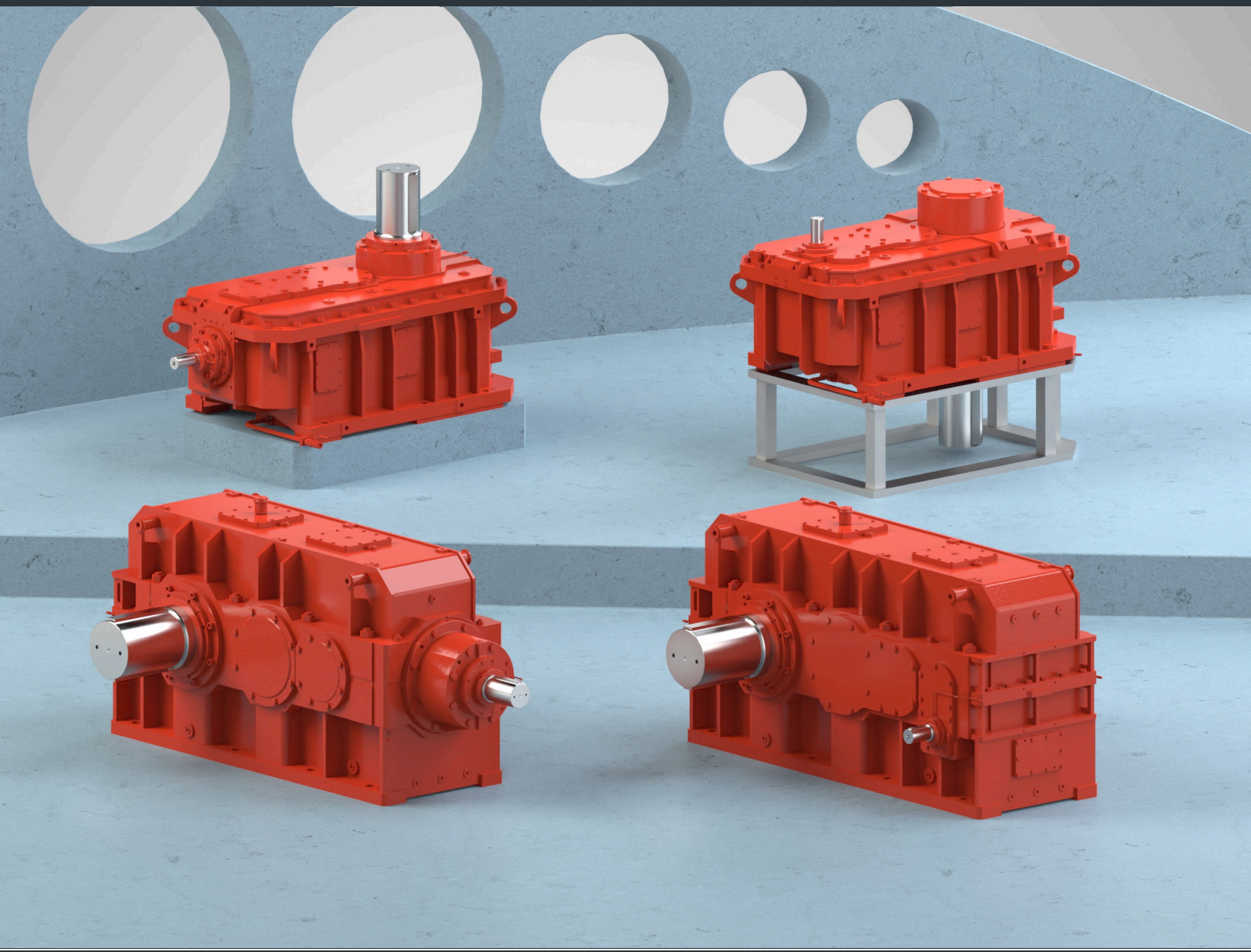
SEW EURODRIVE

Installation and Operating Instructions



Industrial Gear Units
Helical and Bevel-Helical Gear Units
ML..2 & ML..V2 Series
Torque classes from 470 kNm - 1480 kNm

Edition 12/2021

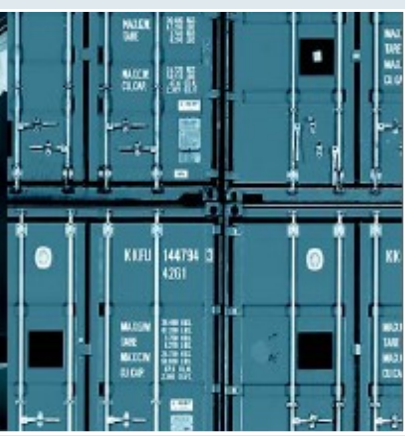
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1. General Information

1.1 How to use the operating instructions

Operating instructions are an integral part of the product and contain important information for operation and service. The operating instructions are written for all employees who assemble, install, start up, and service the product.

The operating instructions must be legible and accessible at all times. Make sure that staff responsible for the plant and its operation as well as persons who work independently on the unit, have read the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

Always follow the safety and warning instructions in this operating instruction !

Pictogram	Meaning	Pictogram	Meaning
	**Electrical hazard** Possible consequences: Severe or fatal injuries.		**Harmful situation** Possible consequences: Damage to the drive and the environment.
	**Hazard** Possible consequences: Severe or fatal injuries.		**Important information about explosion protection.**
	**Hazardous situation** Possible consequences: Slight or minor injuries.		**Tips and useful information.**

1.3 Rights to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the operating instructions. Therefore, read the operating instructions before you start working with the unit.

1.4 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the ML..2 & ML..V2 series gear units and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.5 Copyright notes

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Unauthorized duplication, modification, distribution, or other utilization of the whole or any part of this documentation is strictly prohibited.

1.6 Waste disposal



Follow the current instructions:

- Housing parts, gears, shafts and anti-friction bearings of the gear units must be disposed of as steel scrap. The same applies to gray cast iron castings unless there are separate collection arrangements.
- Collect waste oil and dispose of it correctly.

2. Safety Notes

Preliminary remarks

The following safety notes are primarily concerned with the use of industrial gear units of the ML..2 & ML..V2 series. If using gear motors, also refer to the safety notes for motors in the corresponding operating instructions.

Also observe the supplementary safety notes in the individual sections of these operating instructions.

General information

During and after operation, industrial gear units and motors have live and moving parts and their surfaces may be hot.

All work related to transport, storage, setting up/mounting, connection, startup, maintenance and repair may only be performed by trained personnel observing

- the corresponding detailed operating instruction(s) and wiring diagrams,
- the warning and safety signs on the industrial gear unit,
- the specific regulations and requirements for the system,
- national/regional regulations governing safety and the prevention of accidents.

Severe injuries and damage to property may result from



- incorrect use,
- incorrect installation or operation,
- removal of required protective covers or the housing when this is not permitted.

Designated use

Industrial gear units are intended for industrial systems. They correspond to the applicable standards and regulations. The technical data and the information about permitted conditions are provided on the nameplate and in the documentation.

It is essential to observe all specified information!

Transport

Inspect the delivery for any damage in transit as soon as you receive the delivery. Inform the transport company immediately. It may be necessary to preclude startup.

Startup/ operation

Check that the direction of rotation is correct in **decoupled** status (also listen for unusual grinding noises as the shaft rotates).

Secure the shaft keys for test mode without drive components. Do not render monitoring and protection equipment inoperative even for test mode.

Switch off the main motor if in doubt whenever changes occur in relation to normal operation (e.g. increased temperature, noise, vibration). Determine the cause; contact SEW-EURODRIVE if necessary.

Inspection/ maintenance

Refer to the instructions in Sec. "Inspection and Maintenance."

2.1 Transport of industrial gear units

Transport eyebolts Lifting point [1] on the main gear unit. They are designed for the weight of the industrial gear unit.

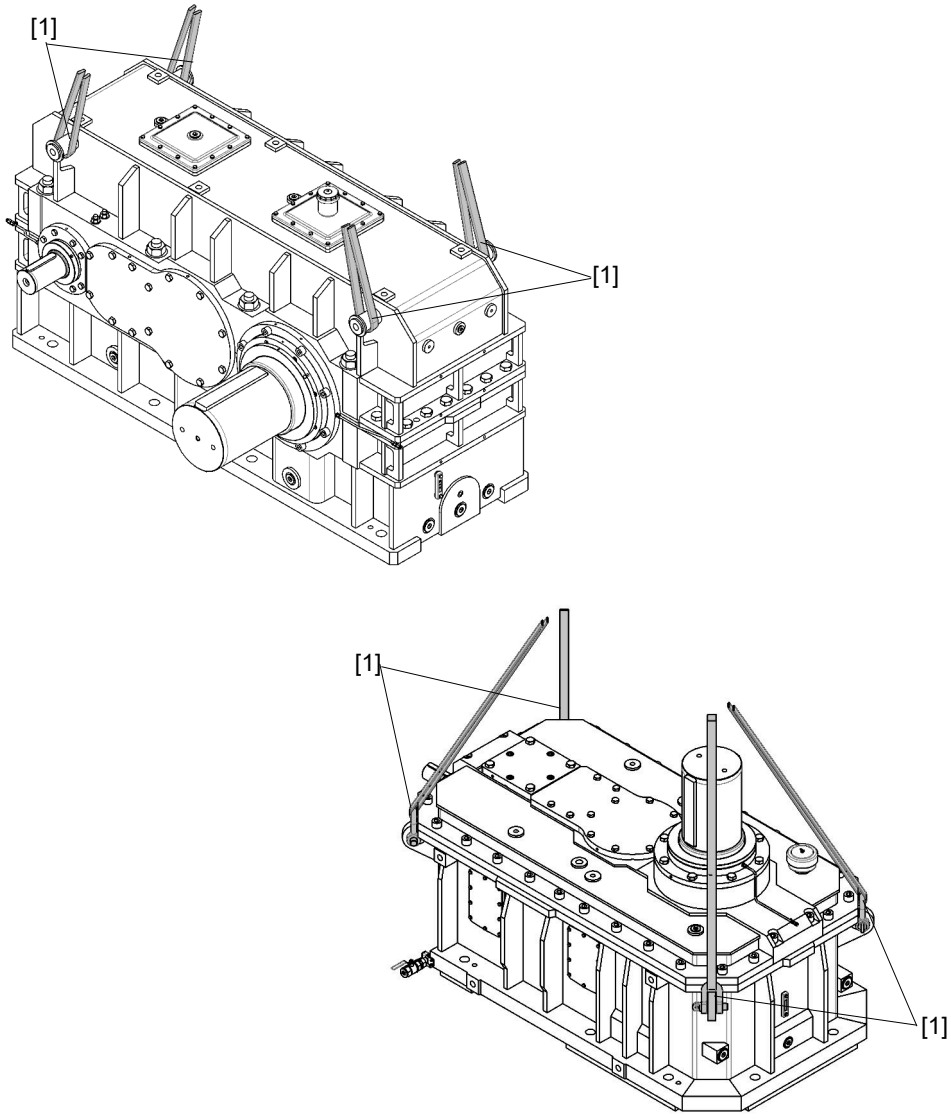


Figure 1: Positions of transport lifting points

- **The main gear unit must be lifted using lifting ropes or chains on the four lifting points on the main gear unit. The weight of the gear unit is indicated on the nameplate or the dimension sheet. The loads and regulations specified on the nameplate must always be observed.**
- **The length of the lifting chains or ropes must be dimensioned in such a way that the angle between the chains or ropes does not exceed 45°.**
- **Eyebolts on the motor, auxiliary gear unit or primary gear unit must not be used for transport!**
- **Use suitable, sufficiently rated handling equipment if necessary. Before startup, remove securing devices used for transport.**

2.2 Storage and transport conditions

The gear units can be provided with the following protection and packaging types depending on the storage and transport conditions.

2.2.1 Internal corrosion protection

Standard corrosion protection

After the test run, the test oil fill is drained out of the gear unit. The remaining oil film protects the gear unit against corrosion for a limited period of time.

Long-term corrosion protection

After the test run, the test oil fill is drained out of the gear unit and the interior space is filled will a vapor phase inhibitor. The breather filter is replaced by a screw plug and enclosed with the gear unit.

2.2.2 Exterior corrosion protection

In general, the following measures are taken for exterior corrosion protection:

- Corrosion protection is applied to bare, non-painted functional surfaces of shafts, flanges, mounting and foot surfaces on the gear unit. Remove it only using an appropriate solvent which is not harmful to the oil seal.
- Small spare parts and loose pieces, such as bolts, nuts, etc., are packed in corrosion protection plastic bags (VCI corrosion protection bags).
- Threaded holes and blind holes are covered by plastic plugs.
- If the gear unit is stored longer than 6 months, you must check the protective coating of unpainted areas as well as the paint at regular intervals. Areas in which the protective coating and/or paint has been damaged may have to be repainted.

2.2.3 Packaging

Standard packaging

The gear unit is delivered on a pallet without cover.
Application: Land transport

Long-term packaging

The gear unit is delivered in a wooden box that is also appropriate for sea transport.
Application: Sea transport and/or for long-term storage

2.2.4 Storage conditions

- During storage up to startup, the gear unit must be stored in a shock-free manner to prevent damage to the anti-friction bearing races.
- The output shaft must be rotated at least one full rotation every six months so that the position of the roller elements in the bearings of the input and output shafts changes.

The gear units are delivered without an oil fill; different protection systems are required depending on the storage period and storage conditions as shown in the table below.

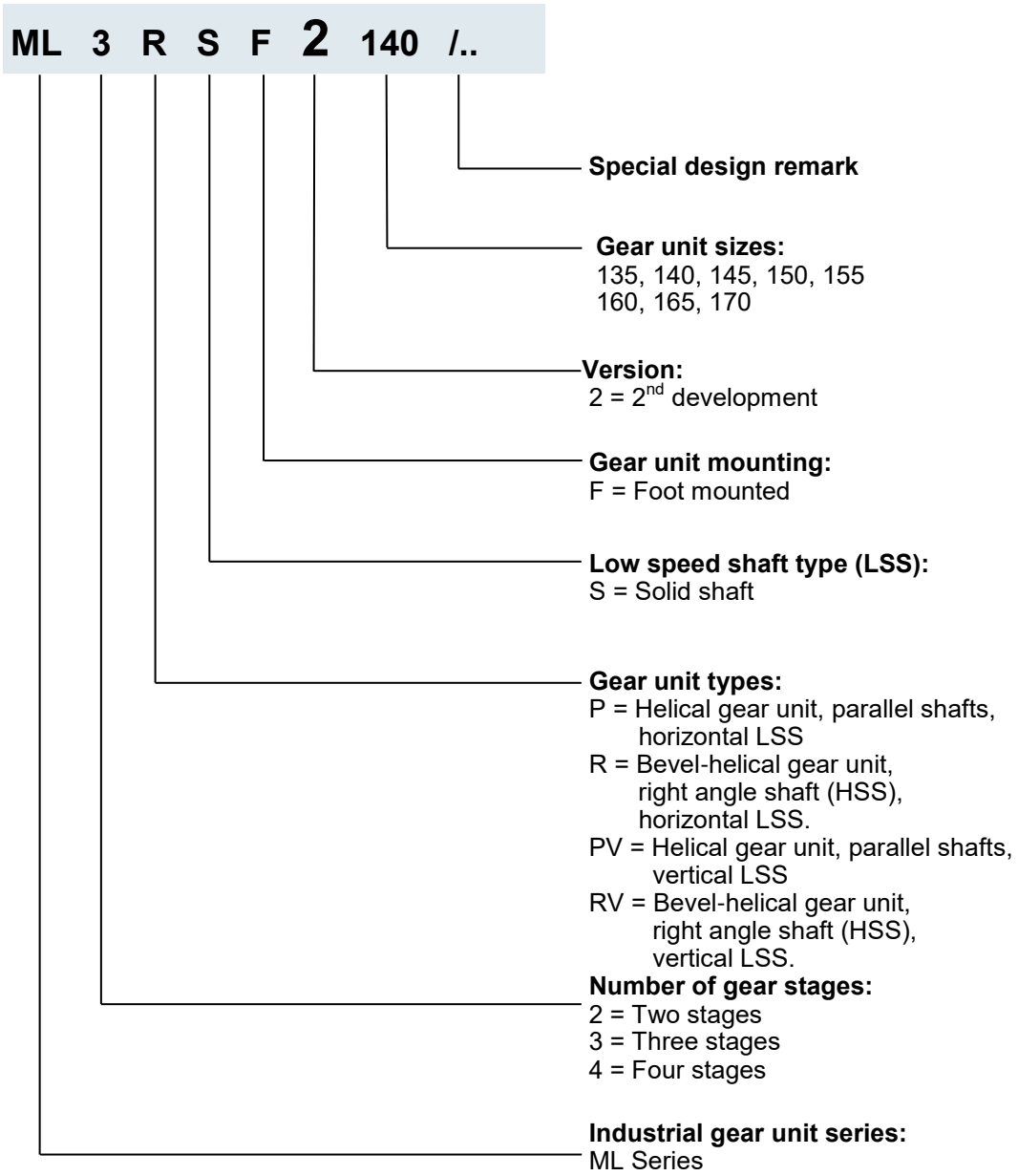
Corrosion protection + packaging	Storage location	Storage duration
Standard corrosion protection: + standard packaging	With roof, enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C, < 50% relative atmospheric humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). Protected against aggressive vapors and shocks.	Max. 6 months with intact surface corrosion protection.
Long-term corrosion protection: + standard packaging	With roof, enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C, < 50% relative atmospheric humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). Protected against aggressive vapors and shocks.	Max. 3 years with regular inspection and checking for intactness.
Long-term corrosion protection: + long-term packaging	With roof, protected against rain and shocks.	Max. 3 years with regular inspection and checking for intactness.

If stored in tropical zones, provide for sufficient protection against insect damage. Contact SEW-EURODRIVE for differing specifications.

3. Gear Unit Design

3.1 Unit designation

The designation of ML..2 & ML..V2 series gear unit is set up as follows:



3.2 Nameplate

Example: Nameplate of the ML..2 series industrial gear unit, SEW-EURODRIVE.

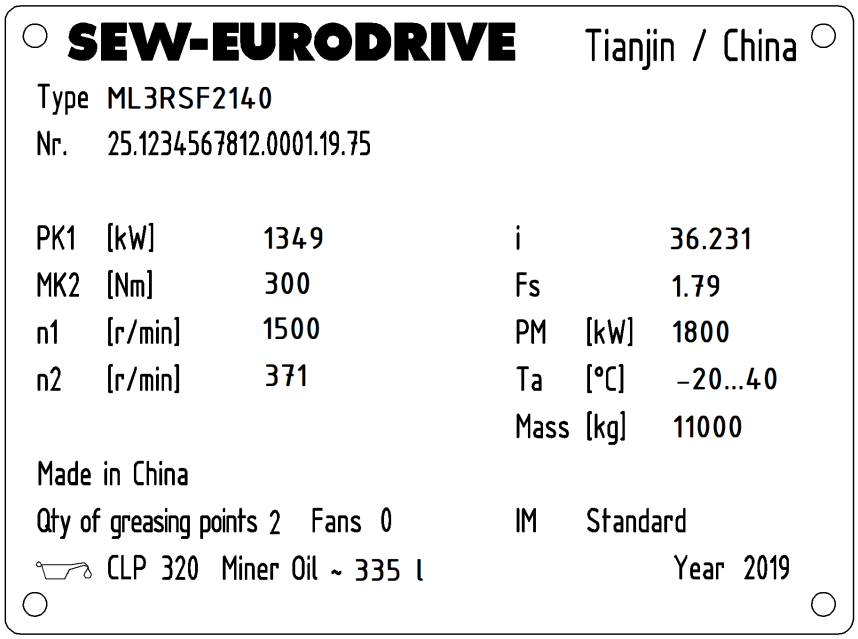


Figure 2: Nameplate

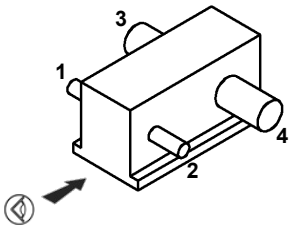
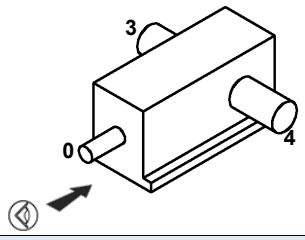
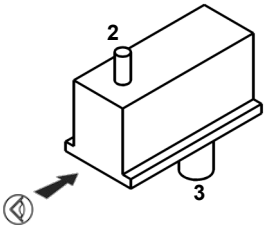
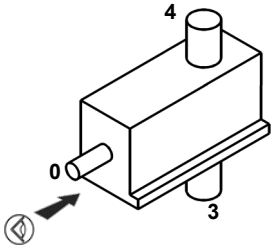
Type		Unit designation
Nr.		Serial number
PK1	[kW]	Operating power on the input shaft (HSS)
MK2	[Nm]	Gear unit output torque
n 1	[r/min]	Input speed (HSS)
n 2	[r/min]	Output speed (LSS)
i		Exact gear unit reduction ratio
Fs		Service factor
PM	[kW]	Motor power
Ta	[°C]	Ambient temperature
Mass	[kg]	Weight of the gear unit
Year		Year of manufacture
IM		Mounting position
		Oil grade and viscosity class / oil quantity

3.3 Mounting positions, shaft positions and directions of rotation

The shaft positions (0, 1, 2, 3, 4) and directions of rotation shown in the following figures apply to output shafts (LSS) of the types **solid shaft and hollow shaft**. For other shaft positions or gear unit with backstop, contact SEW-EURODRIVE.

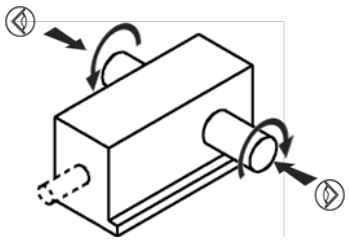
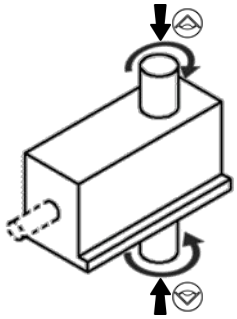
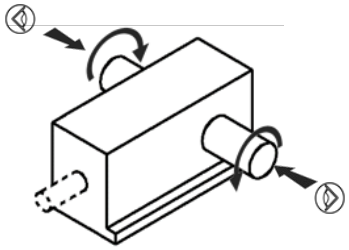
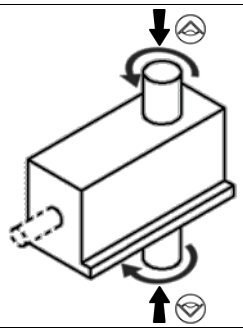
3.3.1 Mounting positions, shaft positions

The standard mounting position is horizontal foot mounting.
The following mounting positions and shaft positions (0, 1, 2, 3, 4) are possible:

Mounting positions, shaft positions		
	ML..PSF..	**ML..RSF..**
Solid output shaft		
	ML..PSFV..	**ML..RSFV..**
Solid output shaft		

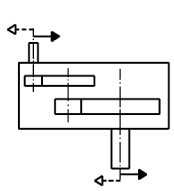
3.3.2 The directions of rotation of the output

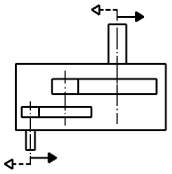
The directions of rotation of the output shaft (LSS) are defined as follows:

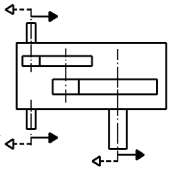
Direction of rotation	Gear unit version	
	ML..PSF.. ML..RSF..	**ML..PVSF.. ML..RVSF..**
Clockwise (CW)		
Counterclock-wise (CCW)		

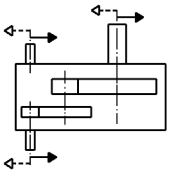
3.3.3 Shaft positions and corresponding directions of rotation

ML2P..

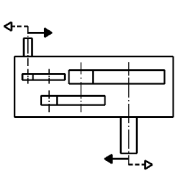

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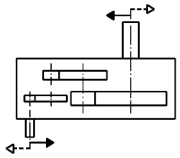

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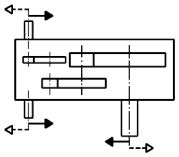

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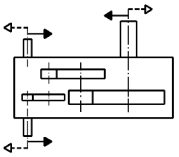

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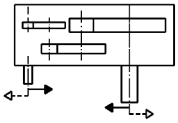
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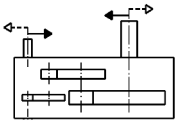

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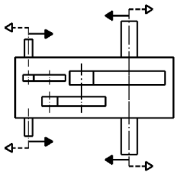

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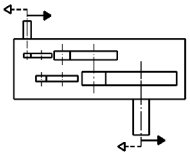

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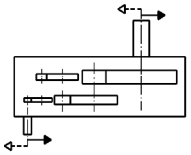

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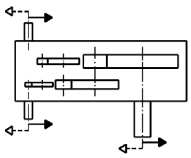

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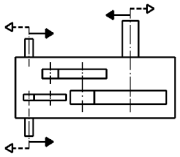

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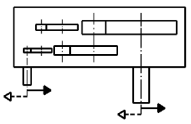
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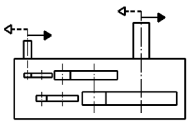

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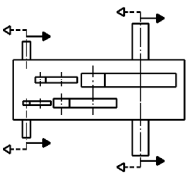

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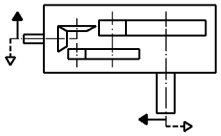

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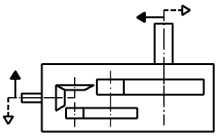

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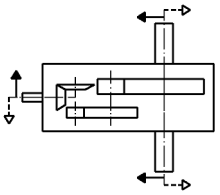
ML3R..



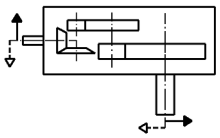
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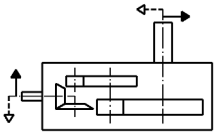
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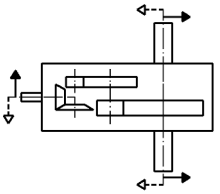
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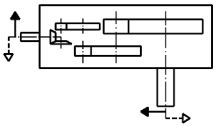


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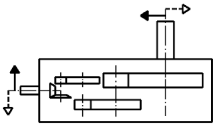


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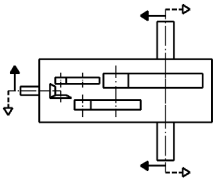
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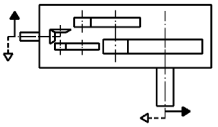
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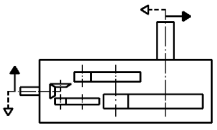
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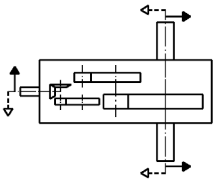
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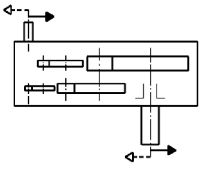


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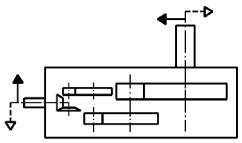
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ML4PV..

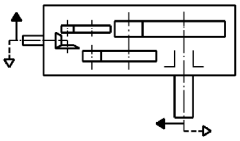


SP 23

ML4RV..



SP 04



SP 03

3.4 Lubrication of industrial gear units

For ML..2 gear units in horizontal design, the lubrication types “splash lubrication”, "bath lubrication" or "pressure lubrication" are normally used.
For ML..V2 gear units in horizontal design, the lubrication type "pressure lubrication" is recommended.

3.4.1 Splash lubrication

Splash lubrication is used for industrial gear units in horizontal mounting position. With splash lubrication, the oil level is low. With this lubrication method, oil is splashed onto the bearings and gearing components.

3.4.2 Pressure lubrication

If requested, pressure lubrication is possible as lubrication method **disregarding the mounting position**.
With pressure lubrication, the oil level is low. The gearing components and bearings not submerged in the oil bath are lubricated through a shaft end pump, or through a motor pump.

The lubrication method "pressure lubrication" is used when

- oil bath lubrication is not desired for vertical mounting positions
- input speeds are very high
- the gear unit must be cooled by an external oil/water or oil/air cooling system
- the pitch line velocity is too high for splash or bath lubrication.

3.4.3 Bath lubrication

With oil bath lubrication, the oil level is so high that the bearings and gearing components are submerged in the lubricant.

3.5 Symbols and mounting positions

3.5.1 Symbols used

The following table shows which symbols are used in the subsequent figures and what they mean.


Visual inspection cover


Oil drainage


Grease nipple point


Breather plug


Oil level glass


Oil heater


Oil filler


Lifting attachment


Oil sight glass


Flat grease nipple

The positions of the elements are exemplary and cover most of the cases. For exact positions, please refer to the corresponding dimension drawing.

3.5.2 Symbols and mounting positions of gear units

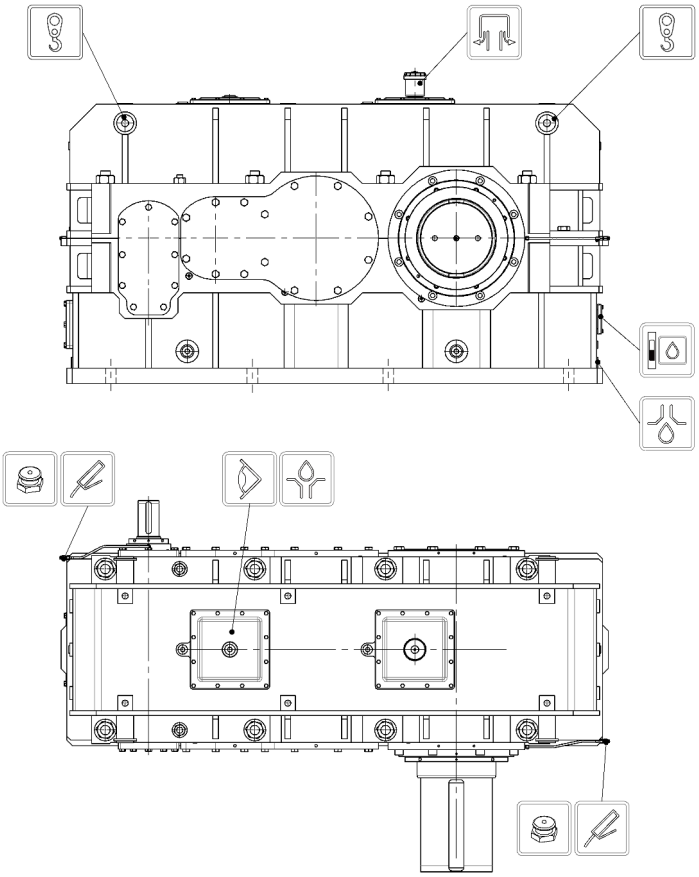


Figure 3: Symbols and mounting positions of ML..2 gear units

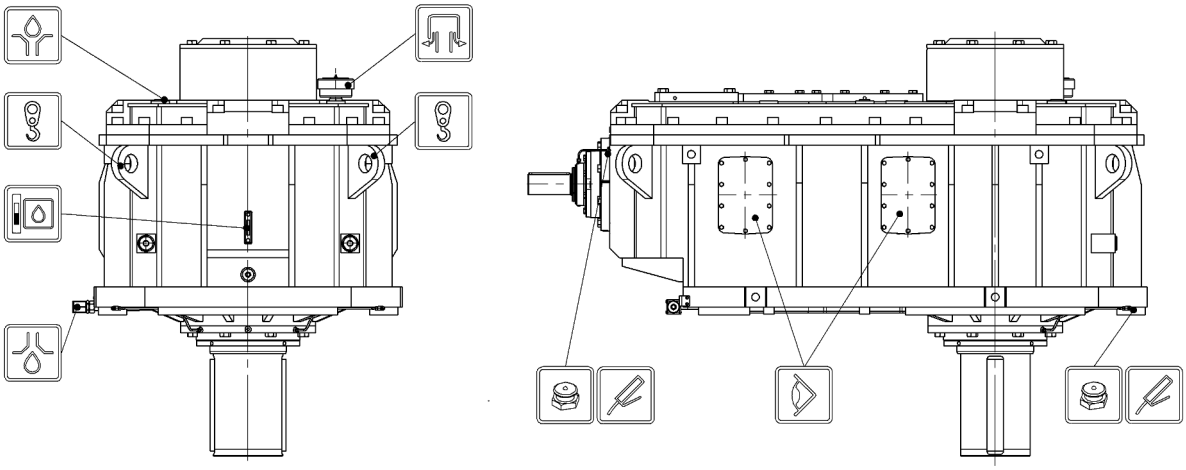


Figure 4: Symbols and mounting positions of ML..V2 gear units

4. Mechanical Installation

4.1 Required tools / resources

Not included in the scope of delivery:

- Wrench set
- Torque wrench (for shrink discs)
- Mounting device
- Shims and spacing rings if necessary
- Fasteners for input and output elements
- Lubricant (e.g. NOCO® fluid from SEW-EURODRIVE)
- For hollow shaft gear units (→ Sec. "Mounting/removal of hollow shaft gear units with keyed connection): Threaded rod, nut (DIN 934), retaining screw, ejector screw, end-plate.
- Securing components according to Sec. "Gear unit foundation"

Installation tolerances

Shaft end	Flanges
Diametric tolerance in accordance with DIN 748 • ISO k6 for solid shafts with Φ ≤ 50 mm • ISO m6 for solid shafts with Φ > 50 mm • ISO H7 for hollow shafts for shrink disc • ISO H8 for hollow shafts with keyway • Center hole in accordance with DIN 332, shape DS..	Centering shoulder tolerance: • ISO js7 / H8

4.2 Before you begin

The drive may only be installed if

- the data on the nameplate of the motor match the supply voltage
- the drive is not damaged (no damage resulting from transport or storage)
- the following requirements have been properly met:
  - **with standard gear units:**
    ambient temperature according to the lubricant table in Sec. "Lubricants" (see standard), no oil, acid, gas, vapors, radiation, etc.
  - **with special versions:**
    drive configured in accordance with the ambient conditions (→ order documents)

4.3 Preliminary work

Output shafts and flange surfaces must be completely free of anti-corrosion agents, contamination or other impurities (use a commercially available solvent). Do not let the solvent get in contact with the sealing lips of the oil seals: danger of damage to the material!

4.4 Gear unit foundation

4.4.1 Foundation for foot-mounted gear units

To ensure quick and successful mounting, the type of foundation should be correctly selected and the mounting carefully planned in advance. Foundation drawings with all necessary construction and dimension details should be available.

SEW-EURODRIVE recommends foundation methods shown in the following figures. A customer's own foundation method must be equally adequate.

When mounting a gear unit onto steel framework, special attention should be paid to the rigidity of this framework to prevent destructive vibrations and oscillations. The foundation must be dimensioned according to weight and torque of the gear unit by taking into account the forces acting on the gear unit.

Example :

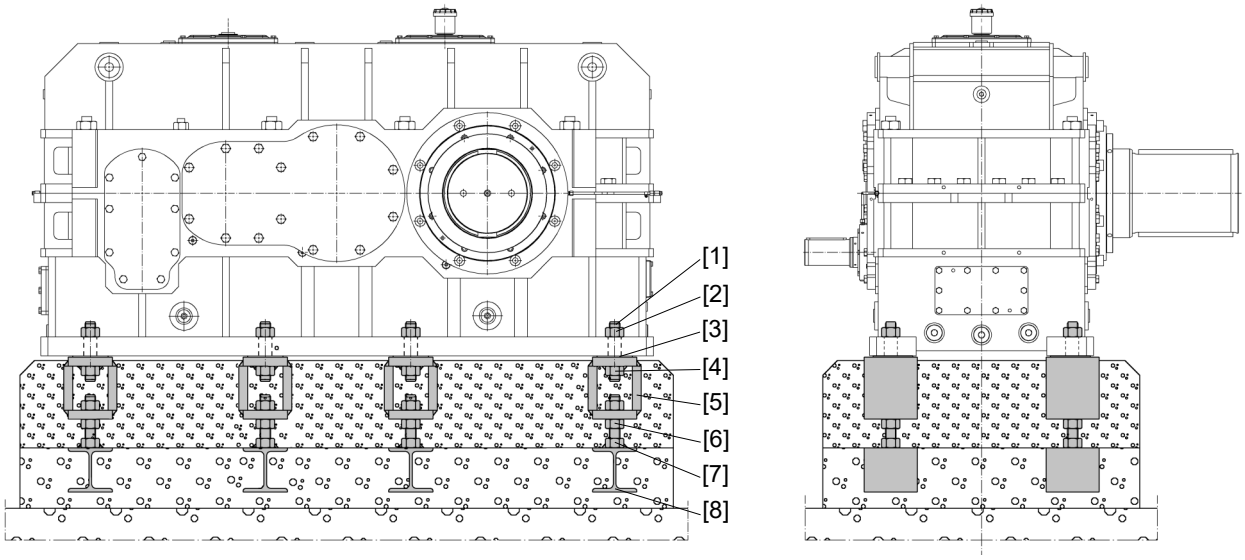


Figure 5: Reinforced concrete foundation for gear units

[1] Hex head screw or stud
[2] Hex nut if [1] is a stud or an upside-down screw
[3] Shims (about 3 mm space for shims)
[4] Hex nut
[5] Foundation bracket
[6] Hex nut
[7] Hex nut and foundation screw
[8] Supporting girder

4.4.2 Tightening torques

Gear unit size ML..2..	Screw / Nut	Tightening torque screw / nut [Nm]
2135	M48	6022
2140	M48	6022
2145	M48	6022
2150	M48	6022
2155	M56	9650
2160	M56	9650
2165	M56	9650
2170	M64	14415

Gear unit size ML..V2..	Screw / Nut	Tightening torque screw / nut [Nm]
2135	M48	6022
2140	M48	6022
2145	M56	9650
2150	M56	9650
2155	M56	9650
2160	M64	14415
2165	M64	14415
2170	M64	14415

4.5 Mounting of solid shaft gear units

Before mounting the gear unit, check the foundation dimensions with those in the corresponding drawings in Sec. "Gear unit foundation."

4.5.1 Mount the gear unit in the following order:

- Mount the components according to Sec. "Gear unit foundation". The shims [1] (→ Figure 6) facilitate later adjustment and, if necessary, to mount a replacement gear unit.
- Secure the gear unit at the selected positions on the supporting girders using three foundation screws. Position the foundation screws at maximum possible distance (two screws on one side of the gear unit and one on the other side). Align the gear unit as follows:
  – vertically by lifting, lowering or tilting the unit using the nuts of the foundation screws
  – horizontally by tapping the foundation screws slightly into the required direction
- After having aligned the gear unit, tighten the three nuts of the foundation screws used for alignment. Carefully insert the fourth foundation screw into the supporting girder and tighten it securely. When doing so, make sure that the position of the gear unit does not change. If necessary, realign the gear unit.
- Tack-weld the ends of the foundation screws to the supporting girders (at least three welding spots per foundation screw). Tack-weld the foundation screws alternately in both directions (starting from the middle) on each side of the center line of the gear unit. This way, misalignment caused by the welding process is avoided. After having tack-welded all screws, they must be welded all the way round in the above mentioned order. Adjust the nuts on the foundation screws to ensure that the welded foundation screws do not twist the gear unit housing.
- After having tack-welded the nuts of the retaining screws of the gear unit, check the mounting and carry out grouting.
- When the grouting concrete has set, check the mounting a last time and adjust, if necessary.

4.5.2 Mounting accuracy when aligning

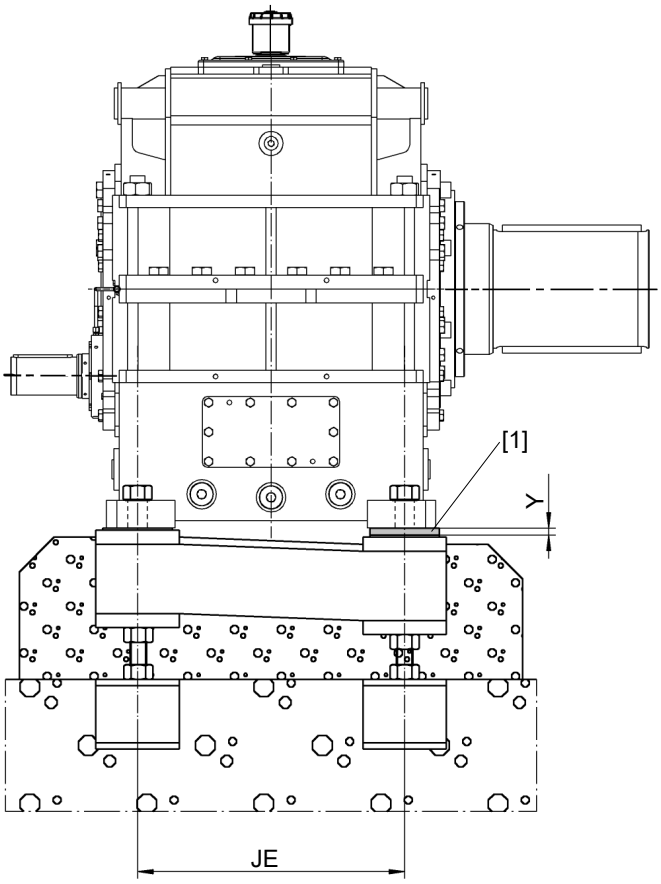


Figure 6: Mounting accuracy when aligning

When aligning the gear unit, make sure that the mounting tolerances for the evenness of the foundation are not exceeded (values y_{max} in below table). If necessary, use shims [1] to align the gear unit on the foundation plate.

JE [mm]	y_{max} [mm]
<400	0.035
400…799	0.06
800...1200	0.09
1200...1600	0.125
1600...2000	0.15

4.6 Mounting a motor with motor adapter

Motor adapters [1] are available for mounting IEC motors of sizes 132 to 355 to industrial gear units of the ML..2 & ML..V2 series.
For assembly clearance between motor shaft end and shaft end of the gear unit, please refer to chapter "Mounting of couplings" or to a separate coupling manual.
The clearance can be checked by opening the inspection cover of the motor adapter.

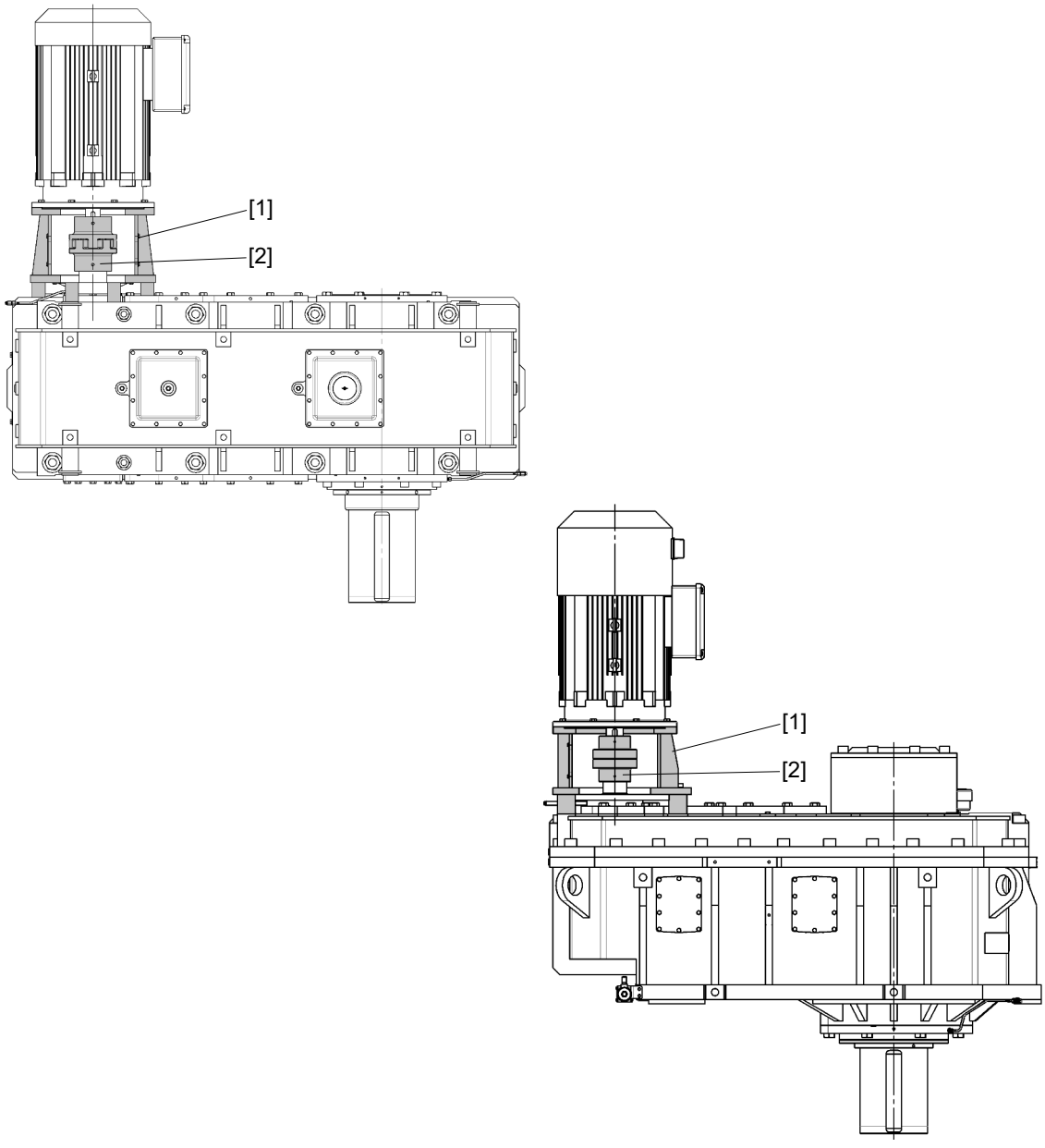


Figure 7: Mounting a motor with motor adapter

For mounting couplings [2], refer to the notes in Sec. "Mounting of couplings."
Please consult SEW-EURODRIVE, if need mounting a motor with motor adapter.

5. Mechanical Installation Options

5.1 Important installation instructions

Disconnect the motor from the power supply before starting work and secure it against unintentional restart!

5.1.1 Important installation notes

- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never mount couplings, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft!).**
- **Observe correct tension of the belt for belt pulleys (in accordance with manufacturer's specifications).**
- Power transmission elements should be balanced after insertion and must not give rise to any impermissible radial or axial forces.

Note:
Installation is easier if you first apply lubricant to the output element or heat it up briefly (to 80 °C - 100 °C).

Adjust the following misalignments when mounting couplings:
a) Axial misalignment (maximum and minimum clearance)
b) Offset misalignment (concentric running fault)
c) Angular misalignment

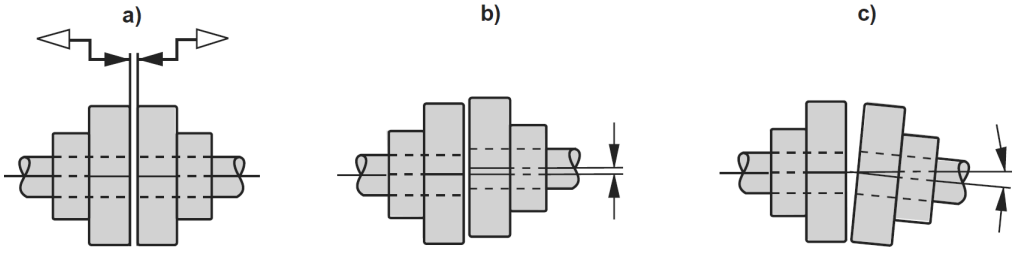
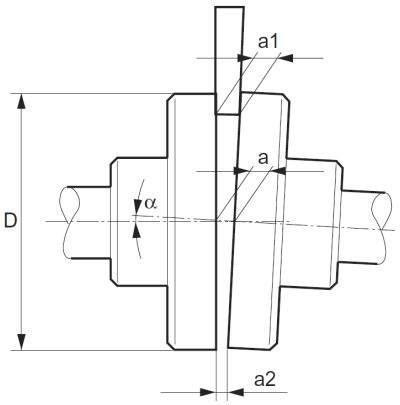


Figure 8: Clearance and misalignment when mounting the coupling

Input and output elements such as couplings must be equipped with a protection cover!

The following methods for measuring angular and axial misalignment are important for complying with the mounting tolerances specified in Sec. "Mounting of couplings"!

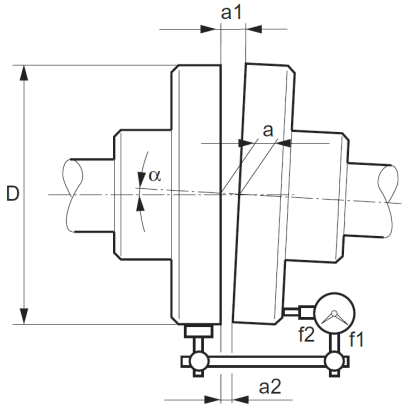
5.1.2 Measuring of angular misalignment with a feeler gauge



The figure shows the measurement for angular misalignment (α) using a feeler gauge. When using this method, an accurate result is only achieved when the deviation of the coupling faces is eliminated by turning both coupling halves by 180° and the average value is then calculated from the difference ($a_1 – a_2$).

Figure 9: Measuring angular misalignment using a feeler gauge

5.1.3 Measuring of angular misalignment using a micrometer dial

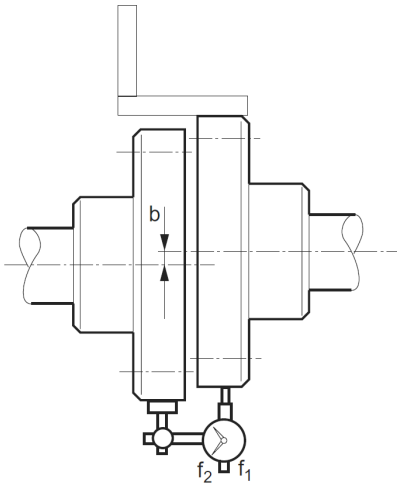


The figure shows the measurement for angular misalignment using a micrometer dial. This measuring method provides the same result as described under "Measuring angular offset with a feeler gauge" if the **coupling halves are rotated together**, for instance with one coupling pin, so that the needle of the micrometer dial does not move noticeably on the measuring surface.

Figure 10: Measuring angular misalignment using a micrometer dial

A prerequisite for this measuring method is that there is no axial play in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two micrometer dials when rotating the coupling).

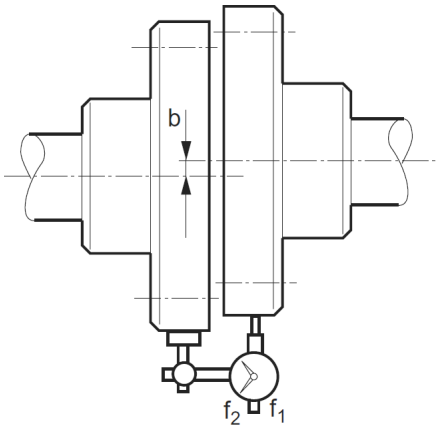
5.1.4 Measuring of offset misalignment using straight-edge and micrometer dial



The figure shows the measurement for offset misalignment using a straightedge. Permissible values for eccentricity are usually so small that the best measurement results can be achieved with a micrometer dial. If you **rotate one coupling half** together with the micrometer dial and divide the deviation by two, the micrometer dial will indicate the deviation and as a result the misalignment (dimension "b"), which includes the offset misalignment of the other coupling half.

Figure 11: Measuring offset misalignment using straight-edge and micrometer dial

5.1.5 Measuring of offset misalignment using a micrometer dial



The figure shows the measurement for offset misalignment using a **more accurate measuring method**. The **coupling halves** are **rotated together** without the tip of the micrometer dial moving on the measuring surface. The offset misalignment is obtained by dividing the deviation indicated on the micrometer dial (dimension "b").

Figure 12: Measuring offset misalignment using a micrometer dial

5.2 Mounting of couplings

5.2.1 ROTEX coupling

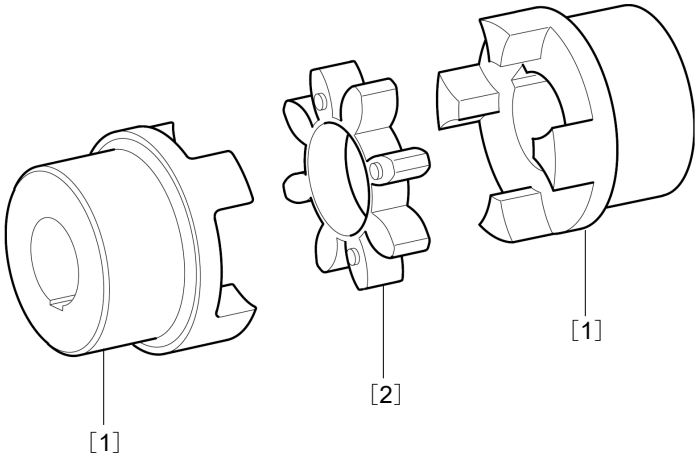


Figure 13: Design of the ROTEX coupling

[1] Coupling hub
[2] Ring gear

The low-maintenance, elastic ROTEX coupling is capable of compensating radial and angular misalignment. Careful and exact alignment of the shaft ensures long service life of the coupling.

Mounting the coupling halves onto the shaft

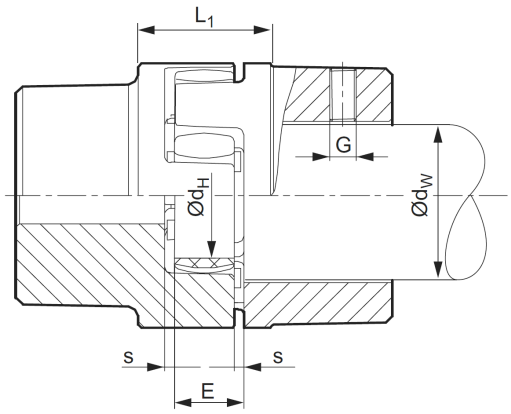


Figure 14: Mounting dimensions of the ROTEX coupling

Coupling size	Mounting dimensions						Locking screw	
	E [mm]	s [mm]	dH [mm]	dW [mm]	L1(Alu/GG/GGG) [mm]	L1(steel) [mm]	G	Tightening torque [Nm]
14	**13**	1.5	10	7	-	-	M4	2.4
19	**16**	2	18	12	26	-	M5	4.8
24	**18**	2	27	20	30	-	M5	4.8
28	**20**	2.5	30	22	34	-	M6	8.3
38	**24**	3	38	28	40	60	M8	20
42	**26**	3	46	36	46	70	M8	20
48	**28**	3.5	51	40	50	76	M8	20
55	**30**	4	60	48	56	86	M10	40
65	**35**	4.5	68	55	63	91	M10	40
75	**40**	5	80	65	72	104	M10	40
90	**45**	5.5	100	80	83	121	M12	69
100	**50**	6	113	95	92	-	M12	69
110	**55**	6.5	127	100	103	-	M16	195
125	**60**	7	147	120	116	-	M16	195
140	**65**	7.5	165	135	127	-	M20	201
160	**75**	9	190	160	145	-	M20	201
180	**85**	10.5	220	185	163	-	M20	201



The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.

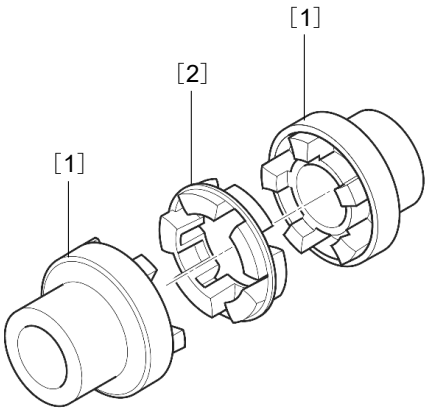
5.2.2 Nor-Mex coupling, types G and E

The low-maintenance Nor-Mex couplings types G and E are torsionally flexible couplings capable of compensating axial, angular, and radial shaft misalignments.

Torque is transmitted via an elastic element with high damping properties, which is also oil and heat resistant. The couplings can be used for either direction of rotation and can be mounted in any position. The design of the Nor-Mex coupling type G allows to replace the elastic element [5] without movement of the shafts.

Nor-Mex E

[1] Coupling hub
[2] Elastic element



Nor-Mex G

[1] Socket head screw
[2] Washer
[3] Claw ring
[4] Flange hub
[5] Elastic element
[6] Coupling hub

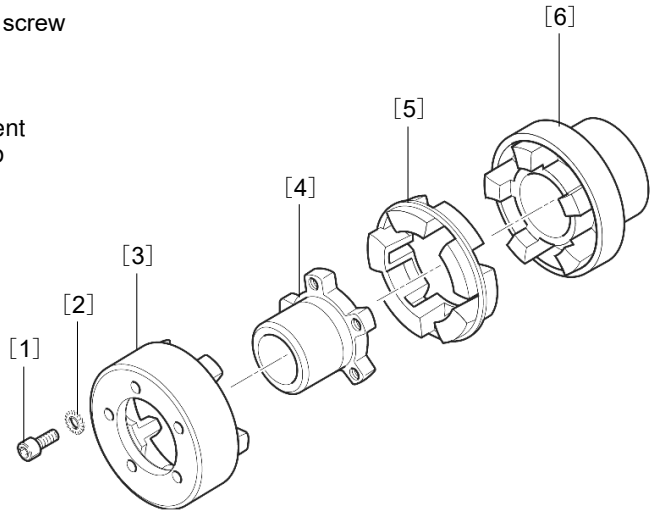


Figure 15: Design of the Nor-Mex E / Nor-Mex G coupling

Mounting instructions, mounting dimensions for Nor-Mex G couplings

After having mounted the coupling halves, ensure that the recommended play (dimension S2 for type G, dimension S1 for type E) and the overall length (dimension LG for type G and dimension LE for type E) corresponds with the dimensions given in the following tables. Accurate alignment of the coupling (→ Sec. 'Mounting tolerances') ensures long service life.

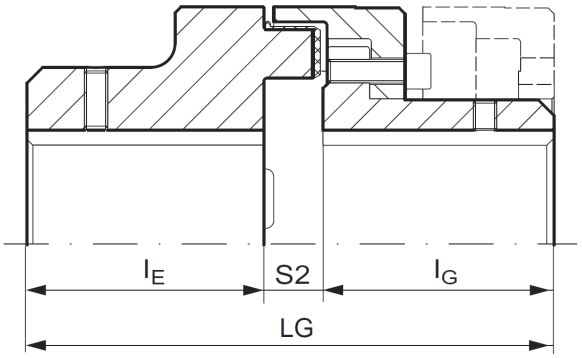


Figure 16: Mounting dimensions of the Nor-Mex G coupling

Nor-Mex G Coupling size	Mounting dimensions				Weight [kg]
	l_E [mm]	l_G [mm]	LG [mm]	Permitted tolerance S2 [mm]	
82	40	40	92	12±1	1.85
97	50	49	113	14±1	3.8
112	60	58	133	15±1	5
128	70	68	154	16±1	7.9
148	80	78	176	18±1	12.3
168	90	87	198	21±1.5	18.3
194	100	97	221	24±1.5	26.7
214	110	107	243	26±2	35.5
240	120	117	267	30±2	45.6
265	140	137	310	33±2.5	65.7
295	150	147	334	37±2.5	83.9
330	160	156	356	40±2.5	125.5
370	180	176	399	43±2.5	177.2
415	200	196	441	45±2.5	249.2
480	220	220	485	45±2.5	352.9
575	240	240	525	45±2.5	517.2

Mounting dimensions of the Nor-Mex E coupling

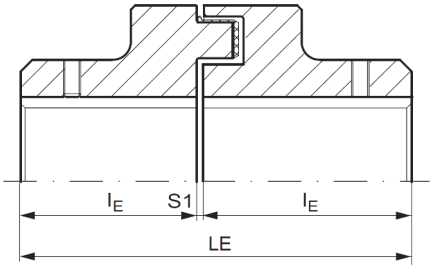


Figure 17: Mounting dimensions of the Nor-Mex E coupling

Nor-Mex E Coupling size	Mounting dimensions			Weight [kg]
	l_E [mm]	LE [mm]	Permitted tolerance S1 [mm]	
67	30	62.5	2.5±0.5	0.93
82	40	83	3±1	1.76
97	50	103	3±1	3.46
112	60	123.5	3.5±1	5
128	70	143.5	3.5±1	7.9
148	80	163.5	3.5±1.5	12.3
168	90	183.5	3.5±1.5	18.4
194	100	203.5	3.5±1.5	26.3
214	110	224	4±2	35.7
240	120	244	4±2	45.7
265	140	285.5	5.5±2.5	66.3
295	150	308	8±2.5	84.8
330	160	328	8±2.5	121.3
370	180	368	8±2.5	169.5
415	200	408	8±2.5	237
480	220	448	8±2.5	320
575	240	488	8±2.5	457

Mounting tolerances

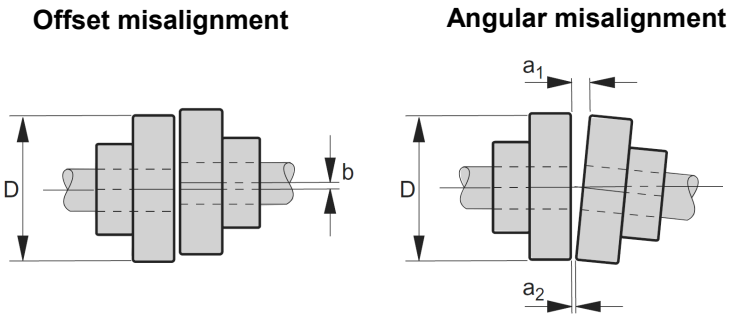


Figure 18: Mounting tolerances

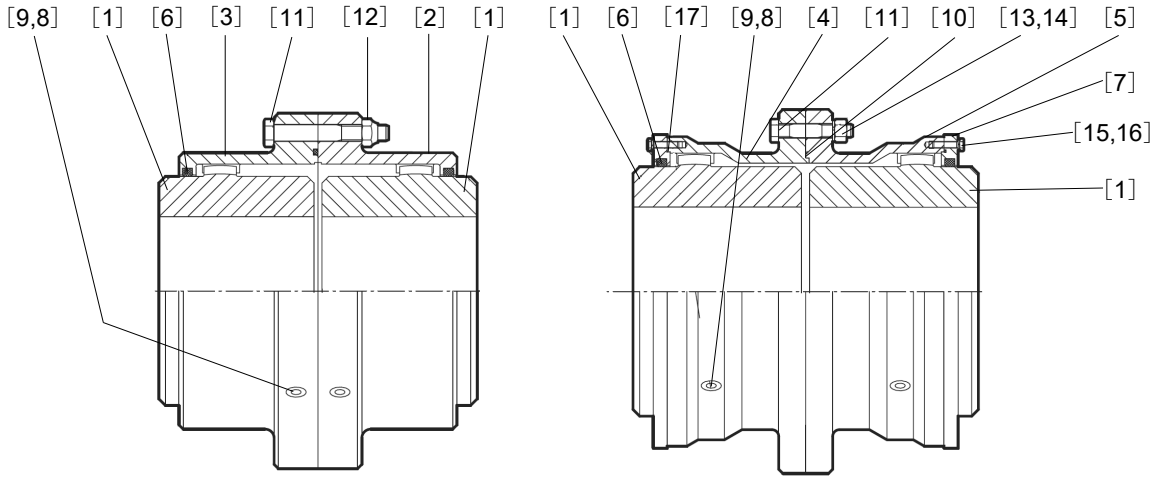


The mounting tolerances specified in the following table apply to elastic Nor-Mex and ROTEX couplings.

Outside diameter D [mm]	Mounting tolerances [mm]					
	n < 500 min^{-1}		n: 500 - 1500 min^{-1}		n > 1500 min^{-1}	
	$a_1 - a_2$	b	$a_1 - a_2$	b	$a_1 - a_2$	b
⩽ **100**	0.05	0.05	0.04	0.04	0.03	0.03
100 < D ≤ 200	0.06	0.06	0.05	0.05	0.04	0.04
200 < D ≤ 400	0.12	0.10	0.10	0.08	0.08	0.06
400 < D ≤ 800	0.20	0.16	0.16	0.12	0.12	0.10

$a_1 - a_2$ = max. angular misalignment
b = max. offset misalignment

5.2.3 Mounting of torsionally rigid GM, GMD, and GMX couplings



GM 42-260 **GM 280-800**

Figure 19: Design of the GM coupling

[1] Coupling hub
[2] Sleeve
[3] Sleeve
[4] Sleeve (male)
[5] Sleeve (female)
[6] Seal or O-ring
[7] Cover
[8] Grease nipple
[9] Grease nipple
[10] Gasket
[11] Bolt
[12] Self-locking nut
[13] Washer
[14] Nut
[15] Bolts
[16] Washer
[17] O-ring

- Before mounting the coupling, thoroughly clean the individual parts of the coupling, in particular the toothing.
- Grease the O-rings [6] slightly and place them into the corresponding grooves in the sleeve [2, 3].
- Grease the toothing of the sleeves [2, 3] and push the sleeves onto the shaft ends without damaging the O-rings [6].
- Slide the coupling hubs [1] onto the shaft. Move hubs to be flush with the shaft end.
- Align the machine to be coupled and check the shaft distance (dimension "a" → Sec. "Shaft distance, tightening torque").
- Align both axes and check the permitted values using a dial indicator. The mounting tolerances (→ Sec. "Mounting tolerances") depend on the coupling torque.
- Before you screw on the sleeves [2, 3], have the coupling hugs [1] cool off and grease the toothing.
- Insert the gasket [10] and tighten the sleeve halves to the specified tightening torque (→ Sec. "Shaft distance, tightening torque"). Grease the gasket slightly to facilitate mounting.
- It is important that the grease nipples [9] on the two sleeve halves [4, 5] are positioned at an angle of 90° towards each other after having tightened the sleeves.

Mounting tolerances

Offset misalignment **Angular misalignment**

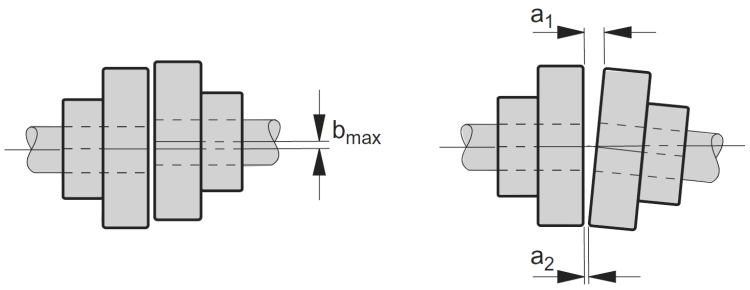


Figure 20: Mounting tolerances of the GM coupling

Coupling type	Mounting tolerances [mm]									
	n < 250 min^{-1}		n: 250 - 500 min^{-1}		n: 500 - 1000 min^{-1}		n: 1000 - 2000 min^{-1}		n: 2000 - 4000 min^{-1}	
	$a_1 - a_2$	b_{max}	$a_1 - a_2$	b_{max}	$a_1 - a_2$	b_{max}	$a_1 - a_2$	b_{max}	$a_1 - a_2$	b_{max}
GM42 … 90	0.25	0.25	0.25	0.25	0.25	0.25	0.2	0.15	0.1	0.08
GM100 … 185	0.6	0.5	0.6	0.5	0.35	0.25	0.2	0.15	0.1	0.08
GM205 … 345	1	0.9	0.75	0.5	0.35	0.25	0.2	0.15	-	-
GM370 … 460	2	1.5	1.1	0.8	0.5	0.4	0.25	0.2	-	-
GM500 … 550	2.2	1.5	1.1	0.8	0.5	0.4	0.25	0.2	-	-

$a_1 - a_2$ = max. angular misalignment
b_{max} = max. offset misalignment

Shaft distance, tightening torque

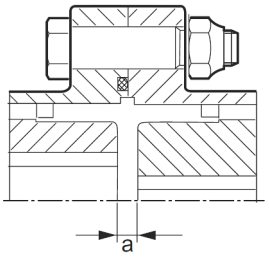


Figure 21: Shaft distance "a"

Coupling type	42	55	70	90	100	125	145	165	185	205	230	260	280
Shaft distance a [mm]	61	61	62	82	82	82	102	103	103	123	123	123	163
Tightening torque screw [Nm]	8	20	68	108	108	230	230	230	325	325	325	375	375

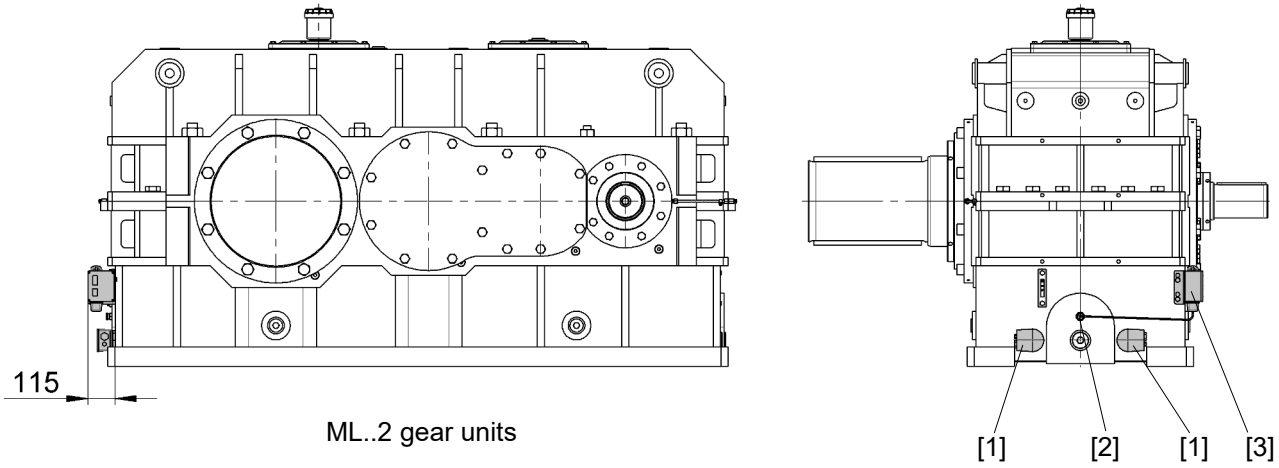
5.3 Oil heater

Purpose and basic design

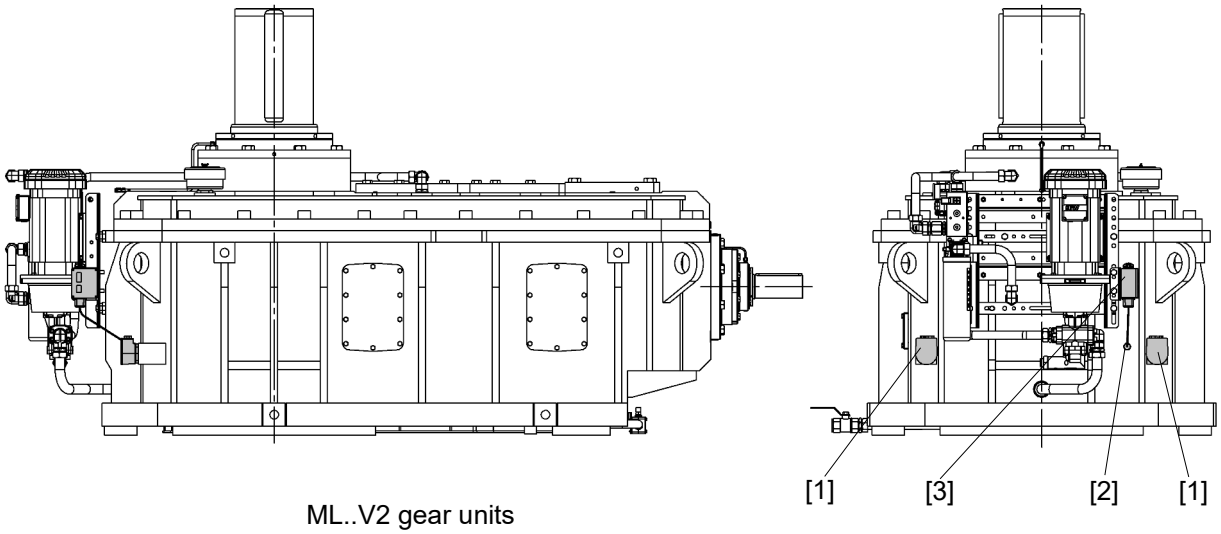
Oil heating is required to ensure lubrication at startup when the ambient temperature is low (e.g. cold start of the gear unit).

- The oil heater consists of 3 basic parts (→ Figure 22)

1. Resistor element in the oil bath ("Oil heater") with terminal box
2. Temperature sensor
3. Thermostat



ML..2 gear units



ML..V2 gear units

Figure 22: Oil heater for gear units

[1] Oil heater
[2] Temperature sensor
[3] Thermostat

Activation / deactivation behaviour

The oil heater

- is activated when the factory set temperature is reached. This temperature setpoint depends on the following:
  - for splash/bath lubricated units: on the pour point of the used oil
  - for pressure lubricated units: on the temperature at which the oil viscosity is maximal 2000 cSt

ISO VG	Setpoint for splash/bath lubrication [°C]		
	460	320	220
Mineral oil	-8	-12	-16
Synthetic oil	-20	-25	-29

ISO VG	Setpoint for pressure lubrication [°C]		
	460	320	220
Mineral oil	+20	+15	+10
Synthetic oil	+15	+10	+5

- is deactivated when the set temperature is exceeded by 8 °C to 10 °C.

The thermostat and the oil heater are normally installed to the gear unit and are ready to operate but without electrical connections. Therefore, the following has to be done before startup:

1. Connect the resistor element ("Oil heater") with the power supply
2. Connect the thermostat with the power supply

It is essential that you check the following points before activating the oil heater:

- **Check for correct electrical connection according to the ambient conditions (→ Sec. "Electrical connection")**
- **Check for correct oil grade and oil volume of the gear unit (→Nameplate)**

There is a potential danger of explosion if the oil heater is not connected correctly or is operated above the oil surface!

Electrical connection resistor element

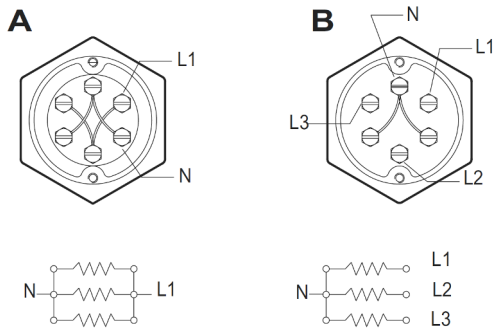


Figure 23: Electrical connection options for the oil heater (A: single-phase / B: three-phase)

Basic design thermostat

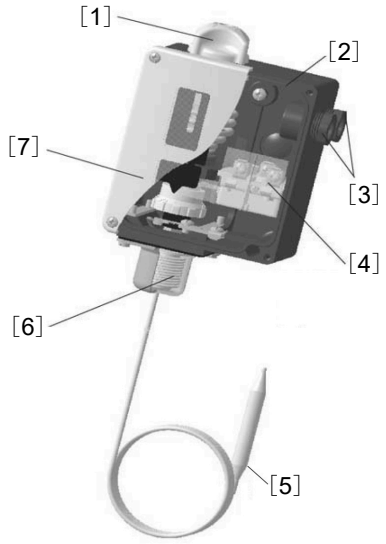
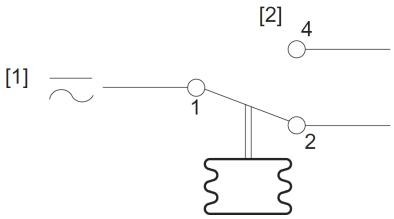
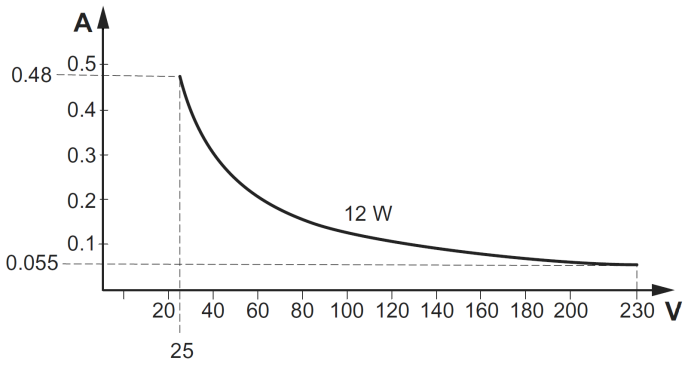


Figure 24: Basic design thermostat

[1] Setting range knob
[2] IP66 enclosure (units with external reset IP54)
[3] 2 x PG 13.5 cable diameter 6 mm → 14 mm
[4] SPDT contact system. Exchangeable
[5] Capillary tube length up to 10 m
[6] Stainless steel bellows
[7] Polyamide cover

	RT thermostats
Ambient temperature	-50 °C to 70 °C
Contact system	 [1] Line [2] SPDT
Contact load	**Alternating current:** AC-1: 10 A, 400 V AC-3: 4 A, 400 V AC-15: 3A, 400 V **Direct current:** DC-13: 12 W, 230 V 
Contact material: **AgCdO**	
Cable entry	2 PG 13.5 for 6 -14 mm diameter cable
Enclosure	IP66 acc. to IEC 529 and EN 60529. Units with external reset IP54. Thermostat housing is made of bakelite acc. to DIN 53470, the cover is made of polyamid.

In the following cases, a contactor must be used:
- a 3-phase voltage supply is used
- 2 heating rods are used (e.g. ML130)
- current ratings exceed nominal values of the thermostat

Adjusting the setpoint

The setpoint is normally set at the factory. For adjustments, the following process has to be followed:

The range is set by using the setting knob [1] while at the same time reading the main scale [2]. Tools must be used to set thermostats equipped with a seal cap. The differential is set by the differential disc [3]

The size of the obtained differential can be established by comparing the set main scale value and the scale value on the differential disc with the help of the nomogram for the thermostat concerned.

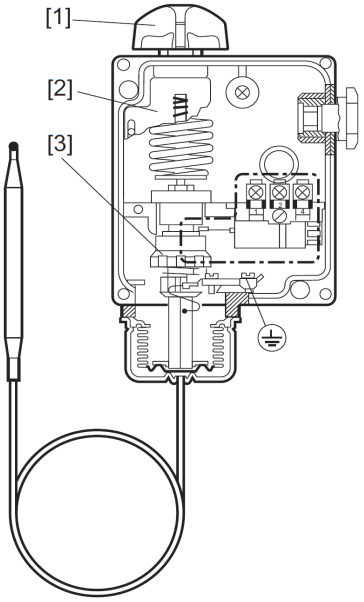


Figure 25: Design thermostat

[1] Setting knob
[2] Main scale
[3] Differential setting disc

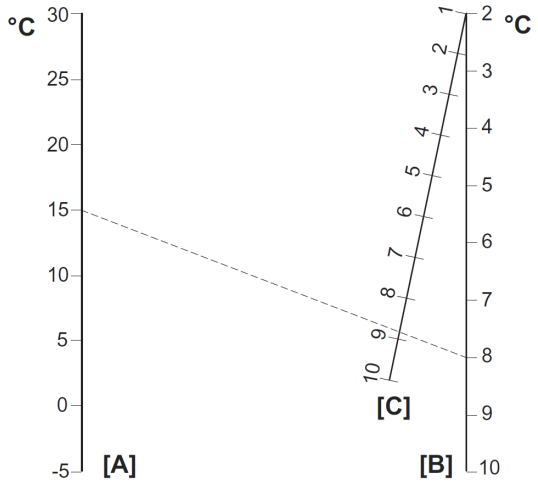


Figure 26: Nomogrcem for obtained differential

[A] Range setting
[B] Obtained differential
[C] Differential setting

5.4 Temperature sensor PT100

The temperature sensor PT100 can be used to measure the temperature of the oil in the gear unit.

Dimensions

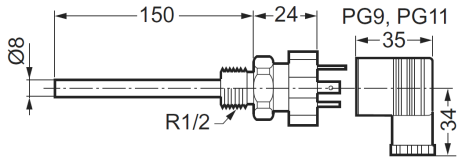


Figure 27: Temperature sensor PT100

Electrical connection

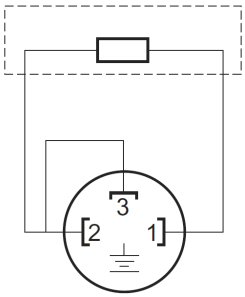


Figure 28: Electrical connection temperature sensor PT100

Technical data

- Sensor tolerance ± (0.3 + 0.005 × t), (corresponds to DIN IEC 751 class B), t = oil temperature
- Plug connector DIN 43650 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 25 Nm.

5.5 SPM adapter

SPM adapters are available for measuring the shock pulses of the gear unit bearings. Shock pulses are measured using shock pulse sensors attached to the SPM adapter.

Nipple 32000 and cover 81025

g = M8
L = 24, 113, 202, 291

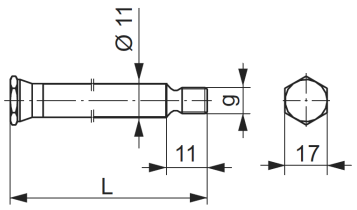


Figure 29: SPM adapter

Sensor to be wired 40000 and fitting 13008

g = M8
L = 17, 106, 195, 284

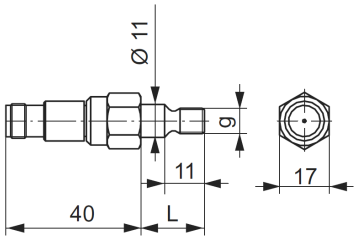


Figure 30: SPM adapter

Mounting of shock pulse sensor

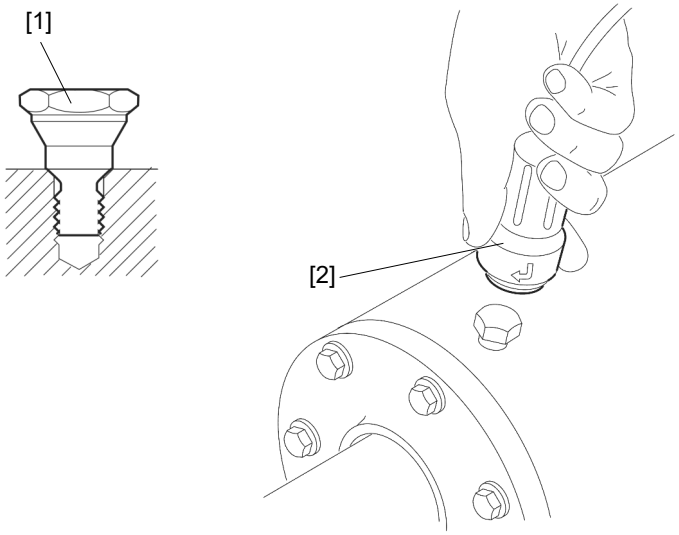


Figure 31: Mounting the shock pulse sensor onto the SPM adapter

[1] SPM adapter
[2] Pulse sensor

- Remove the protection cap of the SPM adapter [1]. Ensure that the SPM adapter [1] is tightened correctly and securely (tightening torque: 15 Nm).
- Mount the shock pulse sensor [2] onto the SPM adapter [1].

6. Pressure Lubrication

For gear units equipped with a separate lubrication system (sometimes in connection with a cooling system) refer also to the separate manual.

6.1 Motor pump

The MHP motor pump [1] is suited for operation in both directions of rotation.

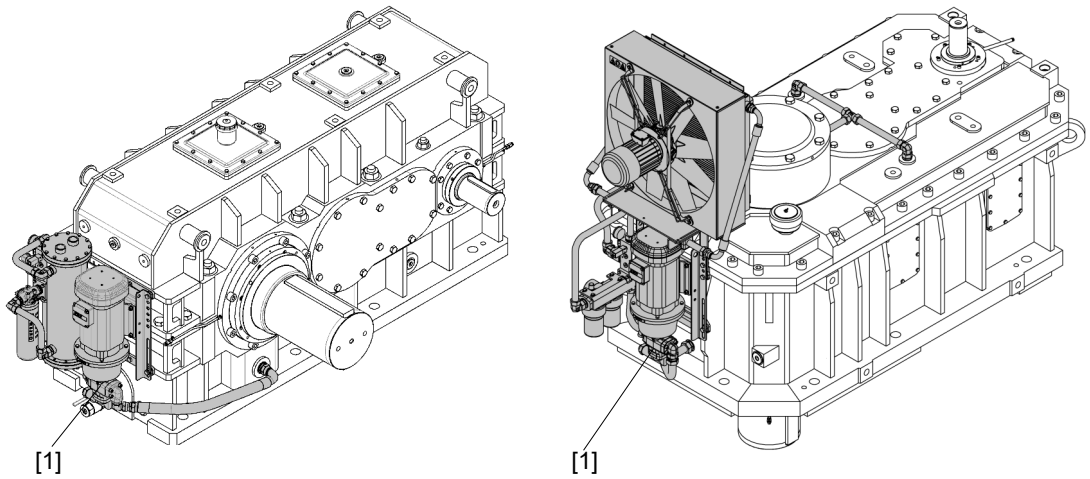


Figure 32: Motor pump

MHP motor pump comprising:
- AC motor
- Coupling between AC motor and gear pump
- Motor flange
- Gear pump

AC motor:
Supply voltage: 220-240 V / 380-420 V, 50 Hz

Consult SEW-EURODRIVE in case of deviating supply voltages and/or 60 Hz operation. For a detailed description, please refer to the separate manual.

Other standard equipment and optional instruments are also available. Consult SEW-EURODRIVE.

6.2 External cooling system

For gear units supplied with an oil/water or oil/air cooling system, please refer to the separate manual.

6.3 *Customer supplied external cooling and lubrication* systems

General

If the customer orders a gear unit for which SEW-EURODRIVE recommends a pressure lubrication or/and an additional cooling system, this chapter provides some guidelines for selecting the components.

First, define
- The required oil volume Q_P the motor pump has to provide.
- The required cooling capacity P_L of the oil/water or oil/air cooler,

If the gear unit is ordered for a customer-supplied pressure lubrication system, the gear unit must not be taken into operation without the pressure lubrication system.

The required oil flow, oil pressure and oil temperature for pressure lubrication with or without cooler, please consult SEW-EURODRIVE

We recommend to use the following additional components and instrumentation:
- Oil filter with a minimum filtration degree of 25 µm.
- Control switch to check operation of the motor pump, for example using a **pressure Switch.**
- If cooler is used: Control of oil temperature in the return line of the cooler, for example using a **thermo switch** or a **visual thermometer.**

Typical setup pressure lubrication without cooler

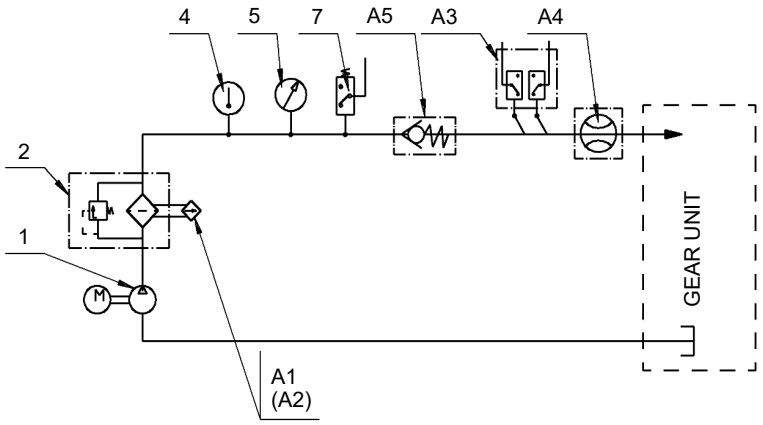


Figure 33: Pressure lubrication

Standard equipment:
[1] Pump
[2] Filter
[5] Pressure gauge
[7] Pressure switch
[A1] Visual filter contamination indicator

Optional equipment:
[4] Thermometer
[A2] Electrical filter contamination indicator
[A3] Temperature monitors
[A4] Flow indicator
[A5] Check valve

Typical setup pressure lubrication with oil/water

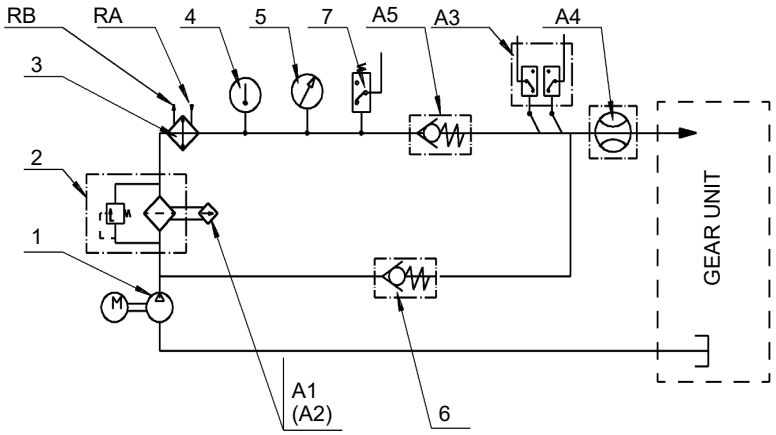


Figure 34: Pressure lubrication with oil/water cooler

Standard equipment:
[1] Pump
[2] Filter
[3] Oil/Water cooler
[5] Pressure gauge
[7] Pressure switch
[A1] Visual filter contamination indicator
[RA] Water inlet
[RB] Water outlet

Optional equipment:
[4] Thermometer
[6] Pressure relief valve
[A2] Electrical filter contamination indicator
[A3] Temperature monitors
[A4] Flow indicator
[A5] Check valve

Typical setup pressure lubrication with oil/air

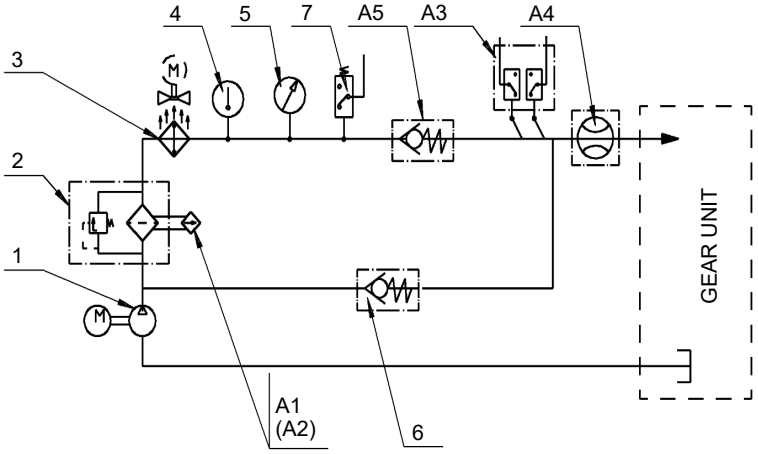


Figure 35: Pressure lubrication with oil/air cooler

Standard equipment:
[1] Pump
[2] Filter
[3] Oil/Air cooler
[5] Pressure gauge
[7] Pressure switch
[A1] Visual filter contamination indicator

Optional equipment:
[4] Thermometer
[6] Pressure relief valve
[A2] Electrical filter contamination indicator
[A3] Temperature monitors
[A4] Flow indicator
[A5] Check valve

7. Startup

7.1 Startup of ML..2 & ML..V2 gear units



- **It is essential to adhere to the safety notes in Sec. "Safety Notes."**
- **It is absolutely necessary to avoid open flames or sparking when working with the gear unit!**
- **Take preventive measures to protect people from the solvent vapors generated by the vapor phase inhibitor!**
- **Before startup, check for correct oil level! For lubricant fill quantities, refer to Sec. "Lubricants."**
- **For gear units with long-term protection: Replace the screw plug on the location indicated by the breather plug (Position → Sec. "Mounting Positions").**

Before startup

- **For gear units with long-term protection:** Remove the gear unit from the seaworthy protection box.
- Remove the corrosion protection agent from the gear unit parts. Make sure gaskets, sealing surfaces and sealing lips are not damaged by mechanical abrasion, etc.
- Before filling the gear unit with the correct oil grade and volume, drain the remaining amount of protection oil. To do so, unscrew the oil drain plug and drain the remaining protection oil. Thread the oil drain plug back in place.



- Remove the oil filling plug (Position → Sec. "Symbols and mounting positions "). Use a funnel to fill
the oil (filter mesh max. 25 µm). Fill the gear unit with the correct oil grade and volume (→ Sec. "Nameplate"). Guidelines for selecting the correct oil type (→ Sec. "Lubricants"). Decisive is the oil type mentioned on the nameplate. The oil volume specified on the nameplate of the gear unit is a reference value. The oil level glass is the decisive indicator of the correct oil level. After having filled the oil, replace the oil filling plug.
- Make sure that rotating shafts as well as couplings are equipped with suitable protective covers.
- If the gear unit has a motor pump, check for proper functioning of the pressure lubricating system. Make sure that monitoring devices are connected properly.
- After an extended period of storage (max. two years), have the gear unit operate without load with the correct oil fill (→ Sec. "Nameplate"). This way, the correct functioning of the lubricating system and particularly the oil pump is ensured.

Running-in period

SEW-EURODRIVE recommends running-in the gear unit as first startup phase. Increase load and revolutions in two to three steps up to maximum level. The running-in phase takes about 10 hours.

Check the following points during the running-in phase:

- Verify the power values specified on the nameplate because their frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noise?
- Are there signs of oil leakages on the gear unit?

For further information and troubleshooting, refer to Sec. "Malfunctions."

7.2 Taking ML..2 & ML..V2 gear units out of operation

Disconnect the drive from voltage supply and secure it to prevent unintentional restart!

If the gear unit is not operated for a longer period of time, you must activate it at regular intervals every two to three (2 to 3) weeks.

If the gear unit is not operated for a period **longer than six (6) months**, additional corrosion protection is required:

- **Corrosion protection for the inside of gear units with splash lubrication or bath lubrication:**
  Fill the gear unit up to the breather plug with the oil grade specified on the nameplate.
- **Corrosion protection for the inside of gear units with oil pressure lubrication:**
  Contact SEW-EURODRIVE in this case!
- **Surface corrosion protection:**
  Apply a wax-based protective coating onto shaft ends and unpainted surfaces as corrosion protection. Grease the sealing lips of the oil seal to protect them from preservative agents.

For taking the gear unit back into operation, refer → Sec. "Startup."

8. Inspection and Maintenance

8.1 Inspection and maintenance intervals

Interval	What to do?
• Daily	• Check the housing temperature: – with mineral oil: max 90 °C. – with synthetic oil: max. 100 °C. • Check gear unit noise. • Check the gear unit for signs of leakage.
• After 500 - 800 hours of operation	• First oil change after initial startup.
• After 500 hours of operation	• Check the oil level, refill oil (→ Sec. "Nameplate") if necessary.
• Every 3000 hours of operation, at least every 6 months	• Check the oil: If the gear unit is operated outdoors or in humid conditions, check the water content of the oil. The water content must not exceed 0.03 % (300 ppm). • Regrease labyrinth seals. Option for gear unit. Standard gear unit supplied without grease nipple. Use about 30 g grease per grease nipple. • Clean the breather plug.
• Depending on the operating conditions, at the latest every 12 months	• Change the mineral oil (→ Sec. "Inspection and maintenance of the gear unit"). • Check whether retaining screws are tightly secured. • Check contamination and condition of the oil/air cooling system. • Check the condition of the oil/water cooling system. • Clean oil filter, replace filter element if necessary.
• Depending on the operating conditions, at the latest every 3 years	• Change synthetic oil (→ Sec. "Inspection and maintenance of the gear unit")
• Varying (depending on external factors)	• Repair or renew the surface/anticorrosion coating. • Clean the gearcase surface and fan. • Check the oil heater: – Are all connection cables and terminals tightened securely and free from corrosion? – Clean incrusted elements (such as the heating element) and replace, if required (→ Sec. "Inspection and maintenance of the gear unit").

8.2 Lubricant change intervals

Change the oil more frequently when operating the industrial gear unit under more severe/aggressive environmental conditions!

Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following figure corresponds to the PAO oils.

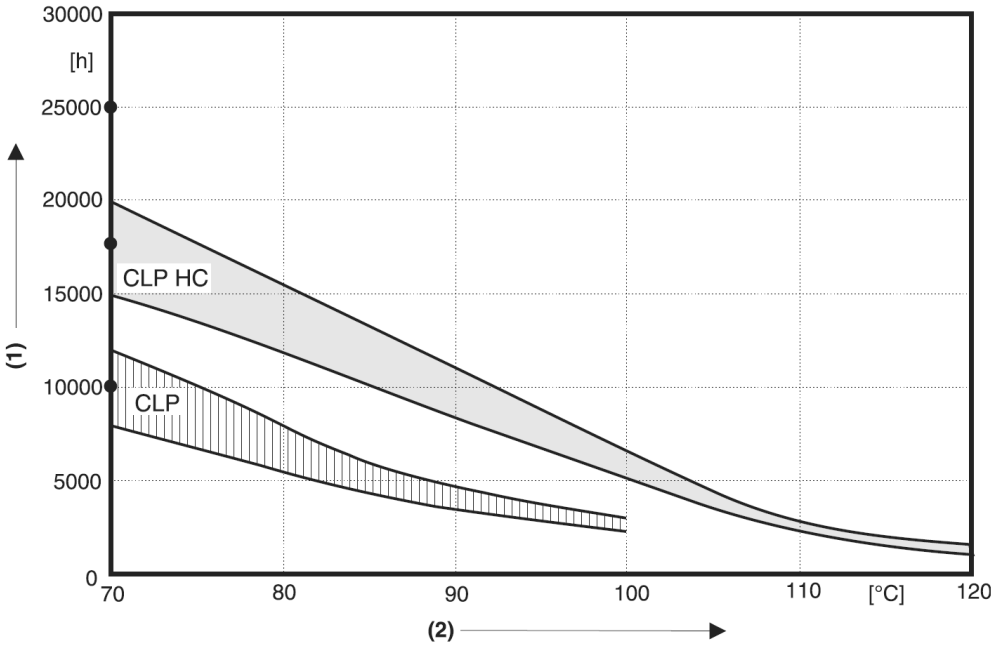


Figure 36: Lubricant change intervals for ML..2 & ML..V2 gear units under normal ambient conditions

(1) Hours of operation
(2) Sustained oil bath temperature

8.3 Inspection and maintenance of the gear unit

- **Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants!**
- **For positions of the oil level plug, the drain plug, the breather plug and the oil sight glass, refer to Sec. "Mounting Positions."**

Checking the oil level

1. **Disconnect the motor from voltage supply and secure it to prevent unintentional restart!**
   Wait until the gear unit has cooled off – Danger of burns!

2. For gear units with oil level glass: Visually check correct oil level (= middle of oil sight glass)



3. For gear units with oil dipstick (option):
   - Unscrew the oil dipstick and remove it. Clean the dipstick and re-insert it into the gear unit (do **not** screw in tightly!).
   - Remove dipstick again and check oil level. Correct if necessary: the oil level is correct when it is between the oil level mark (= maximum oil level) and the end of the dipstick (= minimum oil level)

Checking the oil



1. **Disconnect the motor from voltage supply and secure it to prevent unintentional restart!**

   Wait until the gear unit has cooled off – Danger of burns!
2. Remove some oil from the oil drain plug
3. Check the oil consistency
   - Viscosity
   - If you can see that the oil is heavily contaminated, we recommend to change the oil disregarding the service intervals specified in Sec. "Service and maintenance intervals."

Changing the oil

When changing the oil, clean the gearcase thoroughly to remove oil residues and abrasion. Use the same oil grade as for the operation of the gear unit.



1. **Disconnect the motor from voltage supply and secure it to prevent unintentional restart!**

   Wait until the gear unit has cooled off – Danger of burns! If your gear unit is equipped with an oil expansion tank, let the gear unit cool off until it reaches ambient temperature. The reason is that there might still be oil in the oil expansion tank which might leak through the oil filling hole!

   Note: The gear unit must still be warm because the high viscosity of cold oil will make it more difficult to drain the oil correctly.
2. Place a container under the oil drain plug.
3. Remove oil filling plug, breather plug and oil drain plugs.
4. Drain the oil completely.
5. Reinstall the oil drain plugs.
6. Use a funnel to fill the oil (filter mesh max. 25 µm). Fill new oil of the same type as the old oil via the oil filling plug (if you want to change the oil type, contact our customer service first).
   - Fill the oil according to the volume specified on the nameplate (→ Sec. "Nameplate"). The oil volume specified on the nameplate is an approximate value. **The marks on the oil level glass (option: oil dipstick) are decisive for the oil level.**
   - Check whether the oil level is correct using the oil dipstick.



7. Reinstall the oil filling plug.
8. Mount the breather plug.
9. Clean the oil filter, replace the filter element if necessary (when using an external oil/air or oil/water cooling system).



If you remove the housing cover, you must apply new sealing compound to the sealing surface. Else, the tightness of the gear unit is not guaranteed! Contact SEW-EURODRIVE in this case!

Cleaning the oil heater

Incrustation on the oil heater caused by oil must be removed. Remove the oil heater for this purpose.

The oil heater must be deactivated before draining the oil. The reason is that the hot oil heater might ignite the evaporating oil

Removing the oil heater

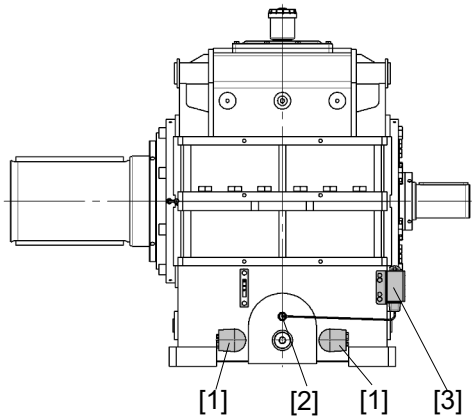


Figure 37: Oil heater ML..2 & ML..V2 gear units

[1] Oil heater
[2] Temperature sensor
[3] Thermostat

- Remove the oil heater [1] and the gasket on the gear unit.
- Remove the base of the terminal box.
- Clean the tubular heating elements with solvent.

Be careful not to damage the heating elements through scratching or scraping!

Mounting the oil heater

- Reinstall the oil heater [1] and the gasket on the gear unit. The tubular heating elements must always be immersed in liquid.
- Mount the base of the terminal box onto the heating rod using a mounting ring.
- Make sure that the gasket is placed correctly between terminal box and upper end of the heating element.
- Insert the temperature sensor [2] into the oil sump of the gear unit. Set the required temperature on the thermostat [3].

Refilling grease

Risk of crushing due to rotating parts.
Make sure to provide for sufficient safety measures for relubrication.

Regreasable sealing systems may be filled with lithium soap grease. Use moderate pressure to force about 30g of grease into each lubrication point until new grease leaks out of the sealing gap.

Used grease, including contaminants and sand, is in this way pressed out of the sealing gap.

Immediately remove the old grease that leaked out.

9. Malfunctions

9.1 Gear unit malfunctions

Problem	Possible cause	Solution
Unusual, regular running noise	A Meshing/grinding noise: bearing damage. B Knocking noise: irregularity in the gearing.	A Check the oil (→ Sec. "Inspection and Maintenance), replace bearings. B Contact customer service.
Unusual, irregular running noise	Foreign particles in the oil.	• Check the oil (→ Sec. "Inspection and Maintenance") • Stop the drive, contact customer service
Unusual noise in the area of the gear unit mounting	Gear unit mounting has loosened.	• Tighten the retaining screws and nuts to the specified torque. • Replace the damaged / defective retaining screws or nuts.
Operating temperature too high	A Too much oil B Oil too old. C Oil contaminated. D Gear units with fan: air intake opening / gearcase contaminated. E Malfunctions of oil/air or oil/water cooling system.	A Check the oil level, correct if necessary (→ Sec. "Inspection and Maintenance"). B Check when the oil was changed last time; change oil if necessary (→ Sec. "Inspection and Maintenance"). C Change the oil (→ Sec. "Inspection and Maintenance"). D Check the air intake opening and clean if necessary, clean gear unit housing. E Observe the separate operating instructions of the oil/water and oil/air cooling system!
Bearing point temperatures too high	A Oil not enough or too much oil. B Oil too old. C Bearing damaged.	A Check the oil level, correct if necessary (→ Sec. "Inspection and Maintenance"). B Check when the oil was changed last time; change. oil if necessary (→ Sec. "Inspection and Maintenance"). C Check bearing and replace if necessary, contact customer service.
Oil leaking[1] • from cover plate • from gearcase cover • from bearing cover • from mounting flange • from output/input end oil seal	A Gasket on cover plate / gearcase cover / bearing cover / mounting flange leaking. B Sealing lip of oil seal upside down. C Oil seal damaged / worn.	A Tighten the bolts on the respective cover plate and observe the gear unit. Oil still leaking: contact customer service. B Vent the gear unit (→ Sec. "Mounting Positions") Observe the gear unit. Oil still leaking: contact customer service. C Contact customer service.
Oil leaking • from oil drain plug/ valve • from breather plug	A Too much oil. B Drive operated in incorrect mounting position. C Frequent cold starts (oil foams) and/or high oil level.	A Correct the oil level (→ Sec. "Inspection and Maintenance). B Mount the breather plug correctly (→ Sec. "Mounting Positions") and correct the oil level (→ Sec. "Lubricants").
Malfunctions of the oil/air or oil/water cooling system		Observe separate operating instructions of the oil/water and oil/air cooling system!
Operating temperature at backstop too high	Damaged / defective backstop	• Check the backstop; replace if necessary. • Contact customer service.

1 It is normal for small amounts of oil/grease to emerge from the oil seal during the running-in phase (24 hour running time, see also DIN 3761).

Customer service

Please have the following information available when contacting our customer service:

- Complete nameplate data.
- Nature and extent of the fault.
- Time of occurrence and accompanying circumstances of the fault.
- Presumed cause.

10. Lubricants

10.1 Guideline for oil and grease selection

10.1.1 Lubricating oils

This instruction applies to the following conditions:

- Ambient temperature in the range of -30 °C … +40 °C
- Actual max. pitch line velocity less than 35 m/s
- All lubricating methods with oil: splash, bath and pressure lubrication

In addition to the required viscosity class ISO VG, the oil must contain anti-wear, anti-rust, anti-oxidant and antifoam additives. The FZG stage should be at least 12 according to DIN 51354.

The oil must also contain pressure-resistant additives (EP additives). If synthetic oils are selected due to operating temperatures or oil change intervals, SEW-EURODRIVE recommends polyalfaolefine based (PAO) oil.

10.1.2 Mineral oils

Lubricating oil standards

Lubricating oils are grouped in ISO VG viscosity classes according to standards ISO 3448 and DIN 51519.

ISO VG class	ISO 6743-6 designation	DIN 51517-3 designation	AGMA 9005-D94 designation
150	ISO-L-CKC 150	DIN 51517 CLP 150	AGMA 4 EP
220	ISO-L-CKC 220	DIN 51517 CLP 220	AGMA 5 EP
320	ISO-L-CKC 320	DIN 51517 CLP 320	AGMA 6 EP
460	ISO-L-CKC 460	DIN 51517 CLP 460	AGMA 7 EP
680	ISO-L-CKC 480	DIN 51517 CLP 680	AGMA 8 EP

Containing EP additives

Selection of viscosity class ISO VG (40 °C)

The maximum operating temperature of mineral oil is 80 °C.

Selection of the lubricating oil

Mineral oil, when the gear unit is located outdoors, use an oil heater in the following cases:

- With splash or bath lubrication when the starting temperature is less than the pour point of the oil
- With pressure lubrication when the starting oil viscosity is greater than 2000 cSt.

10.1.3 Synthetic oils (PAO)

Lubricating oil standards

Lubricating oils are grouped in ISO VG viscosity classes according to standards ISO 3448 and DIN 51519.

ISO VG class	ISO 6743-6 designation
150	ISO-L-CKT 150
220	ISO-L-CKT 220
320	ISO-L-CKT 320
460	ISO-L-CKT 460

Containing EP additives

Selection of viscosity class ISO VG (40 °C)

The maximum operating temperature of synthetic oil is 90 °C.

Selection of the lubricating oil

Synthetic PAO oils, When the gear unit is located outdoors, use an oil heater in the following cases:

- With splash or bath lubrication when the starting temperature is less than the pour point of the oil.
- With pressure lubrication when the starting oil viscosity is greater than 2000 cSt.

10.1.4 Lubricating greases for bearings

Lubricating grease standards

If lubricating grease for bearings is used, this will be indicated on the gear unit and in the technical specification. Contains EP additives. Only to be used for greasing of bearings. Hardness class NLGI 2.

ISO 6743-9 designation	ISO 51502 designation
ISO-L-XCCFB 2	DIN 51502 K2K-30

Lithium soap based greases are recommended.

Selection of lubricating grease

The greases are used for roller bearings. A plate with grease recommendations is attached if the gear unit requires grease lubrication.

10.1.5 Slow speed gear units

When the pitch line velocity of the slowest stage is under 1 m/s (n_2 < 15 1/min), the gear unit operates in boundary lubrication area.

It is recommended to use:

- mineral oils with EP- and anti-wear additives.
- running viscosity should be ≥ 100 cSt.
- the cleanliness of the oil and the oil sump must be ensured.

10.2 Lubricant table

The lubricant table shows the permitted lubricants for SEW-EURODRIVE gear units. Please note the abbreviations, meaning of shading and notes.

CLP = Mineral oil
CLP HC = Synthetic polyalphaolefin
E = Ester oil (water hazard classification 1)

= Mineral lubricant
= Synthetic lubricant

3) = Use lubricants only when service factor $F_S \geq 1.3$
4) = Take into account critical startup behavior at low ambient temperatures
6) = Ambient temperature

= Lubricant for the food industry (food grade oil)

= Biodegradable oil (lubricant for agriculture, forestry, and water management)

Contact SEW-EURODRIVE if you operate the unit under extreme conditions, such as cold, heat, or if the operating conditions have changed since project planning.

6) °C -50 0 +50 +100	DIN (ISO)	ISO,NLGI	Mobil®	Shell	bp	KLÜBER LUBRICATION	ARAL	TEXACO	Castrol Tribol	Castrol Optimol	FUCHS	Q8	TOTAL
Standard -10 +40	CLP CC	VG 320	Mobilgear XMP 320 Mobilgear 600XP 320	Shell Omala F 320	BP Energol GR-XP-320	Klüberoil GEM 1-320 N	Aral Degol BG 320	Meropa 320	Alpha SP 320 Tribol 1100/320	Optigear BM 320	Renolin CLP 320 Plus Renolin High Gear 320	Goya NT 320	Carter EP 320
-20 +20	CLP CC	VG 150 3)	Mobilgear XMP 150 Mobilgear 600XP 150		BP Energol GR-XP-150	Klüberoil GEM 1-150 N	Aral Degol BG 150	Meropa 150	Alpha SP 150 Tribol 1100/150	Optigear BM 150	Renolin CLP 150 Plus Renolin High Gear 150	Goya NT 150	
-15 +30	CLPCC	VG 220	Mobilgear XMP 220 Mobilgear 600XP 220	Shell Omala F 220	BP Energol GR-XP-220	Klüberoil GEM 1-220 N	Aral Degol BG 220	Meropa 220	Alpha SP 220 Tribol 1100/220	Optigear BM 220	Renolin CLP 220 Plus Renolin High Gear 320	Goya NT 3220	Carter EP 220
-5 +45	CLP CC	VG 460	Mobilgear XMP 460 Mobilgear 600XP 460	Shell Omala F 460	BP Energol GR-XP-460	Klüberoil GEM 1-460 N	Aral Degol BG 460	Meropa 460	Alpha SP 460 Tribol 1100/460	Optigear BM 460	Renolin CLP 460 Plus Renolin High Gear 460	Goya NT 460	Carter EP 460
0 +50	CLP CC	VG 680	Mobilgear XMP 680 Mobilgear 600XP 680	Shell Omala F 680	BP Energol GR-XP-680	Klüberoil GEM 1-680 N		Meropa 680	Alpha SP 680 Tribol 1100/680	Optigear BM 680	Renolin CLP 680 Plus Renolin High Gear 680	Goya NT 680	Carter EP 680
Standard -25 +40	CLP HC	VG 320	Mobilgear SHC XMP 320 Mobil SHC 632	Shell Omala HD 320	BP Enersyn EP-XF-320	Klübersynth GEM 4-320 N		Pinnacle EP 320	Alphasyn EP 320	Optigear Synthetic X 320	Renolin CLP 320 Plus Renolin High Gear Synth 320	El Greco 320	Carter SH 320
4) -40 +10	CLP HC	VG 68 3)	Mobil SHC 626	Shell Omala HD 68	BP Enersyn EP-XF-68	Klübersynth GEM 4-68 N				Optigear Synthetic X 68	Reolin Unisyn CLP 68		
4) -35 +20	CLP HC	VG 150	Mobilgear SHC XMP 150 Mobil SHC 629	Shell Omala HD 150	BP Enersyn EP-XF-150	Klübersynth GEM 4-150 N		Pinnacle EP 150	Alphasyn EP 150	Optigear Synthetic X 150	Reolin Unisyn CLP 150	El Greco 150	Carter SH 150
-30 +30	CLP HC	VG 220	Mobilgear SHC XMP 220 Mobil SHC 630	Shell Omala HD 220	BP Enersyn EP-XF-220	Klübersynth GEM 4-220 N		Pinnacle EP 220	Alphasyn EP 220	Optigear Synthetic X 220	Renolin CLP 320 Plus Renolin High Gear Synth 220	El Greco 220	Carter SH 220
-20 +50	CLP HC	VG 460	Mobilgear SHC XMP 460 Mobil SHC 634	Shell Omala HD 460	BP Enersyn EP-XF-460	Klübersynth GEM 4-460 N		Pinnacle EP 460	Alphasyn EP 460	Optigear Synthetic X 460	Renolin CLP 320 Plus Renolin High Gear Synth 460	El Greco 460	Carter SH 460
-10 +60	CLP HC	VG 680	Mobilgear SHC XMP 680 Mobil SHC 636	Shell Omala HD 680	BP Enersyn EP-XF-680	Klübersynth GEM 4-680 N		Pinnacle EP 680		Optigear Synthetic X 680	Reolin Unisyn CLP 680	El Greco 680	Carter SH 680
-10 +30	CLP HC NSF H1	VG 68 3)		Shell Cassida Fluid GL 68		Klüberöl 4UH1-68 N				Optileb HY 68	Geralyn SF 460		
-20 +20		VG 220 3)		Shell Cassida Fluid GL 220		Klüberöl 4UH1-220 N				Optileb GT 220			
4) -40 -10		VG 460 3)		Shell Cassida Fluid GL 460		Klüberöl 4UH1-460N				Optileb GT 460			
-20 +40	E	VG 460				Klüberbio CA2-460			Tribol BIO TOP 1418/460		Plantogear 460 S		

10.3 Lubricant fill quantities for horizontal installation gear units

The specified fill quantities are guide values. The precise values vary depending on the gear ratio and lubrication type. The required oil level depends on the mark on the oil sight glass, oil level glass and/or the dipstick.

Size	Oil Quantity (Bath lubrication) [l]				
	ML2P..	ML3P..	ML4P..	ML3R..	ML4R..
2315	560	710	710	560	710
2140	690	860	860	690	860
2145	700	890	890	700	890
2150	830	990	990	830	990
2155	950	1210	1210	950	1210
2160	1150	1360	1360	1150	1360
2165	1490	1720	1720	1490	1720
2170	1690	1910	1910	1690	1910

Size	Oil Quantity (Pressure lubrication) [l]				
	ML2P..	ML3P..	ML4P..	ML3R..	ML4R..
2315	305	375	375	305	375
2140	335	405	405	335	405
2145	350	435	435	350	435
2150	405	475	475	405	475
2155	435	535	535	435	535
2160	510	590	590	510	590
2165	585	665	665	585	665
2170	655	730	730	655	730

Size	Oil Quantity (Pressure lubrication)	
	ML4PV..	ML4RV..
2315	380	380
2140	410	410
2145	-	460
2150	-	540
2155	-	660
2160	-	740
2165	-	880
2170	-	1010



When using pressure lubrication, it is essential to observe the specifications on the nameplate and in the order-specific documentation!

10.4 Sealing grease / rolling bearing grease

The table shows the grease types recommended by SEW-EURODRIVE for operating temperature from – 20 °C to +100 °C.

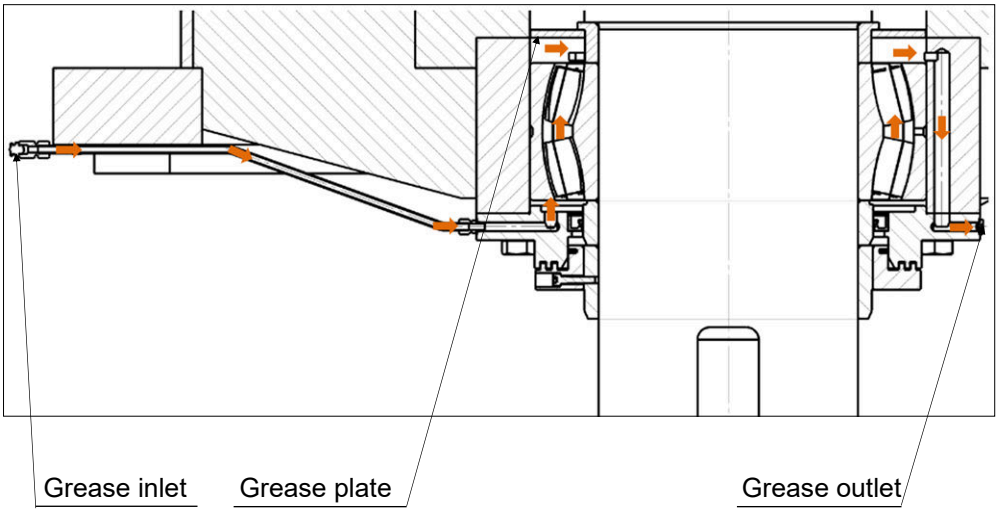
Manufacturer	Grease
Aral	Aralub HLP2
BP	Energrease LS-EPS
Castrol	Spheerol EPL2
Fuchs	Renolit CX TOM 15 OEM
Klüber	Centoplex EP2
Kuwait	Q8 Rembrandt EP2
Mobil	Mobilux EP2
Shell	Alvania EP2
Texaco	Multifak EP2
Total	Multis EP2
Castrol	Obeen FS2
Fuchs	Plantogel 2S

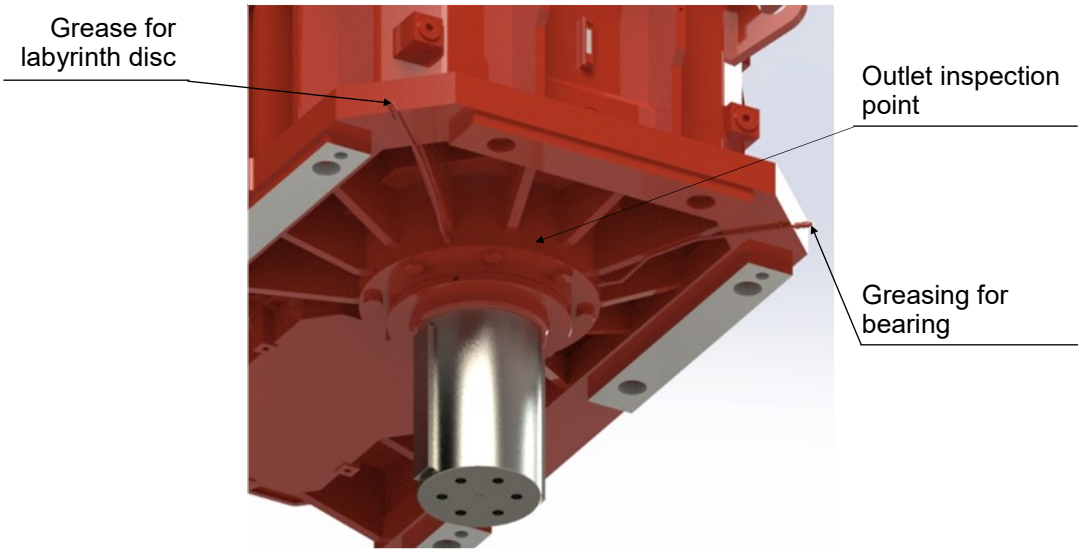
If the lubricant used is not listed in the above table, you have to make sure that it is suitable for the intended application.

10.5 Grease fill quantities for bearing in drywell sealing system

The specified fill quantities are guide values. First filling has been completed at delivery.

Size ML..V2	Diameter of LSS [mm]	First filling		Re-greasing	
		Grease volume [l]	Grease mass [g]	Grease volume [l]	Grease mass [g]
135	340	7.20	6118	3.60	3059
140	340	7.20	6118	3.60	3059
145	360	8.07	6864	4.04	3432
150	380	8.76	7447	4.38	3723
155	400	10.14	8620	5.07	4310
160	420	10.95	9308	5.48	4654
165	440	12.27	10429	6.13	5214
170	460	14.29	12143	7.14	6072





Open the grease draining plug so that old excess grease can escape.
Fill the grease while the gear unit is running by carefully pressing the required quantity.



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Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
		Additional addresses for service in China provided on request!	

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales	**Prague**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 + 1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 Normanton, West-Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com sales@seweurodriveindia.com subodh.ladwa@seweurodriveindia.com



India			
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 c.v.shivkumar@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Société industrielle & commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1115 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Jordan Kuwait Saudi Arabia Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com

Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW Caron-Vector** Research park Haasrode Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit Route D'El Jadida KM 14 RP8 Province de Nouaceur Commune Rurale de Bouskoura MA 20300 Casablanca	Tel. +212 522633700 Fax +212 522621588 fatima.haquiq@premium.net.ma http://www.groupe-premium.com

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe



Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 45 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	24 Hour Service		Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com



Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 4419164 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

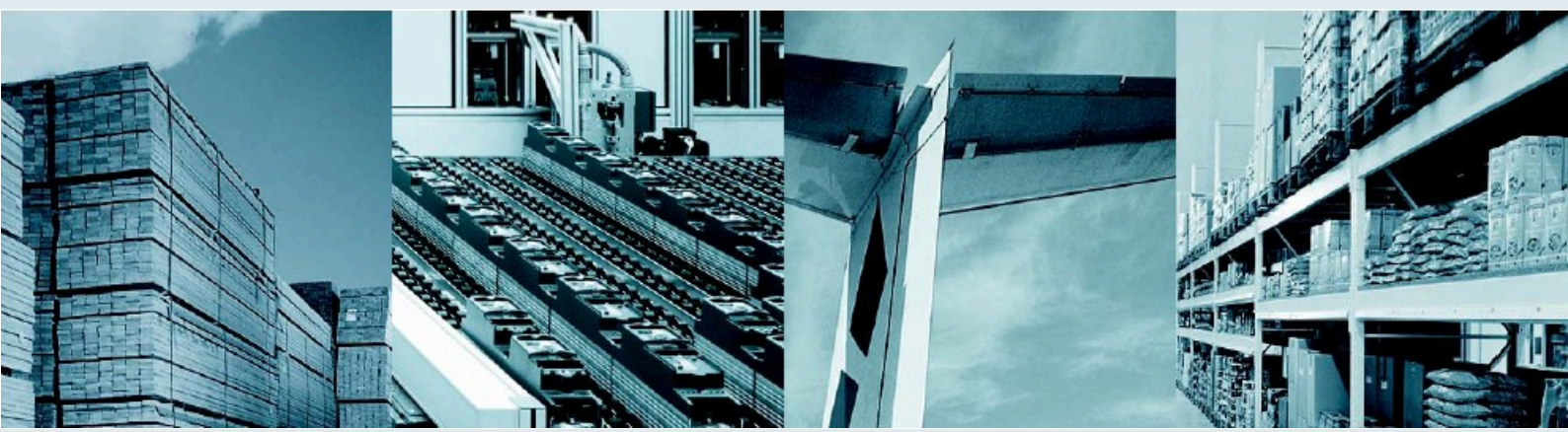
United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

USA			
Production **Assembly** **Sales** **Service** **Corporate Offices**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
Additional addresses for service in the USA provided on request!			

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

Vietnam			
Sales	**Ho Chi Minh City**	Nam Trung Co., Ltd 91 - 93 Tran Minh Quyen Street, District 10, HCMC	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn







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