

Spiral bevel gear

PowerGear

Installation and operating instructions

PowerGear P54 to P450
X54 to X280
S90 to S170



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Table of contents

1. General notes	4
1.1 Use of the operating instructions	4
1.2 Significance of the warning notes	4
1.3 Exclusion of liability	4
1.4 Copyright	4
2. Intended use of MS-Graessner Gear Units	5
3. Conversions and alterations / Modifications of the product	5
4. Set-up of gear unit / Technical data	5
4.1 Set-up of gear unit	5
4.2 Type designations	6
4.3 Performance tables PowerGear	7
4.4 Technical data PowerGear	8
4.5 Type plate	8
5. Safety notes	9
5.1 Basic duties	9
5.2 Qualified personnel	9
5.3 Environmental protection	9
6. Transport, storage and long term storage	10
6.1 Transport	10
6.2 Storage conditions	10
6.3 Long-term storage	10
6.4 To be noted before commissioning	10
7. Installation	11
7.1 General installation instructions	11
7.2 Gear unit installation in plant	11
7.3 Installation positions	11
7.4 Fitting of motors	12
7.5 Installation of the other fitted components	12
7.6 Finishing work	13
8. Commissioning	14
9. Operation of the PowerGear gear units	15
9.1 General notes on operation	15
9.2 To be watched out for during operation	15
9.3 Irregularities	15

10. Faults, causes, remedy	16
10.1 General fault indications	16
10.2 Possible faults	16
11. Inspection and maintenance	17
11.1 General notes	17
11.2 Service intervals	17
11.3 Oil service life	17
11.4 Oil change	17
11.5 Checking gear unit condition	18
12. Replacement parts, replacement part stocks, service	18
12.1 Replacement parts	18
12.2 Replacement part stocks	18
12.3 Service department	18
13. Index (alphabetic)	19

1. General notes

1.1 Use of the operating instructions

These operating instructions are an integral part of the product and must be carefully studied before use and kept in a safe place for later consultation.

It comprises important notes on the operation and service of the **PowerGear** series of gear units. These operating instructions are intended for all persons carrying out assembly, installation, commissioning and service work on gear units from this series of gear units.






The gear units of the **PowerGear** series are components for installation in machines and exclusively intended for guiding, distributing and multiplying torques and only designed for the area of use described in Chapter 2 "Technical Data".

Other operational uses and conditions must be agreed with MS-Graessner GmbH & Co.KG and contractually regulated.

The gear units are manufactured according to the latest technical state of the art and delivered such that they are safe to operate. They meet the current state of the description as contained in these operating instructions. We reserve all rights to implement technical modifications on components, whilst retaining performance capability and safety of the gear units.

1.2 Significance of the warning notes

The warning notes appear in the context in which a hazard may occur and refer to the same. They refer to hazards and possible consequences if such hazards are not remedied. The notes on personal safety are highlighted by warning triangles indicating the hazard types. Depending on the hazard level the warning notes are shown as follows:

	Note Useful note or information
	Attention: Material damage may occur on the drive system or the environment!
	Caution: Risk of bodily injury! (Here risk of burns)
	Warning: Possible hazardous situation - death or serious bodily injury may occur! (Here risk of crushing)
	Danger: Immediate danger with death or serious bodily injury as consequences! (Here risk of crushing for bodies)

1.3 Exclusion of liability

MS-Graessner GmbH & Co. KG does not assume any liability for damage and operating malfunctions resulting from non-compliance with these instructions .



1.4 Copyright

The copyright relating to these instructions is retained by **MS-Graessner GmbH & Co. KG**, all rights reserved

These **installation and operating instructions** are available on our website www.graessner.de as a download.

With regard to all technical queries please contact our product management or our service department:

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	These operating instructions must be read carefully before use Keep in a safe place for later reference
	If these operating instructions are not complied with, damage to the gear unit, operating faults, material damage and personal injury may occur. MS-Graessner GmbH & Co. KG does not accept any liability for any resulting damage and faults.

2. Intended use of MS-Graessner Gear Units

PowerGear gear units are components for machine installation and intended exclusively for guiding, distributing and multiplying torques within the speed range up to 3500 min⁻¹.
They comply with the machine directives (EN 292) and EMC directives to the extent they are applicable..

PowerGear gear units must only be used in the application cases provided for in the catalogue and the associated technical specifications.

Any other use and/or any use exceeding those cases described in the catalogue and/or associated technical specifications is deemed not compliant with the intended use.
The manufacturer does not accept any liability whatsoever for any damage resulting therefrom. This risk shall be solely borne by users.

PowerGear gear units can be used in a wide range of different areas; therefore, responsibility for the specific application passes to users upon commencement of such use..

3. Conversions and alterations / Modifications of the product

PowerGear gear units must not be changed in terms of design or technical safety without our prior agreement.
Any unauthorized modification within the meaning of this provision excludes any liability on our part.

4. Set-up of gear unit / Technical data

4.1 Set-up of gear unit

PowerGear are angular gear units with case-hardened spiral bevel gear pairs, with gearing according to the Gleason system, for installation in machines and plant.

The gear unit housings are machined on all sides and feature threaded bores for attachment on all sides via 3 spigot fits with standard tolerances. The mounting of the shafts by tapered roller bearings in a cantilevered support (drive) and fork mounting (output), shaft seal rings with dust lip, flange seals by lamella sealing discs. Mathematically exact ratios from 1.00:1 to 5.00:1. Gear unit in full shaft or hollow shaft design, for coupling transmission or direct attachment of the motor.

PowerGear gear units are intended for guiding, distributing and multiplying torques within the speed range up to 3500 min⁻¹ (nominal), see also the current catalogue edition "**PowerGear**" in this regard.

PowerGear gear units are in full compliance with the machine directives (EN 292) and EMC directives to the extent they are applicable.

4.2 Type designations

PowerGear P54 to P280

P version with type series L, H, FL, FH,
X version, reinforced, with type series L and H

<p>Type series L shown in ratio 2:1 and in Wa.2 (WA = shaft arrangement) with 2 shaft ends on the output shaft. Additional shaft arrangements are Wa.1 and Wa.3. Fits on the shaft ends in k6</p>	<p>Type series H shown in ratio 1:1, in Wa.2 (WA = shaft arrangement) with fits in H7 at both shaft ends of the output shaft. Fit on the drive shaft end in k6.</p>

The bearings are provided as tapered roller bearings. The drive pinions are shrunk into the driven pinion gears on the shaft. In the case of the **reinforced X version** the drive shafts are provided as pinion shafts.

PowerGear P360 to P450

P version with type series L and H

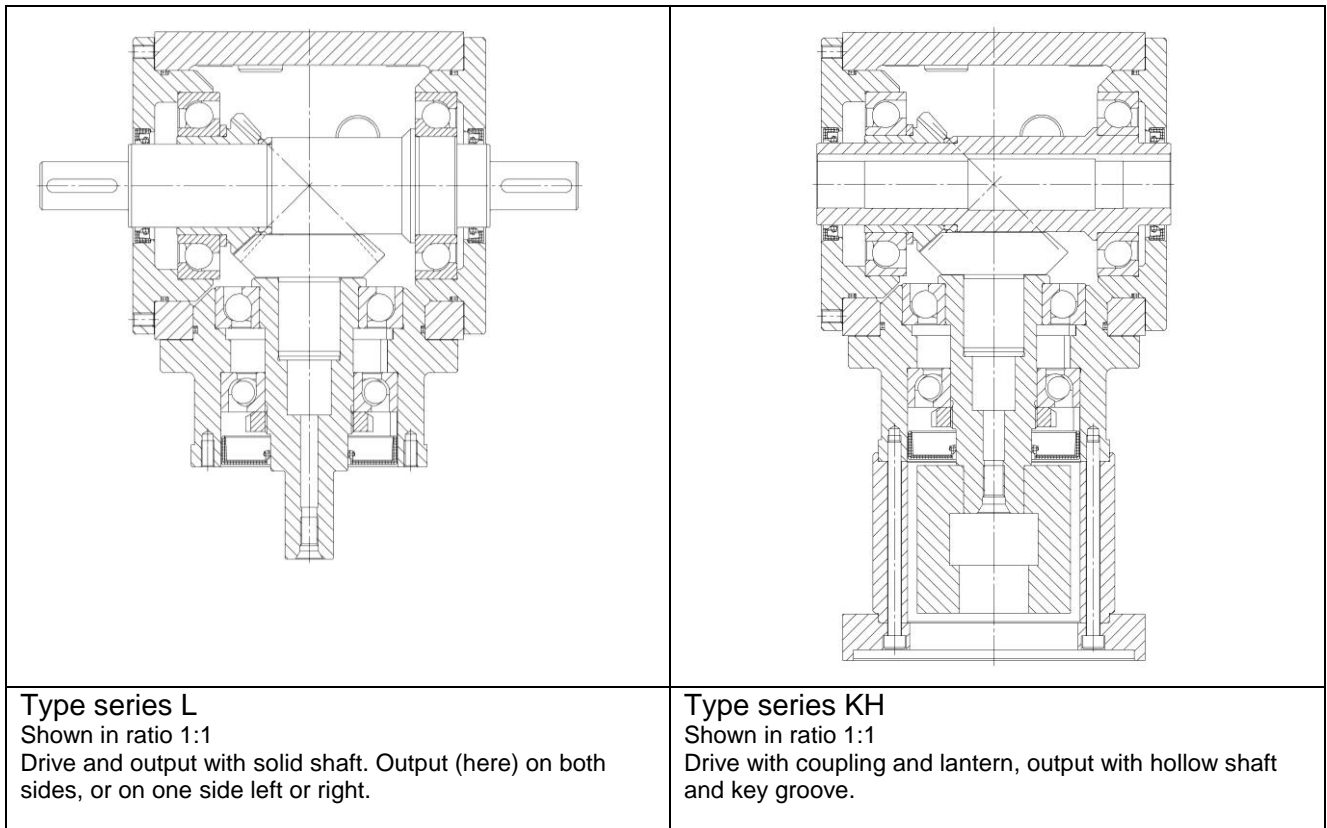
<p>Type series L Shown in ratio 1:1 The two bevel gears are connected to the shafts via feather</p>	<p>Type series L Shown in ratio 3:1 (analogously 4:1 and 5:1) complete with bevel gear on hub and pinion shaft.</p>

key, in addition there is a light shrink fitting.
For the ratio 2:1 the pinion is shrunk onto the drive shaft.

The bevel gear is screwed and bolted with the hub, this sits
in a feather key connection on the output shaft.

PowerGear HS S90 to S170

S version with type series L and KH



Shaft bearings with angular contact ball bearings, lubrication with synthetic gear oil ISO VG 150

4.3 Performance tables

PowerGear P Standard

Nominal torque on output T_{2N} (Nm) at	P54	P75	P90	P110	P140	P170	P210	P240	P280	P360	P450
$i=1:1$	15	45	78	150	360	585	1300	2150	3200	3750	6600
$i=1.5$	15	45	78	150	360	585	1300	2150	3200	3550	7000
$i=2:1$	12	42	68	150	330	544	1220	2010	3050	3500	7000
$i=3:1$	12	33	54	120	270	450	1020	1650	2850	3350	7000
$i=4:1$		28	52	100	224	376	860	1410	2300	2900	6600
$i=5:1$		25	40	85	196	320	740	1210	2000	2600	6000

PowerGear X reinforced version

Nominal torque on output T_{2N} (Nm) at	X54	X75	X90	X110	X140	X170	X210	X240	X280
$i=1:1$	24	87	135	290	625	1020	2050	3350	5200

PowerGear HS High Speed

Nominal torque on output T_{2N} (Nm) at		S90	S110	S140	S170
$i=1:1$		45	78	150	360
$i=1.5:1$		45	78	150	360
$i=2:1$		42	68	150	330

The braking as well as the emergency stop moments are shown in the performance table in the catalogue, download at www.graessner.de. There you will also find the moments for the reinforced gear unit versions X54 to X280 as well as for the high speed versions S90 to S170.

4.4 Technical data

PowerGear P

	P54	P75	P90	P110	P140	P170	P210	P240	P280	P360	P450
Running noise at 1500min ⁻¹ Partial load in dB(A)	70	70	74	76	77	78	80	82	83	85	85
Weight kg	1.8	4.5	8.0	13.0	22.0	38.5	71.0	103.5	155.0	240	400
Lubrication	Synthetic gear oil ISO VG 150, up to size P140 with filling										
Average oil quantity in l	0.05	0.10	0.20	0.30	0.40	1.00	2.20	2.60	3.0	9.0	22.0

PowerGear X

	X54	X75	X90	X110	X140	X170	X210	X240	X280
Running noise at 1500 min ⁻¹ Partial load in dB(A)	70	70	74	76	77	78	80	82	83
Weight in kg	1.9	5.0	8.5	13.5	22.5	39.0	71.5	104.0	155.5
Lubrication	Synthetic gear oil ISO VG 150, up to size P140 with filling								
Average oil quantity in l	0.05	0.10	0.20	0.30	0.40	1.00	2.20	2.60	3.00

PowerGear HS

	S90	S110	S140	S170
Running noise at 1500 min ⁻¹ Partial load in dB(A)	< 70	< 74	< 76	< 77
Weight in kg	4.5	8.0	13.0	22.0
Lubrication	Synth. gear oil ISO VG 150			
Average oil quantity in l	0.20	0.30	0.40	1.00


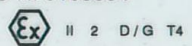
Operating temperatures PowerGear P and X respectively -30 to +90°C, PowerGear HS -30 to +100°C



Further technical data is shown in the catalogue "PowerGear", download at www.graessner.de.

4.5 Type plate

The type plate comprises (example):

 MS-Graessner GmbH & Co. KG D-72135 Dettenhausen PowerGear P140L 1,00:1 Wa.13 21140P000007 S-N. 3109634 	<ul style="list-style-type: none"> The exact type designation P140L, the ratio 1.00:1 and the shaft arrangement Wa.13 (output on sides 1 and 3)
	<ul style="list-style-type: none"> the article number of the gear unit 21140P000007
	<ul style="list-style-type: none"> the serial number of the gear unit S-N.3109634

- | | |
|--|---|
| | <ul style="list-style-type: none">• Details on explosion protection area of operation / zones |
|--|---|

5. Safety notes

5.1 Basic duties

The safety notes listed here are used to avoid personal injury and material damage, and must always be complied with and observed.

For this purpose persons with responsibility for the plant as well as qualified personnel working on the gear unit under its own responsibility must have read and fully understood these operating instructions, in order

- to prevent any hazards for life and limb of users and any third parties.
- to provide for the operational safety of the gear unit.
- to exclude downtime and environmental damage as a result of incorrect handling.

5.2 Qualified personnel

means persons having relevant education and training and a professional qualification who are able to detect risks in the handling of these products and avoid possible hazards.

Specialists within the meaning of these operating instructions are persons who are familiar with the set-up, mechanical installation, fault removal and maintenance of the gear units and have the following qualifications:

- Training in the field of mechanics with successfully completed professional training (mechanic, machine fitter, mechatronics engineer, toolmaker)
- Knowledge of these operating instructions

All specialists must wear protective clothing appropriate to their activity.

5.3 Environmental protection

All existing packaging material must be disposed of in accordance with regulations or recycled.

When changing the oil, the used oil must be caught in suitable vessels. Any pooled oil spills must be removed immediately by means of a binding agent.

Any pooled oil spills must be removed immediately by means of a binding agent.

Used oil, oil binding agent or oil-contaminated cleaning cloths must be disposed of in accordance with the relevant environmental protection regulations.

Disposal of the gear unit following the end of its service life:

- Drain oil and preservation agents completely from the gear unit and dispose of as waste oil in accordance with the applicable national regulations
- Housing parts, shafts, roller bearings and geared parts must be disposed of or recycled in accordance with applicable national regulations, depending on the relevant provisions also separately.



Serious personal injury and material damage due to

- incorrect use of the gear unit
- incorrect installation or operation



Risk to life due to operational plant

When working on the gear unit, the gear unit must always be shut down.

The drive must have been secured against unintentional activation. (Keyswitch or removal of fuses). At the point of switch-on, an information sign must be affixed indicating the shutdown. The drive must have been secured against unintentional activation. (Keyswitch or removal of fuses). At the point of switch-on, an information sign must be affixed indicating the shutdown.

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	down.
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Serious personal injury and material damage due to

non-permissible removal of the necessary protective covers!

6. Transport, storage and long term storage

6.1 Transport

Any work regarding transportation, storage, siting, installation, commissioning, operation, service and maintenance must be carried out by qualified personnel only.

Any damage identified after delivery must be communicated immediately to the transport company, if appropriate, commissioning / activation must be excluded.

The transportation of the gear unit must be effected such that personal injury and damage to the gear unit are avoided.



Danger:

Immediate danger with serious bodily injury as a consequence!

(Here risk of crushing for bodies or body parts)

Transportation must only be effected by means of suitable means of transportation intended for this purpose. When attaching to eye bolts this must only be carried out at the bores provided for this purpose with approved and sufficiently dimensioned means of attachment. No diagonal pull must arise.

Plant-specific provisions and requirements must be complied with.

Relevant national and regional regulations for safety, accident prevention and environmental protection must be complied with.

6.2 Storage conditions

PowerGear - gear units must only be stored in a closed condition, in a dry, dust-free and low vibration (avoiding damage due to bearing shutdown) environment without any sun radiation at temperatures between -25 and +50°C.

Series gear units can thus be stored for up to 1 year.

Always check the oil level before taking the gear unit into service.

6.3 Long-term storage

If storage is intended to extend for more than 1 year, the version "for long term storage" is recommended.

These gear units can be stored for a period of up to 5 years maximum.

External preservation is carried out by applying a permanent preserving agent.

Internal preservation is carried out by applying a synthetic gear oil based on PAO.

It is recommended to turn the gear units at regular intervals to ensure that the bearings do not become stuck (seize up); rotating the gear units in this way also counteracts the possible occurrence of any standstill markings and the shaft seal rings do not stick and/or become brittle.

6.4 Commissioning

Before commissioning, drain the oil and replenish with fresh oil. If taken into service before the expiry of the 5 years, the function of the gear unit is assured.

If commissioned at a date later than 5 years after being put into storage, the roller bearings, sealing elements and gear oil must all be replaced.

7. Installation

7.1 General installation instructions

The installation must only be effected by **qualified, authorized and trained personnel**.

The safety notes in Section 3 must be complied with.

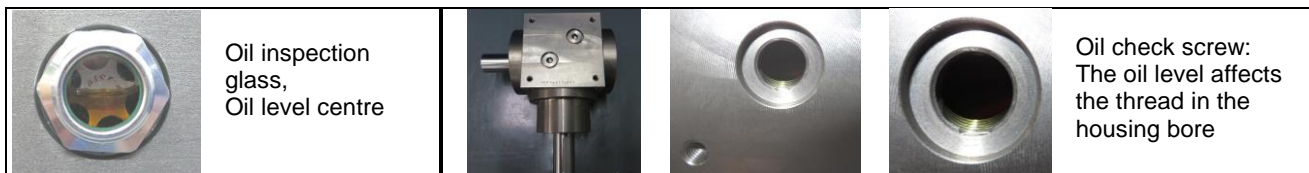
When transporting the gear unit the notes in Section 6 must be complied with.

Suitable crane tackle and lifting gear must be provided.

Before commissioning

- fill the gear unit to the correct oil level, unless the gear unit is provided with lubrication for life.
- before commissioning check the correct attachment of the transmission parts
- do not deactivate monitoring and protection devices, not even during test operation

If oil level indicators or inspection glasses exist, then the markings on these, or the centre of the oil inspection glass, are to be taken as minimum markings.



Oil quantities (dependent on ratio, speed, shaft arrangement and installation position)

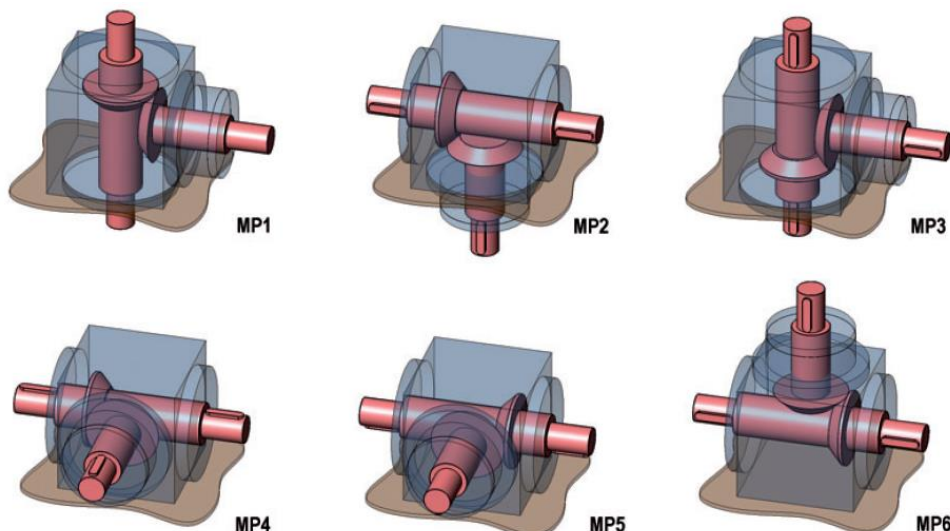
Build size	P54	P75 / X75	P90 / X90	P110 / X110	P140 / X140	P170 / X170	P210 / X210	P240 / X240	P280 / X280	P360	P450
average oil quantity	0.05	0.1 l	0.2 l	0.3 l	0.4 l	1.0 l	2.2 l	2.6 l	3.0 l	9.0	22.0
max. oil quantity	-	-	-	0.35 l	0.6 l	1.2 l	2.5 l	3.5 l	5.0 l	15.0	32.0

7.2 Gear unit installation in plant

During installation or assembly ensure the following:

- an even support on a level, vibration-dampened and torsion-free substructure, stress and strain in the housing must be avoided.
- Perfect lubrication and ventilation are only assured with an installation in accordance with the drawings and build type.
- tension-free assembly with combined flange or insertion mount attachment
- exact alignment of the gear unit for direct coupling, comply with manufacturer's details

7.3 Installation positions (MP = mounting position)



7.4 Fitting of motors

The gear unit types FL and FH are equipped at the drive end with a hollow shaft complete with key groove, the bore fitting is provided of H7 quality. **The motor shaft must always be positioned and fitted such that it is in alignment with the gear shaft.** Coat shafts with assembly paste, then join up motor to the gear shaft.

Do **not** use a hammer to drive in motor, but use the suitable bores and threads on gear unit and motor to pull the same with mounting bolts up to the flange surfaces until the motor is in close contact.

If there is stress on the bearings, the motor will spring back easily, repeat process until motor and gear unit are in stress-free contact with the flanges and the shafts can be rotated easily.



Attention damage to gear unit:

If the motor is driven on by the hammer, gear unit damage may occur.

Any stress and tension on the bearings may cause them to overheat and cause bearing damage with ensuing blockage.

Drive with lantern and coupling

a. Preparation

The surfaces of the coupling bores and the shaft ends must be free from dirt, above all from grease and oil.

b. Installation of the coupling

The radially located clamp screw of the coupling half to be fitted is turned to the left, until the screw head is in contact with the cross pin in the depression. By continuing to rotate the screw the coupling bore is elastically expanded, so that the coupling can be slid easily onto the shaft. For disassembly, proceed analogously.



Clamp screw and cross pin.

Turn screw to the left until the head of the screw is in contact with the cross pin. If you then continue to turn the screw further to the left, the coupling will be expanded.

ATTENTION: Expand only to such an extent that the coupling can be fitted, otherwise there is a **risk of fracture**.



Coupling expanded for fitting.

Coupling bores must be free from dirt and grease.

After installation the clamp screw must be tightened with the necessary tightening torque

Tightening torques of the clamp screws

Screws: DIN 912, 10.9, galvanized

M4	M5	M6	M8	M10
5 Nm	10 Nm	14 Nm	35 Nm	65 Nm

7.5 Installation of the other fitted components

The drive and output elements (gears, belt wheels, jointed shafts etc.):

- must have been balanced with G 6.3,
- must only be fitted using suitable fitting and withdrawal devices,
- must be axially secured even if they have been shrunk on,

When using suitable tensioning elements the tightening torques must be taken into account.


The components must be mounted onto the shaft as far as is specified in the article-related dimension sheet.


In the case of a belt drive the correct belt tension must be assured, comply with the manufacturer's instructions in this regard. The permissible transversal forces for the shaft must not be exceeded (see catalogue).

Drive and output elements must be covered by contact protection.

7.6 Finishing work

- Before fitting protective covers check again the correct oil level in the gear unit.
- Check for even running free from strains, stresses and any faults.
- Fit protective covers.
- Carefully clear away all tools as well as any parts not fitted.

	<p>Attention: Due to incorrect installation the gear unit can be damaged and become unusable. Such damage may be caused by falling objects, dumping, welding work or insufficient attachment.</p> <p>Due to incorrect installation the gear unit can be damaged and become unusable. Such damage may be caused by falling objects, dumping, welding work or insufficient attachment.</p> <p>The operator must ensure:</p> <ul style="list-style-type: none">• The gear unit must be protected against any falling objects and dumping.• Welding work must not be carried out on any part of the drive.• The gear unit must not be used as a ground point for electric welding work.• All mounting options assigned to the build type must be used.• Any screws that have become unusable during assembly and disassembly must be replaced by new ones featuring the same design and strength class.
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	<p>Attention damage to gear unit: Impacts or shocks during the mounting of the coupling may cause damage inside the gear unit.</p> <p>Fit couplings with pull-on devices. The shaft seal rings and the running surfaces of the shafts must not be damaged when fitting the coupling parts.</p>
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8. Commissioning

- The commissioning (*taking up operation in accordance with the intended use*) of the PowerGear gear unit is prohibited until it has been determined that the machine or plant complies with the provisions of the EU machine directive.
- Before commissioning check the correct attachment of the transmission parts.
- Check oil level
- Do not deactivate monitoring and protection devices, not even during test operation.
- **The use of an aeration and ventilation filter is not necessary for gear units up to P110 / X110 , for gear units from P140 / X140 we recommend its use, as soon as the gear units exceed an operating temperature of 60°C.**

The first start-ups must be carried out without load and at low speeds, until it is ensured that all roller bearings, bevel gears and shaft seals are wetted with oil, then increase speed to approx. 500 min⁻¹
After approx. 30 min. slowly increase speeds until operational speed is reached, running-in time at idle approx. 90 minutes.

- During start-up and run-up pay attention to running noise and temperature development, in particular at the bearing points. In the case of unusual running noise, shut down machine and identify fault.
See Section 10: "Faults, causes and remedies."

Apparent leakage at the shaft seal rings

Grease emerging from the lubrication in the shaft seal rings does not represent an oil leak. This is an **apparent leakage**, until the remaining lubricant has become regulated.
Wipe off any such apparent leakage and continue to observe.



Attention damage to gear unit:

If the new gear unit is started up too rapidly, this may cause bearings to overheat, as well as cause insufficient lubrication on the gear flanks!

It is necessary to allow the gear unit to run-in in stages!



Warning:

Risk of burns!

Serious burns possible on hot surfaces (>55°C).

Wear suitable gloves and protective clothing.

9. Operation of Power Gear

9.1 General notes on operation

The notes at item 1 "General safety notes", item 10 "Faults, causes and remedies", and item 11 "Inspection and maintenance" must be complied with.

In order to achieve a perfect trouble-free operation of the gear unit, the operating factors defined in the "Technical Data" must be complied with.

9.2 During operation monitor the following:

Operating temperature

When using mineral gear oils (CLP) the operating temperature should not exceed 80°C or only exceed this limit for a short temporary time period. When using synthetic gear oils (CLP) an operating temperature - in connection with sealing rings made of FKM (fluorinated rubber, viton) - of temporarily 110°C is permissible.

Changing gear unit noises, vibrations

Oil leakage on the housing and on the shaft seal rings

Oil level – for oil level checking the gear unit must be shut down.

Check oil levels only with the gear unit in a cooled down condition:

- If an oil inspection glass is available, the oil level shown must be at the centre of the oil inspection glass
- Without oil inspection glass, the check is performed at the screw plug of a vertically positioned housing surface. The oil level must be in contact with then thread in the housing (see page 11, Section 7.1)

**Attention:**

Insufficient lubrication caused by an excessively low oil level may cause damage to the geared parts and the bearings!

Carry out a regular oil level check

**Warning:**

Serious burns possible on hot surfaces (>55°C)

Wear suitable gloves and protective clothing

9.3 Irregularities

In the event of any changes in relation to standard operation, e.g. increased temperatures, noises, vibrations, the gear unit must be shut down in any case of doubt so that the cause of such changes can be determined.

See Section 10: "Faults, causes, remedy."

If necessary, contact our service department for consultations.

10. Faults, causes, remedy

10.1 General fault indications

The Sections 5 "Safety notes" and 11 "Service and Maintenance" are to be complied with!

Faults occurring during the warranty period, which necessitate a repair of the gear unit, must only be removed by service department employees of MS-Graessner.

If, on expiry of the warranty period, faults should occur whose cause cannot be clearly recognized, contact the service department at MS-Graessner.

10.2 Possible faults



Faults	Causes	Remedy
Changed operating noise	Damage to gearings Bearing play is increased. Bearing is defective	Check geared components; if necessary, replace any damaged components, adjust bearing play, contact service department Replace defective bearing, contact service department
Increased temperature at the bearing points	Oil level in the housing is too low or too high Oil is too old Bearing is defective	Check oil level at room temperature, if necessary replenish or drain oil. Check when the last oil change has been carried out. If necessary, change the oil Check bearing condition; replace, if necessary; contact service department
Gear unit is oily on the outside	Insufficient sealing of the bearing flanges and gear unit covers	Seal bearing flanges and gear unit covers
Oil leak at the ventilation filter	Oil foams Oil level in the gear unit is too high Incorrect execution of the ventilation	See fault "Oil foams in gear unit" Decrease oil level in gear unit to the pre-specified level Prevent any direct oil injection by attaching suitable extensions or angle pieces
Oil leaks from gear unit	Insufficient sealing of the bearing flanges and gear unit covers Radial shaft seal rings are defective	Check seals, replace if necessary Check radial shaft seal rings, replace if necessary.
Oil foams in gear unit	Water in oil Oil too old (De-foaming agent used up). Unsuitable oils mixed up	Examine oil condition for water ingress by means of a test tube sample. Have the oil sample analysed, change oil. Examine oil, change oil Examine oil, change oil
Water in oil	Water condensates in the gear unit by external climatic conditions, sun, wind, cold: Ambient temperatures change a great deal.	Protect gear unit against temperature influences
Increased operating temperature	Oil level in the gear unit is too high. Oil is too old Oil is highly contaminated	Check oil level Correct if necessary. Check when the most recent oil change was carried out, change oil Have the oil sample analysed, change oil.

11. Inspection and maintenance

11.1 General notes

All service and maintenance work must only be carried out by qualified personnel.
See "Safety Notes 3.2" in this regard.

For carrying out service and maintenance tasks the gear unit must always be shut down.
The drive unit must be secured against any unintentional start-up (key switch, lock) and an information sign must be affixed with the information that work is being carried out on the gear unit.

	<p>Warning: Major risk of injury due to accidental start-up of the drive unit!</p> <p>Before commencing any maintenance work, secure gear unit against any start-up!</p>
	<p>Warning: Major risk of injury due to disassembly of transmission parts (couplings, jointed shafts, belts, etc.) whilst torsional forces are still acting on the gear shafts!</p> <p>Secure gear shafts against torsional forces and disassembly transmission elements.</p>

11.2 Service intervals

If service intervals are not complied with, major damage may be caused to the gear unit and within the plant.
Therefore it must be ensured that these service intervals are observed.

Measures	Service intervals	Remarks
Check running noise for any changes	daily	
Check gear unit for leakage	daily	
Check oil level	monthly	
Carry out first oil change	500 operating hours after commissioning	Chapter 11.3
Carry out additional oil changes mineral oil filling	Every 24 months or 10000 operating hours	Chapter 11.3
Carry out additional oil changes Synthetic oils	Every 4 years or 20000 operating hours	Chapter 11.3
Check gear unit condition	Every 2 years	Chapter 11.4

11.3 Oil service life

The oil service life at 80°C mean oil temperature in the gear unit without any serious change in the oil qualities are specified by the oil manufacturers as minimum values:

- For mineral oils, biodegradable oils and physiologically harmless oils 2 years or 10,000 operating hours
- For synthetic oils (polyalphaolefins and polyglycols) 4 years or 20,000 operating hours

Note on oil service life

The actual relevant oil service life may be longer, but also shorter for operating temperatures in excess of 80°C. Here, the rule applies that a temperature increase by 10°C approximately halves the service life of the oil.

11.4 Oil change

Oil should be drained directly after shutdown whilst the oil is still warm.

**Caution:**

There is a **risk of burns** on the hot gear unit, and a **risk of scalding** when draining the oil!

Provide for suitable protection measures!

Screw off aeration and ventilation filter or remove top screw plug on one side of the housing, open oil drain plug and catch oil in suitable vessel.

Fit drain plug with new copper seal and screw back into housing.

Fill gear unit with oil, see also Chapter 8.

Replace oil filler plug or aeration and ventilation filter.

**Material damage**

Possible damage to the gear unit by defective lubrication due to incorrect or mixed oils.

When carrying out an oil change always refill with the oil type previously used!

It is not permitted to mix different makes or mineral and synthetic oils, in particular hydrocarbon oils must not be mixed with polyglycols. The mixtures may become resinous or agglutinate and then precipitate into the gear unit.

11.5 Checking gear unit condition

This check must only be carried out by qualified operating personnel or the MS-Graessner service department. Here it must be possible to assess reliably what exactly needs to be replaced on the gear unit, or it must be determined that all gear unit components are in order.

12. Replacement parts, replacement part stocks, service

12.1 Replacement parts

Wear part packs and replacement parts complete with replacement or repair instructions are available from our service department.

The designation and positioning of the individual parts are shown in the associated dimension sheets and replacement part drawings.

12.2 Replacement part stocks

We recommend keeping a stock of the most important replacement parts and wear parts in the vicinity of the place of use of the gear unit, so as to ensure the operational readiness of the gear unit in this way.

The parts are shown in the replacement part drawings

12.3 Service

Should you require **help from our service department** please provide the following details:

- Gear unit type and size
- All data printed on the type plate (see photograph on page 7).
If the type plate is missing, you will find the serial number stamped into the housing.
- Type and scope of the fault
- Suspected cause
- Photographs of any damage (digital)

**Note**

Contact to Customer Service see pages 4, 8 and 20 (bottom)

13. Alphabetic index

<i>Index keyword</i>	<i>Section</i>	<i>Page</i>
Aeration and ventilation filter	8.	13
Basic duties	5.1.	9
Before commissioning	6.4	10
Checking gear unit condition	11.5.	18
Commissioning	8.	14
Conversions and alterations	3.	5
Copyright	1.4.	4
Disposal of the gear unit after use	5.3	9
Downloads - Notes	1.4, 4.5	4, 8
During operation monitor the following	9.2.	15
Environmental protection	5.3	9
Exclusion of liability	1.2.	4
Faults, causes, remedy	10.	16
Finishing work	7.6	13
Fitted components - Notes	7.5	12
Fitting of motors	7.4	12
Gear unit installation in plant	7.2.	11
General fault indications	10.1.	16
General installation instructions	7.1.	11
General notes on inspection and maintenance	11.1.	17
General notes on operation	9.1.	15
General notes on the operating instructions	1.	4
Inspection and maintenance	11.	17
Installation	7.	11
Installation of coupling	7.4	12
Installation position (see fitted positions)	7.3	11
Installation positions:	7.3.	11
Intended use of MS-Graessner gear units	2.	5
Irregularities	9.3.	15
Long-term storage	6.3.	10
Maintenance	11.	17
Modifications of the product	3.	5

Oil change	11.4.	17
Oil inspection glass	7.1.	11
Oil quantities	7.1.	11
Oil service life	11.3	17
Operating temperature	9.2.	15
Operation of the PowerGear gear units	9.	15
Performance tables PowerGear	4.3.	7
Possible faults	10.2	16
Qualified personnel	5.2.	9
Replacement part stocks	12.2.	18
Replacement parts.	12.1.	18
Replacement parts. Service	12.	18
Safety notes	5.	9
Service	12	18
Service intervals	11.2.	17
Set-up of gear unit	4.1.	5
Set-up of gear unit / Technical data	4.	5
Storage conditions	6.2.	10
Table of contents	0.	2
Technical data	4.4.	8
Transport	6.1.	10
Transport, storage and long term storage	6.	10
Type designations	4.2.	6
Type plate	4.5	8
Use of the operating instructions	1.1.	4
Warning notes	1.2	4

	Note Contact to our service department
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