2 Product description

2.1 Product features

2.1.1 Operating temperatures

Gear units

The following standard temperature ranges are permitted for filling the gear units according to the lubricant table:

Gear units	Filled with	Permitted standard temperature range
K..19, K..29, K..39, K..49	CLP(PG) VG460	-20 °C to +40 °C
K..37 , K..47, K..57– K..187 **RX.57 – RX.107** **R.07 – R.167** **F..27 – F..157**	CLP(CC) VG220	-15 °C to +40 °C
S..37 – S..97	CLP(PG) VG680	0 °C to +40 °C
W..10 – W..30, W..37, W..47	CLP(SEW-PG) VG460	-20 °C to +40 °C

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

INFORMATION

For information on churning losses and thermal rating, refer to chapter "Churning losses and thermal rating" (→ 🗎 49).

Gear units 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.

SEW-EURODRIVE recommends thermal project planning for the drives in general and offers to perform the project planning.

Motors

The motors of the DR.. product family are designed for use in a temperature range from -20 °C to +40 °C.

This expands the standardized temperature range required by IEC 60034.

Using the motors outside the above temperature range is possible with some special adjustments. Contact SEW-EURODRIVE in this case.

INFORMATION

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

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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 > 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 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 reduction 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 units	Painting
R, F, K, S, W gear units	blue/gray RAL 7031

Exception: SPIROPLAN® W..10DR2S5 gearmotors have an aluminum housing and are supplied unpainted as standard.

Special paintings are available on request.

2.1.7 Surface and anti-corrosion protection

If required, all gear units, motors and gearmotors from SEW-EURODRIVE can also be supplied with surface protection for applications in extremely humid and chemically aggressive environments.

2.1.8 Heat dissipation and accessibility

Make sure to maintain adequate distance from heat-sensitive components when installing gearmotors/geared brakemotors to the driven machine. The distance is necessary for air circulation for the heat dissipation, for maintenance of the brake and of the MOVIMOT® inverter, if installed.

Please also observe to the notes in the motor dimension sheets in the "AC Motors" catalog.

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2.1.9 Weights

Please note that the weight information shown in the catalogs only apply to the gear units and gearmotors without lubricant. The weight varies according to gear unit design and gear unit size. The lubricant fill depends on the mounting position selected, which means that in this case no universally applicable information can be given. Refer to the chapter "Lubricant fill quantities" (→ 🗎 122) for recommended lubricant fill quantities depending on the mounting position. For the exact weight, refer to the quotation or the order confirmation.

2.1.10 Backlash reduction

Helical, parallel-shaft helical and helical-bevel gear units with reduced backlash (only K..7) are available as of gear unit size 37.

The rotational clearance of these gear units is considerably less than that of the standard designs so that positioning tasks can be solved with great precision. The rotational clearance is specified in angular minutes in the chapter "Geometrically possible combinations". The rotational clearance for the output shaft is specified without load (max. 1% of the rated output torque); the gear unit input side is blocked. The specified values have a tolerance of ± 2 angular minutes. For further information, refer to the chapter "Reduced backlash gear unit design /R" (→ 🗎 128).

2.1.11 Multi-stage gearmotors

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

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

2.1.12 Gear units and gearmotors for agitators and mixers

A special design variant of the helical gear, parallel-shaft and helical-bevel gear units are gear units and gearmotors equipped with an extended output bearing hub (RM../FM../FAM../KM.. and KAM..). These units are designed especially for agitator and mixer applications and allow for high bending moments as well as overhung and axial loads. The remaining data corresponds to that of standard gear units and gearmotors. For further information on gear unit and gearmotor designs for agitators and mixers, refer to chapter "Agitator designs" (→ 🗎 22).

2.1.13 SPIROPLAN® 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 relation and the aluminum housing. As a result, SPIROPLAN® right-angle gearmotors are wear-free and lightweight.

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

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

On request, SPIROPLAN® gearmotors can be equipped with a torque arm.

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2.1.14 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. Included in the delivery is either an automatic disengaging hand lever or an adjustable setscrew. The brake is controlled by a brake control that is installed in either the motor wiring space or 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.

2.1.15 International markets

Market access is contingent to local approvals in many countries. Additional laws, regulations and market conventions must be adhered to. Experience has shown that an identification of the product is required together with certification. This is realized at SEW-EURODRIVE with one or several logos on the main nameplate, with additional labels on the motor, or by providing the relevant certificates.

The countries listed below, for example, have special requirements for motors. The country-specific requirements apply to the motor in general, the efficiency or to the explosion protection. For further details, refer to the relevant motor catalogs.

Some countries, such as the states of the European Union impose certain requirements regarding the gear unit. The relevant marking is attached to the gear unit if these requirements are met.

Contact SEW-EURODRIVE, if required.

Marking	Meaning
CE	CE mark to state compliance with European guidelines, such as the Low Voltage Directive.
Ex	ATEX mark to state compliance with the European Directive 2014/34/EU.
UR	UR logo to confirm that UL (Underwriters Laboratory) is informed about the registered components; register number by UL: E337323
MC170602 CSA	CSA mark to confirm the Canadian Standard Association (CSA) and the market conformity of AC motors
EAC	EAC mark (EurAsian Conformity) Confirms compliance with the regulations of the economic and customs union of Russia, Belarus and Kazakhstan.
013	UA.TR (UkrSEPRO) mark (Ukrainian Certification of Products) Confirms compliance with the technical regulations of the country Ukraine.

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2.1.16 Components on the input side

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

- **Input shaft assembly with input shaft end,** optionally with
  - Centering shoulder
  - Backstop
  - Motor 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

2.1.17 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 device
- Proximity-type thermal monitoring device

Contact SEW-EURODRIVE for additional information.

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2.2 Corrosion and surface protection

2.2.1 General information

For motor and gear unit operation in aggressive environments, SEW-EURODRIVE optionally offers the following preventive measure:

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

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

Optional preventive measures are also available for the output shafts.

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 have a surface coating.
- The flange contact surfaces and shaft ends are treated with a temporary rust preventive.
- For brakemotors, additional measures are performed.

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

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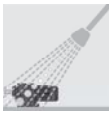
2.2.3 OS surface protection

As an option for standard surface protection, motors and gear units are also 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 within buildings and interior rooms with neutral atmospheres. Similar to corrosivity category[3)]: • C1 (negligible)	• Machines and systems in the automobile industry • Transport systems in logistics • Conveyor belts at airports
OS1		Suited for environments prone to condensation and atmospheres with low humidity or contamination, such as applications outdoors under roof or with protective device. According to corrosivity category[3)]: • C2 (low)	• Systems in saw mills • Hall gates • Agitators and mixers
OS2		Suitable for environments with high humidity or mean atmospheric contamination, such as applications outdoors subject to direct weathering. According to corrosivity category[3)]: • C3 (moderate)	• 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)	• 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)	• 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 OS2 – OS4 surface protection are only offered in combination with KS corrosion protection.
3) According to DIN EN ISO 12944-2, classification of ambient conditions

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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.

Measure	Protection principle	Suitable for
FKM 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 NOCO® fluid in larger quantities from SEW-EURODRIVE.

Batch size	Packaging type	Part number
5.5 g	Sachet	09107819
100 g	Tube	03253147
1 kg	Tub	09107827

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

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2.3 Extended storage

2.3.1 Design

SEW-EURODRIVE recommends the "extended storage" gear unit design for storage periods longer than 9 months. The lubricant of those gear units is then mixed with a VCI anti-corrosion agent (**v**olatile **c**orrosion **i**nhibitors). 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. As standard, the gear unit with "extended storage" option will be supplied with OS1 surface protection. Instead of OS1, you can order OS2, OS3 or OS4.

INFORMATION

For SPIROPLAN® gear units, the extended storage option is not available yet.

INFORMATION

To prevent the VCI anti-corrosion agent from evaporating, the gear units in "extended storage" design must remain tightly sealed until startup.

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	• roofed • Protected against rain and snow • and shocks	Up to 3 years with regular inspection of the packaging and humidity indicator (rel. humidity < 50%)
	open	• Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 50 °C, relative humidity < 50%) • No sudden temperature variations • Controlled ventilation with filter (free from dust and dirt) • No aggressive vapors • No shocks	2 years or more with regular inspections • Check for cleanness and mechanical damage during the inspection • Check corrosion protection

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Climate zone	Packaging[1]	Storage[2]	Storage duration
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	• roofed • Protected against rain and snow • and shocks	Up to 3 years with regular inspection of the packaging and humidity 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 variations • 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 cleanness and mechanical damage during the 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

2.4.1 DUO10A oil aging sensor

The DUO10A diagnostic unit consists of a temperature sensor and the actual evaluation unit. The service life curves of the oil grades common in SEW-EURODRIVE 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, this unit analyzes the oil temperature to calculate the remaining service life in days until the next oil change. The remaining service life is displayed directly on the evaluation unit. When the service life is expired, a binary signal can be sent to a higher-level system and evaluated or visualized in the system.

Using the DUO10A diagnostic unit, the system operator no longer replaces 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.

For the technical data and part numbers of the DUO10A oil aging sensor, refer to chapter "Information on oil aging sensor /DUO10A" (→ 🗎 169).

2.4.2 Vibration SmartCheck /DUV40A

DUV40A Vibration SmartCheck vibration monitoring is used to detect damage of gear units and gearmotors early (e.g. bearing damage or imbalances). For this, permanent frequency-selective monitoring of the gearmotor is used. Apart from the vibration analysis, additional measured values of up to 3 signal encoders can be detected, recor-

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ded and analyzed. The additional signals can be used as reference value for signal analysis e.g. to trigger time or event-based measuring tasks. After the analysis and depending on user-defined alarm limits, the system can switch outputs and display the state using LEDs.

Vibration SmartCheck is configured using the FAG software SmartWeb. If you use several Vibration SmartCheck systems, you can control them via the FAG software SmartUtility Light centrally from one PC.

The full version of the SmartUtility software allows you to open sensors directly via the FAG software SmartWeb, to analyze measurement data in the SmartUtility Viewer and to download configurations or uploading configurations on other devices.

For information on the scope of delivery, part numbers and technical data, refer to chapter "Information on Vibration SmartCheck /DUV40A" (→ 🗎 171).

2.5 Oil expansion tank

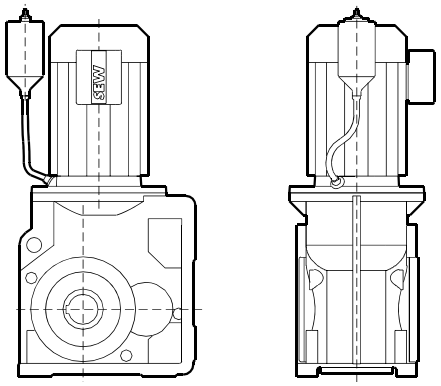
The oil fill level for gear units in mounting position M4 has technical reasons. In case of unfavorable circumstances, oil may leak from the breather valve of these gear units. Use an oil expansion tank to reliably avoid oil from leaking. The oil expansion tank provides additional space for the lubricant to expand.

In case of gear units and gearmotors of size 107 and larger, an oil expansion tank is always required for operation in mounting position M4.

SEW-EURODRIVE recommends using an oil expansion tank for gear units and gearmotors in mounting position M4, in the following cases:

- For input speeds > 2000 min^{-1}
- For sizes 77 – 97 and input speeds > 1800 min^{-1}

The following figure shows the oil expansion tank of a gearmotor.



9007204233922315

The oil expansion tank is delivered as assembly kit for mounting onto the gearmotor. In case of limited space or of gear units without motor, the oil expansion tank can also be mounted to nearby machine parts.

INFORMATION

Transverse acceleration is not permitted for gear units with expansion tank with fixed piping for third party motors and servomotors.

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

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2.6 Agitator designs

All gear units in agitator design are equipped with an extended bearing hub especially suitable for mixing and agitating applications. Agitator gear units are based on 3 proven standard gear unit series by SEW-EURODRIVE. Almost any agitator, mixer, blender or kneader application in a whole range of different industries can be provided by using one of the agitator designs of the gear unit.

Advantages of agitator gear units:

- FEM-optimized housing and a special agitator flange for particularly high permitted overhung loads
- No additional bearing required for the agitator shaft,
- Shaft and flange dimensions are compatible with standard dimensions.
- Many different options and design variants for optimum adaptation to the application
- Gear units/gearmotors also available in explosion-proof design
- Global service provided by SEW-EURODRIVE

	RM.. series helical gear units (2 and 3 stages)	Parallel-shaft helical gear units FM../FAM.. series (2 and 3 stages)	Helical-bevel gear units KM../KAM.. series (3-stage)
Sizes:	57 / 67 / 77 / 87 / 97 / 107 / 127 / 137 / 147 / 167	67 / 77 / 87 / 97 / 107 / 127 / 157	67 / 77 / 87 / 97 / 107 / 127 / 157
Gear ratio i:	4.29 – 289.74	3.87 – 281.71	5.20 – 197.37
Maximum output torque in Nm:	450 – 20000	820 – 20000	820 – 20000
Maximum permitted output overhung load in N:	4000 – 120000	35000 – 135000	20000 – 135000

Available options:

- Double oil seal on the output side for additional protection against leaks
- Grease nipple for further greasing of output shaft bearings
- The gear units use series housings and series gearing components. The special flange is bolted to the output side of the standard gear unit.
- Energy efficiency classes IE1 – IE4 for gearmotors
- Motor power range of 0.12 – 200 kW
- Motor adapter AM.. for mounting IEC and NEMA motors

Also available for FM../FAM... and KM../KAM.. series:

- Reinforced bearings also opposite the output side. These increase the permitted overhung load, particularly for high output speeds and low gear ratios.
- Drywell design with leak sensor prevents the product from being contaminated by leaking lubricant.

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