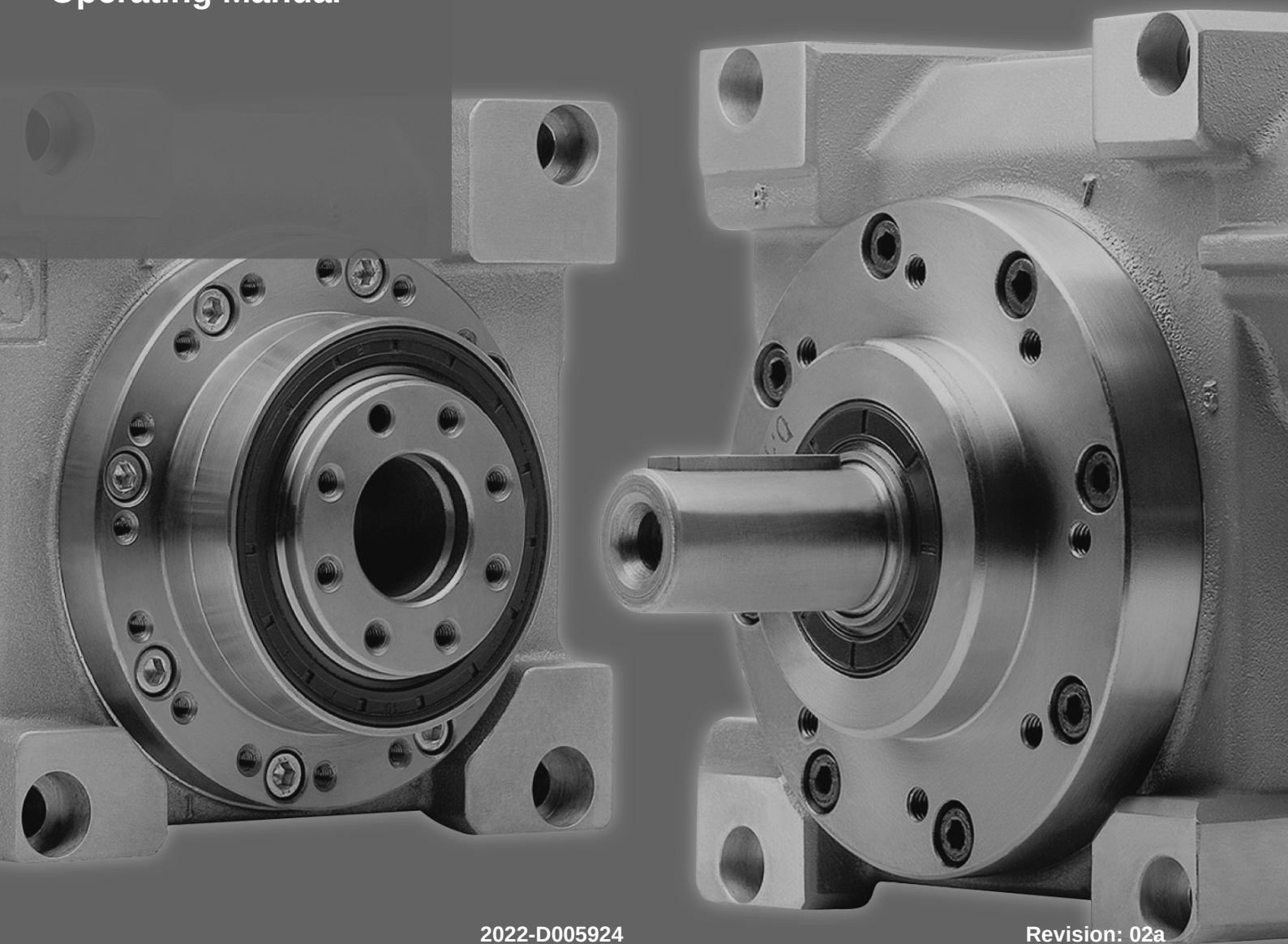


V-Drive

Operating Manual



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1.1 Service Contact

Please contact our customer service department if you have any technical questions:

Tel.: +49/ (0) 79 31 / 493-900

Fax: +49/ (0) 79 31 / 493-903

E-Mail: service@alphagetriebe.de

Address:

alpha getriebebau GmbH

Walter-Wittenstein-Str. 1

D-97999 Igersheim

2 General Information

2.1 Description, Designations

The low-backlash angle gear V-Drive, hereafter referred to as gear reducer, is installed in the "T" (output flange), "S" (output shaft) and "H" (hollow output shaft) versions.

2.2 Whom does this manual concern?

This manual concerns all persons who install, operate, or maintain this gear reducer.

They may only carry out work on the gear reducer, if they have read and understood this operating manual. Please pass the safety instructions on to other persons as well.

2.3 Which signs and symbols are referred to in this manual?

➡ An "action instruction", which requires you to carry out an action.

▽ With a "check" you can specify whether the device is ready for the next work stage.

☺ A "usage tip" shows you an option of facilitating or improving operations.

The safety instructions symbols are described in the "Safety" section.

2.4 Exclusion of liability

The manufacturer does not accept liability for damage or injury ensuing from improper handling of the gear reducer.

2.5 Modifications, Reconstructions

Modifications or reconstructions of the gear reducer may only be carried out with the express written authorisation of **alpha getriebebau**.

2.6 EC Machinery Directive

Within terms of the EC machinery directive 98/37 EC, the gear reducer is not considered an autonomous machine, but as a component to install in machines.

Operation is prohibited within the area of validity of the EC directive, until it has been determined that the machine, in which this product is installed, corresponds to the regulations within this directive.

2.7 Technical Modifications

alpha getriebebau reserves the right of carrying out technical modifications to improve the product.

2.8 Copyright

© 2002, **alpha getriebebau** GmbH

3 Safety

3.1 Intended Use

The gear reducer is designed for use in machines and terotechnology. Please refer to our catalogue or our Internet page for the maximum permitted torques and speeds:
<http://www.alphagetriebe.de/gear>.

- ➔ Please consult our service department (see 1.1) if your gear reducer is older than a year. In this way you receive valid data.

3.2 Improper Use

Every usage which exceeds the limits stated above (especially higher torques and speeds) is not compliant with the regulations, and is thus prohibited.

The operation of the gear reducer is prohibited if:

- it was not mounted according to regulations (e.g., securing the motor),
- it was not installed according to regulations (e.g., securing screws),
- the gear reducer is very soiled,
- it is operated without lubricant.

3.3 Safety Instructions

The following symbols are used in this operating manual to warn you of hazards:



DANGER!

This symbol warns you of danger of injury to yourself and others.



Attention

This symbol warns you of the risk of damage to the gear reducer.



Environment

This symbol warns of environmental pollution risk.

3.3.1 General Safety Instructions

Working on the gear reducer



DANGER!

Inappropriately executed work can lead to injury and damage.

- ➔ Make sure that the gear reducer is only installed, maintained, and dismantled by trained technicians.



DANGER!

Foreign bodies spinning through the air can cause grave injury.

- ➔ Before putting the gear reducer into operation, check that there are no foreign bodies or tools near the gear reducer.

Operation



DANGER!

Touching hot surfaces can lead to burns.

- ➔ Do not touch the gear reducers if their operating temperatures are too high, or use suitable safety equipment (e.g. gloves).



DANGER!

Rotating machinery can lead to injury. There is danger of being trapped or pulled in!

- ➔ Keep a sufficient distance to rotating machinery.

Maintenance



DANGER!

An unintentional start of the machine during maintenance work can lead to serious accidents.

- ➔ Make sure no one can start the machine while you are working on it.

**DANGER!**

Even a brief running of the machine during maintenance work can lead to accidents if the safety devices are not operating.

- ➔ Make sure that all safety devices are mounted and active.

Lubricants**DANGER!**

Extended, intensive contact with synthetic oils can lead to skin irritations.

Avoid extended contact with oil, and clean oil off skin thoroughly.

**DANGER!**

Hot oil may cause scalding.

When changing oil, protect yourself against contacting hot oil.

**Attention**

Mixing different lubricants can impair the lubricant properties. This can destroy the gear reducer.

- ➔ Only re-fill with the lubricant type that is in the gear reducer.
- ➔ If you wish to use another lubricant, carry out a complete oil change (with flushing).

**Environment**

Lubricants (oils and greases) are hazardous substances, which can contaminate soil and water.

Collect drained lubricant into suitable receptacles and dispose of it according to the valid national guidelines.

3.4 Tightening Torques

All screwed connections for which a tightening torque is specified, must on principle be tightened with a calibrated torque wrench, and checked.

3.5 In case of fire

The gear reducer itself is not combustible. However, it usually contains a synthetic gear oil (polyglycol).

- ➔ Please observe the following instructions, if the gear reducer is situated in a burning environment.

3.5.1 Suitable extinguishing agents, Protective equipment

Carbon dioxide, powder, foam, fog

**DANGER!**

High temperatures produce irritating steam.

- ➔ Use a protective breathing apparatus.

3.5.2 Unsuitable extinguishing agents

Do not spray with water!

3.5.3 Additional Information**Environment**

- ➔ Prevent the penetration of the lubricant into drains, sewers, and water resources.

For additional information on TRIBOL 800/220 gear unit oil, refer to:

Castrol Industrie GmbH, Mönchengladbach

Tel.: +49 (0) 2161 / 909-30

4 Technical Specifications

4.1 Design

The gear reducers are comprised of low-backlash angle gears.

All gear reducers are factory-filled with oil; gear input and output sides are sealed with radial shaft sealings.

The clamping hubs enable a quick and easy mounting of the motor:

The motor is centred on the gear reducer axle using the bearing-supported clamping hub and not the adapter plate. The motor can thus be mounted without radial distortion.

High flexibility is assured by being able to adapt the reducer to various motors through the functions of adapter plate and the spacer sleeve.

The gear reducer has been designed to compensate for thermal linear expansion of the motor shaft.

For varying applications, the gear reducer is available with:

- Output flange "VDT",
- Output shaft "VDS" and
- Hollow output shaft "VDH".

4.1.1 "VDT" with output flange

The output flange, in accordance with ISO 9409, has two centring mechanisms and a bore hole for an indexing pin so that the gear reducer (or the application) can be zeroed mechanically.

The hollow shaft running through serves as a conduit for lines or hoses, but does not aid in securing the load. On the back side of the output flange, the position and / or the speed of the load can be measured through the hollow shaft. (see fig. 4.1)

4.1.2 "VDS" with output shaft

The output shaft is available in the following forms:

- Smooth face,
- With feather key groove (according to DIN 6885) or
- Involute (according to DIN 5480).

(see fig. 4.1)

4.1.3 "VDH" with hollow output shaft

The output shaft is available in the following forms:

- Smooth face or
- With groove for a feather key (according to DIN 6885).

For the load shaft, we recommend the tolerance h6 (DIN ISO 286). The material must have a minimum yield stress of 385 N/mm².

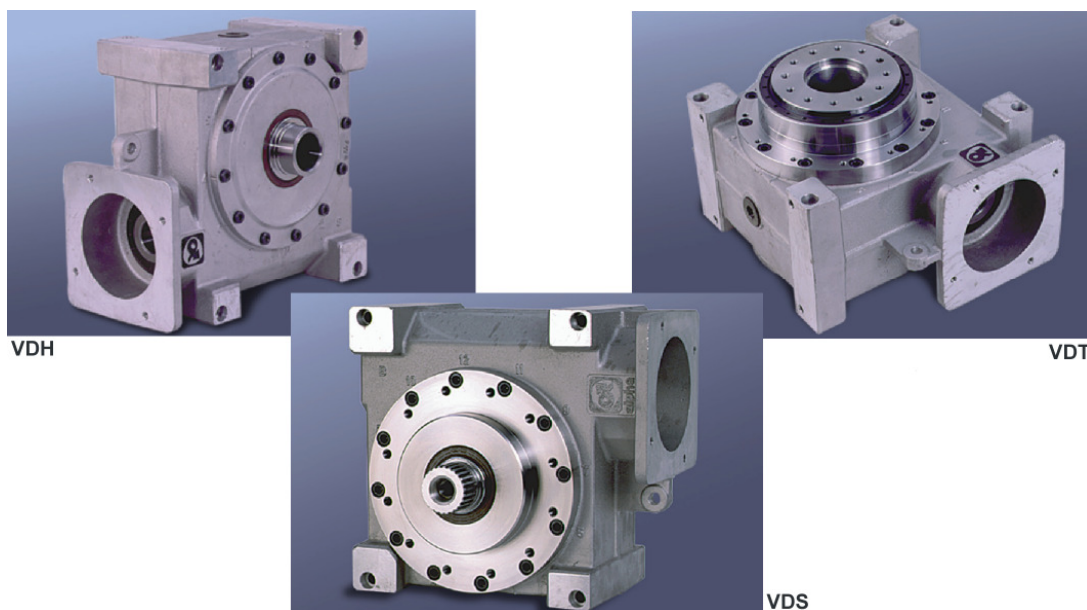


Fig. 4.1 shows VDT, VDS and VDH

4.2 Weight

The weight of the gear reducer ranges from 7 to 64 kg.

☉ The tables in section 5.2 help you in a more exact specification of the weights.

4.3 Quantity of lubricant and types

- ☉ Please observe the instructions in the “General Safety Instructions” in section 3.3.1.

All gear reducers are filled by the manufacturer with synthetic gear oil of viscosity class ISO VG 220 (Tribol 800/220).

The following table specifies all permitted oils of the viscosity class ISO VG 220. You can find additional information from the manufacturer at the specified Internet addresses.

Manufacturer	Lubricant	Internet address
Aral	Degol GS 220	www.aral.de
BP	Energol SG-XP 220	www.bp.com
DEA	Polydea PGL P220	www.dea.de
Esso	Glycolube 220	www.esso.de
Fuchs	Renolin PG 220	www.fuchs-oil.de
Klüber	Klübersynth GH 6-220	www.klueber.com
Optimol	Optiflex A 220	www.optimol.com
	Syntheso D 220 EP	-
Shell	Tivela Oil WB (PG 220)	www.shell.com
Tribol	800/220	www.castrol-industrie.com

Table 4.1

The filled lubricant and the required lubricant quantities are specified on the identification plate. These apply for the mounting position stated with the order.

- ☉ Correct the lubricant quantity, if required, according to the following tables. The ambient temperature may not be under -10°C and not over +40°C. Operating temperature may not exceed +90°C.

Divergent operating conditions may make different lubricant quantities and different lubricants necessary.

- ☉ In these cases, please consult **alpha getriebebau**.

You can find the lubricant quantities for your gear reducer in the following sections. Please note the design version (e.g. VDT), the size (e.g. 050) and the mounting position (e.g. AC) of the gear reducer.

4.3.1 Lubricant quantities VDT and VDS

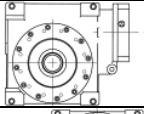
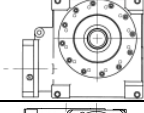
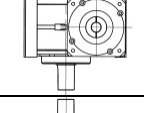
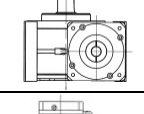
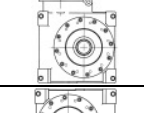
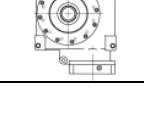
Lubricant quantities [cm ³]					
Size		050	063	080	100
Mounting position					
	AC BC	600	900	2300	4500
	AD BD	300	500	1200	2700
	AE	600	1000	2200	4300
	BE	500	900	2000	4200
	AF BF	700	1100	2800	6200
	AG BG	700	1100	2800	6200

Table 4.2

4.3.2 Lubricant quantities VDH

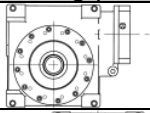
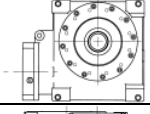
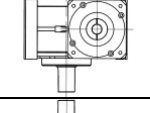
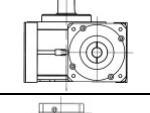
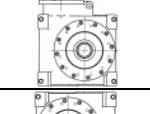
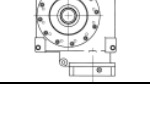
Lubricant quantities [cm ³]					
Size		050	063	080	100
Mounting position					
	AC BC	500	800	2100	4400
	AD BD	300	500	1200	2700
	AE	500	900	2000	4200
	BE	500	900	2000	4200
	AF BF	600	1000	2600	6000
	AG BG	600	1000	2600	6000

Table 4.3

4.4 Performance Statistics

Please refer to our catalogue or our Internet page for the maximum permitted torques and speeds: <http://www.alphagetriebe.de/gear>.

- Please consult our service department (see 1.1) if your gear reducer is older than a year. In this way you receive valid data.

4.5 Identification Plate, Ordering Key

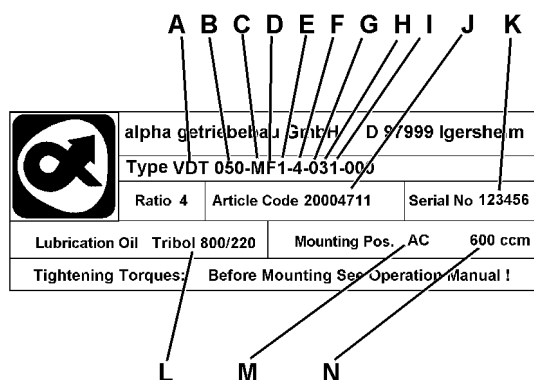


Fig. 4.2

The following specifications can be found on the identification plate:

A Gear reducer type: VDT / VDH / VDS

B Axle distance: 050/063/080/100

C Gear reducer versions:

M = motor-mounted gear reducer

D Gear reducer design:

F = standard design, FPM sealings

X = special gear reducer

E Stage number: 1 = 1-stage

F Ratio: e.g. 4

G Form of gear output: (index number)

H Bore diameters of the clamping hub: (index number)

I Clearance specification:

1 = Standard (≤ 3 arc min)
clearance adjustment possible

J Article code: e.g. 20004711

K Serial number: e.g. 123456

L Lubricant: e.g. Tribol 800/220

M Mounting position: (e.g.: AC)

N Lubricant quantity for the designated mounting position: e.g. 600 ccm

5 Delivery Status, Transport, Storage

5.1 Delivery Status

The gear reducers are wrapped in foil (PE) and foamed (diphenylmethane) into the cardboard box.

- Please dispose of packing material according to the valid national regulations.
- All gear reducers are treated with an anti-corrosion agent at the gear input and output.
The gear reducers are filled with lubricant by the manufacturer.

5.2 Transport

No special direction or position is prescribed to transport the gear reducer.

The tables show below are designed to help you specify the weights of your gear reducer.

Weight [kg]				
Size	050	063	080	100
Version				
VDT	8	16	30	64
VDS	8	14	27	57
VDH	7	13	25	47

Table 5.1

5.2.1 Transport using hoisting equipment



DANGER!

Falling loads or breakage of fastening equipment can cause injury.

- Do not stand under suspended loads.
- Keep as safe a distance as possible from securing equipment.



Attention

Falling or hard placement can damage the gear reducer.

- Only use hoisting and securing equipment which is permitted for the size / weight of your gear reducer.
- Ensure that the load is slowly and carefully handled and placed.

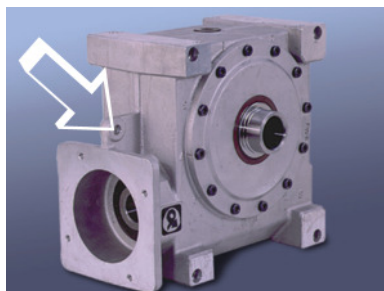


Fig. 5.1

In the gear unit housing is an eye for fastening gear.

5.3 Storage

The gear reducer can be stored dry and in a horizontal position in the original packing for a maximum of 2 years at a temperature between 0 °C and +30 °C. As storage logistic, we recommend the “first in - first out” principle.

6 Mounting, Putting into Operation

- Please observe the instructions in the „General Safety Instructions” in section 3.3.1.

6.1 Preparation

All gear reducers are treated with an anti-corrosion agent at the gear input and output.

- Remove all traces of the anti-corrosion agent in all versions before mounting the gear reducer.

**Attention**

Pressurised air can damage the gear reducer seals, and thus lead to leakage.

➔ Do not blow out the flanges with pressurised air when cleaning.

In the gear unit housing are four threaded bores on each of three surfaces (fig. 6.1).

➔ Use all threaded bores of **one** surface to secure the gear reducer to your machine.

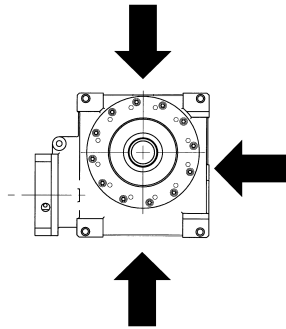


Fig. 6.1

Threaded bores in the gear unit housing				
Gear reducer size	Bolt size	Thread depth [mm]	Property class	Tightening torque [Nm]
050	M 8	13.5	8.8	24
063	M 10	17.0	8.8	48
080	M 12	19.5	8.8	83
100	M 12	19.5	8.8	83

Table 6.1

6.2 Mounting the Motor

6.2.1 General Information

If the gear reducer is not delivered with an attached motor, it is to be motor-mounted. The motor to be mounted must:

- correspond to the B5 design,
- have a radial and axial runout tolerance of "N" according to DIN 42955 and
- if possible, have a smooth shaft.

**Attention**

Distortion can damage the motor and the gear reducer.

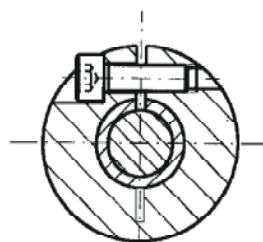
➔ Ensure that the motor is mounted in a vertical position.

6.2.2 Tools for tightening the clamping hub

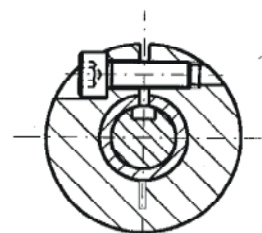
The clamping bolts M4 to M8 can be tightened through the mounting bores of the adapter plate using a square $\frac{1}{4}$ inch socket spanner.

The M10 clamping bolt requires a square $\frac{3}{8}$ inch socket spanner, the M12 and M16 clamping bolts require a $\frac{1}{2}$ inch socket spanner. In addition, calibrated torque wrenches are needed for the respective torque range.

6.2.3 Assembly



Smooth shaft with
spacer sleeve



Grooved shaft with
spacer sleeve

➔ If the motor shaft has a feather key, remove the feather key.

Fig. 6.2

A clamping hub connects the motor shaft and the gear drive shaft. A slotted spacer sleeve is additionally used for certain motor shaft diameters and applications (fig. 6.2).

- Clean the plane fitting surfaces of the motor and gear reducer.
- Clean the motor shaft, the clamping hub bore hole and, if required, the spacer sleeve
- ▽ Take care that the slot of the spacer sleeve is positioned coincident to the slot of the clamping hub.
- Turn the clamping hub so that the clamping screws are positioned coincident to the mounting holes in the adapter plate.



Attention

Excessively high axial forces can damage the motor and gear reducer.

- Ensure that the axial forces that occur are not higher than the values specified in Table 6.2.

Gear reducer size	Clamping hub interior Ø [mm]	Clamping screw DIN 912-10.9	Width across flats [mm]	Tightening torque [Nm]	Max. axial force [N]
050	≤ 19	M 6	5	14	51
063	≤ 28	M 8	6	34	49
080	≤ 35	M 10	8	67	80
100	≤ 48	M 12	10	117	118

Table 6.2



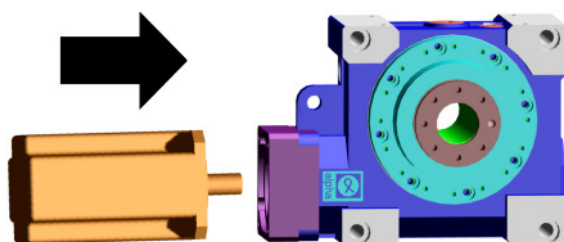
Attention

Motors with

- shaft shoulder,
- distinctive chamfer radius, or
- longer shafts than are permitted for the relevant gear reducer

lead to distortions in mounting, which damage the motor and the gear reducer.

- Check the interfering edges by measuring, or by a measurement check based on our catalogue specifications and the information of the motor manufacturer.
- Please consult our service department to obtain a wider adapter plate or an intermediary flange.



- Position the motor so that the plane surfaces fit together. (fig. 6.3)
- ▽ Ensure that the motor allows itself to be moved into position “easily”.
- ▽ There is to be no gap between the motor and the gear reducer.
- Insert the screws in the clamping hub without tightening to the required torque.
- Coat the screws with a screw-bonding agent (e.g. Loctite 221) and screw the motor and the adapter plate together.

Fig 6.3

- Turn the screw in the clamping hub to the tightening torque (see table 6.2).
- Press the supplied stopper plugs into the mounting bores of the adapter plate until they are flush with the surface.

6.3 Mountings on the gear output side

- Thoroughly clean the output flange or shaft, centring, and fitting surface.

6.3.1 Mountings on the output flange (version VDT)

The output flange, in accordance with ISO 9409, has two centring mechanisms and a bore hole for an indexing pin so that the gear reducer (or the application) can be zeroed mechanically.

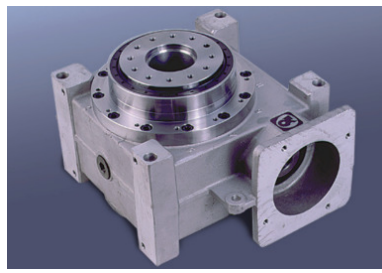
The hollow shaft running through serves as a conduit for lines or hoses, but does not aid in securing the load.

**Attention**

Distortions during mounting operations can damage the gear reducer.

- Mount gearwheels and toothed belt pulleys onto the output flange without forcing.
- Do not on any account attempt an assembly by force or hammering.
- Only use suitable tools and equipment.

☺ You can find the prescribed tightening torques in the following table.

Thread in output flange

Gear reducer size	Quantity x thread	Indexing bore hole Ø	Property class	Tightening torque
				[Nm]
VDT 050	7 x M 6	6 H 7	10.9	14
VDT 063	11 x M 6	6 H 7	10.9	14
VDT 080	11 x M 8	8 H 7	10.9	34
VDT 100	11 x M10	10 H 7	10.9	67

Table 6.3

6.3.2 Mountings on the output shaft (version VDS)

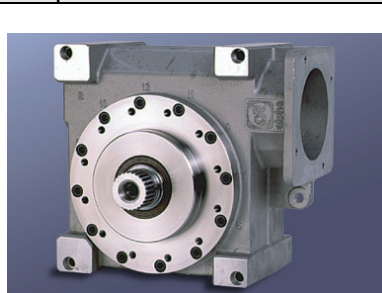
The output shaft is available in the following forms:

- Smooth face,
- With feather key groove (according to DIN 6885) or
- Involute (according to DIN 5480).

**Attention**

Distortions during mounting operations can damage the gear reducer.

- Mount gearwheels and toothed belt pulleys onto the output shaft without forcing.
- Do not on any account attempt an assembly by force or hammering.
- Only use suitable tools and equipment.
- When shrink-fitting a gear onto the output shaft: Ensure that the maximum static axial forces (table 6.4) are not exceeded.

Output shaft

Gear reducer size	F_{amax} [N]
050	10750
063	18500
080	31250
100	49750

Table 6.4

6.3.3 Mountings on the hollow shaft with feather key (version VDH with groove)

The shaft end of the machine must be equipped with a DIN 6885 Part 1, Form A feather key and must have a DIN 332 Form DS centring (with thread).

- ▽ Check the hollow and machine shafts for damaged edges or poor fit. Re-machine the parts if necessary and clean them.
- Protect the cleaned contact surfaces against rust with a suitable lubricant (e.g. Klüger Altemp Q paste).

**Attention**

A tilting of the shaft can lead to damage.

- Ensure that the hollow shaft is aligned with the machine shaft.

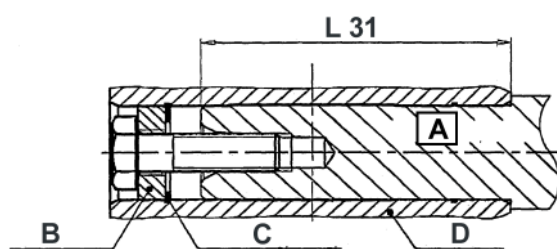


Fig. 6.4

The axial securing of the hollow shaft gear reducer to the machine shaft (A) can be made with an end washer (B) and a retaining ring (C).

If the end washer is to be used for dismantling as a forcing washer, the machine shaft (A) may not exceed a certain insertion length (L 31) in the hollow shaft (D). The maximum insertion lengths are specified in the following table.

Gear reducer size	Maximum insertion length L 31 [mm]
VDH 050	77
VDH 063	89
VDH 080	119
VDH 100	159

Table 6.5

6.3.4 Mountings on the hollow shaft with shrinkable disk (version VDH smooth face)

The axial securing of the hollow shaft to the machine shaft is made using a shrinkable disk connection. The shrinkable disk is delivered ready to be installed.



Attention

Dirt can inhibit transmission of the torque.

- Do not disassemble the shrinkable disk prior to installation.
- De-grease the machine shaft and the hollow shaft bore leaving no residual traces in the area of the shrinkable disk seat.
- ☺ Only the exterior surface of the hollow shaft may remain greased in the area of the shrinkable disk seat.



Attention

The forces of the shrinkable disk can deform the hollow shaft.

- Always first install the machine shaft before tightening the clamping screws of the shrinkable disk.



Attention

A tilting of the shaft can lead to damage.

- Ensure that the hollow shaft is aligned with the machine shaft.

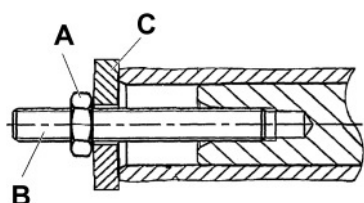


Fig. 6.5

- Mount the hollow shaft onto the machine shaft using a nut (A) and a threaded spindle (B). The supporting (C) must be performed by the hollow shaft.

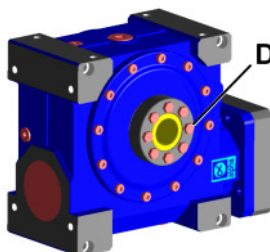


Fig. 6.6

- Tighten the clamping screws (D) of the shrinkable disk one after another in a single direction (not diagonally crossing) in multiple circular passes.
- Tighten the individual screws only up to the maximum permitted tightening torque.
- ☺ The maximal tightening torque of the tightening screws are shown in table 6.6

Tightening torque [Nm]		
Clamping screw thread	Property class 10.9	Property class 12.9
M6	12	14.5
M8	29	35

Table 6.6

- ➔ Check that the front surfaces of the outer and inner rings are aligned. Only then is the correct braced condition obtained. If this flush alignment is not obtained during bracing, the tolerance of the machine shaft must be checked.

6.3.5 Mounting the gear reducer onto your machine

- ➔ Please observe the instructions in the „General Safety Instructions” in section 3.3.1.

Check the lubricant quantity

The gear reducers are compliant for every mounting position; the lubricant quantity, however, is dependent on the mounting position.

The filled lubricant and the required lubricant quantities are specified on the identification plate. These apply for the mounting position stated with the order.

- ➔ Correct the lubricant quantity, if required, according to the tables in section 4.3.

Mounting the gear reducer

Mounting and connecting structures must be designed so that no vibrations from adjacent machinery parts and components are transmitted.

- ➔ Coat the four screws with screw-bonding agent (e.g. Loctite 221), and screw the gear unit housing and your machine together.
- ☺ You can find the prescribed screw sizes and tightening torques in table 6.1.

6.4 Putting into operation

- ➔ Please observe the instructions in the „General Safety Instructions” in section 3.3.1.

6.5 Changing the torsional flank backlash (optional)

For special applications, there is the option of changing the torsional flank backlash.

- ☺ The procedure for setting the torsional flank backlash can be found in the appendix: section 11.2.

7 Operation

7.1 Operating conditions

- ➔ Please observe the instructions in the „General Safety Instructions” in section 3.3.1.

The gear reducer must be installed in a clean and dry environment. Coarse dust and liquids of all kinds impair its function.

The specifications for lubricants and operating temperatures can be found in section 4.3. Divergent operating conditions may make different lubricant quantities and different lubricants necessary.

- ➔ In these cases, please consult **alpha getriebebau**.

8 Maintenance

8.1 Shutdown, preparation

- ➔ Please observe the instructions in the „General Safety Instructions” in section 3.3.1.
- ➔ Shut down the machine in which the gear reducer is installed.
- ➔ Disconnect the machine from the mains, before starting maintenance work.

8.2 Inspection schedule

Maintenance work / See section...	Maintenance periods			
	At start-up	After 500 operating hours or 3 months	Every 3 months	Yearly
Visual inspection / 8.3.1	X	X	X	
Checking the tightening torques / 8.3.2	X	X		X
Oil change / 8.3.3	Recommendation: initially after 7,000 operating hours and every 10,000 operating hours thereafter (after 5 years at the latest)			

Table 8.1

8.3 Maintenance Work

8.3.1 Visual Inspection

- ➔ Check the entire gear reducer by carrying out a thorough visual inspection for exterior damage and oil leakage.

8.3.2 Checking the tightening torques

Check the tightening torques of the fastening bolts on the gear unit housing.

- ☺ You can find the prescribed tightening torques in the table 6.1 in section 6.
- ➔ Check the tightening torque of the clamping bolts on the motor mounting.
- ☺ You can find the prescribed tightening torques in the table 6.2 in section 6.

8.3.3 Oil change

- ➔ Please observe the instructions in the „General Safety Instructions” in section 3.3.1.

☺ You can find a list of permitted lubricants in section 4.3.

All gear reducers are lubricated for their entire working life. However, we **recommend** an oil change after an initial 7,000 operating hours for synthetic oils, and then approx. every 10,000 operating hours thereafter. This is because oil becomes contaminated, causing increased wear and tear.

- ➔ Heat up the gear reducer to operating temperature.

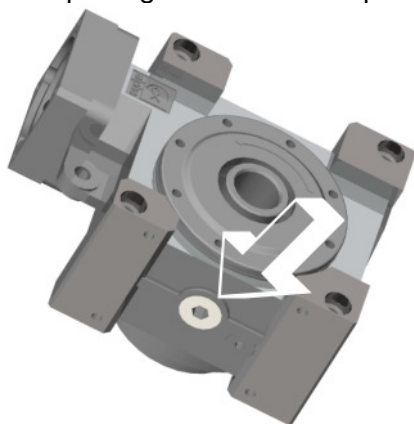


Fig. 8.1

- ➔ Drain the oil off through a plug located below. (fig. 8.1)
- ➔ If draining is not possible in mounted position, dismantle the gear reducer as described in section 9.
- ➔ Open a plug situated at top, if possible, so that the gear reducer is ventilated. In the gear unit housing are one large and three small plugs (see also table 8.2).

- ☺ There is now only residual oil and dirt in the gear reducer. We recommend that these be flushed out:

- Screw in the bottom plug, fill with oil, and screw in the top plug.
- Let the machine run for a short time, and drain the oil off again.

- ➔ De-grease the bottom plug and coat this with a bonding agent (e.g. Loctite 573).
- ➔ Fit the bottom plug in place (see also table 8.2).
- ➔ Fill with the prescribed quantity of oil.
- ☺ You can find the prescribed lubricant quantity in section 4.3.1 to 4.3.2.
- ➔ De-grease the top plug, and coat this with a bonding agent (e.g. Loctite 573).
- ➔ Fit the top plug in place (see also table 8.2).

- Should you have to dismantle the gear reducer, remount it as described in section 6.

Gear reducer size	All screws in accordance with DIN 908 with inner hexagon and flanged	
	large screw	small screws
050	G 1/2"	G 1/4"
063	G 1/2"	G 1/4"
080	G 3/4"	G 1/4"
100	G 1"	G 1/4"

Table 8.2

8.4 Start-up after maintenance work

- Clean the outside of the gear reducer.
- Assemble all safety devices.
- Do a test run, before re-releasing the machine for operation.

8.5 Malfunction list (troubleshooting)

- Seek an immediate solution if you notice oil loss, increased noise during operation or higher operating temperatures.

Malfunction	Possible cause	Solution
Higher operating temperature	Dimensioning insufficient	Check the technical data
	Motor heating the gear reducer	Check the wiring of the motor, replace the motor or install insulation between motor and gear reducer
	Ambient temperature too high	Ensure adequate cooling
	Oil quantity too high	Correct the oil level  Attention The gear reducer can be damaged if the oil level is too low. ➤ Do not allow too much oil to drain off.
Increased noise during operation	Damaged bearings	Please consult our customer service department.
	Damaged gear teeth	
Oil loss	Sealings not tight	Please consult our customer service department.

Table 8.3

9 Dismantling

- Please observe the instructions in the „General Safety Instructions” in section 3.3.1.

9.1 Preparation

- Shut down the machine in which the gear reducer is installed.
- Make sure that it is possible to dismantle the gear reducer without the risk of damage to the entire machine.
- Before starting work, disconnect the machine from the mains.

9.2 Disassembling the gear reducer

- For gear reducers with motor mounting, disconnect the electrical connections of the motor.
- Secure the gear reducer so it cannot fall.
- Release the screws connecting the gear reducer to the machine.
- Remove the gear reducer from its position with great care, so as to safeguard the gear reducer and adjacent parts against damage.

9.2.1 Dismantling of a slip-on gear mechanism with feather key

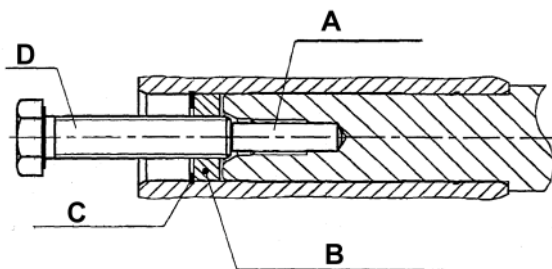


Fig. 9.1

If the maximum insertion length has not been exceeded during assembly, the end washer may be used as a forcing washer.

- Remove the screw in the end washer (B) and take it off.
- Take off the retaining ring (C).
- Place a cylinder pin (A) in the centring bore of the machine shaft to support it.
- Insert the end washer (B) and replace the retaining ring (C).
- Use an appropriate screw (D) to pull the hollow shaft from the machine shaft.

The table below lists the thread diameter of the required forcing screws.

Gear reducer size	Forcing screw
VDH 050	M 12
VDH 063	M 12
VDH 080	M 16
VDH 100	M 20

Table 9.1

- Remove the gear reducer from its position with great care, so as to safeguard the gear reducer and adjacent parts against damage.

9.2.2 Dismantling of a slip-on gear mechanism with shrinkable disk

- Loosen the clamping screws one after another in multiple circular passes.
- If the outer ring does not detach itself from the inner ring, remove a few of the clamping screws and screw into the adjacent forcing threads.
- Remove the gear reducer from its position with great care, so as to safeguard the gear reducer and adjacent parts against damage.
- ☺ The removed shrinkable disk does not need to be disassembled and regreased prior to bracing again. Only if the shrinkable disk is dirty should it be disassembled and cleaned.



Attention

Cleaned shrinkable disks can have other coefficients of friction. This can lead to damage during mounting.

- Lubricate the inner smooth surfaces of the shrinkable disk using a solid lubricant with a coefficient of friction of $\mu = 0.04$.

- ☺ The following lubricants are permissible for relubricating the shrinkable disk:

Lubricant	Commercial form	Manufacturer
Molykote 321 R (lubricating varnish)	spray	DOW Corning
Molykote Spray (powder spray)	spray	DOW Corning
Molykote G Rapid	spray or paste	DOW Corning
Aemasol MO 19 P	spray or paste	A.C. Matthes
Molykombin UMFT 1	spray	Klüber Lubrication
Unimoly P 5	powder	Klüber Lubrication

Table 9.2

9.3 Disassembling the motor

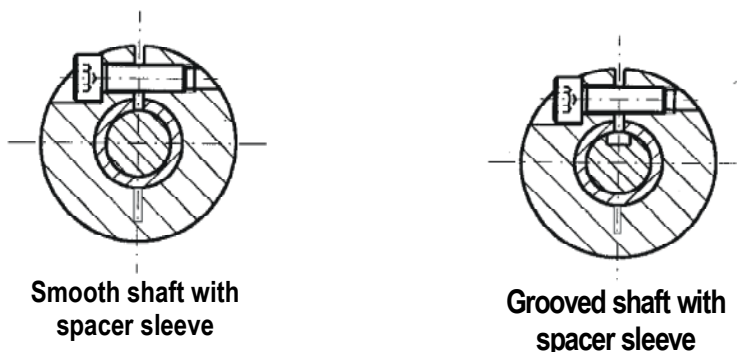


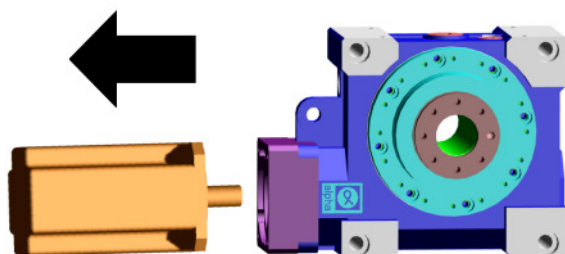
Fig. 9.2

For gear reducers with motor mounting, the motor shaft and the gear reducer's drive shaft were connected with a clamping hub. A slotted spacer sleeve was additionally used for certain motor shaft diameters and applications (see fig. 9.2).



Attention

Distortion can damage the motor and the gear reducer.
Ensure that the motor is dismantled in a vertical position.



- Remove the plug stoppers from the mounting bores of the adapter plate.
- Loosen the screws in the clamping hub.
- Loosen the screws between motor and adapter plate.
- ▽ The motor must allow itself to be removed "easily".
- Separate the motor and the gear reducer. The adapter plate and the spacer sleeve are part of the gear unit. Should you wish to return the gear unit, please include these parts.

Fig. 9.3

10 Disposal

If our product is no longer of use and you wish to dispose of it, refer to the instructions here. If you have any questions regarding ecological disposal methods, please consult our service department (see 1.1).

10.1 Lubricants

- Please observe the instructions in the „General Safety Instructions“ in section 3.3.1.
- Allow all the lubricant to drain out and dispose of it according to regulations.

10.2 Sealing rings

- Remove the sealing rings from the gear reducer, and clean them of oil and grease residues.
- Dispose of the sealing rings as composite material (metal/plastic)

10.3 Metal

- Divide up the remainder of the gear reducer, if possible, into:
 - iron
 - aluminium (e.g. adapter plate), and
 - non-ferrous heavy metal (e.g. motor windings).

11 Appendix

11.1 Tightening torques

property class	Tightening torque [Nm] for threads...													
	M 3	M 3.5	M 4	M 5	M 6	M 8	M 10	M 12	M 14	M 16	M 18	M 20	M 22	M 24
4.8	0.56	0.86	1.28	2.5	4.3	10.5	21	36	58	88	121	171	230	295
8.8	1.28	1.96	2.9	5.75	9.9	24	48	83	132	200	275	390	530	675
10.9	1.8	2.75	4.1	8.1	14	34	67	117	185	285	390	550	745	950
12.9	2.15	3.3	4.95	9.7	16.5	40	81	140	220	340	470	660	890	1140

Table 11.1

11.2 Setting the torsional flank backlash

Inspection

The gear reducer is set by the manufacturer with a minimal torsional flank backlash. The process of wear, as well as extended operating times, can cause the backlash to increase.

Readjustment

Due to decreasing of the centre distance from worm gear shaft and worm wheel, the torsional flank backlash can be reduced.

- ➔ If necessary, dismantle the gear reducer from the entire machine as described in section 9.



Attention

If you remove the side cover of the gear reducer, oil loss will result.

- ➔ When performing adjustments, leave the cover in place.

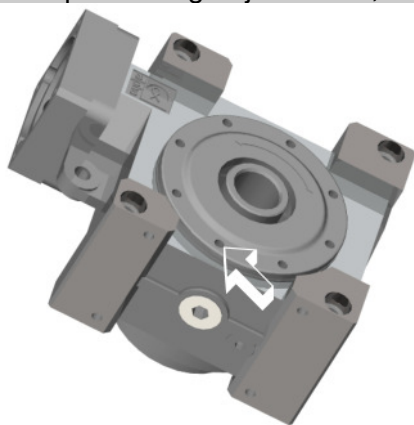


Fig. 11.1

- ➔ Remove the inner hexagonal bolts on both side covers (see fig. 11.1). On the covers are markings pointing to the numbers on the housing.
- ➔ Turn the covers so that the marking points to the next highest number. Both covers must point to the same number.
- ▽ Check whether the toothing has enough backlash by turning the worm gear several times.
- ➔ Reinsert the inner hexagonal bolts in the cover.

The table below specifies the prescribed tightening torque.

Gear reducer size	Tightening torque [Nm]
VDH 050	7
VDH 063	17
VDH 080	17
VDH 100	34

Table 11.2

- ▽ Check again whether the gear teeth still have adequate backlash.



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