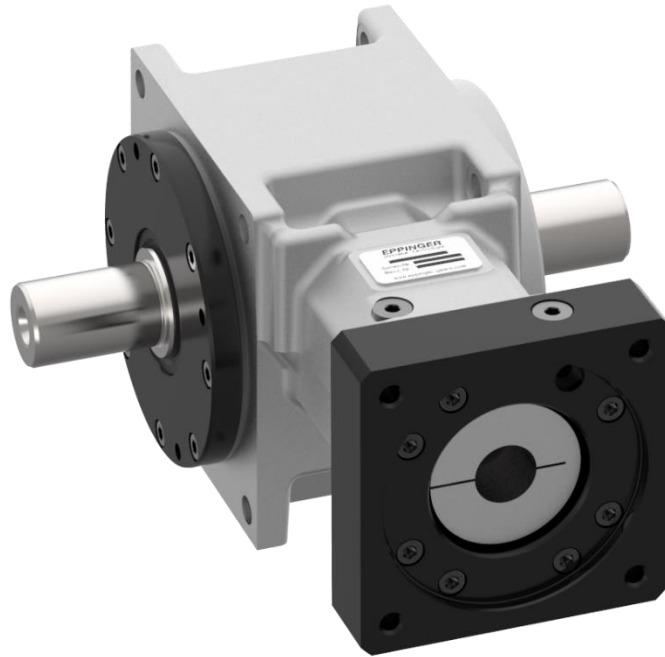
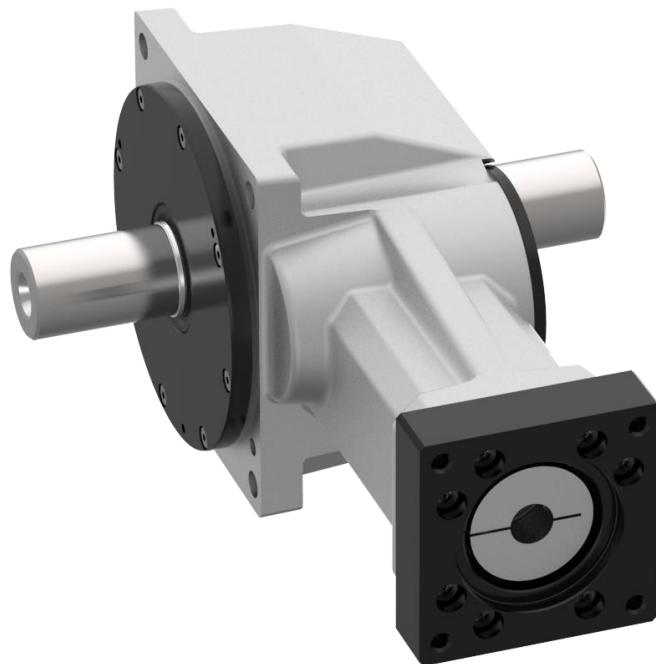


Assembly instructions

HT / SHT Gearboxes



HT



SHT

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1 Safety instructions

A distinction is made between different levels of safety instructions. Table 1 below shows the definitions of symbols and signal words.


Symbol	Signal word	Definition
	DANGER!	Immediately imminent danger. Death or extremely serious injury, crippling.
	WARNING!	Possibly dangerous situation. Death or extremely serious injuries may result.
	CAUTION!	Less dangerous situation. Minor or moderate injuries may result.
	NOTICE	Potentially damaging situation. Possible damage to product and/or machine.
	INFO	Tips and other useful or important information and advice. No dangerous or harmful consequences for persons or property.

Table 1: Classification of notices


Symbol	Signal word	Definition
	Environmental hazard	Pollution risk for the environment

Table 2: Other symbols

2 General

2.1 Information on the documentation

These assembly instructions have to be read carefully before assembling, commissioning and maintaining the product. The document must be kept in a suitable place for future reference and must be available for any assembly, maintenance or dismantling work.

2.2 Target group

This documentation is intended for qualified trained personnel who are familiar with mechanical assembly work. Assembly, commissioning and maintenance may only be carried out by accordingly qualified personnel. Technical training or safety instruction is required.

2.3 Scope

The scope of these instructions covers the following products of the company ESA Eppinger GmbH:

- HT Hypoid gearboxes
- SHT Hypoid helical gearboxes

All mounting parts necessary for the assembly, installation, operation and maintenance, which are included in the scope of supply of these gearboxes, are also within the scope of this document.

2.4 Intended use

Eppinger gearboxes are machine elements for converting or diverting torques and rotational speeds within the respectively specified performance range. Any operation outside the specified performance characteristics or other than the specified use is not permitted. The permissible torques and rotational speeds of the gearboxes must not be exceeded. The forces affecting on the gearbox shafts have to be limited to the maximum permissible values.

Unauthorised modifications or alterations to the product are not permitted.

According to the EC Machinery Directive 2006/42/EC, gearboxes are referred to as machine components and are therefore assemblies that do not fall within the scope of the Machinery Directive 2006/42/EC. Therefore, gearboxes are components to be installed in machines. The commissioning is forbidden until

by or after the integration into the end product, the requirements of the machine directives are met.

2.5 Contact

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3 Handling and Transport



DANGER!

Death or extremely serious injury / crippling caused by falling loads. During transport, never stay under suspended loads.

The weights indicated in Table 3 apply to gearboxes without motor flange and with solid output shafts on both sides.

Gearbox	SHT100 HT90	SHT120 HT115	SHT150 HT140	HT170	HT215
Weight about	4 kg	6 kg	10 kg	16 kg	35 kg

Table 3: Weights

4 Storage

The gearboxes have to be stored protected from dust, dirt and moisture. The temperature has to be between -5°C and +40°C and the humidity should not exceed 60%. The maximum storage period is 24 months and the corrosion protection has to be checked regularly to ensure that it is intact.

5 Assembly



CAUTION!

Assembly work may only be carried out by accordingly qualified trained personnel. First of all, check the gearbox for external damage.



CAUTION!

A damaged gearbox must not be operated.

Before installing the gearbox, always switch off the machine and secure it against a restart. In addition it has to be ensured that the machine cannot move.



DANGER!

Death or extremely serious injury / crippling caused by moving machine elements when accidentally switched on or by accidentally releasing stressed components during assembly.

Before installation, check the direction of rotation of the gearbox. The direction of rotation of the gearbox can be gathered from the data sheet.

5.1 Mounting of the gearbox

The gearbox has to be securely screwed to the application. Special attention has to be paid to a flat support.

The centring collar on the output end of the gearbox housing can be used for the exact centring of the gearbox. The dimensions as well as the tolerances can be gathered from the data sheet.

All existing mounting holes must always be used on the selected screw-on side. At this, the screw tightening torque depends on the strength class of the screw as well as the material of the bearing face respectively the internal thread. The thread reach has to be chosen according to the strength class of the screw as well as the material of the internal thread.

5.2 Assembly of the output shaft

When mounting the output shaft, appropriate torque transmission must be ensured. In the gearboxes of the HT and SHT series, a basic distinction is made

between solid shaft gearboxes (Figure 1) and hollow shaft gearboxes (Figure 2).

The assembly of these two variants is described respectively in the following chapters 5.2.1 for gearboxes with solid output shaft and 5.2.2 for gearboxes with hollow output shaft.



DANGER!

Risk of injuries due to a slipping of the shaft. The torque cannot be reliably transmitted, if the shaft is not assembled according to the indicated requirements.

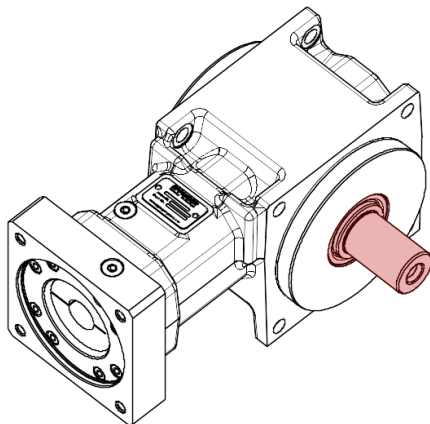


Figure 1: Gearbox with solid shaft

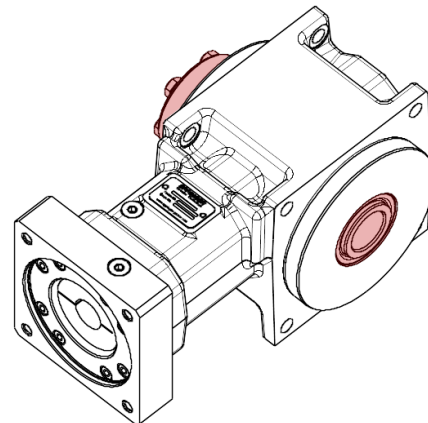


Figure 2: Gearbox with hollow shaft

5.2.1 Assembly of gearboxes with solid output shaft

This chapter describes the assembly of the output shaft for gearboxes with a solid shaft (Figure 1). The solid output shaft is designed plain and without a keyway or spline profile. Torque transmission can, for example, take place backlash-free by means of clamping couplings, clamping bushings or heat shrinking of components onto the shaft. For the chosen transmission principle, the existing specification of the manufacturer of the coupling respectively the clamping sleeve must be observed.

When heat-shrinking components onto the gear shaft, a clean and grease or oil-free gear shaft must be ensured.

The gear shaft must not be heated too much by the hot component because the adjacent radial shaft seals on the gear shaft could be damaged.

NOTICE

Damage to the radial shaft seals due to heat shrinking of components that are too hot onto the gear shafts.

5.2.2 Assembly of gearboxes with hollow output shaft

This chapter describes the assembly of the output shaft for gearboxes with a hollow shaft (figure 2). The hollow output shaft is designed plain and without a keyway or spline profile. The torque transmission as well as axial securing takes place backlash-free by clamping the customer shaft in the hollow shaft by means of a shrink disc. This shrink disc creates a frictional connection between the hollow gear shaft and the customer's solid shaft by means of taper bushings.

The customer's shaft has to meet the following characteristics:

- Yield strength $Re \geq 340 \text{ N/mm}^2$
- E-Module about 206 kN/mm^2
- Average surface roughness $Ra \leq 3.2 \text{ }\mu\text{m}$
- Shaft tolerance h6 in the area of the shrink disc



DANGER!

Risk of injuries due to a slipping of the shaft. The torque cannot be reliably transmitted, if the shaft is not manufactured according to the requirements indicated above or if the shrink disc is not properly assembled.

Prior to the assembly clean and degrease the machine shaft as well as the hollow gear shaft.

After the shaft has been inserted into the hollow shaft of the gearbox, the clamping screws of the shrink disc must be tightened evenly in turn by $\frac{1}{4}$ turns until the front face of the stepped tapered ring is flush with the front face of the stepped tapered bushing. (Figure 3)

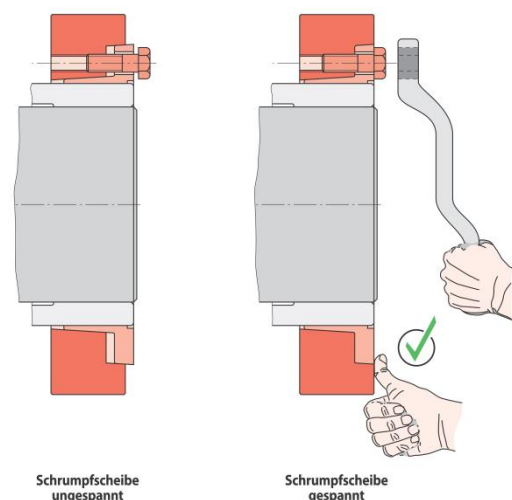


Figure 3: Assembly of the shrink disc

INFO

The assembly of the shrink disc is carried out in a path-controlled manner. It is not necessary to use a torque wrench.

NOTICE

The shrink disc must only be tightened, if the machine shaft is inserted. A tightening of the locking screws could otherwise deform the hollow gear shaft.

5.3 Motor assembly

For gearboxes with an attached motor flange and a drive coupling, prior to the assembly of the motor, the coupling has to be aligned in such a manner that the clamping screw of the coupling can be tightened via the through hole of the locking screw in the motor flange (Figure 4).

INFO

For gearboxes with an integrated dismantling system, the clamping hub can be widened by means of the clamping screw for an easier assembly. For this, the clamping screw has to be unscrewed until it is widening the clamping hub beyond the dead stop by means of a further unscrewing.

For motors with a key, this has to be removed prior to the assembling. The keyway must be aligned in such a manner that it matches the notch of the coupling hub (Figure 4).

Carefully introduce the motor shaft into the coupling bore. The motor shaft has to be introduced steadily at a right angle and concentrically to the bore. An angular or lateral misalignment during movement of the motor shaft can damage the coupling bellows. An axial deformation of the coupling bellows, e.g. by a canting of the motor shaft during the introduction into the coupling is not permissible.

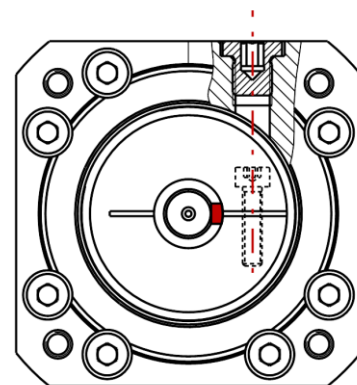


Figure 4: Alignment of coupling and motor shaft

NOTICE

Damaging of the coupling by a lateral, axial or angular displacement of the coupling bellows by the motor shaft during the assembling.

After the motor has been inserted until the motor plate is in contact with the gearbox flange, screw the motor to the gearbox flange. Take care of the thread reach of the bolts. The thread reach of the motor flange shall be twice the length of the nominal diameter of the screw. (Figure 5)

After that, clamp the motor shaft in the coupling. The clamping screw of the coupling can be reached through the through hole of the locking screw in the motor flange. (Figure 4). The torque to be used as well as the wrench size can be gathered from Table 4.

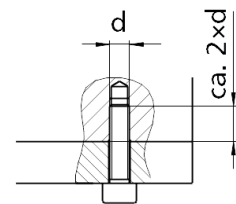


Figure 5: Length of the screw

Gearbox	SHT100	SHT120	SHT150	HT140	HT170	HT215
		HT90	HT115			
Tightening torque	4 Nm	4.5 Nm	8 Nm	15 Nm	40 Nm	85 Nm
Width across flats	AF3	AF3	AF4	AF5	AF6	AF8

Table 4: Tightening torques / wrench sizes coupling clamping screw

NOTICE

Damaging of the coupling

The coupling has to be screwed together with a bellows free from axial loads.

6 Commissioning



CAUTION!

The commissioning may only be carried out by accordingly qualified trained personnel.

Before commissioning, all mechanical mounting parts and their fastening must be checked. Check the screw tightening torques. Commissioning may only take place if the machine complies with the provisions of the EC Machinery Directive. The monitoring and protective devices of the machine must not be put out of operation. In addition to EMERGENCY STOP buttons, EMERGENCY STOP command devices, covers and hoods, this also includes other protective devices such as sensors, light barriers and acoustic or optical emergency signals. The security of the gearbox can only be assured by the end product. Therefore, any commissioning with overridden protection equipment of the machine is not permitted.



DANGER!

Death or extremely serious injury / crippling caused by equipment in operation without suitable safety or protective devices by the surrounding end product.

7 Operation



CAUTION!

The gearbox may only be operated by accordingly qualified trained personnel.

The gearbox may only be operated with active protective and monitoring equipment of the machine.



DANGER!

Death or extremely serious injury / crippling caused by equipment in operation without suitable safety or protective devices by the surrounding end product.



WARNING!

Burns at hot surfaces.

During operation, the surface of the gearbox can reach high temperatures. It must be ensured that there is no unintentional contact with the surface of the gearbox.

During the operation, the gearbox should be observed.

Leakage, unusual temperature rises or an increase in the noise respectively vibration indicate a fault which has to be repaired. If one of these criteria should occur, the plant has to be shut down immediately. If the fault cannot be eliminated, contact ESA Eppinger (chapter 2.5).

8 Maintenance



CAUTION!

Maintenance may only be carried out by accordingly qualified trained personnel.

As a matter of principle, the HT and SHT gearboxes of the company ESA Eppinger are maintenance free and lubricated for life.

For special gearboxes and gearboxes with operating conditions outside the specification, any separately communicated maintenance intervals and specifications apply.

INFO

Synthetic oil according to DIN 51517-3:2018-09 with viscosity class ISO VG 150 is used as standard lubricant.

NOTICE

Damages to the gearbox by a reduced lubricity.

Different lubricants must not be mixed. This may result in a reduced lubrication effect and a damaging of the gearbox.



DANGER!

Risk of burns during the oil change by hot gearbox oil.

**CAUTION!**

Skin irritation by intensive contact with synthetic oil.

9 Decommissioning

**CAUTION!**

Dismantling and disposal may only be carried out by accordingly qualified trained personnel.

9.1 Dismantling

Before dismantling the gearbox, always switch off the machine and secure it against a restart. In addition it has to be ensured that the machine cannot move.

**DANGER!**

Death or extremely serious injury / crippling caused by moving machine elements when accidentally switched on or by accidentally releasing stressed components during dismantling.

9.1.1 Disassembly of gearboxes with solid output shaft

In the case of gearboxes with solid shaft (Figure 1), loosen the mounted coupling or clamping hub if necessary according to the manufacturer's instructions.

9.1.2 Disassembly of gearboxes with hollow output shaft

In the case of hollow shaft gearboxes with a shrink disc (Figure 2), all clamping screws of the shrink disc must be loosened in turn by $\frac{1}{4}$ turns.

**WARNING!**

Never unscrew all clamping screws of the shrink disc completely from the threaded holes during dismantling, otherwise there is a risk of accident!

If the two rings do not come loose on their own, unscrew as many clamping screws as there are pull-off threads in the stepped conical bushing and screw them steadily into the press-off threads until the stepped tapered ring is pulled off the stepped tapered bushing.

9.1.3 Motor disassembly

To loosen the clamping hub of the coupling, rotate it so that the clamping screw of the coupling can be reached via the bore in the motor flange. (Figure 4, Page 9)

This can be carried out, for example, by manual rotating the output shaft of the gearbox.

Loosen the clamping screw of the coupling. The wrench size can be gathered from Table 4 (page 10).

INFO

For couplings with an integrated dismantling system, the clamping hub can be widened by means of the clamping screw for an easier dismantling. For this, unscrew the clamping screw until it is widening the clamping hub beyond the dead stop by means of a further unscrewing.

After the loosening of the clamping coupling, the motor screw joint can be unscrewed.



WARNING!

Risk of injury.

The motor is only attached with the motor screw joint. After the loosening of the motor screw joint, the motor can suddenly draw loose.

Pull out the motor steadily and as concentrically as possible from the coupling.

NOTICE

Damaging of the coupling by a lateral, axial or angular displacement of the coupling bellows by the motor shaft during the dismantling.

9.2 Disposal



ENVIRONMENTAL HAZARD!

Environmental compatibility, health risks, disposal regulations and the local possibilities of proper disposal must be observed.

Any and all operating materials, in particular oils, fats and lubricants are to be disposed of according to the national and regional applicable regulations.

**CAUTION!**

Skin irritation by intensive contact with synthetic oil.

10 Changes to these assembly instructions

Changes in version 3:

- Adaption to the corporate design

Changes in version 2:

- Complete revision