

2 Product description

2.1 Product features

2.1.1 Operating temperature

Gear units and gearmotors from SEW-EURODRIVE can be operated in a wide range of ambient temperatures. The following standard temperature ranges are permitted for filling the gear units according to the lubricant table:

Gear unit	Filled with	Permitted standard temperature range
K..19, K..29	CLP(PG) VG460	-20 °C to +60 °C
K..37 – 187, R and F	CLP(CC) VG220	-15 °C to +40 °C
S	CLP(CC) VG680	0 °C to +40 °C
W	CLP(SEW-PG) VG460	-20 °C to +40 °C

The nominal data of the gear units and gearmotors specified in the catalog refer to an ambient temperature of +25 °C.

Gear units and gearmotors from SEW-EURODRIVE can be operated outside the standard temperature range if project planning is adapted to ambient temperatures from as low as up to -40 °C in the intensive cooling range until up to +60 °C. Project planning must take special operating conditions into account and adapt the drive to the ambient conditions by selecting suitable lubricants and seals.

This kind of project planning is generally recommended for increased ambient temperatures as of size 97 and for helical-worm gear units with small gear ratios. SEW-EURODRIVE will gladly carry out this project planning for you.

If the drive is to be operated on a frequency inverter, you must also consider the project planning notes for the inverter and take into account the thermal effects of inverter operation.

2.1.2 Installation altitude

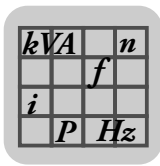
Due to the low air density at high installation altitudes, heat dissipation on the surface of motors and gear units decreases. The rated data listed in the catalog applies to an installation altitude of maximum 1000 m above sea level. Installation altitudes of more than 1000 m asl must be taken into account for project planning of gear units and gearmotors.

2.1.3 Power and torque

The power and torque ratings listed in the catalogs refer to mounting position M1 and similar mounting positions in which the input stage is not completely submerged in oil. In addition, the gearmotors are assumed to be standard versions with standard lubrication and under normal ambient conditions.

2.1.4 Speeds

The quoted output speeds of the gearmotors are recommended values. You can calculate the rated output speed based on the rated motor speed and the gear unit ratio. Please note that the actual output speed depends on the motor load and the supply system conditions.



2.1.5 Noise

The noise levels of all SEW-EURODRIVE gear units, motors and gearmotors are well within the maximum permitted noise levels set forth in the VDI guideline 2159 for gear units and IEC/EN 60034 for motors.

2.1.6 Painting

The gear units, motors and gearmotors from SEW-EURODRIVE are painted as follows:

Gear unit	Painting according to standard 1843
R, F, K, S, W gear units	Blue/gray RAL 7031

Special paints are available on request.

2.1.7 Heat dissipation and accessibility

The gearmotors / brakemotors must be mounted on the driven machine in such a way that both axially and radially, there is enough space left for unimpeded air admission and heat dissipation, for maintenance work on the brake and, if required, for the MOVIMOT® inverter. Please also refer to the notes in the motor dimension sheets.

2.1.8 Weight

Please note that the weight information shown in the catalogs excludes the oil fill for the gear units and gearmotors. The weight varies according to gear unit design and gear unit size. The lubricant fill depends on the mounting position, which means that in this case no universally applicable information can be given. Refer to the "Design and operating notes / lubricants" chapter for recommended lubricant fill quantities depending on the mounting position. For the exact weight, refer to the order confirmation.

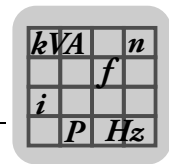
2.1.9 Reduced backlash variant

Helical, parallel-shaft helical and helical-bevel gear units with reduced backlash are available as of gear unit size 37. The circumferential backlash of these gear units is considerably less than that of the standard versions so that positioning tasks can be solved with great precision. The circumferential backlash is specified in angular minutes in the technical data. The circumferential backlash for the output shaft is specified without load (max. 1% of the rated output torque); the gear unit input end is blocked. For further information, refer to chapter "Design and operating notes / Reduced backlash gear units".

2.1.10 Multi-stage gearmotors

You can achieve particularly low output speeds by using multi-stage gear units or multi-stage gearmotors. This requires a helical gear unit on the input end as a second gear unit.

It may be necessary to limit the motor power to match the maximum permitted output torque of the gear unit.



2.1.11 RM gear units, RM gearmotors

RM gear units and RM gearmotors are a special type of helical gear units with an extended output bearing hub. They were designed especially for agitating applications and allow for high overhung and axial loads and bending moments. The other data are the same as for standard helical gear units and standard helical gearmotors. You find special project planning notes for RM gearmotors in the "Project planning/RM gear units" chapter.

2.1.12 SPIROPLAN® right-angle gearmotors

SPIROPLAN® right-angle gearmotors are robust, single- and two-stage right-angle gearmotors with SPIROPLAN® gearing. The difference to the helical-worm gear units is the material combination of the steel-on-steel gearing, the special tooth meshing relationships and the aluminum housing. As a result, the SPIROPLAN® right-angle gearmotors are wear-free, very quiet-running and lightweight.

The particularly short design and the aluminum housing make for very compact and lightweight drive solutions.

The wear-free gearing and lifetime lubrication make for long periods of maintenance-free operation. The identical hole spacing in the foot and face as well as the same shaft height to both makes for a number of mounting options.

Two different flange diameters are available. On request, SPIROPLAN® right-angle gearmotors can be equipped with a torque arm.

2.1.13 Brakemotors

On request, motors and gearmotors can be supplied with an integrated mechanical brake. The SEW-EURODRIVE brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. Due to its operating principle, the brake is applied if the power fails. It meets the basic safety requirements. The brake can also be released mechanically if equipped with manual brake release. For this purpose, the brake is supplied with either a hand lever with automatic reset or an adjustable setscrew. The brake is controlled by a brake controller that is either installed in the motor wiring space or in the control cabinet.

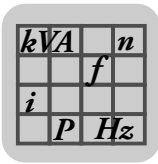
A characteristic feature of the brakes is their extremely short design. The brake bearing end shield is a part of both the motor and the brake. The integrated construction of the SEW-EURODRIVE brakemotor permits particularly compact and sturdy solutions.

2.1.14 International markets

On request, SEW-EURODRIVE supplies UL registered motors or CSA certified motors with connection conditions according to CSA and NEMA standard.

On request, SEW-EURODRIVE supplies UL registered MOVIMOT® drives with connection conditions according to NEMA standards.

For the Japanese market, SEW-EURODRIVE offers motors conforming to JIS standard. Contact your sales representative to assist you in such cases.



2.1.15 Components on the input side

The following components on the input side are available for gear units from SEW-EURODRIVE:

- **Input covers with input shaft extension, optionally with**
 - Centering shoulder
 - Backstop
 - Motor mounting platform
- **Adapter**
 - For mounting IEC or NEMA motors with the option of a backstop
 - For mounting servomotors with a square flange
 - With torque limiting safety couplings and speed or slip monitor
 - With hydraulic start-up coupling, also available with disk brake or backstop

2.1.16 Swing base

A swing base is a drive unit consisting of helical-bevel gear unit, hydraulic centrifugal coupling and electric motor. The complete arrangement is mounted to a rigid mounting rail.

Motor swings are available with the following optional accessories:

- Torque arm
- Mechanical thermal monitoring unit
- Contactless thermal monitoring unit

2.2 Corrosion and surface protection

2.2.1 General information

SEW-EURODRIVE offers various optional protective measures for operating motors and gearmotors under special ambient conditions.

The protective measures comprise two groups:

- Corrosion protection KS for motors
- Surface protection OS for motors and gear units

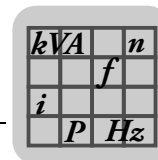
For motors, optimum protection is offered by a combination of corrosion protection KS and surface protection OS.

Special optional protective measures for the output shafts are also available.

2.2.2 KS corrosion protection

KS corrosion protection for motors comprises the following measures:

- All retaining screws that are loosened during operation are made of stainless steel.
- The nameplates are made of stainless steel.
- Various motor parts are coated with a finishing varnish.
- The flange contact surfaces and shaft ends are treated with a temporary anti-corrosion agent.
- Additional measures for brakemotors.



A sticker labeled "KORROSIONSSCHUTZ" (corrosion protection) on the fan guard indicates that special treatment has been applied.





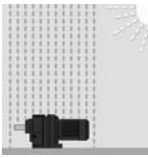
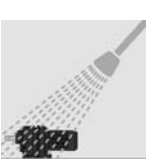
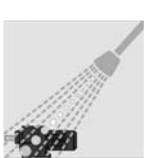
INFORMATION

The following motor options are not available with KS corrosion protection:

- Forced cooling fan /V
- Shaft-centered encoders /ES, /ES7, /EG, /EG7, /EV7, /AS, /AS7, /AG, /AG7, /AV7

2.2.3 OS surface protection

In addition to the standard surface protection, motors and gear units are available with surface protection OS1 to OS4. The special measure "Z" is also available in addition. Special measure "Z" means that large contour recesses are filled with rubber before painting.

Surface protection, ¹⁾²⁾	Ambient conditions	Sample applications
Standard 	Suitable for machines and systems in buildings and rooms indoors with neutral atmospheres. Similar to corrosivity category ³⁾ : • C1 (negligible)	<ul style="list-style-type: none"> • Machines and systems in the automobile industry • Transport systems in logistics • Conveyor belts at airports
OS1 	Suitable for environments prone to condensation and atmospheres with low humidity or contamination, such as applications outdoors under roof or with protection. According to corrosivity category ³⁾ : • C2 (low)	<ul style="list-style-type: none"> • Systems in saw mills • Hall gates • Agitators and mixers
OS2 	Suitable for environments with high humidity or moderate atmospheric contamination, such as applications outdoors subject to direct weathering. According to corrosivity category ³⁾ : • C3 (moderate)	<ul style="list-style-type: none"> • Applications in amusement parks • Funiculars and chair-lifts • Applications in gravel plants • Systems in nuclear power plants
OS3 	Suitable for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasionally acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt load. According to corrosivity category ³⁾ : • C4 (high)	<ul style="list-style-type: none"> • Sewage treatment plants • Port cranes • Mining applications
OS4 	Suitable for environments with permanent humidity or severe atmospheric or chemical contamination. Regular acidic and caustic wet cleaning, also with chemical cleaning agents. According to corrosivity category ³⁾ : • C5-1 (very high)	<ul style="list-style-type: none"> • Drives in malting plants • Wet areas in the beverage industry • Conveyor belts in the food industry

1) Motors/brakemotors in degree of protection IP56 or IP66 are only available with OS2, OS3, or OS4 surface protection.
 2) Gearmotors with surface protection OS2 - OS4 are only offered in combination with KS corrosion protection for motors.
 3) According to DIN EN ISO 12944-2, classification of ambient conditions



2.2.4 Special protection measures

Gearmotor output shafts can be treated with special optional protective measures for operation subject to severe environmental pollution or in particularly demanding applications.

Measures	Protection principle	Suitable for
Fluorocarbon rubber oil seal	High quality material	Drives subject to chemical contamination
Coating on output shaft end	Surface treatment on the contact surface of the oil seal	Severe environmental impact and in conjunction with fluorocarbon rubber oil seal
Output shaft made of stainless steel	Surface protection with high-quality material	Particularly demanding applications in terms of surface protection

2.2.5 NOCO® fluid

As standard, SEW-EURODRIVE supplies NOCO® fluid corrosion protection and lubricant with every hollow shaft gear unit. Use NOCO® fluid when installing hollow shaft gear units. Using this fluid helps prevent contact corrosion and makes it easier to disassemble the drive at a later time. NOCO® fluid is also suitable for protecting machined metal surfaces that do not have corrosion protection, such as parts of shaft ends or flanges. You can also order larger quantities of NOCO® fluid from SEW-EURODRIVE.

NOCO® fluid is food grade according to USDA-H1. The food-grade NOCO® fluid has a corresponding NSF-H1 label on the packaging.

2.3 Extended storage

2.3.1 Type

You can also order gear units designed for "extended storage". SEW-EURODRIVE recommends the extended storage type for storage periods longer than 9 months.

The lubricant of gear units for extended storage is mixed with a VCI anti-corrosion agent (volatile corrosion inhibitors). Please note that this VCI anti-corrosion agent is only effective in a temperature range of -25 °C to +50 °C. The flange contact surfaces and shaft ends are also treated with an anti-corrosion agent. If not specified otherwise in your order, the gear unit with "extended storage" option will be supplied with OS1 surface protection. Instead of OS1, you can order OS2, OS3 or OS4.

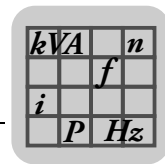
Surface protection	Suitable for
OS1	Low environmental impact
OS2	Medium environmental impact
OS3	High environmental impact
OS4	Very high environmental impact



INFORMATION

The gear units must remain tightly sealed until taken into operation to prevent the VCI corrosion protection agent from evaporating.

The gear units come with the oil fill according to the specified mounting position (M1 – M6). Always check the oil level before you take the gear unit into operation.



2.3.2 Storage conditions

Observe the storage conditions specified in the following table for extended storage:

Climate zone	Packaging ¹⁾	Storage ²⁾	Storage duration
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones)	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap.	Under roof, protected against rain and snow, shock-free.	Up to 3 years with regular checks of the packaging and moisture indicator (rel. humidity < 50%).
	Open	Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 50 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors, no shocks.	2 years or more with regular inspections. Check for cleanliness and mechanical damage during inspection. Check corrosion protection.
Tropical (Asia, Africa, Central and South America, Australia, New Zealand excluding temperate zones)	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap. Protected against insect damage and mildew by chemical treatment.	Under roof, protected against rain and shocks.	Up to 3 years with regular checks of the packaging and moisture indicator (rel. humidity < 50%).
	Open	Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 50 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors, no shocks. Protected against insect damage.	2 years or more with regular inspections. Check for cleanliness and mechanical damage during inspection. Check corrosion protection.

- 1) The packaging must be carried out by an experienced company using the packaging materials that have been explicitly specified for the particular application.
- 2) SEW-EURODRIVE recommends to store the gear units according to the mounting position.

2.4 Condition monitoring: Oil aging sensor

2.4.1 DUO10A diagnostic unit

The diagnostic unit consists of a temperature sensor and the actual evaluation unit. The service life curves of the oil grades common in SEW gear units are stored in the evaluation unit. SEW-EURODRIVE can customize any oil grade in the diagnostic unit. Standard parameterization is performed directly on the evaluation unit. During operation, the evaluation unit uses the oil temperature to continuously calculate the remaining service life in days until the next oil change. The remaining service life is displayed directly on the evaluation unit. The end of the service life can also be transferred to a higher-level system via a binary signal and be evaluated or visualized there.

Using the DUO10A diagnostic unit, the system operator no longer has to replace the oil within predefined intervals, but can adapt the replacement interval individually to the actual load. The benefits are reduced maintenance and service costs, and increased system availability.

2.5 Oil expansion tank

The oil expansion tank allows the lubricant or air space of the gear unit to expand. This means no lubricant can escape the breather valve at high operating temperatures.

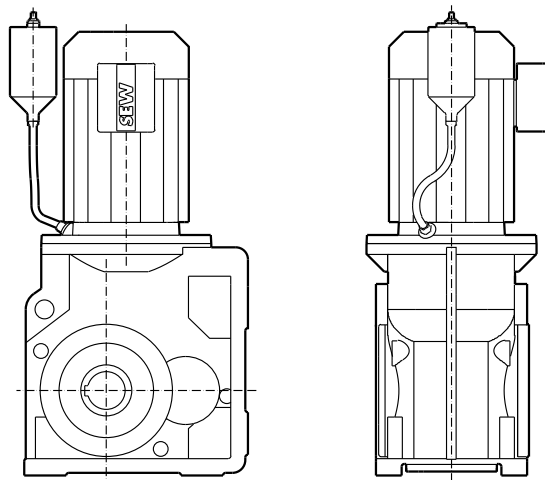
SEW-EURODRIVE recommends to use oil expansion tanks for gear units and gearmotors in M4 mounting position and for input speeds > 2000 rpm.



Product description

Explosion protection according to ATEX

The following figure shows the oil expansion tank:



The oil expansion tank is provided as assembly kit. It is intended for mounting onto the gearmotor. However, if installation space is limited or if the expansion tank is intended for gear units without motor, it can be mounted to nearby machine parts.

For further information, please contact your SEW-EURODRIVE sales representative.

2.6 Explosion protection according to ATEX

2.6.1 Area of application

EU directive 94/9/EC or ATEX lays down new regulations for explosion protection in all types of devices for the European market. This means the directive also applies to gear units. Since July 1, 2003, EU directive 94/9/EC has been applicable without restrictions to the use of gearmotors and motors within the European Union. Other European countries, such as Switzerland, have fallen in with this regulation since.

2.6.2 Scope

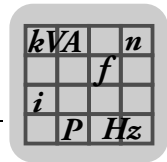
SEW-EURODRIVE supplies explosion-proof gear units in accordance with the corresponding ATEX directive. This also applies to options and accessories in explosion-proof design.

Depending on their features and dimensions, explosion-proof gear units are suitable for:

- Potentially explosive gas atmosphere, zone 1 or 2.
- Potentially explosive dust atmosphere, zone 21 or 22.

SEW-EURODRIVE supplies gearmotors and motors in the following categories for use in zones 1, 21, 2, and 22:

- II2G
- II2D
- II3GD
- II3D



Stand-alone gear units with components on the input side are available in the following categories:

- Gear units with AM adapter and input shaft assembly for use in zones 1, 21, 2 and 22
 - II2GD
- Gear units with AR adapter for use in zones 2 and 22
 - II3GD

AT adapters and drives on a swing base are not available according to ATEX regulation.

2.6.3 Other documentation

For detailed information about explosion-proof SEW-EURODRIVE products, refer to the "Explosion-Proof Drives" catalog and the "Explosion-Proof AC Motors" catalog.