Nidec
All for dreams

Spiral Bevel Gear

PowerGear

Installation and operating instructions
PowerGear P54 to P450
X54 to X280
S75 to S170

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1. General notes

1.1 Use of the operating instructions

These operating instructions are part of the product and must be read carefully before use and kept for future reference. They contain important information on the operation and servicing of the **PowerGear** gear unit range. These Operating Instructions are intended for all persons who perform assembly, installation, commissioning, and service work on gear units from this gear unit series.

The gear units of the PowerGear series are components for installation in machines and are intended exclusively for the transmission, distribution and multiplication of torque and are designed only for the area of application described in section 2 "Technical Data". Other operating conditions must be agreed with Nidec Graessner GmbH & Co.KG and regulated by contract.

The gear units are manufactured according to the latest technical standards and are delivered in a safe and reliable condition. They correspond to the status of the description in these operating instructions.

We reserve the right to make technical modifications to components, while maintaining the performance and safety of the gear units.

1.2 Significance of the warning notes

The warnings are mentioned in the context in which a hazard may occur and refer to it. They specify the hazards and the possible consequences if the hazards are not eliminated. The notes on personal safety are highlighted by warning triangles indicating the types of hazard. Depending on the hazard level, the warning notices are shown as follows:

	**Note:** Useful note or information
	**Attention**: Material damage may occur on the drive system or the environment!
	**Caution**: Risk of physical injury! *(Danger of burns*)
	**Warning**: Possible hazardous situation - death or serious injury may occur! *(Danger of crushing)*
	**Danger**: Imminent danger, death or serious bodily injury as a consequence! *(Danger of bodily harm/crushing)*

1.3 Exclusion of liability

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

1.4 Copyright

These **installation and operating instructions** can be downloaded
from our website www.graessner.de

Regarding all technical queries please contact our product management or our service department:

Nidec Graessner GmbH & Co. KG THE GEAR COMPANY Kuchenaecker 11 D-72135 Dettenhausen	**Service Department** **Product Management**	Tel.: +49 (0)7157 123-0 Fax: +49 (0)7157 123 220 Fax: +49 (0)7157 123 212 mail@graessner.de www.graessner.de

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

2. Intended use of Nidec Graessner Gear Units

PowerGear gearboxes are components for installation in machines and are intended exclusively for the reversal, distribution, and multiplication of torque in the speed range up to 3500 min^{-1}.
They comply with the Machinery Directive (EN 292) and EMC directives, insofar as they are applicable.

PowerGear gear units may only be used for the applications specified in the catalogue and in 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 applications; therefore, the responsibility for the specific application is transferred to the user at the time of use.

3. Conversions and alterations / Modifications of the product

PowerGear gearboxes may not be modified in terms of design or safety without our approval.
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 gears with case-hardened spiral bevel gear pairs, toothed according to the Gleason system, for installation in machines and systems.

The gearbox housings are machined on all sides with threaded holes for mounting on all sides via 3 uniformly toleranced centring fits. Shafts are supported by tapered roller bearings in a cantilevered support (input) and fork mounting (output), shaft seals with dust lip, flange seals by laminar sealing discs.

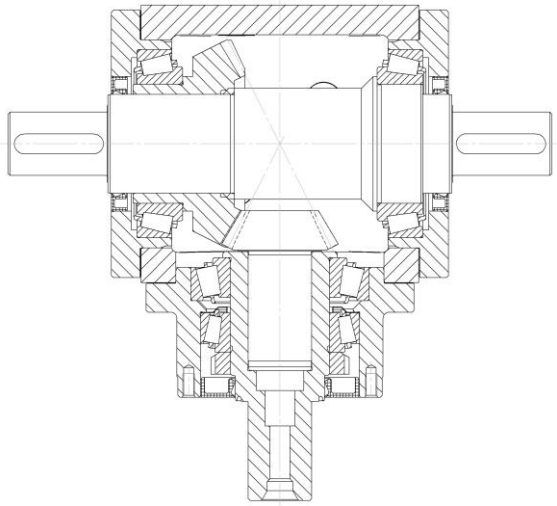
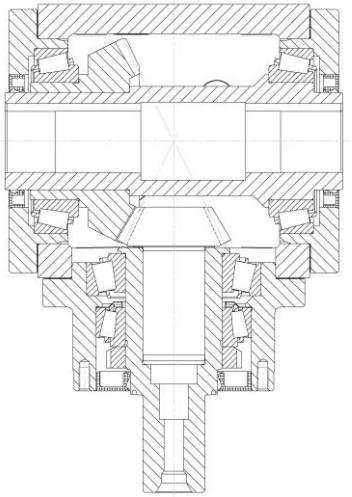
Mathematically exact ratios from 1.00:1 to 5.00:1. Gearboxes in solid or hollow shaft design, for clutch transmission or direct mounting of the motor.

PowerGear gearboxes are components for installation in machines and are intended exclusively for the transmission, distribution, and multiplication of torque in the speed range up to 3500 min^{-1}.
They comply with the Machinery Directive (EN 292) and EMC directives, insofar as they are applicable.

4.2 Type designations

PowerGear P54 to P280

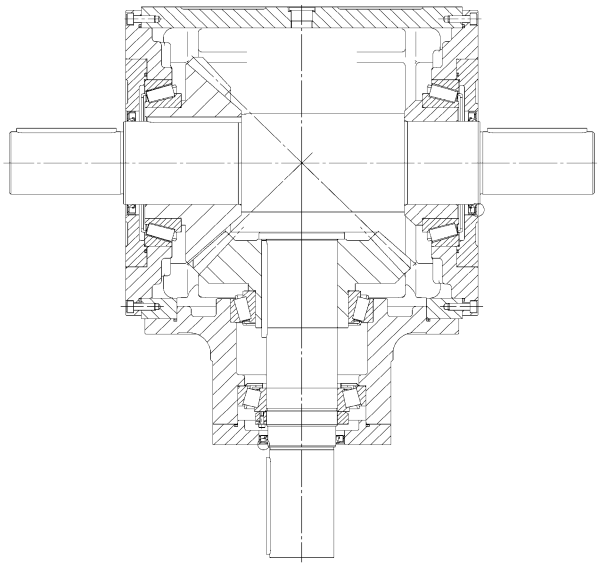
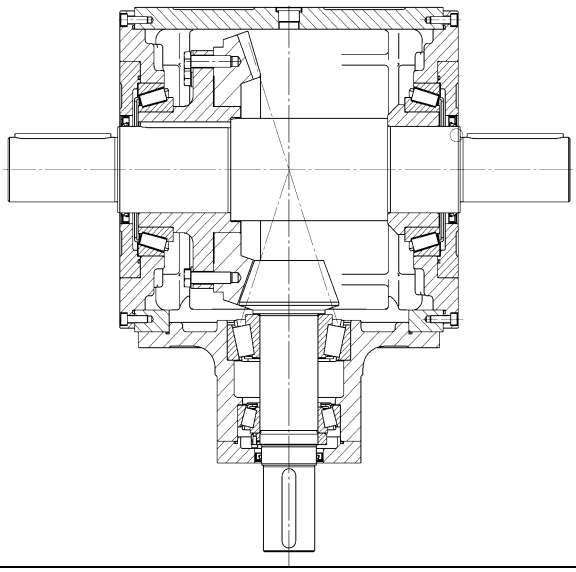
P version with type series L, H, FL, FH,
X version, reinforced, with type series L and H

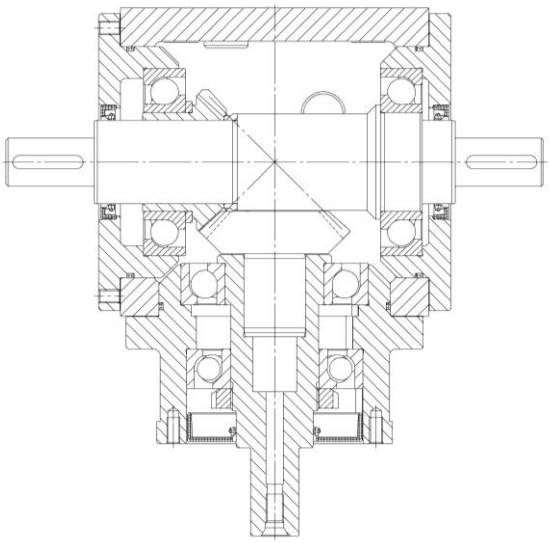
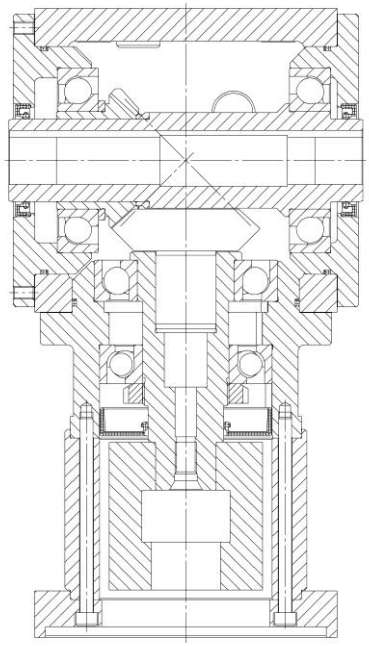
	
Type: Series L shown in ratio 2:1 and in Wa.2 (WA = shaft arrangement) with 2 shaft ends on the output shaft. Additional shaft arrangements are Wa.1 and Wa.3. Fits on the shaft ends in k6	Type: Series H shown in ratio 1:1, in Wa.2 (WA = shaft arrangement) with fits in H7 on both shaft ends of the output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

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

PowerGear P360 to P450

P version with type series L and H

	
Type: Series L Shown in ratio 1:1 The two bevel gears are connected to the shafts via feather key, in addition there is a light shrink fitting. For the ratio 2:1 the pinion is shrunk onto the drive shaft.	Type: Series L Shown in ratio 3:1 (analogously 4:1 and 5:1) complete with bevel gear on hub and pinion shaft. The bevel gear is screwed and bolted with the hub, this sits in a feather key connection on the output shaft.

	
Type: Series L Shown in ratio 1:1 Drive and output with solid shaft. Output (here) on both sides, or on one side left or right.	Type: Series KH Shown in ratio 1:1 Drive with coupling and lantern, output with hollow shaft and key groove.

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	S75	S90	S110	S140	S170
I=1:1	25	45	78	150	360
I=1.5:1	25	45	78	150	360
I=2:1	24	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.

Ex-Protection: **Explosion-proof gearboxes available on request**
Type of protection: **IP 64**

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

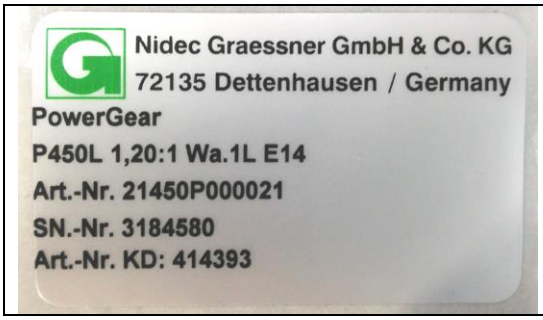
	S75	*S90*	S110	S140	S170
Running noise at 1500 min^{-1} Partial load in dB(A)	< 70	< 70	< 74	< 76	< 77
Weight in kg	3.9	4.5	8.0	13.0	22.0
Lubrication	Synth. gear oil ISO VG 150				
Average oil quantity in l	0.10	0.20	0.30	0.40	1.00

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):



- The exact type designation P450L, the ratio 1,20:1, the shaft arrangement Wa.1L (output on side 1) and the special execution number E14
- The article number of the gearbox 21450P000021
- The serial number of the gearbox 3184580
- The customer number 414393

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.
- provide for the operational safety of the gear unit.
- exclude downtime and environmental damage due to incorrect handling.

5.2 Qualified personnel

This refers to persons having relevant education and training and a professional qualification who can 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 (key switch or removal of fuses). At the point of switch-on, an information sign must be affixed indicating the shutdown.
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The drive must have been secured against unintentional activation. (key switch or removal of fuses). At the point of switch-on, an information sign must be affixed indicating the shutdown.

	**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 carried out in a manner where personal injury and damage to the gear unit are avoided.

	**Danger**: Imminent danger! May result to serious bodily injury. *(Danger of crushing bodies or body parts)*

Transport may only be carried out using suitable and designated means of transport.
When lifting eyebolts, they may only be attached to the intended holes with approved, adequately dimensioned lifting equipment. There must be no diagonal pull.
Installation-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 (to avoid bearing damage) environment, without direct sunlight and at a temperature between -25 and +50°C.
Series gear units can be stored for up to one (1) year.
Always check the oil level before taking the gear unit into service.

6.3 Long-term storage

If storage is planned for more than 1 year, the "long-term storage" version is recommended.
These gear units can be stored for up to 5 years maximum.
The external preservation is carried out by applying a permanent preservative agent.
The internal preservation is carried out with a synthetic gear oil based on PAO.

It is advisable to rotate the gear unit at regular intervals to prevent the bearings from sticking (jamming), the rotation also counteracts standstill marks and the shaft seals do not stick or become brittle.

6.4 Commissioning

Drain the oil and replenish with fresh oil before commissioning. If taken into service before the 5 years have elapsed, its function is guaranteed.

If commissioned later than 5 years after storage, the roller bearings, sealing elements and gear oil must all be replaced.

7. Installation

7.1 General installation instructions

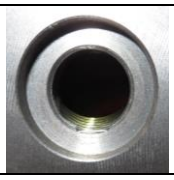
The installation must only be carried out by **qualified, authorized, and trained personnel**.
The safety instructions in Section 3 must be complied with.
When transporting the gear unit, the notes in Section 6 must be complied with.
Suitable crane harness and lifting gear must be provided.

Before commissioning

- Fill the gear unit to the correct oil level, unless the gear unit is provided with lifetime lubrication
- Check if the transmission parts are correctly fitted before commissioning
- Do not deactivate monitoring and protection devices, even in test operation

If an oil level indicator or sight glass is available, the markings on them or the centre of the oil inspection glass, are considered the minimum

Oil inspection glass:
Oil level centre



Oil check screw:
The oil level affects the thread in the housing bore

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

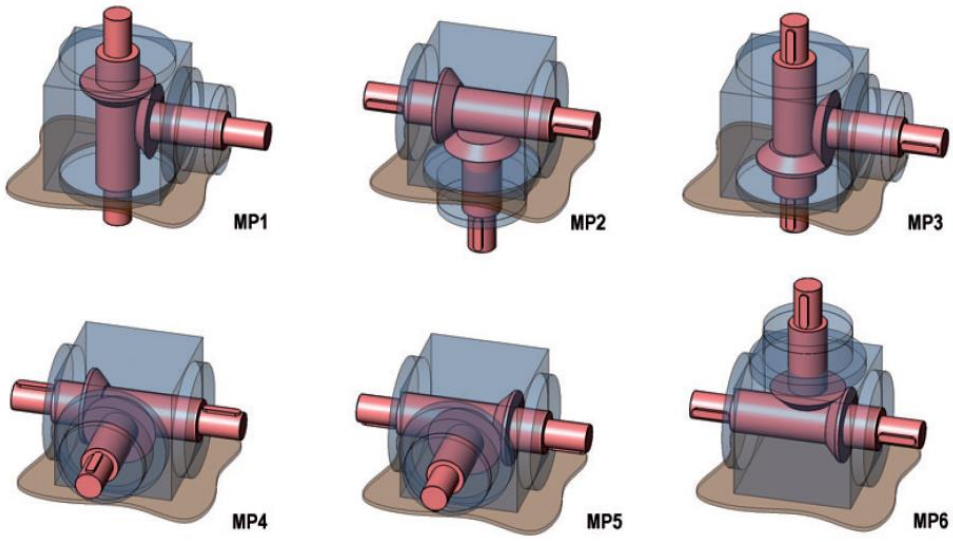
Build size	P54	P75 / X75	P90 / X90	P110 / X110	P140 / X140	P170 / X170	P210 / X210	P240 / X240	P280 / X280	P360	P450
average oil quantity	0.05	0.1 l	0.2 l	0.3 l	0.4 l	1.0 l	2.2 l	2.6 l	3.0 l	9.0	22.0
max. oil quantity	-	-	-	0.35 l	0.6 l	1.2 l	2.5 l	3.5 l	5.0 l	15.0	32.0

7.2 Gear unit installation in plant

During installation or assembly, pay attention and ensure the following:

- An even support on a level, vibration-dampened and torsion-free substructure; stress and strain in the housing must be avoided.
- Proper lubrication and ventilation are only possible if the assembly is carried out in accordance with the drawings and build type.
- Tension-free assembly with combined flange or insertion mount attachment
- Exact alignment of the gear unit on direct coupling, comply with the manufacturer's details

7.3 Installation positions (MP = mounting position)



7.4 Fitting of motors

The gear unit types FL and FH are equipped with a hollow shaft with keyway on the input side. The bore fitting is designed in quality H7. **The motor shaft must always be positioned and fitted in alignment with the motor shaft**. Coat the shafts with assembly paste, then join up motor to the gear shaft. Do not drive in the motor with a hammer but use the suitable holes and threads on the gear unit and motor to tighten the mounting screws on the flange surfaces until the motor is tight. If there is stress on the bearings, the motor will spring back easily. Repeat the procedure until the motor and gear unit rest against the flanges without distortion and the shafts can be easily rotated.

	**Attention against damage to gear unit:** Driving the motor with a hammer can cause damage to the gearbox. Any stress or tension on the bearings may cause them to overheat and lead to bearing damage with blockage.

Drive with lantern and coupling

a. Preparation

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

b. Installation of the coupling

The radially arranged clamping screw of the coupling half to be mounted is turned to the left until the screw head rests against the cross pin mounted in the counterbore. By turning the screw further, the coupling bore is elastically widened so that the coupling can easily be pushed onto the shaft. Proceed in the same way for disassembly.

	Clamp screw and cross pin: Turn screw to the left until the screw head rests against the cross pin. Turning the screw further to the left expands the coupling. **ATTENTION:** Only expand the coupling sufficiently to allow it to be mounted, otherwise there is a risk of breakage.		Coupling widened for fitting. Coupling bores must be free from dirt and grease. After assembly, tighten the clamping screw to the required 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 clamping elements, the tightening torques must be observed.

The components must be mounted on the shaft as far as specified in the dimension sheet for the article.

In the case of belt drive, the correct belt tension must be ensured, the manufacturer's instructions must be observed. The permissible transverse forces for the shafts must not be exceeded (see catalogue).

Input and output elements must be covered with a 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.

	**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. **The operator must ensure:** ▪ 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.

	**Attention against damage to gear unit:** Impacts or shocks during the mounting of the coupling may cause damage inside the gear unit. 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.

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 the 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 or bigger, we recommend that it be used as soon as the gear units exceed operating temperatures 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 minutes, gradually increase speeds until the 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 particularly 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 is not an oil leak.
This is an **apparent leakage**, until the remaining lubricant has become regulated.
Wipe off apparent leakage and continue to observe.

	**Attention against damage to gear unit:** If the new gear unit is started up too quickly, the bearings may overheat, and the tooth flanks may be insufficiently lubricated. It is necessary to allow the gear unit to run-in in stages!

	**Warning**: Risk of burns! Possibility of severe burns on hot surfaces (>55°C). Wear suitable gloves and protective clothing.

9. Operation of Power Gear

9.1 General notes on operation

The instructions in Section 1 "General safety notes", Section 10 "Faults, causes and remedies", and Section 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 period. If synthetic gear oils (CLP) are used, an operating temperature must be set.
In combination with sealing rings made of FKM (fluororubber, Viton), a temperature of 110°C is permissible for a short time.

Changing gear unit noises, vibrations

Oil leakage on the housing and the shaft seal rings

Oil level - to check the oil level, the gearbox must be stopped.
Check oil levels only with the gear unit in a cooled down condition:

- If there is an oil sight glass, the oil level must be in the middle of the oil sight glass
- If without an oil sight glass, the check is carried out at the lower screw plug of a vertical housing surface. The oil level must touch the thread in the housing (see page 11, section 7.1)

	**Attention**: Insufficient lubrication due to a too low oil level can lead to damage to the gear parts and the bearings. Carry out a regular oil level check

	**Warning**: Possibility of severe burns on hot surfaces (>55°C). Wear suitable gloves and protective clothing.

9.3 Irregularities

In case of changes compared to standard operation, e.g. increased temperatures, noises, vibrations, in case of doubt the gearbox must be shut down to determine the cause. See section 10: "Faults, causes and remedies".

If necessary, consult our service department.

10. Faults, causes, remedy

10.1 General fault indications

The Sections 5 "Safety notes" and 11 "Service and Maintenance" must be observed.

Faults occurring during the warranty period which require repair of the gear unit may only be repaired by employees of the Nidec Graessner service department.

If, after the warranty period, faults occur whose causes cannot be clearly identified, the Nidec Graessner service department must be contacted.

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 maintenance and service work may only be carried out by qualified personnel.
See "Safety Instructions 3.2"

The gear unit must always be shut down for maintenance and repair work.
The drive unit must be secured against unintentional start-up (key switch, lock) and an information sign must be attached indicating that work is being carried out on the gear unit.

	**Warning**: High risk of injury due to unintentional start-up of the drive! Before commencing any maintenance work, secure gear unit against any start-up!
	**Warning**: High risk of injury from dismantling transmission parts (clutches, cardan shafts, belts, etc.) while torsional forces are still acting on the gear shafts! Secure gear shafts against torsional forces and disassemble transmission elements.

11.2 Service intervals

Non-compliance with the maintenance intervals can cause severe damage to the gearbox and the plant.
Therefore, it must be ensured that these maintenance 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 average oil temperature in the gear unit without serious changes in the oil qualities is specified by the oil manufacturers as a minimum value:

- 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 oil service life may be longer, and at operating temperatures above 80°C also lower.
Here, the rule applies that a temperature increase of 10°C approximately halves the service life of the oil.

11.4 Oil change

The oil should be drained immediately after shutdown while 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!

Unscrew the ventilation filter or remove the upper screw plug on one side of the housing,
Open the oil drain plug and collect the oil in a suitable container.
Equip the drain plug with a new copper seal and screw it back into the housing.
Fill gear unit with oil, see also section 8.
Reinsert oil filler plug or breather filter.

	**Material damage** Possible damage to the gear unit due to insufficient lubrication caused by incorrect or mixed oils. When changing the oil, always refill with the same oil type previously used! It is not permitted to mix different makes or mineral and synthetic oils. Specifically, hydrocarbon oils must not be mixed with polyglycols. The mixtures may be resinous or clump together and settle in the gear unit.

11.5 Checking the gear unit condition

This check may only be carried out by qualified operating personnel or by the service department of Nidec Graessner. It must be possible to reliably assess what needs to be replaced on the gear unit or to determine that all gear unit parts are in good 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 to keep 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 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

Note: Contact Information of our Service Department

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