

## Servo Angular Gears

# EVOGEAR

EvoGear L / LSV

EG55 to EG115

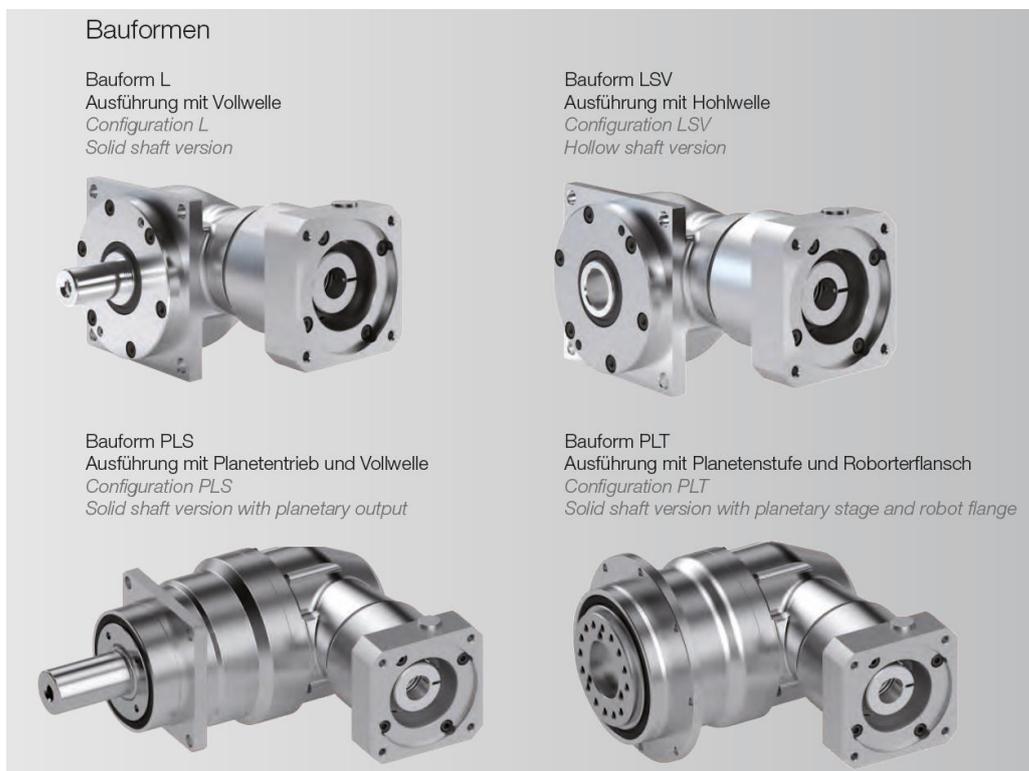
EvoGear PLS

EG55 to EG115

EvoGear PLT

EG55 to EG115

## Installation and Operating Instructions



Issue 2021-07

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# 1. General Information

## 1.1 Use of the Operating Instructions

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

They contain important information on the operation and servicing of the **EvoGear** gearbox range. These operating instructions are intended for all individuals who carry out assembly, installation, commissioning and service work on gearboxes from this gearbox range.

The gearboxes in the **EvoGear** range are components for installation in machines and are intended exclusively for the deflection, distribution and multiplication of torques.

**EvoGear** gearboxes are only designed for the field of application described in Section 2 "Technical Data". Other conditions of use must be agreed with Nidec Graessner GmbH & Co. KG and contractually regulated.

The gearboxes are manufactured according to the latest technical standards and delivered in a condition in which they are safe to operate. They conform to the current status of the description as contained in these operating instructions.

We reserve the right to make technical changes to components while maintaining the performance characteristics and safety of the gearboxes.

## 1.2 Significance of the Warning Notes

The warning notes are mentioned within the context in which a hazard may occur and refer to the same. They refer to the hazards and the possible consequences if the 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 and comprise:

	<b>Note</b> Useful note or information
	<b>Attention:</b> Material damage may occur to the drive system or the environment
	<b>Caution:</b> Risk of bodily injury (Here: risk of burns)
	<b>Warning:</b> Possible hazardous situation - death or serious bodily injury may occur (Here: crushing hazard)
	<b>Danger:</b> Immediate danger of death or serious bodily injury as a consequence (Here: crushing hazard for the body)

## 1.3 Exclusion of Liability

For damage and malfunctions resulting from non-compliance with the instructions, **Nidec Graessner GmbH & Co. KG** does not accept any liability.

## 1.4 Copyright

The copyright to these instructions remains with **Nidec Graessner GmbH & Co. KG** – all rights reserved

These instructions are available on our website  
[www.graessner.de](http://www.graessner.de)  
as a download.

For all technical questions, please contact our Product Management or Service Department:

<b>Nidec Graessner GmbH &amp; Co. KG</b> THE GEAR COMPANY Kuchenaecker 11 D-72135 Dettenhausen	<b>Product Management Department Service Department</b>	Tel.: +49 (0)7157 123-0 Fax: +49 (0)7157 123 212 Fax: +49 (0)7157 123 220 <a href="mailto:mail@graessner.de">mail@graessner.de</a> <a href="http://www.graessner.de">www.graessner.de</a>
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	These operating instructions must be read carefully before use.
	Damage to the gearbox, malfunctions, damage to property and personal injury are possible if these instructions are not observed. Nidec Graessner GmbH & Co. KG does not accept any liability for damage and/or malfunctions resulting from this.

## 2. Intended Use of Nidec Graessner Gearboxes

**EvoGear** gearboxes are components which are intended for incorporation into machines and are to be used exclusively for the deflection, distribution and multiplication of torques. They comply with the Machinery Directives (EN ISO 12100) and EMC Directives, to the extent that these are applicable.

**EvoGear** gearboxes may only be used for the applications provided for in the catalogue and in the associated technical specifications.

Any other use or use that goes beyond the above is considered to be contrary to their intended use. The manufacturer does not accept liability for any damage resulting from this. This risk shall be borne by the user alone.

**EvoGear** gearboxes can be used in a wide range of different areas; for this reason, responsibility for the specific application is transferred to the user in such cases.

## 3. Conversions and Changes / Modification of the Product

**EvoGear** gearboxes must not be changed with respect to their design or safety-related aspects without our prior agreement. Any unauthorized modification within this meaning shall exclude any liability on our part.

## 4. Gearbox Design / Technical Data

### 4.1 Gearbox Design

**EvoGear** are angular gears with case-hardened bevel gear pairs with Gleason hypoid toothing for incorporation into machines and systems. The **EvoGear** is performance-matched to all common servo motors and can be variably adapted by means of the flange and coupling.

The gearboxes offer optimum centring on the input (motor flange/lantern) and on the output (mounting side 1 of the housing).

The shafts are supported by tapered roller bearings in a cantilever bearing arrangement (input) and a fork bearing arrangement (output), shaft seals by shaft seal rings made of NBR (nitrile rubber "Perbunan") and FKM (fluorocarbon rubber "Viton"); flange seals by laminated sealing washers. The ratios are mathematically accurate from 3.00:1 to 100:1 in the standard version. Gearbox in a full shaft or hollow shaft design, for coupling transmission or direct mounting of the motor.

**EvoGear** complies with the Machine Directives (EN ISO 12100) and EMC Directives to the extent that these are applicable.

### 4.2 Type Designations

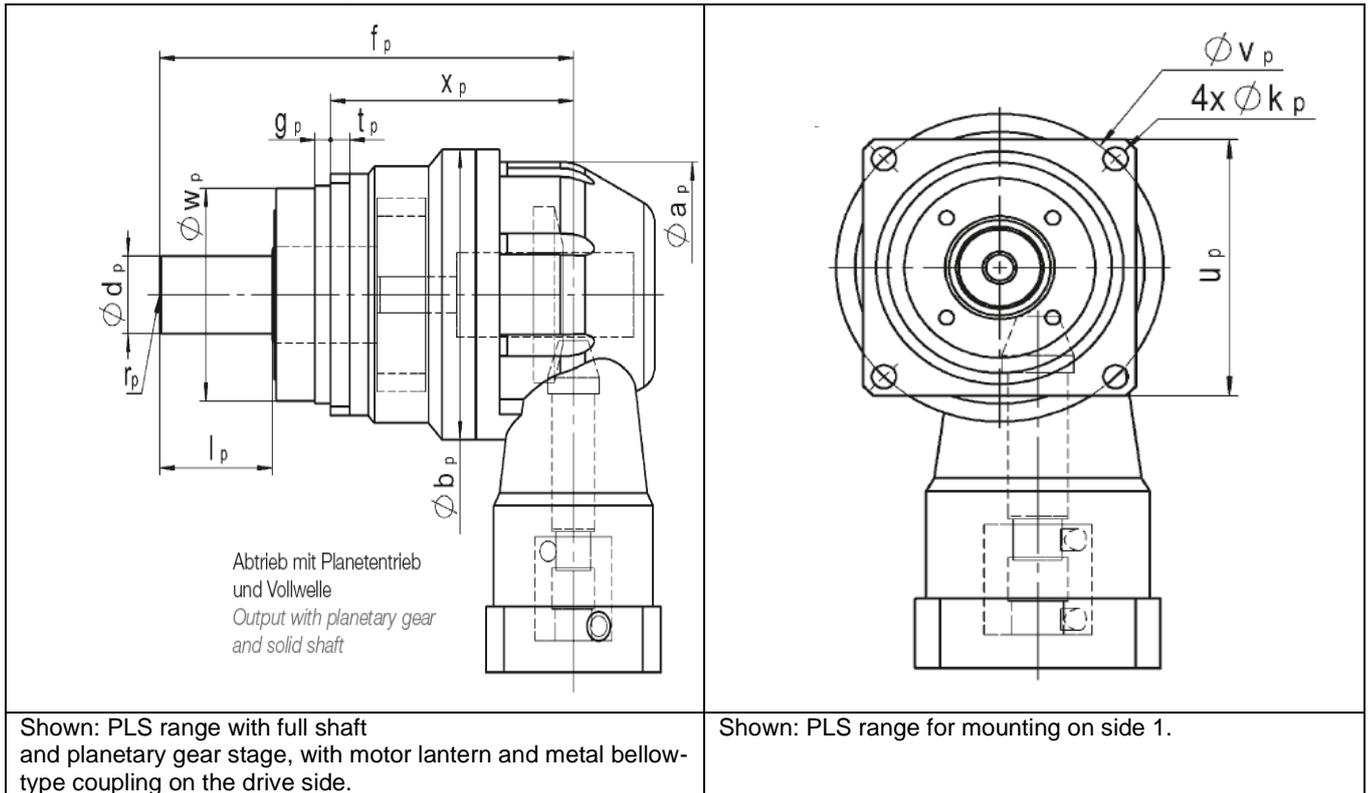
#### EvoGear EG55 to EG115

Output in full shaft (build types L) and hollow shaft design LSV **with** motor lantern and coupling

<p><b>L range (full shaft)</b> Shown in the single-stage version and 1L shaft arrangement, with 1 output shaft on side 1, with motor lantern and metal bellow-type coupling on the drive side.</p>	<p><b>H range (hollow shaft)</b> Shown in the single-stage version and 1LSV shaft arrangement, with motor lantern and metal bellow-type coupling on the drive side.</p>

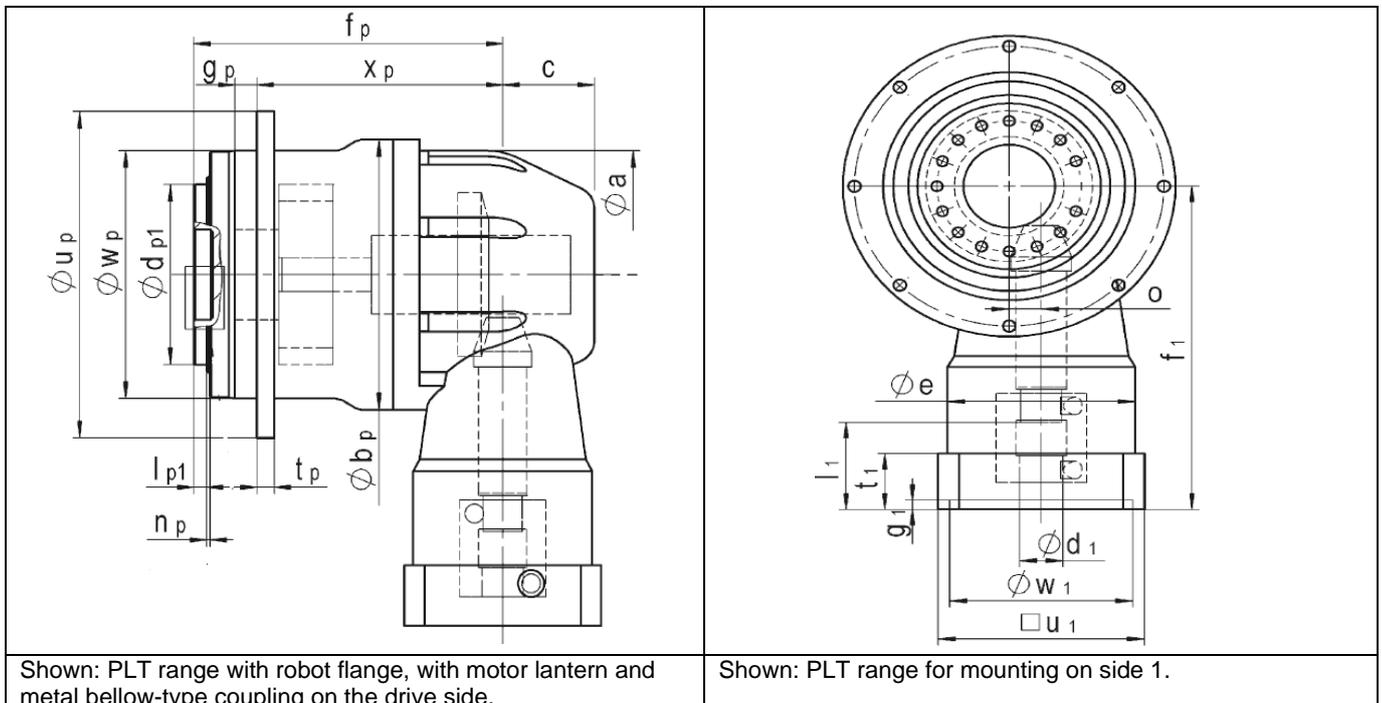
## EvoGear PLS

Output in full shafts with planetary gear stage



## EvoGear PLT

Output with planetary gear stage and robot flange



## 4.3 EvoGear Performance Tables

### EvoGear performance tables **without** planetary drive

Nominal torque at output $T_{2N}$ (Nm) for	EG55	EG75	EG90	EG115
3:1	35	70	140	260
4:1	35	70	140	260
5:1	35	70	140	260
6:1	35	70	140	260
8:1	35	70	140	260
10:1	35	70	140	260
12:1	25	50	95	180
15:1	25	50	95	180

### EvoGear performance tables **with** planetary drive on the output

Nominal torque at output $T_{2N}$ (Nm) for	EG55	EG75	EG90	EG115
i=16	80	200	380	850
i=20	86	220	410	910
i=25	106	280	590	1100
i=28/35/40/50/70	118	280	590	1300
i=100	88	220	440	930

For the max. acceleration torques and the emergency stop torques, please refer to the performance tables in the catalogue, which can be downloaded at [www.graessner.de](http://www.graessner.de).

## 4.4 Technical Data

### EvoGear Technical Data

	EG55	EG75	EG90	EG115
Running noise at 3000 min <sup>-1</sup> Partial load in dB(A)	<66	<66	<68	<68
Weight in kg	2.9	4.8	8.6	13.3
Average oil quantity in l	0.05 0.08	0.06 0.08	0.12 0.15	0.3 0.4

Service life LH (h)	>30,000 S5 load spectrum as design basis
Lubrication:	synthetic gear oil POA base, ISO –VG 150
Installation positions:	any
Operating temperature:	-10°C to +90°C
Paint finish:	Primer RAL 9005 – matt black
Ex-Protection:	Explosion-proof gearboxes available on request
Protection class:	IP 64

## 4.5 Technical Data

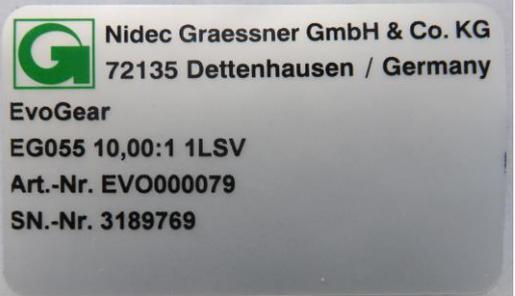
### EvoGear Technical Data with Planetary Gear Stage on the Output

	EG55	EG75	EG90	EG115
Running noise at 3000 min <sup>-1</sup> Partial load in dB(A)	<68	<68	<70	<70
Approx. weight in kg	5.0	9.9	19.5	38.0
Average oil quantity in l	0.06 0.08	0.12 0.15	0.3 0.4	0.55 0.75

Service life LH (h)	>20,000 S5 load spectrum as design basis
Lubrication:	synthetic gear oil POA base, ISO –VG 150
Installation positions:	any
Operating temperature:	-10°C to +90°C
Paint finish:	Primer RAL 9005 – black + silver
Ex-Protection:	Explosion-proof gearboxes available on request
Protection class:	IP 64

## 4.6 Type Plate and Designations

The type plate contains (example):

	<ul style="list-style-type: none"> <li>• Gearbox range</li> </ul>
	<ul style="list-style-type: none"> <li>• Type designation: EG055</li> <li>• Ratio: 10.00:1</li> <li>• Shaft arrangement: 1LSV</li> </ul>
	<ul style="list-style-type: none"> <li>• the article number: EVO000079</li> </ul>
	<ul style="list-style-type: none"> <li>• the serial number: 3189769</li> </ul>

	<p style="text-align: center;"><b>For further technical information, please refer to the “EvoGear” catalogue, which can be downloaded at <a href="http://www.graessner.de">www.graessner.de</a>, or which is available as a printed version from our Product Management and Service Department.</b></p>
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## 5. Safety Information

### 5.1 Fundamental Obligations

The safety information provided here is intended to prevent personal injury and damage to property and must be observed and complied with without fail.

For this purpose, individuals are responsible for the plant, as well as qualified personnel who work on the gearbox on their own responsibility must have read and fully understood these operating instructions.

- in order to avert any hazards to life and limb of the user and third parties.
- in order to ensure the operational safety of the gearbox.
- in order to exclude any loss of use and environmental damage resulting from incorrect handling.

### 5.2 Qualified Personnel

are individuals who have relevant training and a professional qualification and who are skilled at recognising risks and avoiding possible hazards when dealing with these products.

Skilled personnel within the meaning of these operating instructions are individuals who are familiar with the structure, mechanical installation, troubleshooting and maintenance of the gearboxes and who have the following qualifications:

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

All specialists must wear protective clothing that is appropriate to their work.

### 5.3 Environmental Protection

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

\* When the oil is changed, the waste oil must be collected in suitable containers. Oil spills must be removed immediately using oil-binding agents.

\* Waste oil, oil-binding agents or oil-contaminated cleaning cloths must be disposed of in accordance with the relevant environmental protection regulations.

#### \* Disposal of the gearbox at the end of its service life:

- Drain oil and preservatives completely from the gearbox and dispose of as waste oil in accordance with the applicable national regulations.
- Housing parts, shafts, roller bearings and geared parts are to be disposed of or recycled in accordance with the applicable national regulations – also separately depending on the applicable provision.

	<b>Serious personal injury and damage to property due to</b> <ul style="list-style-type: none"><li>• improper use of the gearbox</li><li>• incorrect installation or operation</li></ul>
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	<b>Risk to life due to operational plant</b> <p>When work is carried out on the gearbox, the gearbox must always be shut down. The input must be secured against unintentional switch-on (key switch or removal of the fuses). A sign indicating that the gearbox has been shut down must be attached at the switch-on point.</p>
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	<b>Serious personal injury and damage to property due to</b> <p>non-permissible removal of the necessary protective covers</p>
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## 6. Transport, Storage and Long-Term Storage

### 6.1 Transport

Any work regarding transport, 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 gearbox must be transported in such a way that personal injuries and damage to the gearbox 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 eyebolts, this may only be carried out at the bores provided with approved and sufficiently dimensioned lifting gear. 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

**EvoGear** gearboxes may only be put into storage in a closed condition, in a dry, dust-free and low-vibration environment (avoidance of standstill damage) without sunlight at temperatures between  $-25^{\circ}\text{C}$  and  $+50^{\circ}\text{C}$ . Serial gearboxes can be stored for up to 1 year in this manner.

### 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 gearboxes can be stored for a maximum period of 5 years. External preservation is carried out by applying a permanent preserving agent. Internal preservation is carried out with a PAO-based synthetic gear oil.

It is recommended to turn the gearboxes at regular intervals to ensure that the bearings do not become stuck (seize up); rotating the gearboxes 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 after Long-Term Storage

If commissioning is carried out before the expiry of the 5 years, the function of the gearbox is assured.

If commissioning is carried out later than 5 years after being put into storage, the roller bearings, sealing elements and gear oil must all be replaced.

For this purpose it is probably best if you return the gearbox to our Service Department.

## 7. Installation

### 7.1 General Installation Instructions

The installation must only be effected by **qualified, authorized and trained personnel**. When transporting the gearbox the notes in Section 6 must be complied with. Suitable crane tackle and lifting gear must be provided.

#### Before Commissioning

- Before commissioning, check the correct attachment of the transmission parts
- Do not deactivate monitoring and protection devices, not even during test operation

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

See **EvoGear Technical Data** under **Section 4.4** (page 8)

**EvoGear Technical Data PLS and PLT** under **Section 4.5** (page 9)

### 7.2 Gearbox Installation in the Plant

During installation or assembly ensure the following:

- uniform support on a level, vibration-damped and torsion-free surface substructure, stresses and strains in the housing must be avoided
- tension-free assembly with combined flange or push-on attachment
- exact alignment of the gearbox for direct coupling – comply with the manufacturer's instructions

### 7.3 Attachment of Motors

#### 7.3.1 Input with Motor Flange/Lantern and Coupling

##### a. 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 fitted 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.

	<p>Clamp screw and cross pin. Turn the screw to the left until the screw head is in contact with the cross pin. If you then continue to turn the screw further to the left, the coupling will be expanded. <b>ATTENTION:</b> Expand only to such an extent that the coupling can be fitted, as otherwise there is a <b>risk of fracture</b>.</p>		<p>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</p>
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<p>The drive shaft end must be free from dirt, oil and grease</p>	<p>Fit the coupling and prepare as described above. If specified, set the mounting dimension of the coupling in accordance with the dimension sheet. Tighten clamp screw.</p>	<p>Install lantern and tighten screw(s). The coupling can be tightened on the motor side through the bore at the top. It is recommended to turn the lantern such that this bore is located on the side of the terminal box of the motor.</p>

The mounting dimension of the coupling to the gearbox is stated in the corresponding dimension sheet. If nothing to the contrary has been stated there, push the coupling onto the shaft until it rests against the shaft shoulder.

After tightening the coupling, place the motor lantern in position and screw it tight, ensuring that the bores provided for tightening the clamp screws on the coupling are located on the same side as those on the motor.

### Tightening torques of the clamp screws on the couplings

Screws: DIN 912, 10.9, galvanised, black

M4	M5	M6	M8	M10
5 Nm	8.5 Nm	14 Nm	35 Nm	69 Nm

### b. Mounting the Motor

Preferred installation in the vertical position. Always position the motor shaft with the gear shaft such that it is in alignment with the coupling. The metal bellows of the coupling must be neither bent nor axially compressed during assembly. Do **not** drive in the motor with a hammer, but use suitable bores and threads on the gearbox and motor to allow it to slide into position with assembly screws into the centring seat until the motor is in close contact; then tighten the coupling on the motor side.

There must be no distortion of the bearings or coupling.

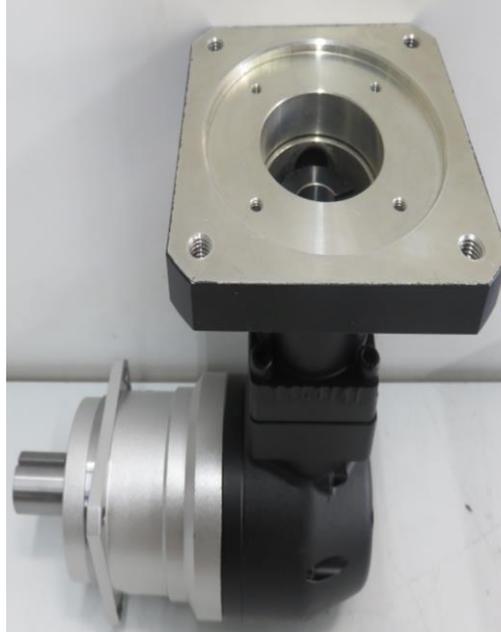
After tightening the clamp screws, insert plug into the bore.

	<p><b>Attention gearbox damage:</b> Due to incorrect assembly the coupling can become compressed or bent!</p> <p>Due to the bearings becoming distorted, overheating of the same may occur which then causes damage to the bearings ending in blockage.</p> <p>The shaft seal rings and the running surfaces of the shafts must not be damaged when fitting the coupling parts. Otherwise leakages may occur!</p>
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Other coupling types and versions can also be installed on request!

As a matter of principle, we refer to the assembly and operating instructions of the respective coupling manufacturer!

### 7.3.2 Input via Clamping Hub and Clamping Ring Screw (Example: EvoGear PLT)

		
<p>Clean the clamping hub, bore and flange surface of the planetary gear stage so that it is free of dirt and grease and then do the same on the motor shaft and motor flange. Position the clamping hub with the clamp screw, then open the same.</p>	<p>Preferred mounting position: Gearbox and motor vertical. Insert the motor into the gearbox from below.</p>	<p>The motor must be in tension-free contact with the gearbox flange, then screw in screws using screw locking paste and tighten crosswise to the prescribed tightening torque.</p>

#### Tightening torques for screws on flanges, lanterns and motors DIN 912, 8.8

M5	M6	M8	M10	M12
6 Nm	10 Nm	25 Nm	50 Nm	86 Nm

#### Tightening torques of the clamp screws on the clamping hubs



Tighten the tensioning screw in the clamping hub with a suitable  $M_A$ ,  
fit plus.

Gearbox	EG55	EG75	EG90	EG115
Tightening torque of the clamp screw $M_A$ (Nm)	6	9	9	up to $\varnothing 14$ - 11 Nm from $\varnothing 19$ - 20 Nm
Width across flats Allen key (mm)	4	4	4	5

## 7.4 Installation of the other Add-on Components

The drive and output elements (gears, belt wheels, cardan 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 and the manufacturer's instructions must be complied with. The permissible transversal forces for the shaft must not be exceeded (see catalogue).

Drive and output elements must be covered by contact protection.

## 7.5 Final Work

- Before fitting protective covers, check the correct oil level in the gearbox, if possible.
- 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 gearbox can be damaged and become unusable, e.g. due to falling objects, spillage, welding work or insufficient fastening.

The operator must ensure:

- The gearbox must be protected against any falling objects and spillage
- Welding work must not be carried out on any part of the input
- The gearbox must not be used as a grounding point for electric welding work
- All mounting options assigned to the build type must be used.
- Any screws that have become unusable during assembly or disassembly must be replaced by new ones featuring the same design and strength class.

## 8. Commissioning

The commissioning (*start of operation in accordance with the intended use*) of the **EvoGear** gearbox is prohibited until it has been determined that the machine or plant complies with the provisions of the EU Machinery Directive.

Before commissioning, check the correct attachment of the transmission parts.

If possible, check the oil level.

Do not deactivate monitoring and protection devices, not even during test operation.

**With EvoGear gearboxes, the use of an aeration and ventilation filter is not provided for. In special cases, with very high operating temperatures, an aeration and ventilation filter may help in S1 operation to decrease the temperature and avoid leakages. Please contact our Product Management in this regard.**

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 the speed to approx. 500 min<sup>-1</sup>. After approx. 30 min. slowly increase speeds until operational speed is reached, running-in time at idle approx. 90 min.

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 settled.

Wipe off any such apparent leakage and continue to observe.



#### Attention gearbox damage:

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

It is necessary to allow the gearbox 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 the EvoGear Gearbox

### 9.1 General Information on Operation

The notes under item 1 "General safety information", 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 gearbox, 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 90°C or only exceed this limit for a short period of time. When using synthetic gear oils (CLP), an operating temperature of 110°C for a short period of time is permissible if all sealing rings are made of FKM (fluorocarbon rubber, "Viton"), whereby it must be ensured that the shaft seals on the drive shafts are already FKM as standard.

See also Section 11.3 Oil Service Life

### - Changing gearbox noises, vibrations.

- **Oil leakage** on the housing and on the shaft seal rings.

- **Oil level** – for oil level checking, the gearbox must be shut down.

Check oil levels only with the gearbox 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 an oil inspection glass, the check is carried out on the screw plug, if present, of a vertical housing surface. The oil level must be in contact with the thread in the housing.



#### **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 additional protective clothing

## 9.3 Irregularities

In the event of any changes in relation to standard operation, e.g. increased temperatures, noises, vibrations, the gearbox 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 and Remedies

### 10.1 General Fault Indications

Sections 5 "Safety Information" and 11 "Inspection and Maintenance" must be observed!

Faults occurring during the warranty period which necessitate a repair of the gearbox must only be corrected by Service Department employees of Nidec Graessner.

The Nidec Graessner Service Department should also be contacted after the warranty period has expired if faults occur whose cause cannot be clearly identified.

## 10.2 Possible Faults

Faults	Causes	Remedy
<ul style="list-style-type: none"> <li>• Changed operating noise</li> </ul>	<ul style="list-style-type: none"> <li>• Damage to gearings</li> <li>• Bearing clearance is increased.</li> <li>• Bearing is defective</li> </ul>	<ul style="list-style-type: none"> <li>• Check geared components; if necessary, replace any damaged components</li> <li>• Adjust the bearing clearance, contact the Service Department</li> <li>• Replace defective bearing, contact the Service Department</li> </ul>
<ul style="list-style-type: none"> <li>• Increased temperature at the bearing points</li> </ul>	<ul style="list-style-type: none"> <li>• Oil level in the gearbox housing is too low or too high</li> <li>• Oil is too old</li> <li>• Bearing is defective</li> </ul>	<ul style="list-style-type: none"> <li>• Check oil level at room temperature, if necessary replenish or drain oil.</li> <li>• Check when the last oil change has been carried out.</li> <li>• If necessary, change the oil</li> <li>• Check the bearing condition; replace if necessary; contact the Service Department</li> </ul>
<ul style="list-style-type: none"> <li>• Gearbox is oily on the outside</li> </ul>	<ul style="list-style-type: none"> <li>• Insufficient sealing of the bearing flanges and gearbox covers</li> </ul>	<ul style="list-style-type: none"> <li>• Check seals, replace if necessary</li> <li>• Seal the bearing flanges and gearbox covers</li> </ul>
<ul style="list-style-type: none"> <li>• Oil leakage at the ventilation filter</li> </ul>	<ul style="list-style-type: none"> <li>• Oil foams</li> <li>• Oil level in the gearbox too high</li> <li>• Incorrect design of the ventilation</li> </ul>	<ul style="list-style-type: none"> <li>• See fault "Oil foams in gearbox"</li> <li>• Decrease oil level in gearbox to the specified level</li> <li>• Prevent any direct oil injection by attaching suitable extensions or angle pieces</li> </ul>
<ul style="list-style-type: none"> <li>• Oil leakage from the shafts</li> </ul>	<ul style="list-style-type: none"> <li>• Radial shaft seal rings or seal seat defective or pressed out of its seat</li> </ul>	<ul style="list-style-type: none"> <li>• Check radial shaft seal rings, replace if necessary.</li> </ul>
<ul style="list-style-type: none"> <li>• Oil foams in the gearbox</li> </ul>	<ul style="list-style-type: none"> <li>• Water in the oil</li> <li>• Oil too old (De-foaming agent used up).</li> <li>• Unsuitable oils mixed up</li> </ul>	<ul style="list-style-type: none"> <li>• Examine oil condition for water ingress by means of a test tube sample.</li> <li>• Have the oil sample analysed, change the oil</li> <li>• Examine oil, change oil</li> <li>• Examine oil, change oil</li> </ul>
<ul style="list-style-type: none"> <li>• Water in the oil</li> </ul>	<ul style="list-style-type: none"> <li>• Water condenses in the gearbox due to external climatic conditions, sun, wind, cold: Ambient temperatures change to a large extent</li> </ul>	<ul style="list-style-type: none"> <li>• Protect gearbox against temperature influences</li> </ul>
<ul style="list-style-type: none"> <li>• Increased operating temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Oil level in the gearbox too high.</li> <li>• Oil is too old</li> </ul> <p>Oil is highly contaminated</p>	<ul style="list-style-type: none"> <li>• Check the oil level. Correct if necessary.</li> <li>• Check when the last oil change was carried out, change the oil</li> <li>• Have the oil sample analysed, change the oil</li> </ul>

# 11. Inspection and Maintenance

## 11.1 General Information

All service and maintenance work must only be carried out by qualified personnel.  
See **Section 3. Conversions and Changes**.

When carrying out service and maintenance tasks, the gearbox must always be shut down.  
The input 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 gearbox.

	<p><b>Warning</b> Major risk of injury due to accidental start-up of the input unit.</p> <p>Before starting any maintenance work, secure the gearbox against any start-up.</p>
	<p><b>Warning</b> <b>Major risk of injury</b> from disassembly of transmission parts (couplings, cardan shafts, belts, etc.) as long as torsional forces are still acting on the gear shafts.</p> <p>Secure gear shafts against torsional forces and disassembly transmission elements.</p>

## 11.2 Maintenance Periods

If maintenance periods are not complied with, major damage may be caused to the gearbox and within the plant. Therefore it must be ensured that these maintenance periods are observed.

Measures	Maintenance Periods	Remarks
Check running noise for any changes	daily	
Check the gearbox for leakage	daily	
Check oil level	monthly	Only if an oil inspection glass is present
Carry out first oil change	500 operating hours after commissioning	Section 11.3
Carry out additional oil changes mineral oil filling	Every 24 months or 10,000 operating hours	Section 11.3
Carry out additional oil changes synthetic oils	Every 4 years or 20,000 operating hours	Section 11.3
Checking the gearbox condition	Every 2 years	Section 11.4

## 11.3 Oil Service Life

The oil service lives at a mean oil temperature of 80°C in the gearbox 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 lives 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 gearbox and a **risk of scalding** when draining the oil!

Provide for suitable protection measures.

- Unscrew the aeration and ventilation filter or remove the upper screw plug on one side of the housing.
- If present, open the oil drain plug and collect the oil with a suitable container.
- Fit drain plug with new copper seal and screw back into housing.
- Fill the gearbox with oil.
- Replace the oil filler plug or aeration and ventilation filter.

**Note:** EvoGear gearboxes have **no** oil bore as standard. An oil change can only be carried out by trained specialist personnel or by the manufacturer.



### Material Damage

Possible damage to the gearbox by inadequate 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 gearbox.

## 11.5 Checking Gearbox Condition

This check may only be carried out by qualified operating personnel or by the Nidec Graessner Service Department. Here, it must be possible to assess reliably what exactly needs to be replaced on the gearbox. Or it must be determined that all gear components are in order.

## 12. Replacement Parts, Stocking of Replacement Parts, 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 Stocking of Replacement Parts

We recommend keeping a stock of the most important replacement parts and wear parts in the vicinity of the place of use of the gearbox in order to ensure the operational readiness of the gearbox in this way.

The parts are shown in the replacement part drawings.

### 12.3 Service Department

Should you require **help from our Service Department**, please provide the following details:

- Gearbox type and size.
- All data printed on the type plate (**see Section 4.6**).
- 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).

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### Note: Contact with our Service Department

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D-72135 Dettenhausen

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