR1 SEW 070040313		Optigear BM 150 SEW 070040313	Rendolin CLP 150 Plus SEW 070040313	Mobilgear 600 XP 150 SEW 070040313	Kilberoil GEM 1-150 N SEW 070040313	Shell Omala S2 GX Plus 150 SEW 070040313	AP-SGO 150 SEW 070040313	Carter EP 150 -20 +80
[4] -25		CLP PG	VG 220	GearOil Poly 220 E1/CN1 SEW 070040313		Optigear Synthetic 800/220 SEW 070040313	Rendolin PG 220 SEW 070040313	Mobil Glygole 220 SEW 070040313	Kilbersynth GH 6-220 SEW 070040313	Shell Omala S4 WE 220 SEW 070040313		Carter SY 220 -25 +115
-30			VG 150	GearOil Poly 150 E1/CN1 SEW 070040313				SPC	Kilbersynth GH 6-150 SEW 070040313			
-25		CLP PG rPCF	VG 220	GearOil Poly 220 E1 SEW 070040313								
[4] -25			VG 220	GearOil Poly 220 H1 E1 SEW 070040313					Kilbersynth UH1 6-220 SEW 070040313			
-20		CLP PG NSF H1	VG 460	GearOil Poly 460 H1 E1 SEW 070040313					Kilbersynth UH1 6-460 SEW 070040313			
-30			VG 150	GearOil Poly 150 H1 E1 SEW 070040313					Kilbersynth UH1 6-150 SEW 070040313			

F02-F03



- [1] Information about special approvals
[2] Oil type

- [3] Ambient temperature range
[4] Standard

Lubricant table for FL09 gear units

The lubricant table is valid on the day this document is published. Refer to www.sew-eurodrive.de/lubricants for the latest tables.

Observe the thermal application limit of the oil seal materials under "Lubricant compatibility with oil seals" (→ 40).

[3] °C -25 0 +50 +100	[4]	[1]	[2]	ISO, SAE NLGI	SEW EURODRIVE	b tremer & leguit	Castrol	FUCHS	Mobil	KUBER LUBRICATION	Shell	SINOPEC	TotalEnergies
-25	+60	CLP PG (PSS)	CLP PG (PSS)	VG 220	GearOil Poly 220 E1/CN1 SEW 070040313					-25 +100 Kübersynth GH 6-220			
-20	+80	CLP PG (PSS)	CLP PG (PSS)	VG 460	GearOil Poly 460 E1/CN1 SEW 070040313					-20 +115 Kübersynth GH 6-460			
-30	+40	CLP PG (PSS)	CLP PG (PSS)	VG 150	GearOil Poly 150 E1/CN1 SEW 070040313					-30 +85 Kübersynth GH 6-150			
-25	+40	CLP PG NSF H1 ⁴⁾ (PSS)	CLP PG NSF H1 ⁴⁾ (PSS)	VG 220	GearOil Poly 220 H1 E1 SEW 070040313					-25 +80 Kübersynth UH1 6-220 SPC			
-20	+70	CLP PG NSF H1 ⁴⁾ (PSS)	CLP PG NSF H1 ⁴⁾ (PSS)	VG 460	GearOil Poly 460 H1 E1 SEW 070040313					-20 +110 Kübersynth UH1 6-460 SPC			
-30	+20	CLP PG NSF H1 ⁴⁾ (PSS)	CLP PG NSF H1 ⁴⁾ (PSS)	VG 150	GearOil Poly 150 H1 E1 SEW 070040313					-30 +65 Kübersynth UH1 6-150 SPC			

FL 9



- [1] Information about special approvals
[2] Oil type

- [3] Ambient temperature range
[4] Standard

Lubricant table for W02–W03 gear units

The lubricant table is valid on the day this document is published. Refer to www.sew-eurodrive.de/lubricants for the latest tables.

Observe the thermal application limit of the oil seal materials under "Lubricant compatibility with oil seals" (→  40).

W02 W03 												
[3] temperature °C	[1]	[2] CLP PG (PSS)	ISO SAE NLGI	SEW EURODRIVE	Castrol	FUCHS	Mobil	KLÜBER LUBRICATION	Shell	SINOPEC	TotalEnergies	
[4] -20			VG 460	GearOil Poly 460 WE1								
				SEW 070040313								
-20			VG 460	GearOil Poly 460 H1 E1								
				SEW 070040313								
[4] -25			VG 220	GearOil Poly 220 H1 E1								
				SEW 070040313								
-30			VG 150	GearOil Poly 150 H1 E1								
				SEW 070040313								

[1] Information about special approvals

[2] Oil type

[3] Ambient temperature range

[4] Standard

8.5.3 Lubricant fill quantities

The following tables show the lubricant fill quantities in relation to mounting positions M1 to M6.

Parallel shaft helical (F) gear units

F.., FA..B, FH..B, FV..B

F.02 and F.03 parallel-shaft helical gear units have a universal design and are filled with the same quantity of oil regardless of the mounting position.

FL09 gear units are only available in mounting position M6.

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F.02	0.15					
F.03	0.25					
FL09	–					0.28

SPIROPLAN® right-angle gear units (W..)

W..

SPIROPLAN® right-angle gear units W.02 and W.03 have a universal design and are filled with the same quantity of oil regardless of the mounting position.

Gear unit	Fill quantity in liters					
	M1	M2	M3	 2	 3	M5
W.02	0.08					
W.03	0.18					

9 Contacting SEW-EURODRIVE

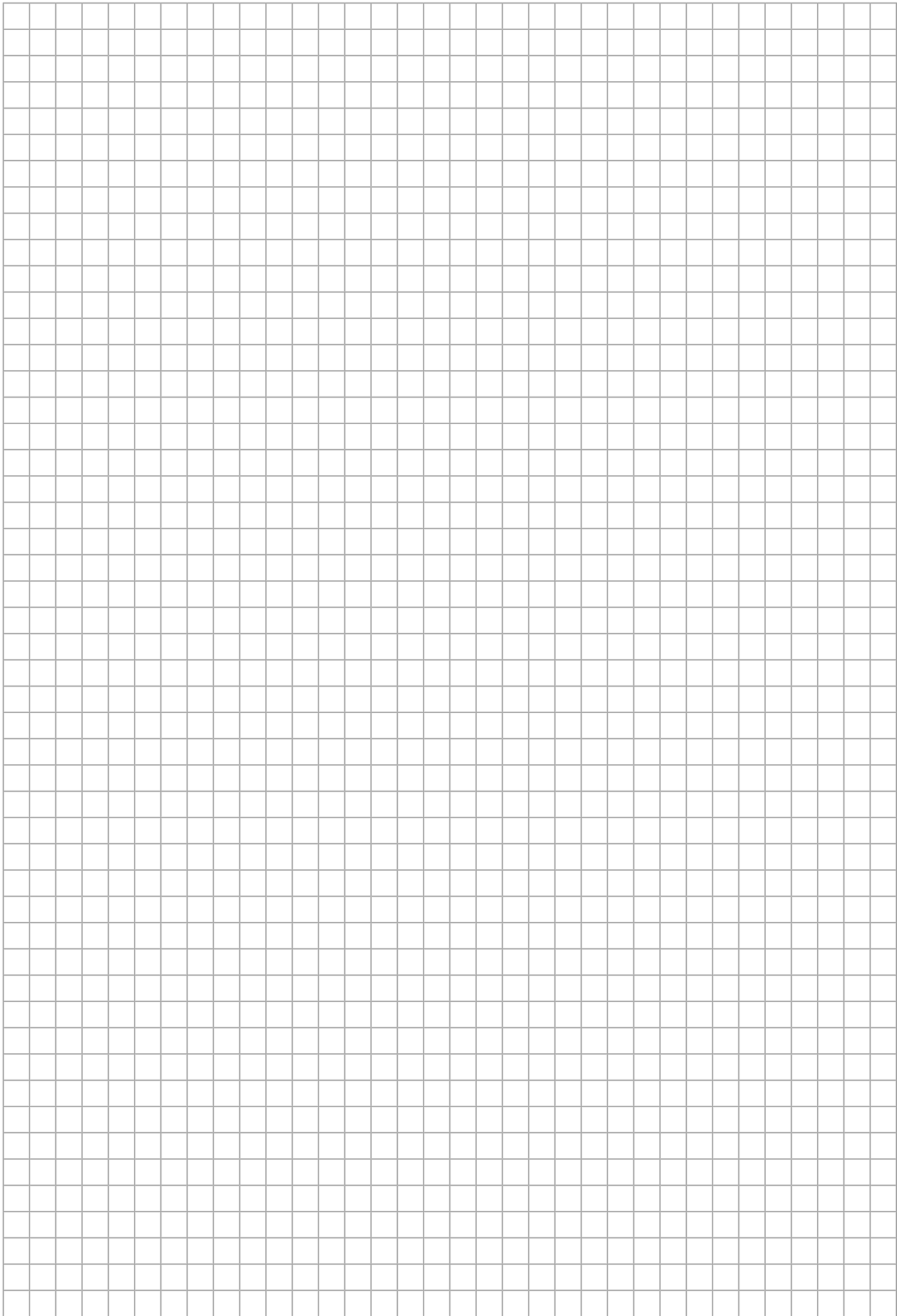
You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

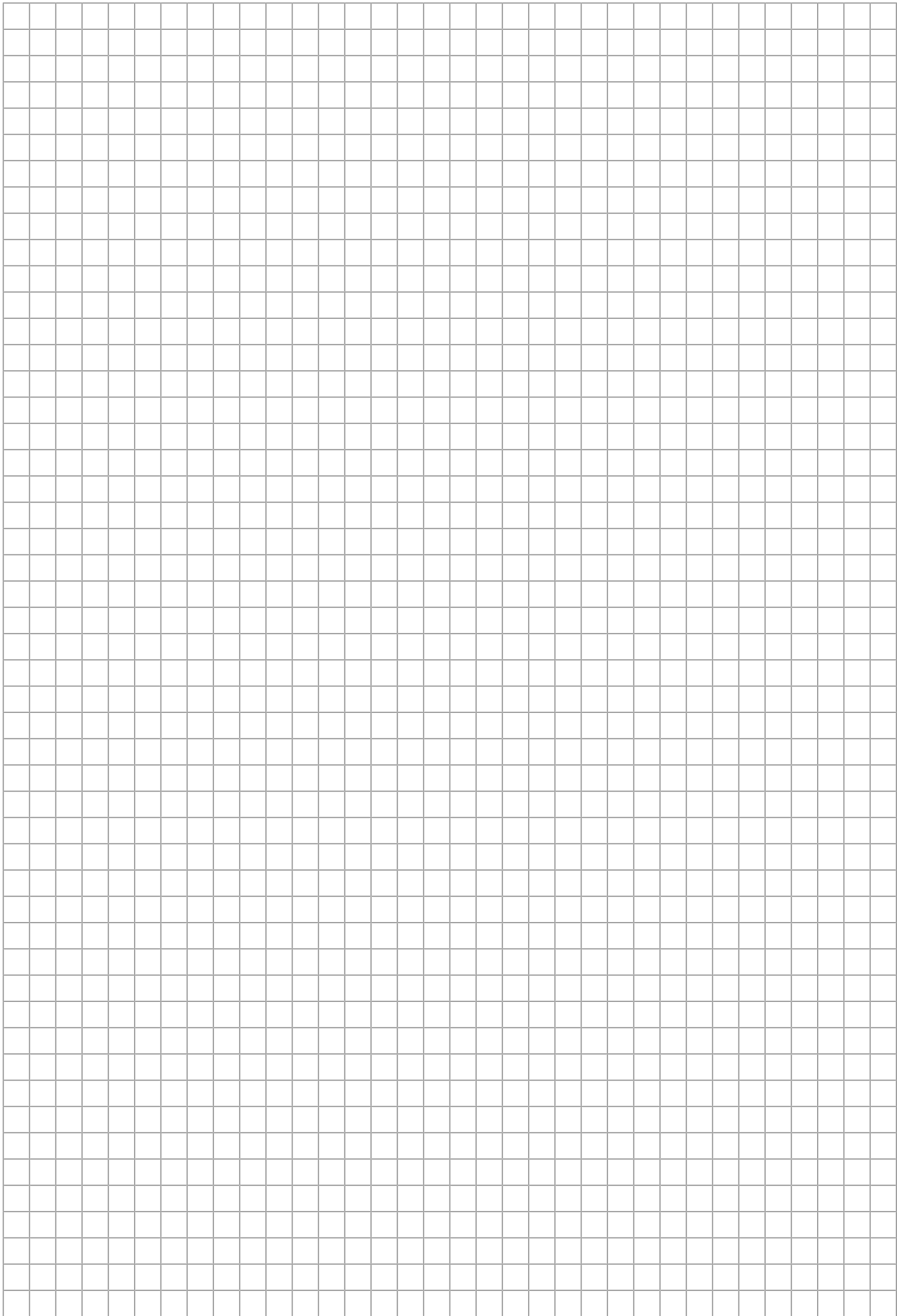
<https://www.sew-eurodrive.de/contacts-worldwide>

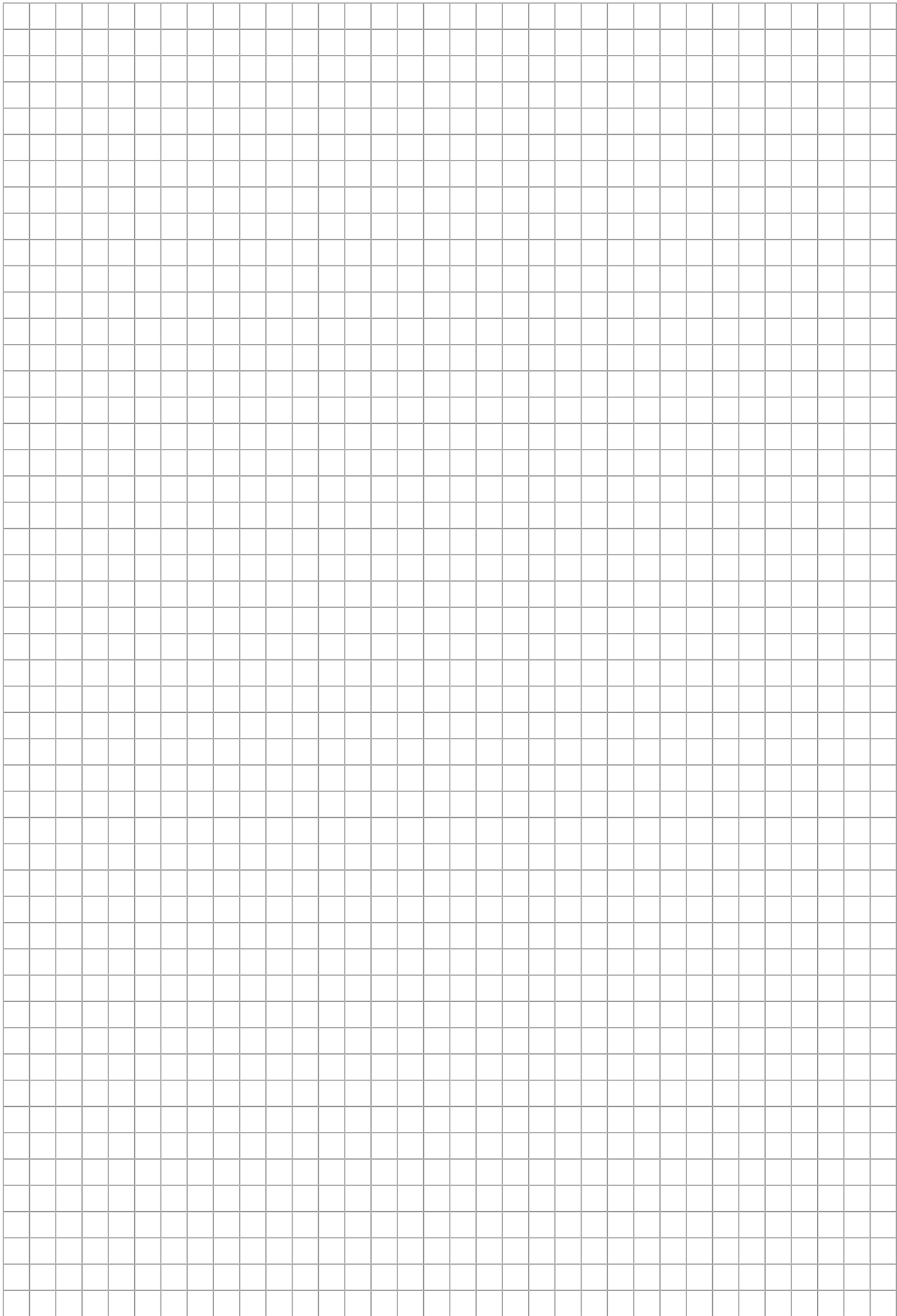


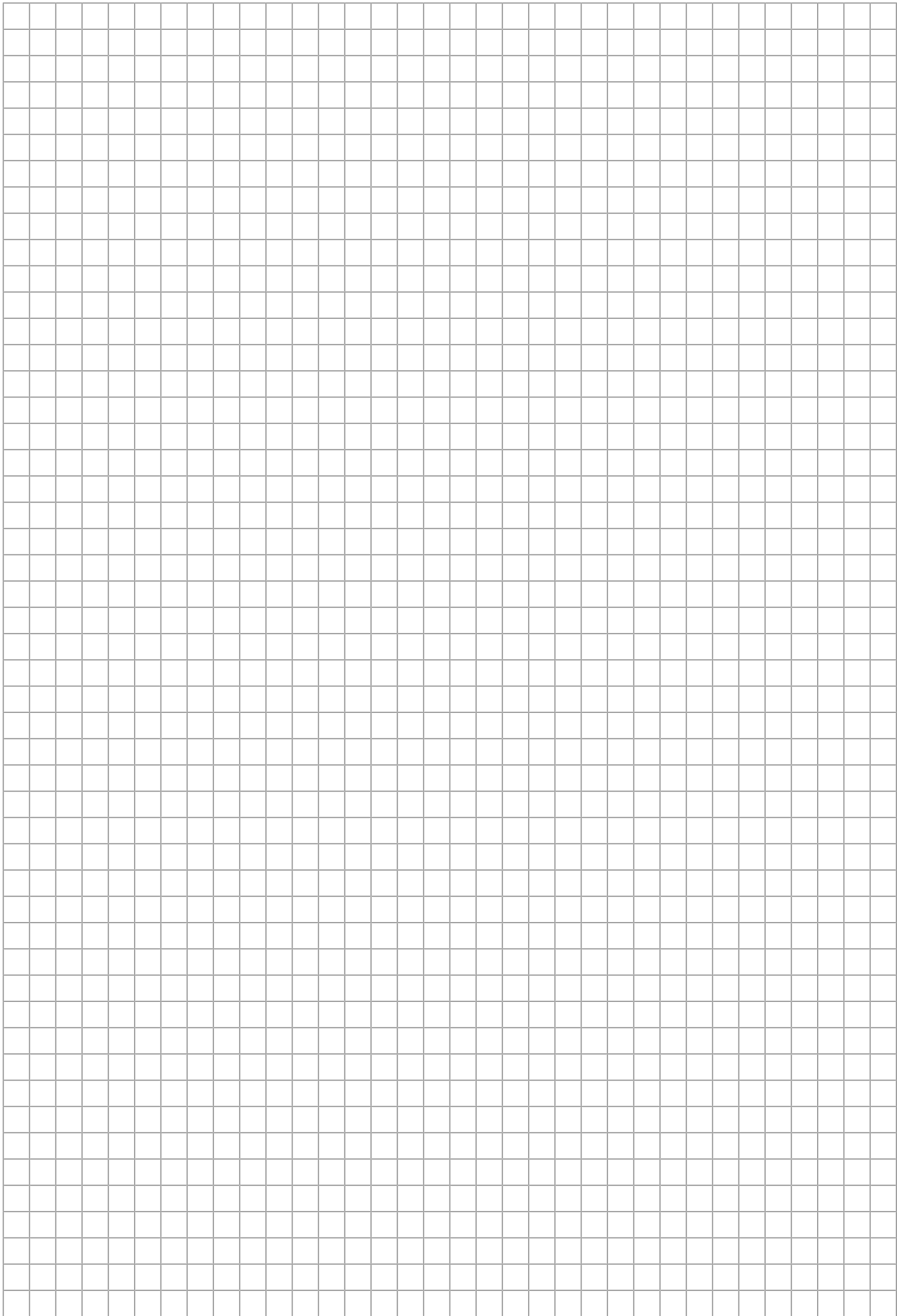
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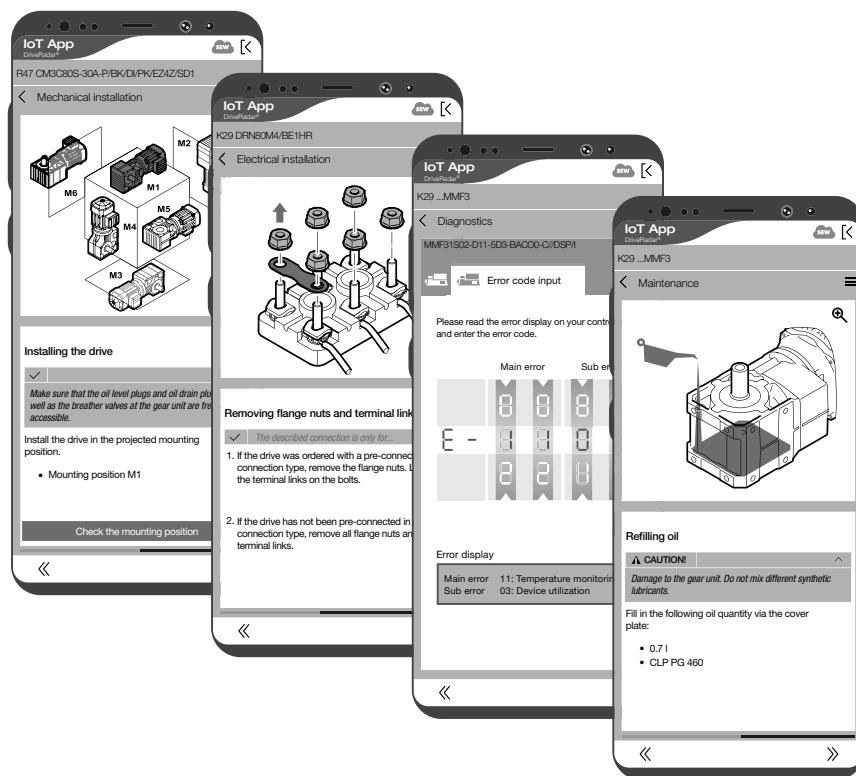












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