

Servo-angular gearbox

DYNA**G**EAR

Installation and operating instructions

DYNA G EAR	D37 to D190
DYNA G EAR Economy	DE-DG55 to DE-DG115 DE-PL 55 to DE-PL90
DYNA G EAR HighRatio	D55HR to D190HR



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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 **DynaGear** 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 **DynaGear** series are components for installation in machines and intended exclusively for guiding, distributing and multiplying torques.

DynaGear have been designed only for the operational 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 and comprise:

	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 instructions are available as a download on our website www.graessner.de.

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

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

DynaGear gear units are components for machine installation and intended exclusively for guiding, distributing and multiplying torques.

They comply with the machine directives (EN 292) and EMC directives to the extent they are applicable..

DynaGear 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.

DynaGear 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

DynaGear 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

DynaGear are angular gearboxes with case-hardened bevel gear pairs featuring a Gleason hypoid toothing for installation in machines and plant. In terms of performance capability **DynaGear** matches all common servo motors and can be adapted variably via flange and coupling.

The gear units have optimum centring on the attachment sides 1 and 3 and processed sides 4 and 5 with attachment threads.

The mounting of the shafts by tapered roller bearings in a cantilevered support (drive) and fork mounting (output), shaft seal rings of NBR (nitrile rubber 'Buna') and FKM (fluorocarbon 'Viton'), flange seals by lamella sealing discs. Mathematically exact ratios from 3.00:1 to 15.00:1. Gear unit in solid shaft or hollow shaft design, for coupling transmission or direct attachment of the motor.

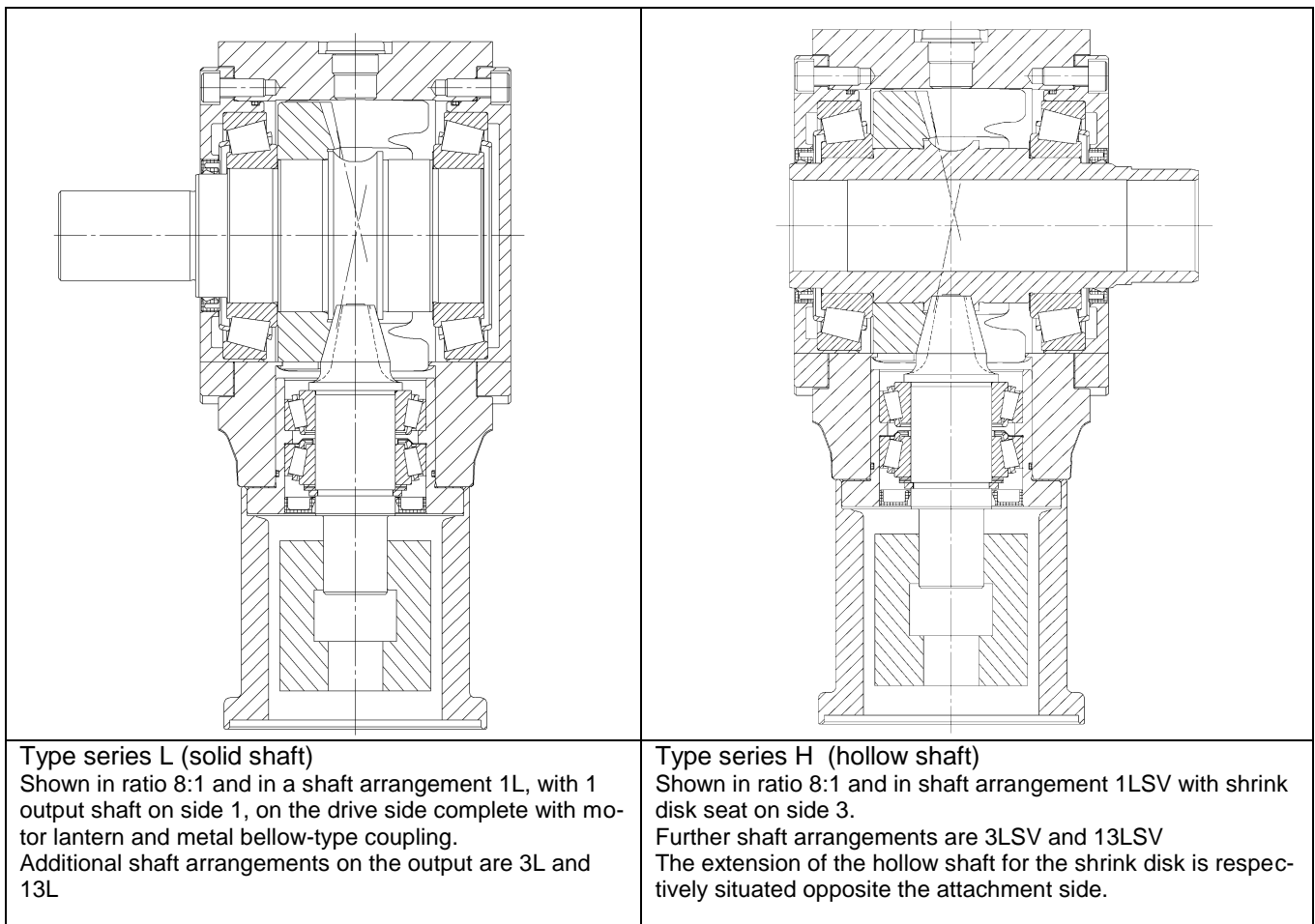
DynaGear gear units are in full compliance with the machine directives (EN 292) and EMC directives to the extent they are applicable.

4.2 Type designations

DynaGear D37 to D190

Output in solid shaft (build types 1L, 3L and 13L) and hollow shaft design 1LSV and 3LSV without motor lantern and without coupling

Output in solid shaft (build types 1L, 3L and 13L) and hollow shaft design 1LSV and 3 LSV with motor lantern and coupling



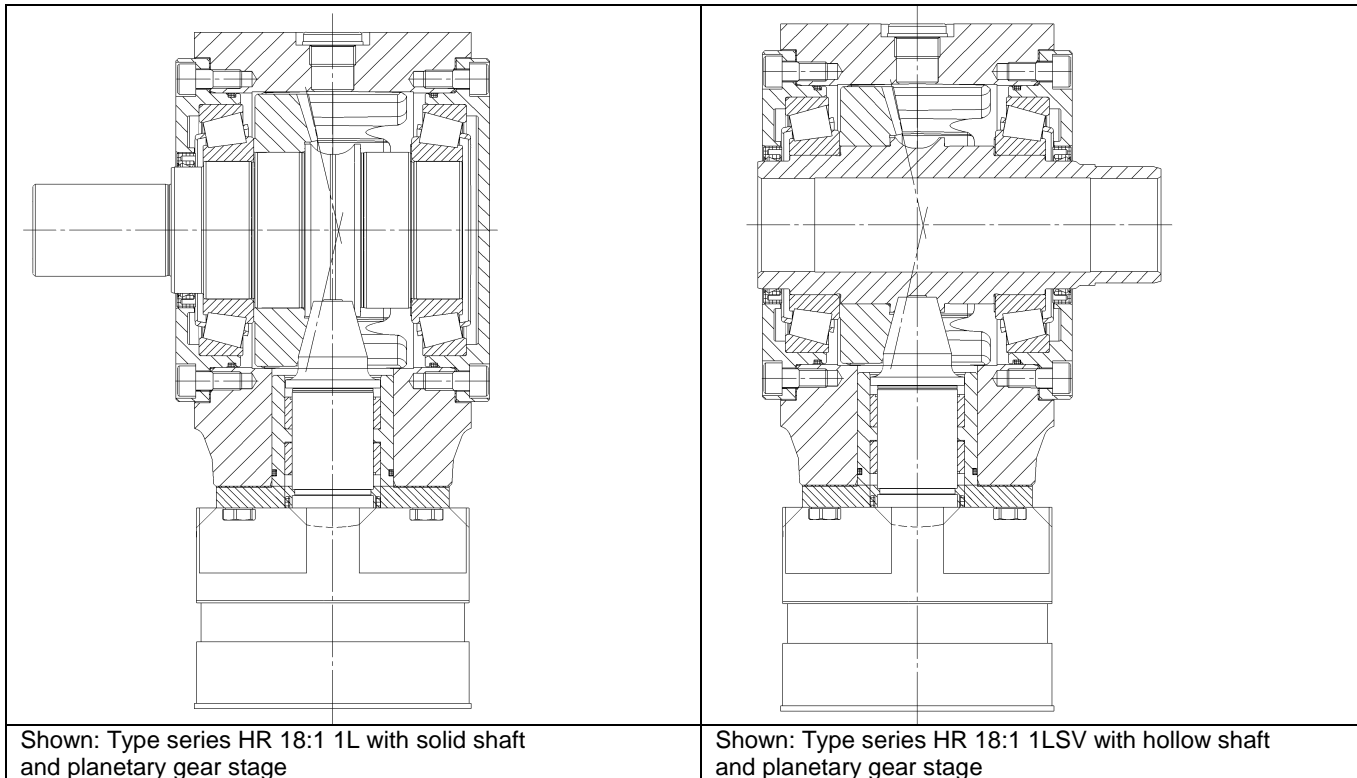
The bearings are provided as tapered roller bearings. In the case of the ratios 3:1 and 5:1 the drive pinions are designed as pinion shafts, from ratio 6:1 the drive pinions are shrunk into the drive shaft.

The output-side bevel gears are shrunk onto the output shafts.

DynaGear High Ratio D55HR to D190HR

Output with solid shaft and hollow shaft

Drive with planetary gear stage for motor shaft and drive flange

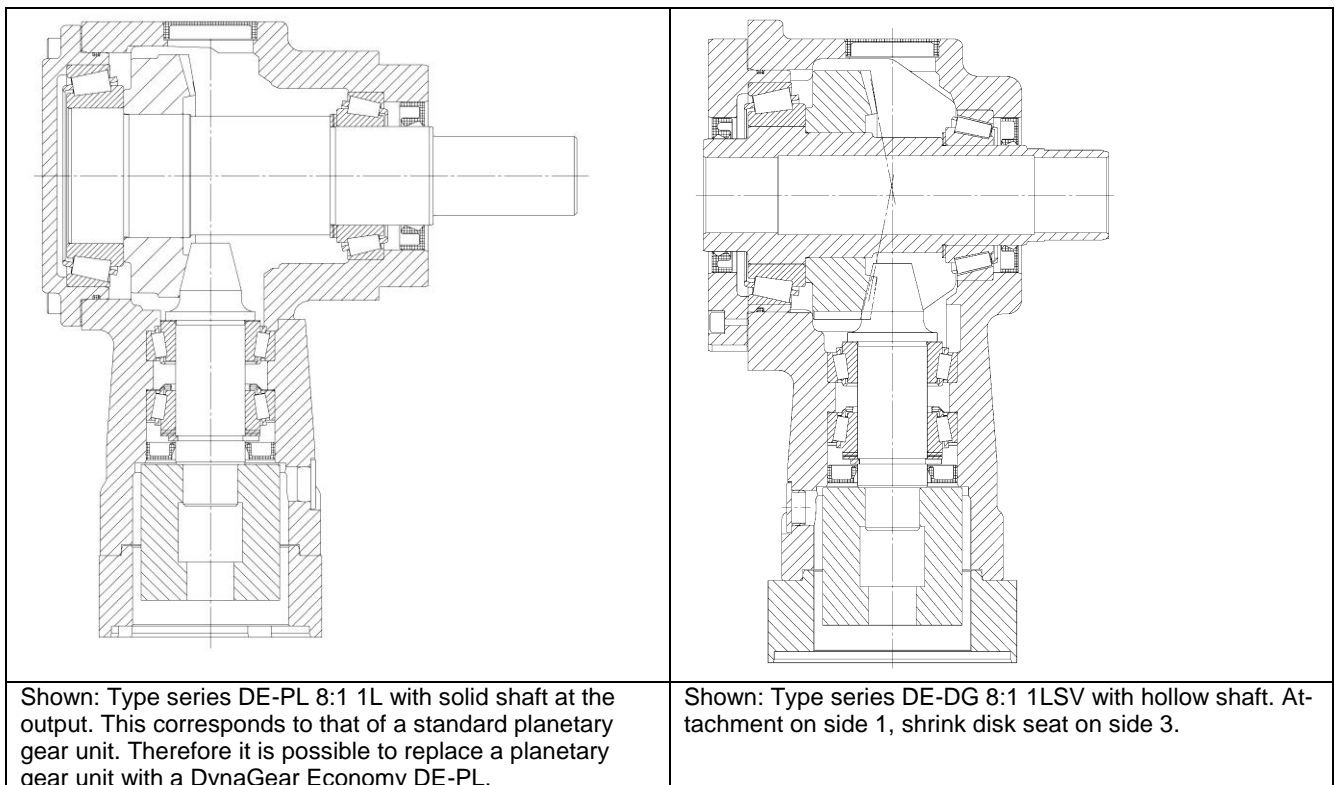


DynaGear Economy DE-DG

Output in solid shaft and hollow shaft design, corresponding to the Standard DynaGear type series
Hollow shaft extended for shrink disk

DynaGear Economy DE-PL

Output in solid shaft, the dimensions correspond to those of a standard planetary gear unit



4.3 Performance tables DynaGear

Nominal torque on output T_{2N} (Nm) at	D37	D55	D75	D90	D115	D130	D140	D160	D190
3:1	22	35	70	140	260	430	720	1100	1440
4:1	22	35	70	140	260	430	720	1100	1440
5:1	22	35	70	140	260	430	720	1100	1440
6:1	22	35	70	140	260	430	720	1100	1440
8:1	22	35	70	140	260	430	720	1100	1440
10:1	22	35	70	140	260	430	720	1100	1440
12:1	15	25	50	95	180	300	510	815	1020
15:1	15	25	50	95	180	300	510	815	1020

Performance tables DynaGear HighRatio

Nominal torque on output T_{2N} (Nm) at	D55HR	D75HR	D90HR	D115HR	D130HR	D140HR	D160HR	D190HR
$i=16/18/24/30/32/$	35	70	140	260	430	720	1100	1440
$40/50/60/80/100$	35	70	140	260	430	720	1100	1440

The max. acceleration torques as well as the emergency stop moments are comprised in the performance tables in the catalogue, download at www.graessner.de.

4.4 Technical data DynaGear

	D37	D55	D75	D90	D115	D130	D140	D160	D190
Running noise at 3000 min^{-1} Partial load in dB(A)	<65	<66	<66	<68	<68	<70	<70	<72	<72
Weight in kg	1,9	3.5	5.5	9.5	15.5	23.5	32.5	46.5	60
average oil quantity in l	0,05 0,07	0.06 0,08	0.12 0,15	0.3 0,4	0.55 0,75	0.8 1,0	1.1 1,3	1.8 2,2	2.3 2,8

Technical data DynaGear HighRatio

	D55HR	D75HR	D90HR	D115HR	D130HR	D140HR	D160HR	D190HR
Running noise at 3000 min^{-1} Partial load in dB(A)	<66	<66	<68	<68	<70	<70	<72	<72
Weight in kg	3.5	5.5	9.5	15.5	23.5	32.5	46.5	60
average oil quantity in l	0.06 0,08	0.12 0,15	0.3 0,4	0.55 0,75	0.8 1,0	1.1 1,3	1.8 2,2	2.3 2,8

Service life LH (h): >30,000 S5- load collective as design basis
 Lubrication: synthetic gear oil POA base, ISO –VG 150
 Installation positions: any
 Operating temperature: -10°C to 90°C
 Paint finish: Priming RAL 9005 – matt black
 Ex protection: EX II 2 D/G cT4
 Protection class: IP 64

4.5 Technical data DynaGear Economy DE-DG55 to DE-DG115 and DE-PL55 to DE-PL115

	DE-DG 55	DE-DG 75	DE-DG 90	DE-DG 115	DE-DG 55	DE-DG 75	DE-DG 90	DE-DG 115
Ratio	5/8/10				15			
Running noise at 1500 min ⁻¹ Partial load in dB(A)	<66	<66	<68	<68	<66	<66	<68	<68
Weight in kg	2.5	4.2	8.2	13.5	2.5	4.2	8.2	13.5
Average oil quantity in l	0.05 0.06	0.085 0.1	0.15 0.17	0.26 0.28	0.05 0.06	0.085 0.1	0.15 0.17	0.26 0.28


DynaGear Economy DE-PL55 to DE-PL90

	DE-PL 55	DE-PL 75	DE-PL 90		DE-PL 55	DE-PL 75	DE-PL 90	
Ratio	5/8/10				15			
Running noise at 1500 min ⁻¹ Partial load in dB(A)	<66	<66	<68		<66	<66	<68	
Weight in kg	2,6	4,5	9,0		2,6	4,5	9,0	
Average oil quantity in l	0,05 0,06	0,085 0,1	0,15 0,17		0,05 0,06	0,085 0,1	0,15 0,17	

Service life LH (h): >15,000 S5- load collective as a design basis
 Lubrication: synthetic gear oil POA base, ISO –VG 150
 Installation positions: any
 Operating temperature: -10°C to 90°C
 Paint finish: Priming RAL 9005 – matt black
 Ex protection: EX II 2 D/G cT4
 Protection class: IP 64

4.6 Type plate and designations

The type plate comprises (example):

	• Gear unit series
	• Type designation: D115
	• Ratio: 10.00:1
	• Shaft arrangement: 1LSV
	• Article number of the gear unit
	• Serial number of the gear unit
• Details on explosion protection area of operation / zones	



Further technical data are contained in the catalogue „DynaGear“,
 Download at www.graessner.de.
 or available as a print version from our product management and
 our service department.

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.

- To prevent any hazards for life and limb of users and any third parties.
- To ensure 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)
- 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.

* 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 <ul style="list-style-type: none">• incorrect use of the gear unit• incorrect installation or operation
	Risk to life due to operational plant <p>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.</p>
	Serious personal injury and material damage due to <p>non-permissible removal of the necessary protective covers</p>

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

DynaGear 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 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 Preparation of 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.

For this purpose it is probably best if you return the gear unit to our service department.

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.

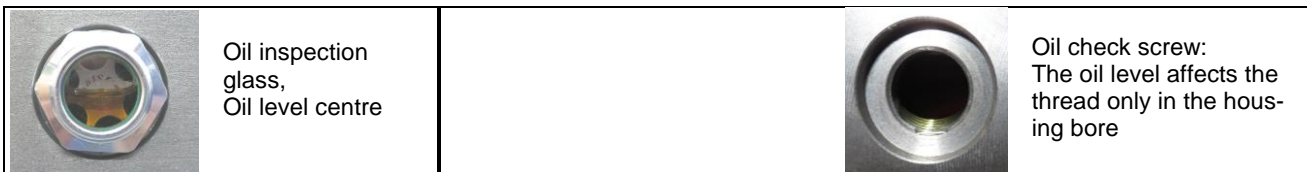
When transporting the gear unit the notes in Section 6 must be complied with.

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 (depending on ratio, speed, shaft arrangement and mounting position)

See **Technical data DynaGear and DynaGear HR** in chapter 4.4 (page 8)

Technical data DynaGear Economy DE-DG and DE-PL in chapter 4.5 (page 9)

7.2 Gear unit installation in plant

During installation or assembly ensure the following:

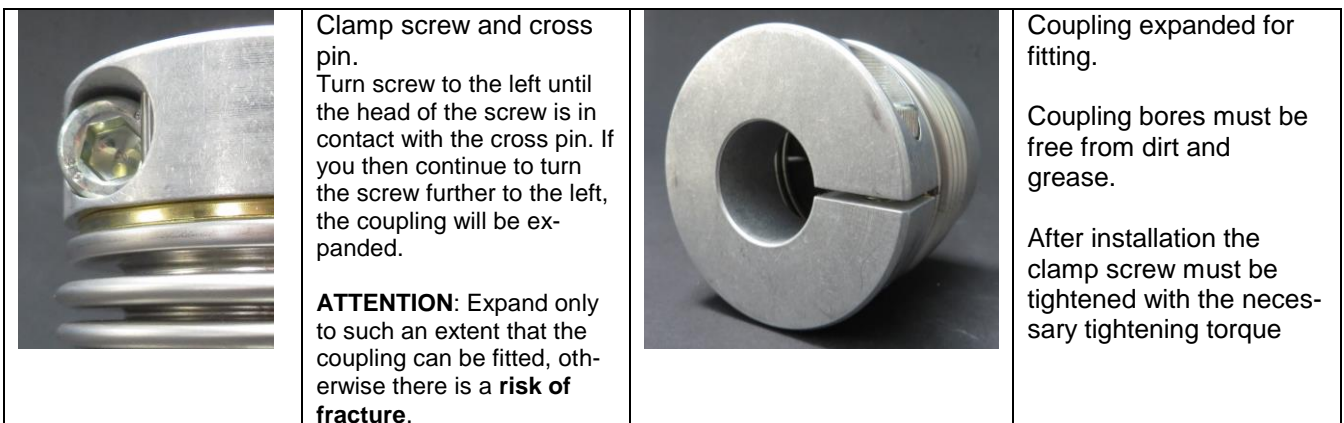
- an even support on a level, vibration-dampened and torsion-free substructure, stress and strain in the housing must be avoided.
- tension-free assembly with combined flange or insertion mount attachment
- exact alignment of the gear unit for direct coupling, comply with manufacturer's details

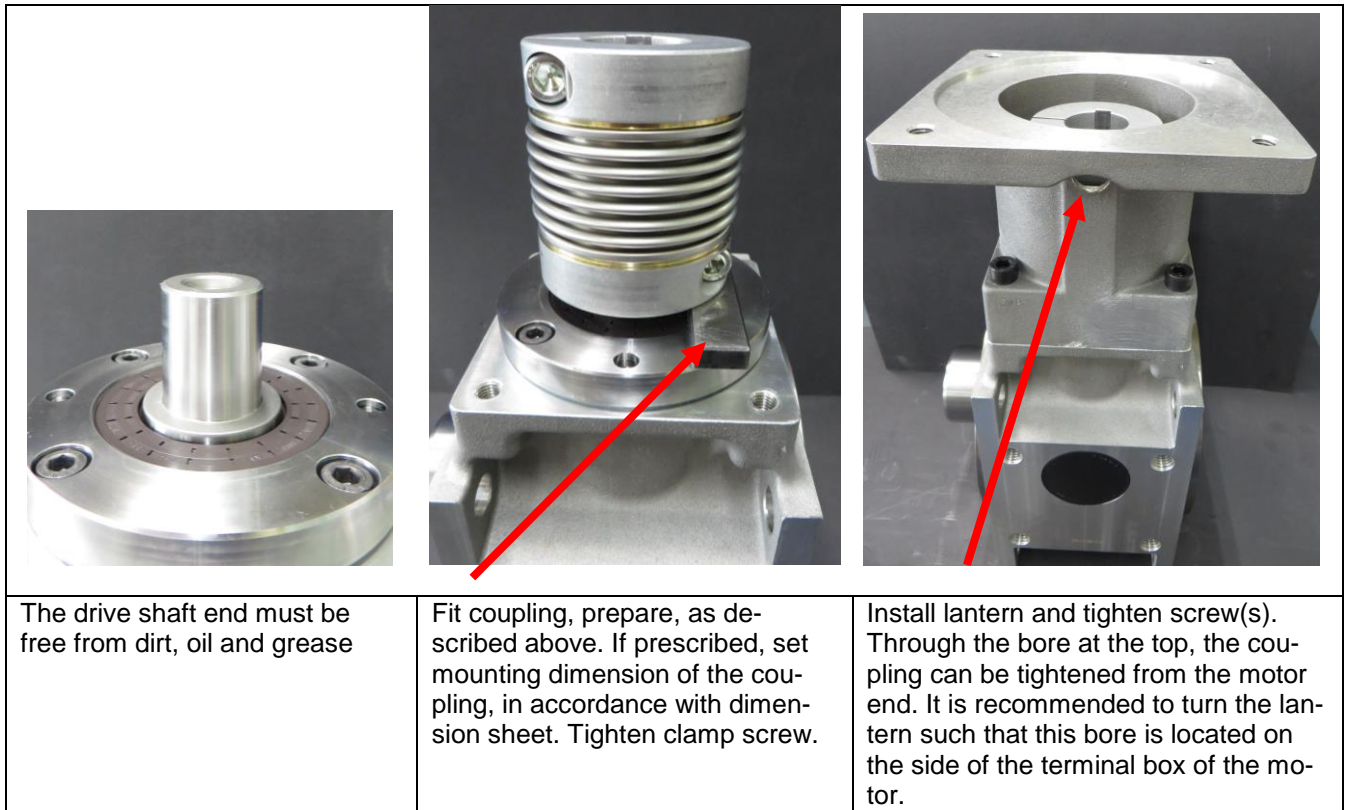
7.3 Fitting of motors

7.3.1 Drive with 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.





The drive shaft end must be free from dirt, oil and grease

Fit coupling, prepare, as described above. If prescribed, set mounting dimension of the coupling, in accordance with dimension sheet. Tighten clamp screw.

Install lantern and tighten screw(s). Through the bore at the top, the coupling can be tightened from the motor end. It is recommended to turn the lantern such that this bore is located on the side of the terminal box of the motor.

The mounting dimension of the coupling to the gear unit is stated in the associated 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 motor lantern into position and screw on; ensure that the bores for tightening the clamp screws on the coupling are located on the same side as the terminal box on the motor.

Tightening torques of the clamp screws on the couplings

Screws: DIN 912, 10.9, galvanized

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

b. Fit motor

Preferred installation in vertical position. Always position motor shaft on the coupling such that it is in alignment with the gear shaft. The metal bellows of the coupling must be neither bent nor axially rammed during assembly. Do **not** drive in motor with a hammer, but use suitable bores and threads on the gear unit 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 coupling at the motor end.

There must be no strain and stress exercised on the bearings and the coupling.

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



Attention damage to gear unit:

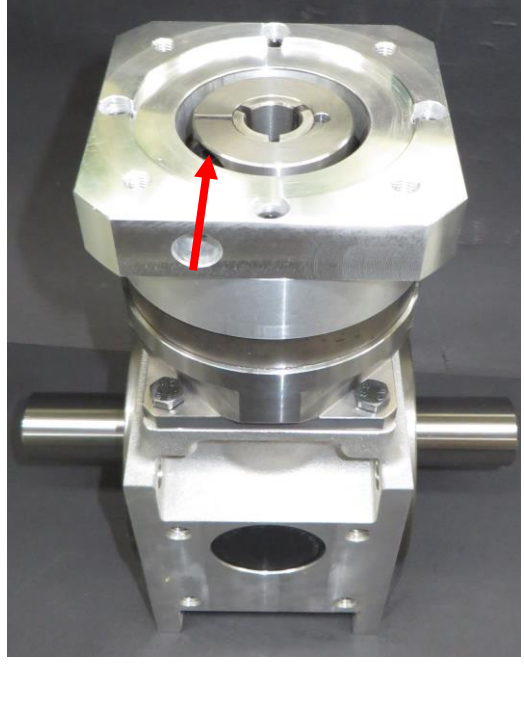
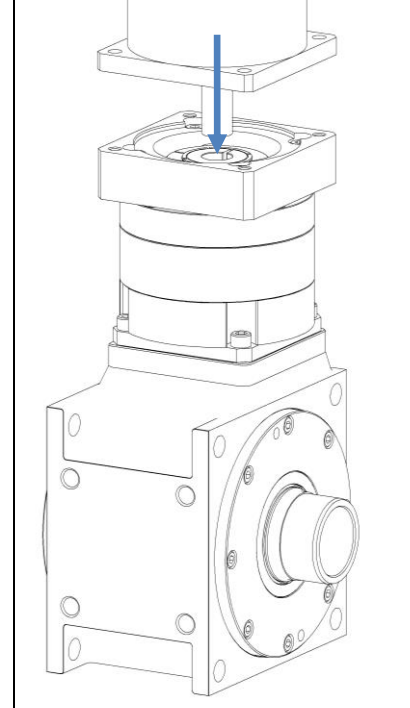
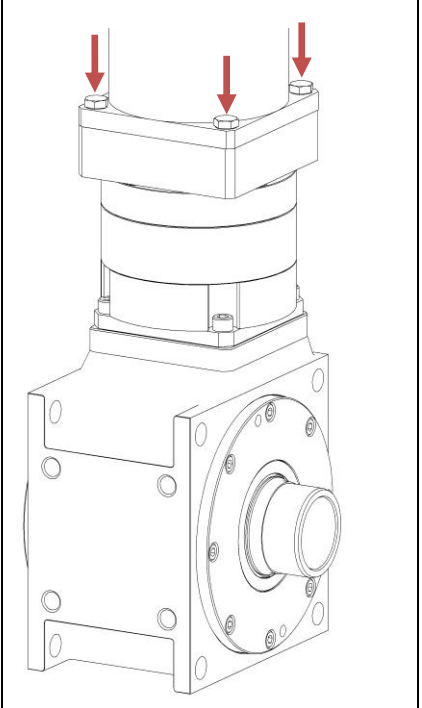
Due to incorrect assembly the coupling can be rammed or bent!

Due to the bearings becoming strained or stressed, overheating of the same may occur which then causes damage to the bearings ending in blockage.

The shaft seal rings and the running surfaces of the shafts must not be damaged when fitting the coupling parts. Otherwise leakages may occur!

Upon request, there is the possibility to use other types and variants of couplings!
Basically, we refer to the operating instructions of the respective manufacturer of the coupling!

7.3.2 Drive via clamping hub and clamping ring screw (DynaGear HighRatio)

		
<p>Clamping hub, bore and flange surface on the planetary gear stage must be cleaned such that they are free from dirt and grease, the same must also be done on the motor shaft and the motor flange. Position the clamping hub with the clamp screw, then open the screw.</p>	<p>Preferred mounting position gear unit and motor vertical. Insert motor from the top into the gear unit.</p>	<p>The motor must be in tension-free contact with the gear unit 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



Tighten tensiing screw in clamping hub with suitable M_A , fit plug.

Tightening torques of the clamp screws on the clamping hubs

Gear unit	D55HR	D75HR	D90HR	D115HR	D130HR	D140HR	D160HR	D190HR
Tightening torque clamp screw M_A (Nm)	6	9	9	up to $\varnothing 14$ - 11 Nm from $\varnothing 19$ - 20 Nm		up to $\varnothing 24$ - 20Nm from $\varnothing 28$ - 35Nm		
Width across flats Allen key (mm)	4	4	4	5	5	5	5	5

7.4 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

7.5 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>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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8. Commissioning

The commissioning (*taking up operation in accordance with the intended use*) of the **DynaGear** 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.

With DynaGear gear units, 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 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 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 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 the DynaGear unit

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 90°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. The shaft sealing at the drive shafts are made of FKM by default.

See also number **11.3 "Oil service life"**, page 19.


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 12, Section 7.1)

	<p>Attention: Insufficient lubrication caused by an excessively low oil level may cause damage to the geared parts and the bearings!</p> <p>Carry out a regular oil level check</p>
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	<p>Warning: Serious burns possible on hot surfaces (>55°C)</p> <p>Wear suitable gloves and additional protective clothing</p>
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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.

The Graessner service department should be also contacted after the warranty period has expired if faults occur the cause of which cannot be clearly identified.

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 at the shafts	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 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 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 department

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 9).
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)

13. Alphabetic index

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