

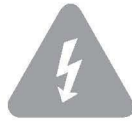
TR.., TF.., TK.., TS.. Series Gear Motor *Operating Instructions*



1. Important Notes

Safety and warning instructions

Always follow the safety and warning instructions in this publication!



Electrical hazard
Possible consequences: Severe or fatal injuries.



Hazardous situation
Possible consequences: Slight or minor injuries.



Hazard
Possible consequences: Severe or fatal injuries.



Harmful situation
Possible consequences: Damage to the drive and the environment.



Tips and useful information.



In order to operate the product failure-free and guarantee the product quality, please follow this instruction. Before operating the reducer, please read the instruction carefully.

The operating instructions contain important information about servicing. Therefore, keep the operating instructions close to the gear unit.



- Adjust the lubricant fill volume and position of the breather valve accordingly in the event of a change of mounting position (see Sec. "Lubricants" and "Mounting Positions").
- Follow the instructions in Sec. "Mechanical installation" / "Installing the gear unit"!

Waste disposal



Please follow the regulation: dealing with the waste based on waste motor condition and exist regulation:

- Deal with the reducer casing gear, shaft and resistance bearing according to the waste steel, the same as grey cast iron unless having an individual regulation.
- Parts of the worm gears are made of nonas appropriate.
- Collect waste oil and dispose of it correctly.

2. Safety Notes

Preface

The following safety notes are primarily concerned with the use of gear units. If using gearmotors, please also refer to the safety notes for motors in the relevant operating instructions.

Please also consider the supplementary safety notes in the individual sections of these operating instructions.

General information

In / After the period of running, the out surface of the geared motor and reducer may get hot due to the voltage and running part.

Only qualified personnel may carry out the following work:

- Transportation
- Putting into storage
- Installation / assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams
- Warning and safety signs on the gear unit / gearmotor
- System-specific regulations and requirements
- National / regional regulations governing safety and the prevention of accidents

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection covers or the housing

Designated use

Gearmotors / gear units are intended for industrial systems. They correspond to the applicable standards and regulations.

Technical data and information about the permitted conditions can be found on the nameplate and in the documentation.

It is essential that you follow all the instructions!

Transportation

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be that you are not permitted to startup the drive due to the damage.

Tighten installed eyebolts. The eyebolts are only designed for the weight of the gearmotor / gear unit. Do not attach any additional loads.

Use suitable, sufficiently rated handling equipment if necessary. Remove any transportation fixtures prior to startup.

**Installation /
assembly**

Observe the instructions in the sections "Installation" and "Assembly/Removal"!

**Startup /
operation**

Check that the direction of rotation is correct in decoupled status. Listen out 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 gearmotor if in doubt whenever changes occur in relation to normal operation (e.g. increased temperature, noise, vibration). Determine the cause; contact TRANSMAX transmission if necessary.

**Inspection /
maintenance**

Follow the instructions in the section "Inspection and Maintenance"!

**Extended
storage of
gear units**

Gear units of the "extended storage" type have:

- An oil fill suitable for the mounting position so the unit is ready to run (mineral oil CLP and synthetic oil CLP HC). You should still check the oil level before startup (see Sec. "Inspection / Maintenance" / "Inspection and maintenance of the gear unit").
- A higher oil level in some cases (synthetic oil CLP PG / food grade oil). Correct the oil level before startup (see Sec. "Inspection / Maintenance" / "Inspection and maintenance of the gear unit").

Attention: the life-span of the bearing lubrication will shorten when the reducer reserve more than one year.

Comply with the storage conditions specified in the following table for extended storage:

Climate zone	Packaging ¹⁾	Storage location	Storage time
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones)	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap.	With roof, protected against rain and snow, no shock loads.	Up to three years with regular checks on the packaging and moisture indicator (relative atmospheric humidity < 50%).
	Open	With roof, enclosed at constant temperature and atmospheric humidity (5 °C < t < 60 °C, <50 % relative atmospheric humidity). No sudden temperature fluctuations and controlled ventilation with filter (free from dirt and dust). No aggressive vapors and no shock loads.	Two years or more given regular inspections. Check for cleanliness and mechanical damage as part of the inspection. Check corrosion protection.
Tropical (Asia, Africa, Central and South America, Australia, New Zealand excluding temperate zones)	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap. Protected against insect damage and mildew by chemical treatment.	With roof, protected against rain, no shock loads.	Up to three years with regular checks on the packaging and moisture indicator (relative atmospheric humidity < 50%).
	Open	With roof, enclosed at constant temperature and atmospheric humidity (5 °C < t < 60 °C, <50 % relative atmospheric humidity). No sudden temperature fluctuations and controlled ventilation with filter (free from dirt and dust). No aggressive vapors and no shock loads. Protection against insect damage.	Two years or more given regular inspections. Check for cleanliness and mechanical damage as part of the inspection. Check corrosion protection.

1) Packaging must be performed by an experienced person who has been expressly specified for the particular application.

3. Gear Unit Structure



The following figures are block diagrams. Their purpose is only to make it easier to assign components to the spare parts lists. Discrepancies may occur depending on the gear unit size and version!

Basic structure of helical gear units

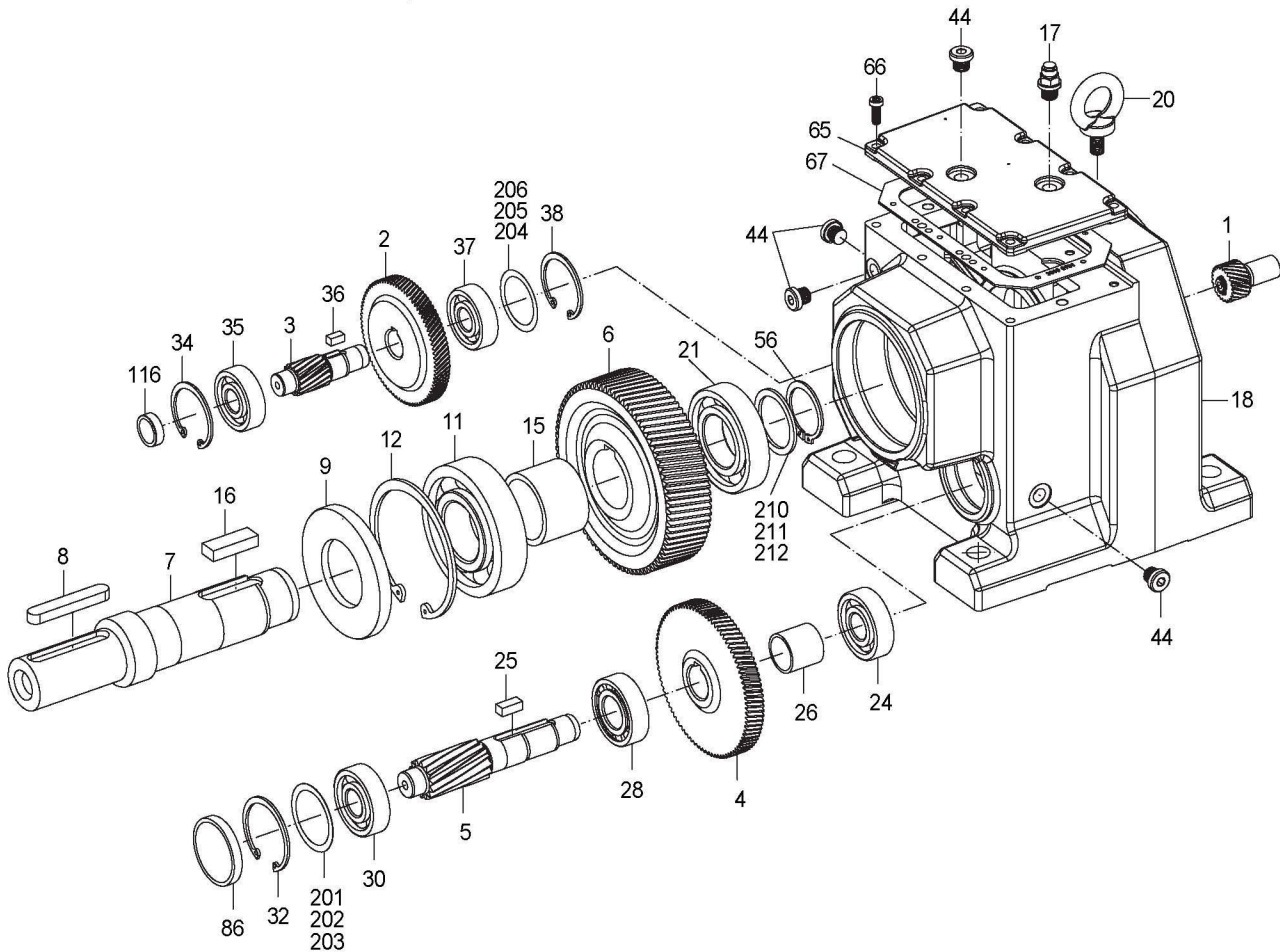


Figure 1: Basic structure of helical gear units

Key

1 Pinion	15 Spacer	32 Circlip	86 Closing cap
2 Gear	16 Key	34 Circlip	116 Closing cap
3 Pinion shaft	17 Breather valve	35 Anti-friction bearing	201 Shim ring
4 Gear	18 Gearcase	36 Key	202 Shim ring
5 Pinion shaft	20 Lifting eyebolt	37 Anti-friction bearing	203 Shim ring
6 Gear	21 Anti-friction bearing	38 Circlip	204 Shim ring
7 Output shaft	24 Anti-friction bearing	44 Screw plug	205 Shim ring
8 Key	25 Key	56 Circlip	206 Shim ring
9 Oil seal	26 Spacer	65 Gearcase cover	210 Shim ring
11 Anti-friction bearing	28 Anti-friction bearing	66 Hex head bolt	211 Shim ring
12 Circlip	30 Anti-friction bearing	67 Gasket	212 Shim ring

Nameplate, unit designation

Sample nameplate

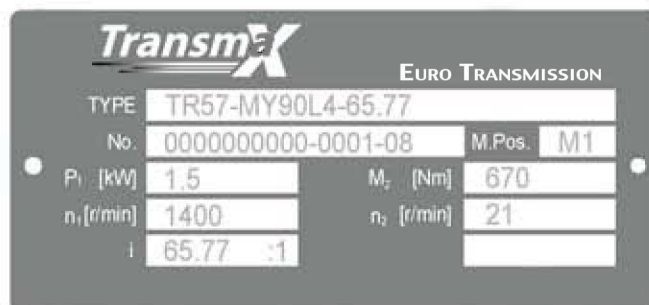
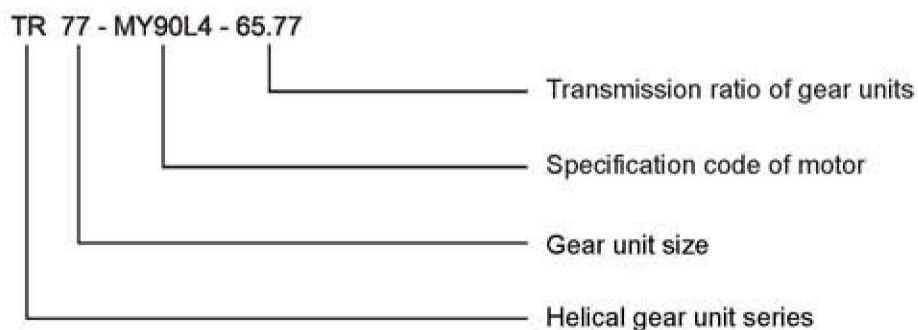


Figure 5: Sample nameplate

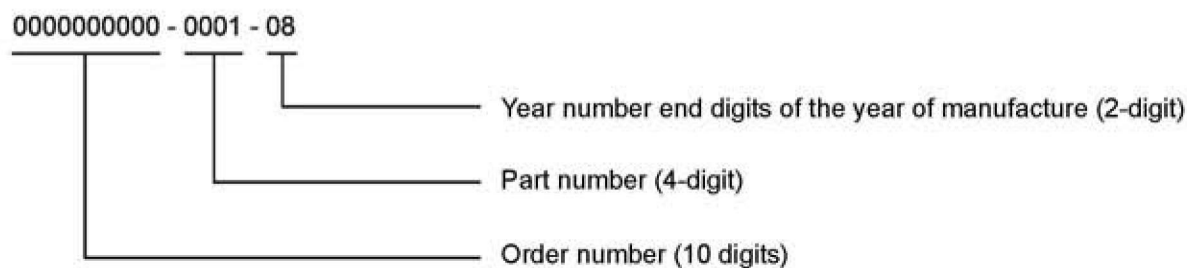
P ₁	[kW]	= Rated power driving motor
n ₁	[r/min]	= Maximum input speed
i	[Nm]	= Gear unit reduction ratio
M.Pos.		= Mounting position
M ₂	[Nm]	= Output torque
n ₂	[r/min]	= Output speed

Unit designation

Example: Helical gear unit,



Example: Serial number



4. Mechanical Installation

4.1 Required tools / aids

Prepare the following tools and spare parts before installation:

- Set of spanners
- Torque wrench for:
 - Shrink discs
 - AM motor adapter
 - Input shaft assembly with centering shoulder
- Mounting device
- Shims and distance rings if necessary
- Fixing devices for input and output elements
- Lubricant
- Standard parts are not part of the delivery

Installation tolerances

Shaft end	Flanges
Diameter tolerance in accordance with DIN 748 <ul style="list-style-type: none"> • ISO k6 for solid shafts with $\Phi \leq 50$ mm • ISO m6 for solid shafts with $\Phi > 50$ mm • ISO H7 for hollow shafts 	Centering shoulder tolerance in accordance with DIN 42948 <ul style="list-style-type: none"> • ISO j6 with $b1 \leq 230$ mm • ISO h6 with $b1 > 230$ mm

4.2 Prerequisites for assembly

Check that the following conditions have been met:

- The data on the nameplate of the gearmotor matches the voltage supply system.
- The drive has not been damaged during transportation or storage.
- Ensure that the following requirements have been met:

– For standard gear units:

Ambient temperature according to the lubricant table in Sec. "Lubricants" (see standard).

The drive must not be assembled in the following ambient conditions:

- Potentially explosive atmosphere
- Oil
- Acids
- Gas
- Vapors
- Radiation
- For special versions:

The drive configured in accordance with the ambient conditions.

- For helical-worm gear units:

No large external mass moments of inertia which could exert a retrodriving load on the gear unit.

$$[At \eta' \text{ (retrodriving)} = 2 - 1/\eta < 0.5 \text{ self-locking}]$$

- You must clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent. Do not let the solvent come into contact with the sealing lips of the oil seals – danger of damage to the material!
- When the drive is installed in abrasive ambient conditions, protect the output end oil seals against wear.

4.3 Installing the gear unit

The gear unit or gearmotor is only allowed to be installed in the specified mounting position.

The support structure must have the following characteristics:

- Level
- Vibration damping
- Torsionally rigid

Maximum permitted flatness error for foot and flange mounting (approximate values with

reference to DIN ISO 1101):

- Gear unit size ≤ 67 : max. 0.4 mm
- Gear unit size 78 ... 107: max. 0.5 mm
- Gear unit size 137 ... 147: max. 0.7 mm
- Gear unit size 157 ... 187: max. 0.8 mm

that you comply with the permitted overhung and axial loads!

Secure the gearmotors with bolts of quality 8.8.

Secure the following gearmotors with bolts of quality 10.9:

- TRF37, TR37F with flange Φ 120 mm
- TRF47, TR47F with flange Φ 140 mm
- TRF57, TR57F with flange Φ 160 mm

Do not tighten the housing legs and mounting flanges against one another and ensure



The oil checking and drain screws and the breather valves must be freely accessible!

At the same time, also check that the oil fill is as specified for the mounting position (see Sec. "Lubricants" / "Lubricant fill quantities" or refer to the information on the name-plate).

The gear units are filled with the required oil volume at the factory. There may be slight deviations at the oil level plug as a result of the mounting position, which are permitted within the manufacturing tolerances.

Adjust the lubricant fill volumes and the position of the breather valve accordingly in the event of a change of mounting position.

Please contact our TRANSMAX customer service if you change the mounting position of TK gear units to M5 or M6 or between M5 and M6.

Please contact our customer service if you change the mounting position of size TS48-TS98, TS gear units to mounting position M2.

Installation in damp locations or in the open

Drives are supplied in corrosion-resistant versions for use in damp areas or in the open air. Repair any damage to the paint work (e.g. on the breather valve).

When mounting the motors onto AM adapters, seal the flange areas with a suitable sealing compound.

Gear unit venting

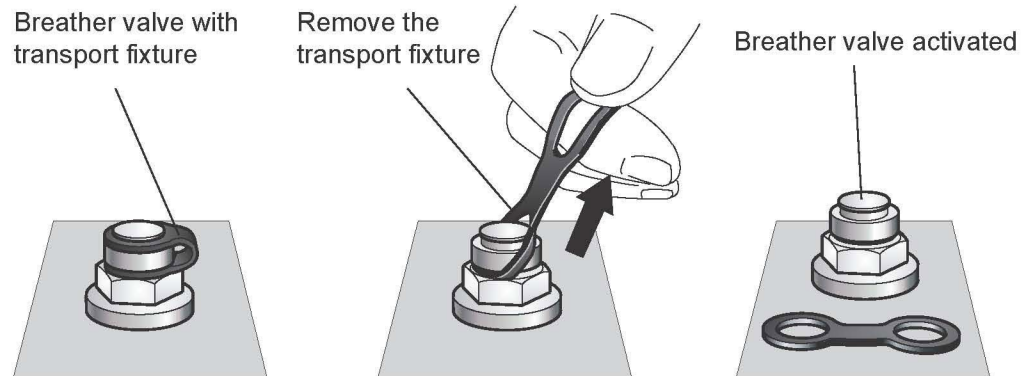
No breather plug is required for the following gear units:

- TR17, TR27 and TF27 in mounting positions M1, M3, M5 and M6

TRANSMAX supplies all other gear units with the breather valve installed and activated according to the particular mounting position.

Activating the breather valve

As a rule, the breather valve is already activated at the factory. If the breather valve has not been activated, you must remove the transport fixture from the breather valve before starting up the gear unit!



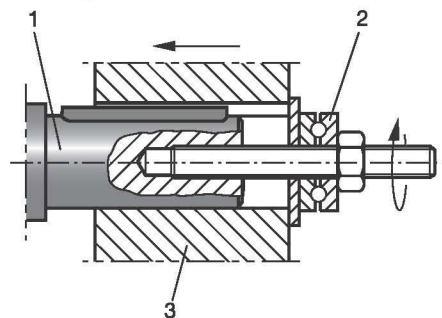
Painting the gear unit

If you paint or respray the drive, ensure that you cover the breather valve and oil seals carefully. Remove the strips of tape after completing the painting work.

4.4 Gear unit with solid shaft

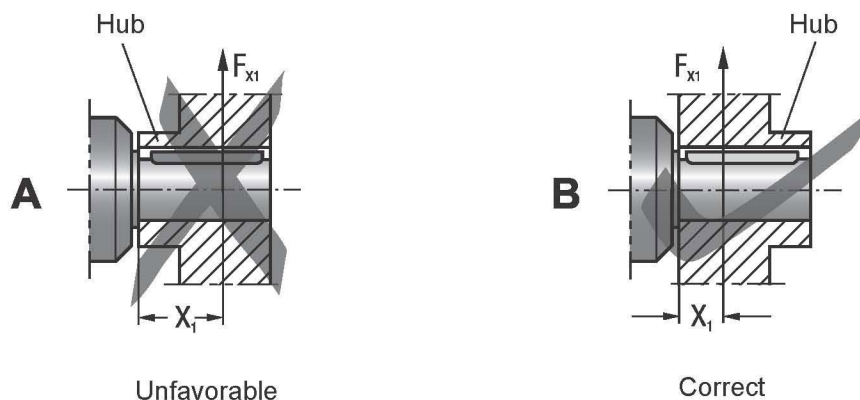
Installing input and output elements

The following figure shows a mounting device for installing couplings or hubs on gear unit or motor shaft ends. It may be possible to dispense with the thrust bearing on the mounting device.



- 1) Gear shaft end
- 2) Thrust bearing
- 3) Coupling hub

Avoid impermissibly high overhung loads: Install the gear or chain sprocket according to figure B.





- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning.
- **Never drive belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer** This will damage the bearings, housing and the shaft!
- In the case of belt pulleys, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.
- Power transmission elements should be balanced after fitting and must not give rise to any impermissible radial or axial forces (see the "Gearmotor" catalogs for permitted values).



Installing couplings

Note:

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

Couplings must be mounted and balanced according to the information provided by the coupling manufacturer:

- a) Maximum and minimum clearance
- b) Axial misalignment
- c) Angular misalignment

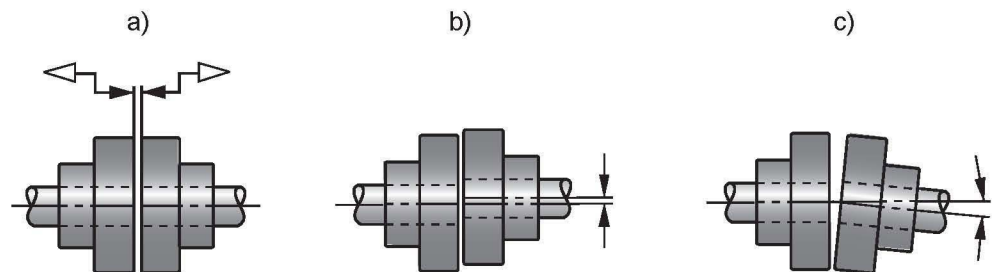


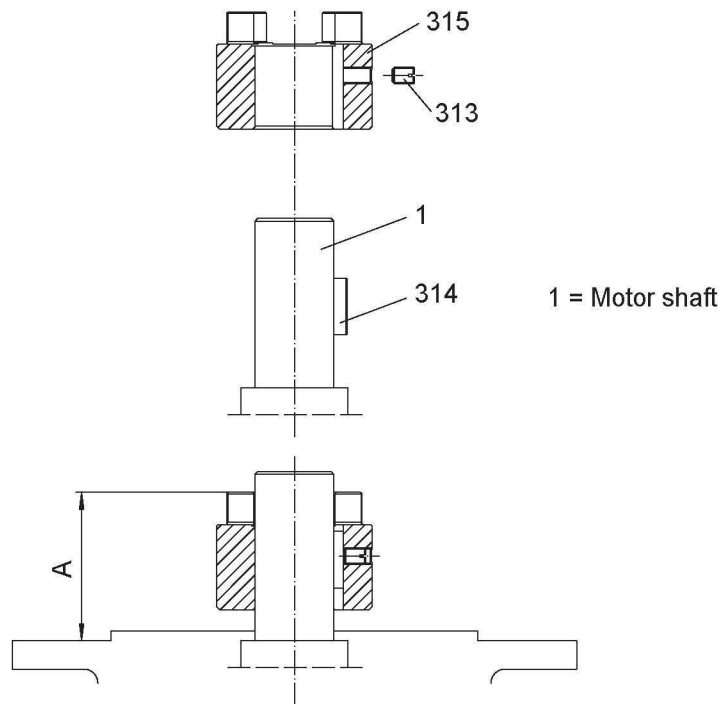
Figure 6: Clearance and misalignment for coupling installation

Input and output elements such as belt pulleys, couplings, etc. must be protected against contact!



4.5 AM adapter coupling

IEC adapter AM63 -225



1. Clean the motor shaft and flange surfaces of the motor and adapter.
2. Remove the key from the motor shaft and replace it with the supplied key (314) (not AM63 and AM250).
3. Heat the coupling half (315) to approx. 80 – 100 °C, push the coupling half onto the motor shaft. Until stop at motor shaft shoulder (position to point A except for AM25 / AM280).
4. Secure key and coupling half using grub screw (313) and tightening torque TA on motor shaft according to the table.
5. Check point A.
6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Mount the motor on the adapter. When doing this, make sure the coupling dogs of the adapter shaft engage in the plastic spider.

IEC AM	63 / 71	80 / 90	100 / 112	132	160 / 180	200	225	250 / 280
A	25	31.5	41.5	54	76.5	78.5	93.5	139
TA	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10



To avoid contact corrosion, we recommend applying lubricate oil to the motor shaft before mounting the coupling half.

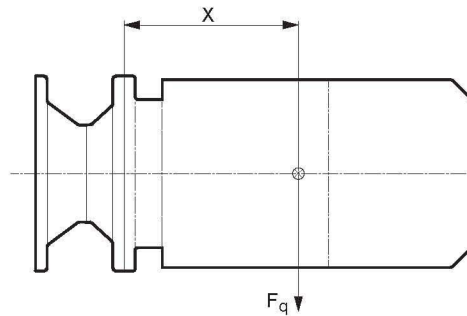


When installing a motor onto the adapter, you must use an anaerobic fluid seal to ensure that moisture cannot penetrate the adapter.

Permitted loads



The load data specified in the following table must not be exceeded when a motor is mounted



IEC adapter type	x ¹⁾ [mm]	IEC adapter	IEC adapter type	x ¹⁾ [mm]	IEC adapter
AM63/71	77	530	AM132..	186	4700
AM80/90	113	420	AM160/180	251	4600
AM100/112	144	2000	AM200/225	297	5600
AM1322)	186	1600	AM250/280	390	11200

- 1) The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases. When this distance is reduced, the maximum permitted weight F_{qmax} cannot be increased.
- 2) Diameter of the adapter drive flange: 160 mm.

Adapter AM with backstop AM

Check the direction of rotation of the drive before installation and startup. Please inform the TRANSMAX customer service if the direction of rotation is incorrect.

The backstop is maintenance-free in operation, and does not require any further maintenance work.

The backstops have a minimum lift-off speed depending on the size (→ following table). If the minimum lift-off speeds are violated, the backstops are subject to wear, and the resulting friction causes the temperature to increase.

Type	Maximum locking torque of backstop[Nm]	Minimum lift-off speed [1/min]
AM80/90	90	640
AM100/112	340	600
AM132	700	550
AM160/180	1200	630
AM200/225	1450	430



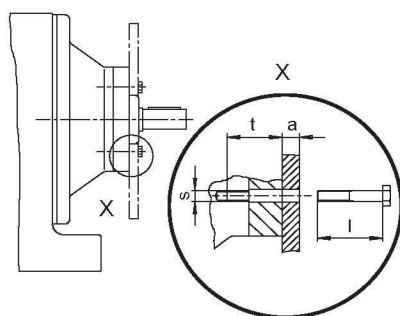
In rated operation, the lift-off speeds must not drop below the minimum values. The lift-off speeds are only permitted to drop below the minimum values during startup or braking.

4.6 AD input shaft assembly

Type with center- ing shoulder AD../ZR

Mounting applications on the input shaft assembly with centering shoulder.

1. Retaining bolts of a suitable length must be used to secure the application. The length l of the new bolts is calculated as follows:



$$l = t + a$$

t = Screw-in depth (see table)

a = Thickness of the application

s = Retaining thread (see table)

Round down the calculated bolt length to the next smaller standard length.

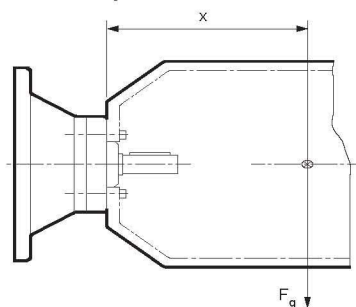
2. Remove the retaining bolts from the centering shoulder.
3. Clean the contact surface and the centering shoulder.
4. Clean the threads of the new bolts and apply a bolt locking compound to the first few threads.
5. Position the application against the centering shoulder and tighten the retaining bolts to the specified tightening torque TA (see table).

Type	Screw-in depth t [mm]	Retaining thread s	Tightening torque TA for connection bolts in strength class 8.8 [Nm]
AD2/ZR	25.5	M8	25
AD3/ZR	31.5	M10	48
AD4/ZR	36	M12	86
AD5/ZR	44	M12	86
AD6/ZR	48.5	M16	210
AD7/ZR	49	M20	410
AD8/ZR	42	M12	86

Permitted loads



The load values specified in the following table must not be exceeded.



Type	X ¹⁾ [mm]	F _q ¹⁾ [N]
AD2/ZR	193	330
AD3/ZR	274	1400
AD4/ZR ²⁾	361	1120
AD4/ZR		3300
AD5/ZR	487	3200
AD6/ZR	567	3900
AD7/ZR	663	10000
AD8/ZR	516	4300

1) Maximum load values for connection bolts in strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases. When this distance is reduced, the F_{qmax} cannot be increased.

2) Diameter of the adapter output flange: 160 mm

5. Startup



Prior to startup check that the oil level is as specified for the mounting position.
The oil checking and drain screws and the breather valves must be freely accessible.

5.1 Startup of helical-worm gear units



Attention: For TS..8 series helical-worm geared motor, change the output shaft direction of rotation from clockwise to counter clockwise. Only request you change the two feeder line of the motor.

Run-in period

helical-worm gear units require a run-in period of at least 24 hours before reaching their maximum efficiency. A separate run-in period applies for each direction of rotation if the gear unit is operated in both directions of rotation. The table shows the average power reduction during the run-in period.

No. of starts	Power reduction	i range	No. of starts	Power reduction	i range
1 start	ca.12%	ca.50~280	5 start	ca.3%	ca.6~25
2 start	ca.6%	ca.20~75	6 start	ca.2%	ca.7~25
3 start	ca.3%	ca.20~90			

5.2 Startup of helical, parallel shaft helical and helical-bevel gear units

No special startup instructions are required for helical, parallel shaft helical and helical-bevel gear units providing the gear units have been installed in accordance with Sec. "Mechanical Installation".

6. Inspection and Maintenance

6.1 Inspection and maintenance intervals

Frequency	What to do?
<ul style="list-style-type: none"> Every 3000 machine hours, at least every 6 months. 	<ul style="list-style-type: none"> Check oil and oil level. Check the seals visually for leakage. For gear units with a torque arm: Check the rubber buffer and change it, if necessary
<ul style="list-style-type: none"> Depending on the operating conditions (see chart below), every 3 years at the latest. According to oil temperature. 	<ul style="list-style-type: none"> Change mineral oil. Replace anti-friction bearing grease (recommendation). Replace oil seal (do not install it in the same track).
<ul style="list-style-type: none"> Depending on the operating conditions (see chart below), every 5 years at the latest. According to oil temperature. 	<ul style="list-style-type: none"> Change synthetic oil Replace anti-friction bearing grease (recommendation). Replace oil seal (do not install it in the same track).
<ul style="list-style-type: none"> Gear units TR18, TR28, TF28 are have lubrication for life and are therefore maintenance-free 	
<ul style="list-style-type: none"> Varying (depending on external factors). 	<ul style="list-style-type: none"> Touch up or renew the surface/anticorrosion coating.

6.2 Lubricant change intervals

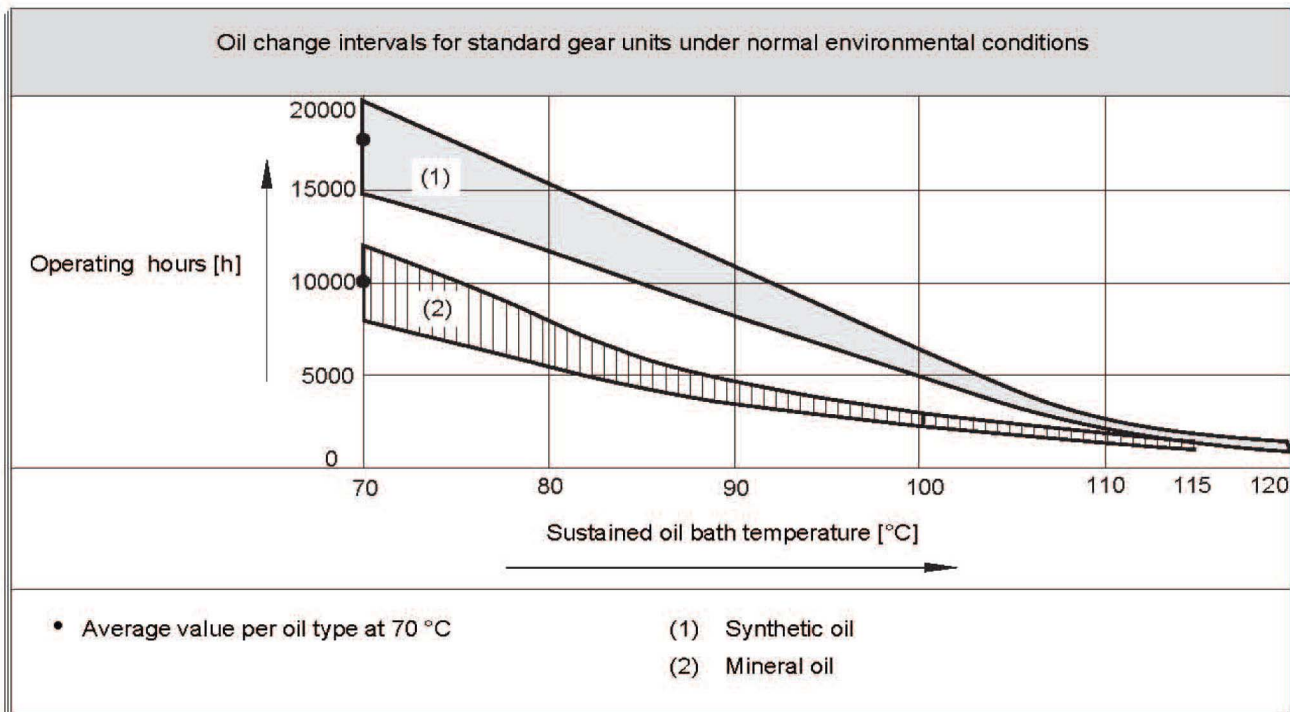


Figure 11: Oil change intervals for standard gear units under normal environmental conditions

6.3 Inspection and maintenance of the gear unit

Do not intermix synthetic lubricants and do not mix synthetic and mineral lubricants together!

The standard lubricant is mineral oil .

The position of the oil level and oil drain plug and the breather valve depends on the mounting position. Refer to the diagrams of the mounting positions.

Checking the oil level



1. De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!

Wait until the gear unit has cooled off – Danger of burns!

2. Refer to Sec. "Installing the gear unit" when changing the mounting position!

3. For gear units with an oil level plug: Remove the oil level plug, check the fill level and correct it if necessary. Screw the oil level plug back in.

Checking the oil consistency



1. De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!

Wait until the gear unit has cooled off – Danger of burns!

2. Remove a little oil from the oil drain plug.

3. Check the oil consistency.

- Viscosity

- If you can see that the oil is heavily contaminated, we recommend that you change the oil even if this is outside the service intervals specified in "Inspection and maintenance periods".

4. For gear units with an oil level plug: Remove the oil level plug, check the fill level and correct it if necessary. Screw the oil level plug back in.

Changing the oil



Only change the oil when the gear unit is at operating temperature.

De-energize the gearmotor and secure it to prevent it from being switched back on inadvertently!

Wait until the gear unit cools down - Danger of burns!

Note: The gear unit must still be warm otherwise the high viscosity of excessively cold oil will make it harder to drain the oil correctly.

With oil drain plug / oil level screw

1. Place a container underneath the oil drain plug.
2. Remove the oil level plug, breather plug/breather valve and oil drain plug.
3. Drain all the oil.
4. Screw in the oil drain plug.
5. Pour in new oil of the same type through the vent hole (if changing the oil type, please first contact our customer service). Do not mix synthetic lubricants.
 - Pour in the volume of oil in accordance with the mounting position (see Sec. "Lubricant fill quantities") or as specified on the nameplate.
 - Check at the oil level plug.
6. Screw the oil level plug back in.
7. Screw in the breather plug/breather valve.

Without oil drain plug / oil level plug

1. Remove cover plate.
2. Drain the oil through the cover plate opening.
3. Pour in new oil of the same type through the vent hole (if changing the oil type, please first contact our customer service). Do not mix synthetic lubricants.
 - Pour in the volume of oil in accordance with the mounting position (see Sec. "Lubricant fill quantities") or as specified on the nameplate.
4. Check the oil level (→ Sec. "Check oil level for gear units with oil level plug")
5. Attach cover plate (observe the tightening torque and series → Sec. "Check the oil level for gear units without an oil level plug")

Changing the oil seal

1. **De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!**
Wait until the gear unit has cooled off – Danger of burns!
2. When changing the oil seal, ensure that there is a sufficient grease reservoir between the dust lip and protective lip, depending on the type of gear unit.
3. If you use double oil seals, the space has to be filled one-third with grease.

6.4 Inspection / maintenance of AM adapters

Frequency	What to do?
<ul style="list-style-type: none"> Every 3000 machine hours, at least every 6 months 	<ul style="list-style-type: none"> Check torsional play Visually check the elastic annular gear Check the adapter visually for leakage
<ul style="list-style-type: none"> After 25000 - 30000 machine hours 	<ul style="list-style-type: none"> Renew the anti-friction bearing grease Replace oil seal (do not install it in the same track) Change the elastic annular gear.

6.5 Inspection / maintenance of AD adapters

Frequency	What to do?
<ul style="list-style-type: none"> Every 3000 machine hours, at least every 6 months 	<ul style="list-style-type: none"> Check running noise for possible bearing damage Check the adapter visually for leakage
<ul style="list-style-type: none"> After 25000 - 30000 machine hours 	<ul style="list-style-type: none"> Renew the anti-friction bearing grease Change the oil seal

7. Malfunctions

Customer service

Please have the following information to hand if you require the assistance of our customer service:

Data from the nameplate (complete)

Nature and extent of the fault

Time and peripheral circumstances of the fault

Presumed cause

7.1 Gear unit malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	A. Meshing/grinding noise: Bearing damage. B. Knocking noise: Irregularity in the gearing	A. Check the oil, change bearings B. Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	<ul style="list-style-type: none"> Check the oil Stop the drive service
Oil leaking ¹⁾ <ul style="list-style-type: none"> From the gear cover plate From the motor flange From the motor oil seal From the gear unit flange From the output end oil seal 	A. Rubber seal on the gear cover plate leaking B. Seal defective C. Gear unit not vented	A. Tighten the bolts on the gear cover plate and observe the gear unit. Oil still leaking: Contact customer service B. Contact customer service C. Vent the gear unit (see "Mounting Positions")
Oil leaking from breaking valve	A. Too much oil B. Drive operated in incorrect mounting position C. Frequent cold starts(oil foams) and / or high oillevel	A. Correct the oil level (see Sec.Inspection and Maintenance") B. Mount the breather valve correctly (see Sec."Mounting Positions")and correct the oil level(see"Lubricants") "
Output shaft does not turn although the motor is running or the input shaft is rotated	Connection between shaft and hub in gear unit interrupted	Send in the gear unit/gearmotor for repair

1) Short-term oil/grease leakage at the oil seal is possible in the run-in phase (24 hours running time).

7.2 AM adapter malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	Meshing/grinding noise: Bearing damage	Contact our company customer service
Oil leaking	Seal defective	Contact our company customer service
Output shaft does not turn although the motor is running or the input shaft is rotated	Connection between shaft and hub in gear unit interrupted	Send the gear unit to our company for repair.
Change in running noise and / or vibrations occur	A. Annular gear wear, short-term torque transfer through metal contact B. Bolts to secure hub axially are loose.	A. Change the annular gear B. Tighten the bolts
Premature wear in annular gear	A. Contact with aggressive fluids / oil; ozone influence; too high ambient temperatures etc, which can cause a change in the physical properties of the annular gear. B. Impermissibly high ambient/contact temperature for the annular gear; maximum permitted temperature –20 °C to +80 °C. C. Overload	Contact our company customer service

7.3 AD input shaft assembly malfunctions

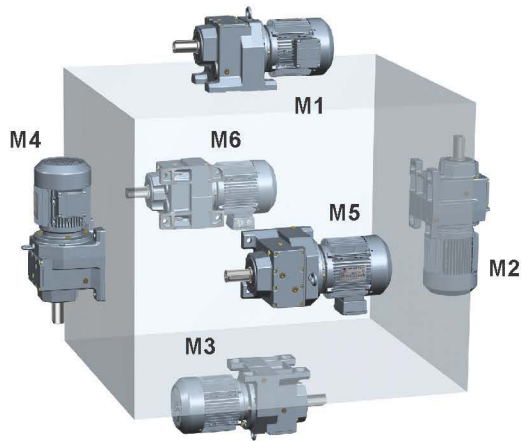
Problem	Possible cause	Remedy
Unusual, regular running noise	Meshing/grinding noise: Bearing damage.	Contact our company customer service
Oil leaking	Seal defective	Contact our company customer service
Output shaft does not turn although the input shaft is rotated.	Connection between shaft and hub in gear unit or cover interrupted	Send the gear unit to our company for repair.

8 Mounting Positions

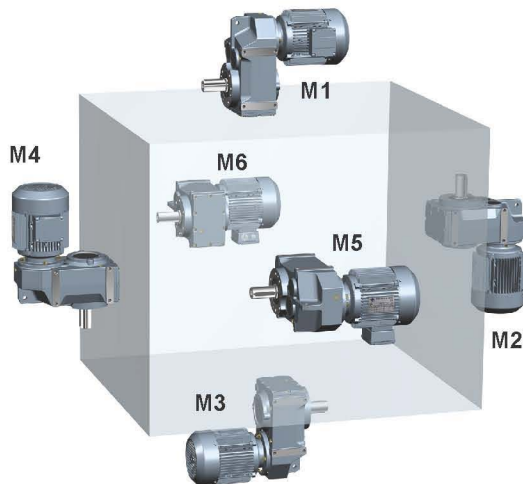
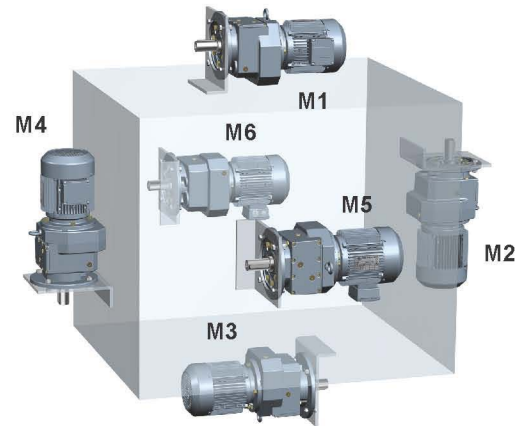
8.1 General information on mounting positions

Mounting position designation

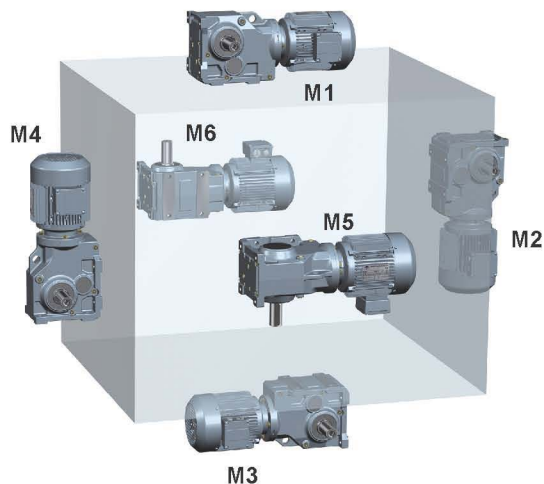
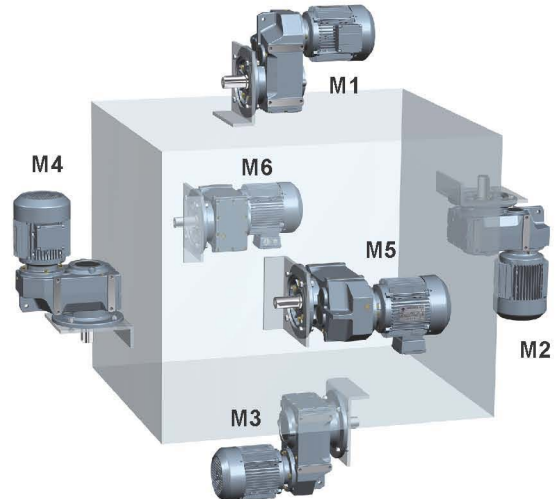
Differentiates between six mounting positions M1 ... M6 for gear units. The following figure shows the spatial orientation of the gearmotor in mounting positions M1 ... M6.



TR..



TF..



**TK..
TS..**

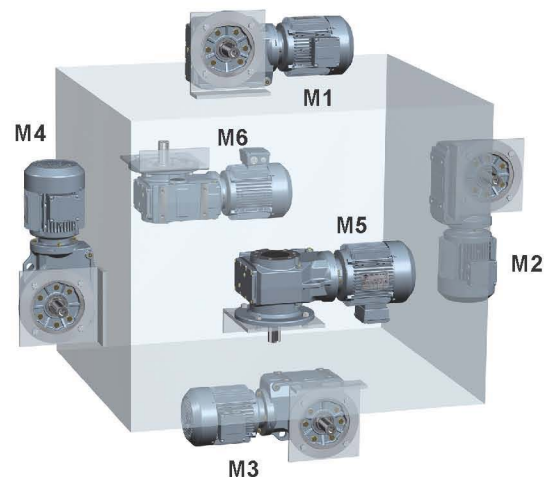


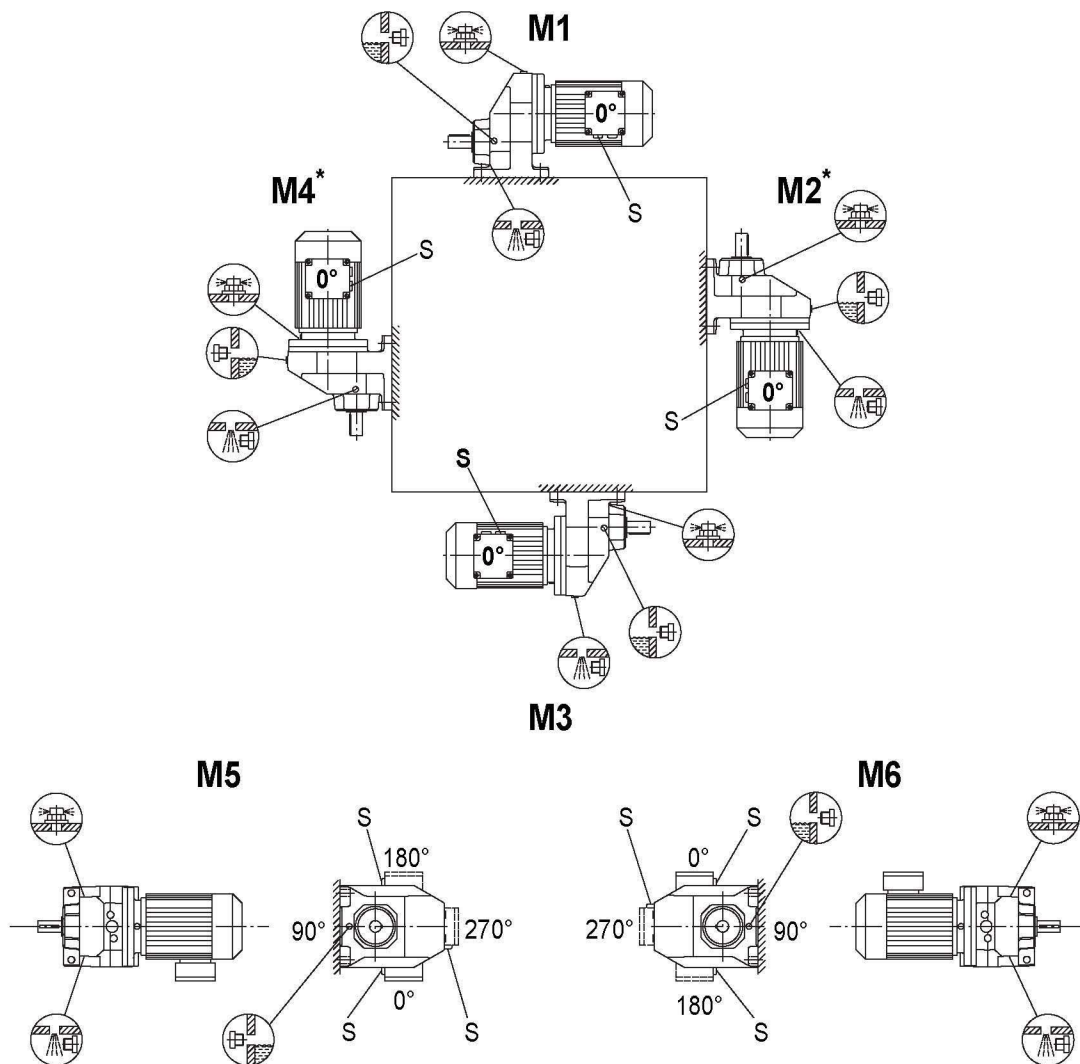
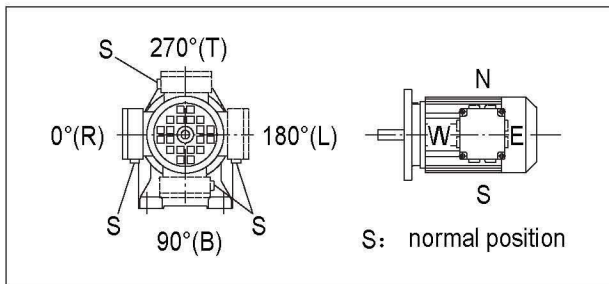
Figure 12: Depiction of mounting positions M1 ... M6

Operating Instructions – Gear Unit, TR.., TF.., TK.., TS..

8.2 Mounting positions of TRX helical gearmotors

TRX57 - TRX107

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug

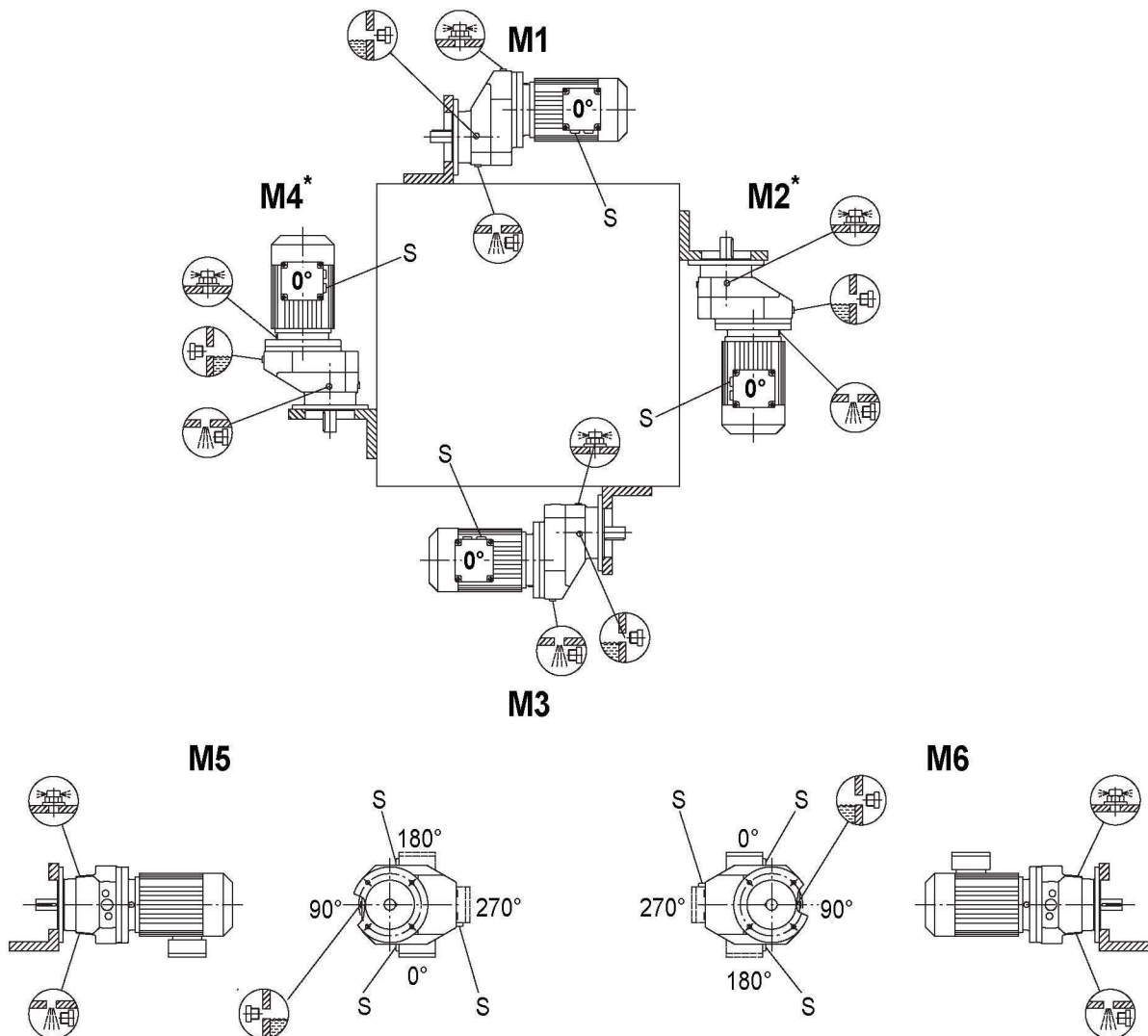
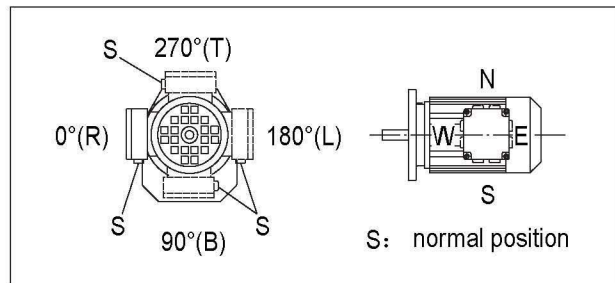


Mounting Positions

Mounting positions of TRX helical gearmotors

TRXF57 - TRXF107

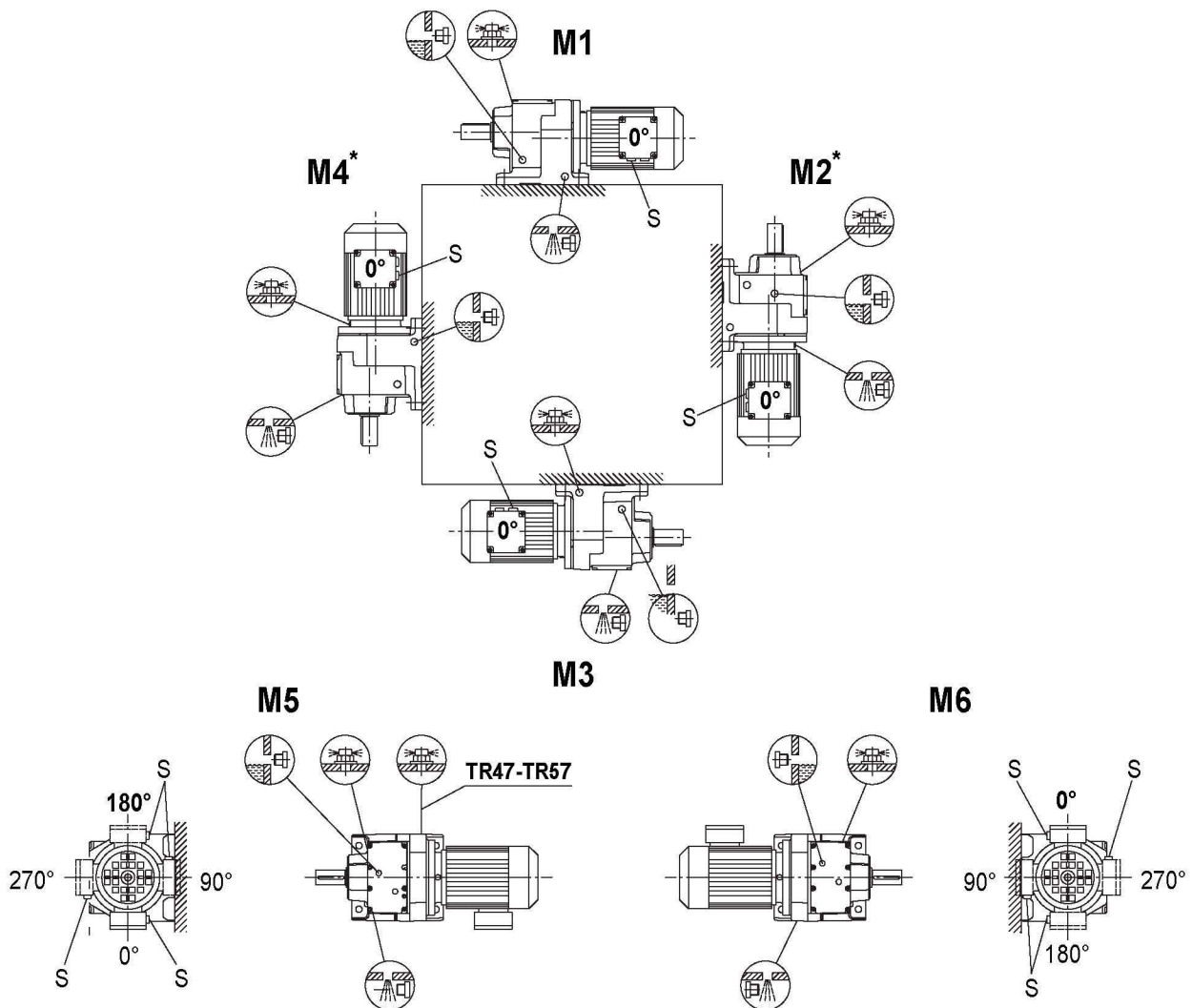
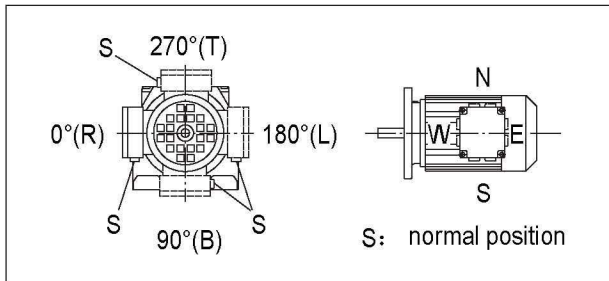
Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug



8.3 Mounting positions for TR helical gearmotors

TR27 - TR167

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug



Mounting position	Gear unit size	Input speed [1/min]
M2*, M4*	97...107	>2500
	>107	>1500

TR27 **M1, M3, M5, M6**

TR27

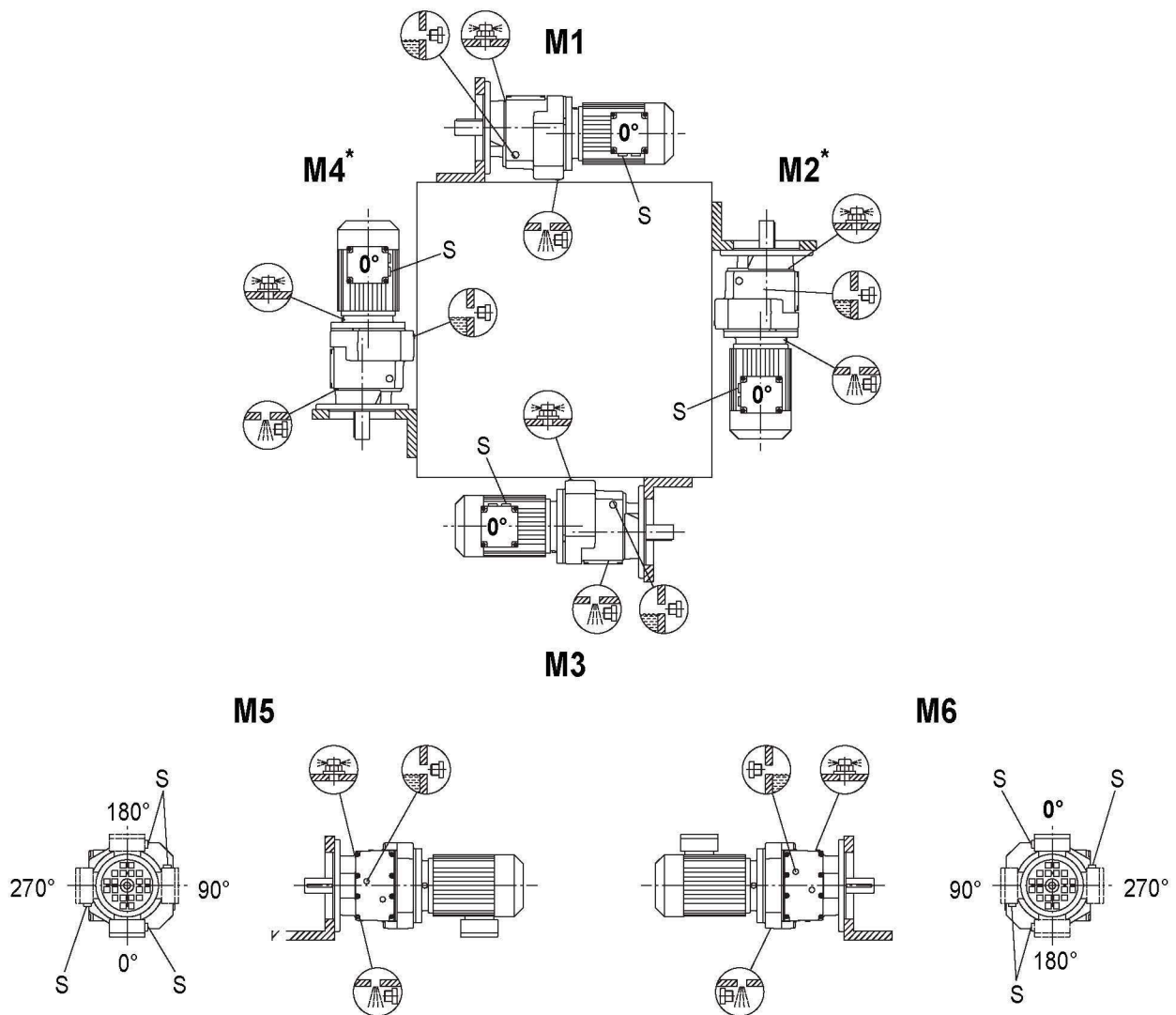
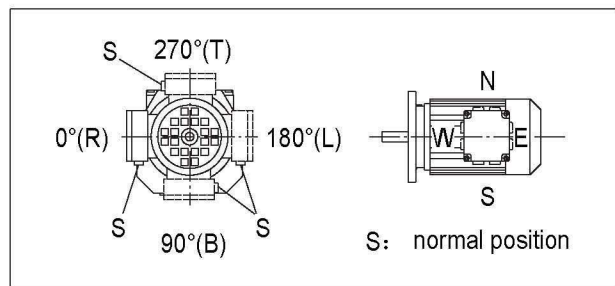
TR47, TR57 **M5**

Mounting Positions





Mounting positions for TR helical gearmotors

TRF27 - TRF167

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug

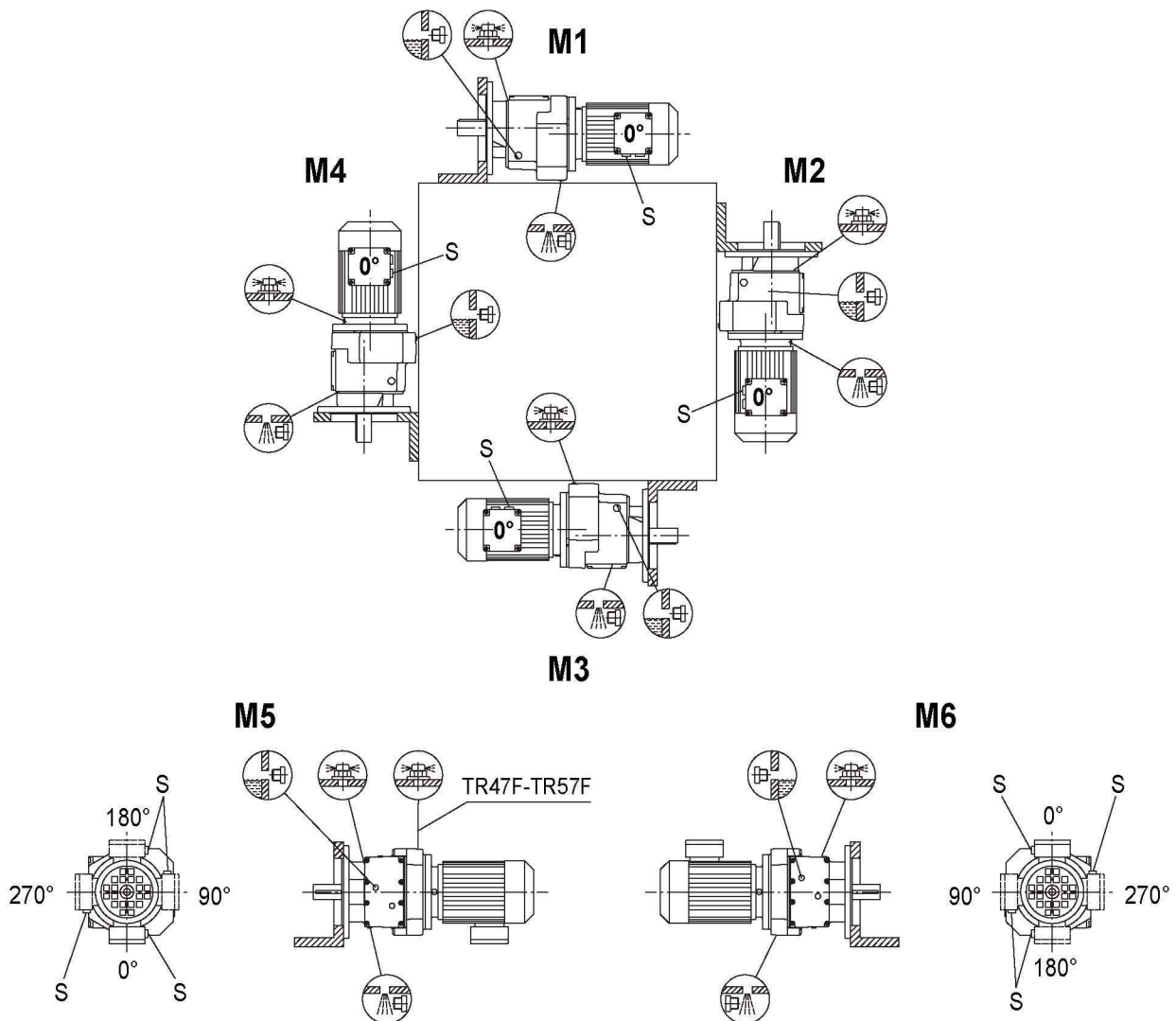
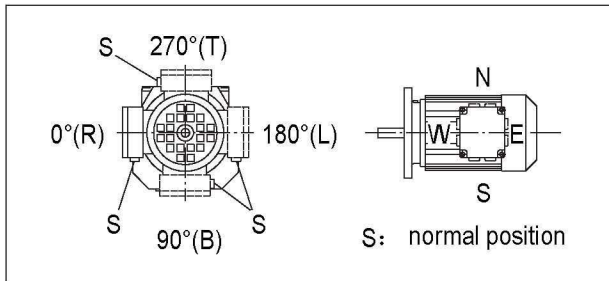


Mounting position	Gear unit size	Input speed [1/min]
M2*, M4*	97...107	>2500
	>107	>1500

TRF27  M1, M3, M5, M6
 TRF27  
 TRF47, TRF57  M5

TR27F - TR87F

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug



TR27F M1, M3, M5, M6

TR27F

TR47F, TR57F M5

9 Lubricants

General information

Anti-friction bearing greases

Unless a special arrangement is made, TRANSMAX supplies the drives with a lubricant fill adapted for the specific gear unit and mounting position. The decisive factor is the mounting position (M1 ... M6, → Sec. "Mounting Positions and Important Order Information") specified when ordering the drive. You must adapt the lubricant fill in case of any subsequent changes made to the mounting position (→ Lubricant fill quantities).

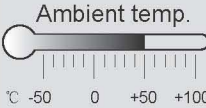




The lubricant table on the following page shows the permitted lubricants for TRANSMAX gear units. Please note the following key to the lubricant table:

	Ambient temperature	Manufacturer	Type	Lubrication type
Anti-friction bearing in gear unit	-20°C ~ +60°C	Mobil	Mobilux EP 2	Mineral lubricant
	-40°C ~ +80°C	Mobil	Mobiltemp SHC 100	Synthetic lubricant
Anti-friction bearing in motor	-20°C ~ +80°C	Esso	Unirex EQ3	Mineral lubricant
	-20°C ~ +60°C	Shell	Alvania RL3	Mineral lubricant
	+80°C ~ +100°C	Klüber	Barrierta L55/2	Synthetic lubricant
	-45°C ~ .25°C	Shell	Aero Shell Grease 16	Synthetic lubricant

The following grease quantities are required:

- For fast-running bearings (motor and gear unit input end): Fill the cavities between the rolling elements one third full with grease.
- For slow-running bearings (in gear units and at gear unit output end): Fill the cavities between the rolling elements two thirds full with grease.

9.1 Lubricant table

	Ambient temp. 					Lubrication type
TR.. TF.. TK..	标准 Standard -10 +40	VG 220	Shell Omala 220	Mobilgear 630	BP Energol GR-XP 220	Mineral lubricant
	-20 +25	VG 150 VG 100	Shell Omala 100	Mobilgear 627	BP Energol GR-XP 100	
	-30 +10	VG 68-46 VG 32	Shell Tellus T 32	Mobil D.T.E. 13M		
	-40 -20	VG 22 VG 15	Shell Tellus T 15	Mobil D.T.E. 11M	BP Energol HLP-HM 15	Synthetic lubricant
	-40 +80	VG 220	Shell Omala HD 220	Mobil SHC 630		
	-40 +40	VG 150		Mobil SHC 629		
	-40 +10	VG 32		Mobil SHC 624		
TS..	-0 +40	VG680	Shell Omala 680	Mobilgear 636	BP Energol GR-XP 680	Mineral lubricant
	-20 +10	VG 150 VG 100	Shell Omala 100	Mobilgear 627	BP Energol GR-XP 100	
	-20 +60	VG 680 ¹⁾	Shell Tivela S 680		BP Energol GR-XP 680	Synthetic lubricant
	-30 +80	VG 460	Shell Omala HD 460	Mobil SHC 634		
	-40 +10	VG 150	Shell Omala HD 150	Mobil SHC 629		
	-25 +40	VG 220 ¹⁾	Shell Tivela S 220	Mobil Glygoyle 30		
	-40 0	VG 32		Mobil SHC 624		

9.1 Lubricant fill quantity

The specified fill quantities are recommended values. The precise values vary depending on the number of stages and gear ratio. When filling, it is essential to check the oil level plug since it indicates the precise oil capacity. The following tables show guide values for lubricant fill quantities in relation to the mounting position M1 ~ M6.

Helical (TR) gear units

TR../TR..F:

Gear units	Fill quantity in liters						unit: (L)
	M1**	M2**	M3	M4	M5	M6	
TR27/TR27F	0.25/0.40	0.70	0.50	0.70	0.50	0.50	
TR37/TR37F	0.30/0.95	0.85	0.95	1.05	0.75	0.95	
TR47/TR47F	0.70/1.50	1.60	1.50	1.65	1.50	1.50	
TR57/TR57F	0.80/1.70	1.90	1.70	2.10	1.70	1.70	
TR67/TR67F	1.10/2.30	2.60/3.50	2.80	3.20	1.80	2.00	
TR77/TR77F	1.20/3.00	3.80/4.10	3.60	4.10	2.50	3.40	
TR87/TR87F	2.30/6.0	6.7/8.2	7.20	7.70	6.30	6.50	
TR97	4.60/9.8	11.7/14.0	11.70	13.40	11.30	11.70	
TR107	6.0/13.7	16.30	16.90	19.20	13.20	15.90	
TR137	10.0/25.0	28.00	29.50	31.50	25.00	25.00	
TR147	15.4/40.0	46.50	48.00	52.00	39.50	41.00	
TR167	27.0/70.0	82.00	78.00	88.00	66.00	69.00	

TRF../TRZ...:

Gear units	Fill quantity in liters						unit: (L)
	M1**	M2**	M3	M4	M5	M6	
TRF/TRZ27	0.25/0.40	0.70	0.50	0.70	0.50	0.50	
TRF/TRZ37	0.35/0.95	0.90	0.95	1.05	0.75	0.95	
TRF/TRZ47	0.65/1.50	1.60	1.50	1.65	1.50	1.50	
TRF/TRZ57	0.80/1.70	1.80	1.70	2.00	1.70	1.70	
TRF/TRZ67	1.20/2.50	2.70/3.60	2.70	2.60	1.90	2.10	
TRF/TRZ77	1.20/2.60	3.80/4.10	3.30	4.10	2.40	3.00	
TRF/TRZ87	2.40/6.0	6.8/7.9	7.10	7.70	6.30	6.40	
TRF97	5.1/10.2	11.9/14.0	11.20	14.00	11.20	11.80	
TRF107	6.3/14.9	15.90	17.00	19.20	13.10	15.90	
TRF137	9.5/25.0	27.00	29.00	32.50	25.00	25.00	
TRF147	16.4/42.0	47.00	48.00	52.00	42.00	42.00	
TRF167	26.0/70.0	82.00	78.00	88.00	65.00	71.00	

Helical (TRX) gear units

TRX...:

Gear units	Fill quantity in liters						unit: (L)
	M1**	M2**	M3	M4	M5	M6	
TRX57	0.60	0.80	1.30	1.30	0.90	0.90	
TRX67	0.80	0.80	1.70	1.90	1.10	1.10	
TRX77	1.10	1.50	2.60	2.70	1.60	1.60	
TRX87	1.70	2.50	4.80	4.80	2.90	2.90	
TRX97	2.10	3.40	7.40	7.00	4.80	4.80	
TRX107	3.90	5.60	11.60	11.90	7.70	7.70	

** The large gear unit of multi-stage gear units must be filled with the larger oil volume.

Helical (TRX) gear units

TRXF...:

Gear units	Fill quantity in liters						unit : (L)
	M1**	M2**	M3	M4	M5	M6	
TRXF57	0.50	0.80	1.10	1.10	0.70	0.70	
TRXF67	0.70	0.80	1.50	1.40	1.00	1.00	
TRXF77	0.90	1.30	2.40	2.00	1.60	1.60	
TRXF87	1.60	1.95	4.90	3.95	2.90	2.90	
TRXF97	2.10	3.70	7.10	6.30	4.80	4.80	
TRXF107	3.10	5.70	11.20	9.30	7.20	7.20	

** The large gear unit of multi-stage gear units must be filled with the larger oil volume.



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