

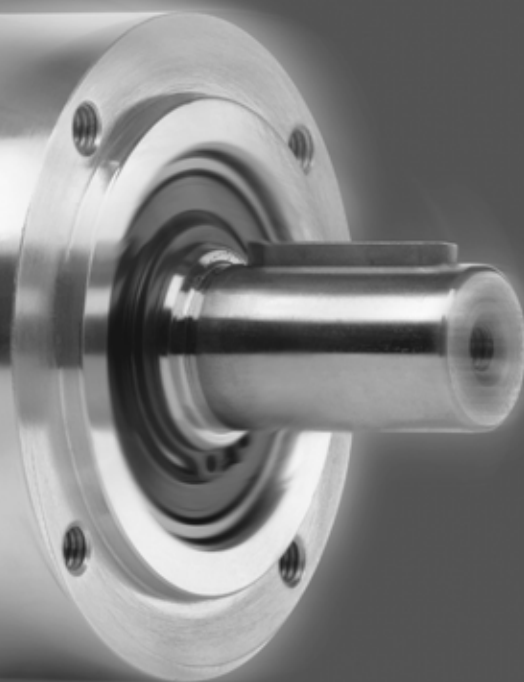


WITTENSTEIN

alpha

**alphira<sup>®</sup>**

**Operating Manual**



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## 1.1 Service contact

Please contact our Customer Service Department if you have any technical questions:

### WITTENSTEIN alpha GmbH

Customer Service  
Walter-Wittenstein-Str. 1  
D-97999 Igersheim

Tel.: +49 (0) 79 31 / 493-10900

Fax: +49 (0) 79 31 / 493-10903

E-Mail: [service-alpha@wittenstein.de](mailto:service-alpha@wittenstein.de)

## 2 General Information

The original instructions were prepared in German; all other language versions are translations of these instructions.

### 2.1 Description, Designations

The low-backlash planetary gear reducer alphira®, subsequently termed gear reducer, is constructed in the "M" (motor-mounted) version.

### 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 section [3 "Safety"](#).

### 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 **WITTENSTEIN alpha**.

### 2.6 EC Machinery Directive

The gearhead is considered a "machine component" and is therefore not subject to the EC Machinery Directive 2006/42/EC.

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

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

### 2.8 Copyright

© 2009, **WITTENSTEIN alpha** GmbH

## 3 Safety

### 3.1 Intended Use

The gear reducer is designed for industrial applications. Its purpose is the transmission and conversion of speeds and torques.

Please refer to our Internet page for the maximum permitted torques and speeds:

[www.wittenstein-alpha.de](http://www.wittenstein-alpha.de).

- ➔ Please consult our Customer 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

Any use transgressing the acceptable limits (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 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.

In addition to the safety specifications mentioned in this operating manual, the general and also the local regulations on the prevention of accidents (for instance, personal safety equipment) and on environmental protection should be observed.

#### 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!**

Impurities spinning through the air can cause grave injury.

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



**Attention**

Loose or overloaded screwed connections can cause damage.

- ➔ Tighten and check all screwed connections for which a tightening torque is specified, on principle with a calibrated torque wrench.
- ➔ **Never** use the gear reducer or the motor as a step, climbing aid, or fastening point.

##### Operation



**DANGER!**

Touching hot surfaces can lead to burns.

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



**DANGER!**

Moving machinery may lead to injury. There is danger of being trapped or pulled in!

- ➔ Keep a sufficient distance to moving 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.
- ➔ Secure the machine against restarting and unintentional movements during assembly maintenance work.



**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**



**Attention**

No change of lubricant in gear reducers of this design!

- ➔ Never open the housing of these gear reducers.



**Environment**

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

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

**3.4 In case of fire**

The gear reducer itself is non-flammable. However, the interior of the standard version has mineral oil-based lubrication.

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

**3.4.1 Suitable extinguishing agents, protective equipment**

Powder, foam, fog, in certain cases carbon dioxide



**DANGER!**

High temperatures produce irritating steam.

- ➔ Use a protective breathing apparatus.

**3.4.2 Unsuitable extinguishing agents**

Do not spray with water!

**3.4.3 Additional Information**



**Environment**

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

☺ For additional information on the OPTIMOL LONGTIME PD 1 lubricant, refer to:  
 Castrol Industrie GmbH,  
 Mönchengladbach, Germany  
 Tel.: +49 (0) 2161 / 909-30

## 4 Technical Specifications

### 4.1 Design

The gear reducer is constructed as one- or multistage planetary gear reducer.

The gear reducer is supplied in the “M” version.

It is factory-filled with lubricant and can be mounted in any mounting position without adjusting the amount of lubricant. The gear reducer is low-backlash and low-noise.

#### 4.1.1 Motor-mounted “M”

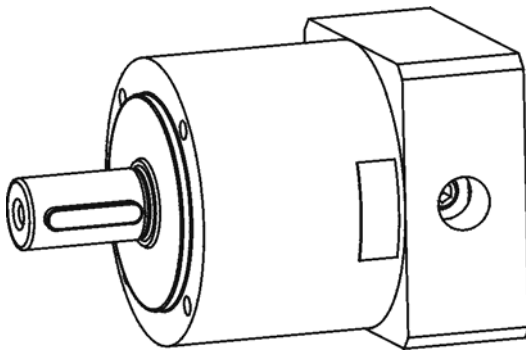


Fig. 4.1

The clamping hub enables a quick and easy mounting of the motor.

The motor is centred using the clamping hub and not with the adapter flange.

The motor can thus be mounted without radial distortion.

The reducer can be adapted to various motors using the adapter flange and spacer sleeve.

### 4.2 Weight

You will find the dimensions of the standard gear reducers with medium-sized adapter flange in Table 4.1. If another adapter flange is mounted, the actual dimensions can deviate by up to 10%.

Weight [kg]				
Gear reducer size alphira®	040	060	080	115
Stages				
1	0,31	0,88	2,1	5,2
2	0,52	1,1	2,8	6,9

Table 4.1

### 4.3 Lubricant



#### Attention

No change of lubricant in gear reducers of this design!

➡ Never open the housing of these gear reducers.

The gear reducers have been filled with high-performance grease and sealed during manufacture. They are lubricated for their entire working life.

The ambient temperature may not be under  $-15^{\circ}\text{C}$  and not over  $+40^{\circ}\text{C}$ . Operating temperature may not exceed  $+90^{\circ}\text{C}$ .

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

➡ In these cases, please consult our Customer Service Department (see 1.1).

#### 4.4 Performance Statistics

Please refer to our Internet page for the maximum permitted torques and speeds:  
[www.wittenstein-alpha.de](http://www.wittenstein-alpha.de).

- ➔ Please consult our Customer Service Department (see 1.1) if your gear reducer is older than a year.

#### 4.5 Noise emission

Depending on the gearhead type and product size, the continuous sound pressure level is between 70 and 75 dB(A).

Please contact our Customer Service Department (see 1.1) if you need information regarding your particular product.

#### 4.6 Identification plate, ordering key

The identification or type plate is located on the gear reducer housing.

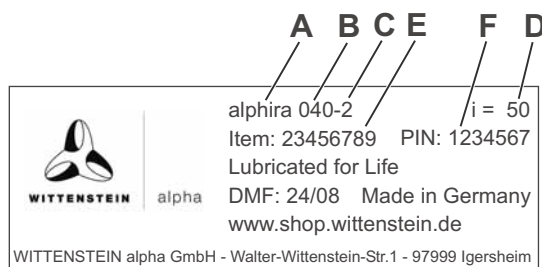


Fig. 4.2

The following specifications can be found on the type plate:

- A Ordering key
- B Size (e.g.: 040)
- C Stage number (e.g.: 2)
- D Ratio (e.g.: 50)
- E Article code (e.g.: 23456789)
- F Serial number (e.g.: 1234567)

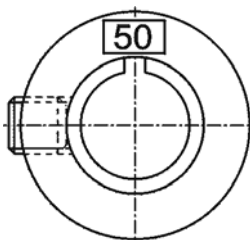


Bild 4.3

The ratio (e.g.  $i = 50$ ) can also be found on a label on the clamping hub. The spacer sleeve is properly aligned when the slit points to the label.

## 5 Delivery Status, Transport, Storage

### 5.1 Delivery Status

Within Europe, the gear reducers are packed in cardboard boxes and foil. The foil and the cardboard boxes can be recycled.

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

## 5.2 Transport

No special direction or position is prescribed to transport the gear reducer. The weight of the gear reducer ranges from **0,31** to **6,9** kg. You can find an assignment to the gear reducer sizes in [Table 4.1](#) in Chapter **4.2 “Weight”**.

### 5.2.1 Transport using hoisting equipment



#### DANGER!

- Falling loads or breakage of securing equipment can cause injury.
- ➔ Do not stand under suspended loads.
  - ➔ Keep as safe a distance as possible from securing equipment.



#### Attention

- Falling or hard dropping 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.

## 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 +40°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 Preparing mounting

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

- ➔ Before mounting the gear reducer, remove any trace of anti-corrosion agent. Use a clean cloth moistened with a suitable cleaning agent (fat dissolving but non-aggressive).



#### Attention

- Pressurised air can damage the gear reducer seals, and thus lead to leakage.
- ➔ Do not blow out the flanges and shafts with pressurised air when cleaning.

Four threaded bores are available in the gear unit housing for bolting it to your machine ([Table 6.1](#)).

- ➔ Do **not** use washers (e.g. plain washers, tooth lock washers).

Threaded bores in the gear unit housing			
Gear reducer size alpha®	Quantity x thread	Property class	Tightening torque [Nm]
<b>040</b>	4 x M4	10.9	4,1
<b>060</b>	4 x M5	10.9	8,1
<b>080</b>	4 x M6	10.9	14
<b>115</b>	4 x M10	10.9	67

Table 6.1

## 6.2 Motor-mounting

### 6.2.1 General information on mounting a motor

If the gear reducer is not delivered with an attached motor, it has been designed for motor-mounting.

The motor to be mounted must:

- correspond to the B5 design
- show a radial and axial runout tolerance of at least “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

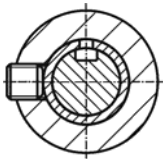
The threaded pin can be tightened through the mounting bores of the adapter flange using a square 1/4 inch socket spanner.

- ➔ Furthermore, use calibrated torque wrenches for the respective torque range.

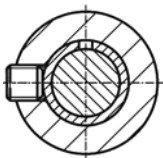
### 6.2.3 Mounting the motor

- ➔ If the motor shaft has a feather key, remove the feather key. If recommended by the motor manufacturer, apply a half wedge.

A plug socket and a slit spacer sleeve connect the motor shaft and the gear drive shaft (see Fig. 6.1).

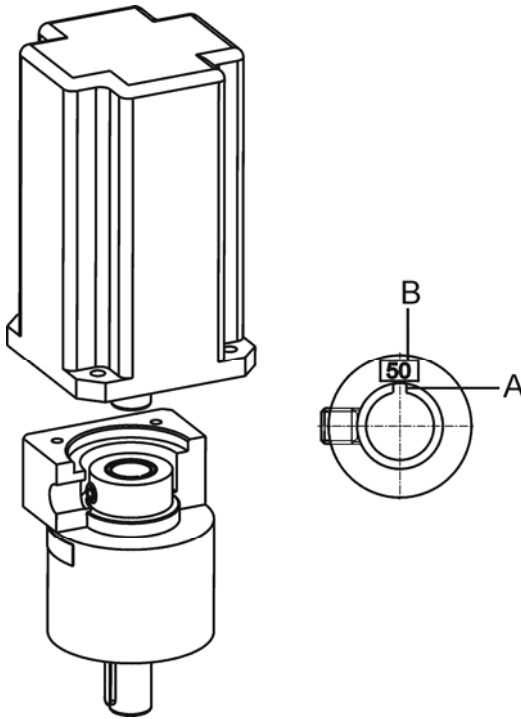


Keywayed shaft with spacer sleeve



Smooth shaft with spacer sleeve

Fig. 6.1



- ➔ Clean the plane fitting surfaces of the motor and gear reducer with a clean cloth.
- ▽ Check the separating surfaces for impurities and damage.
- ➔ Do not put any devices into operation that show evidence of damage.
- ➔ Clean the motor shaft, the clamping hub bore hole, and the spacer sleeve with a clean cloth.
- ➔ Turn the clamping hub so that the threaded pin can be reached through the mounting holes in the adapter flange.
- ▽ Take care that the slot of the spacer sleeve is positioned 90° to the threaded pin.
- ▽ The spacer sleeve is properly aligned when the slit (A) points to the label (B).
- ➔ Readjust the spacer sleeve if necessary.

Fig. 6.2



**Attention**

Excessively high axial forces may 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 alphira®	Max. Axial force [N]
040	45
060	80
080	100
115	150

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.

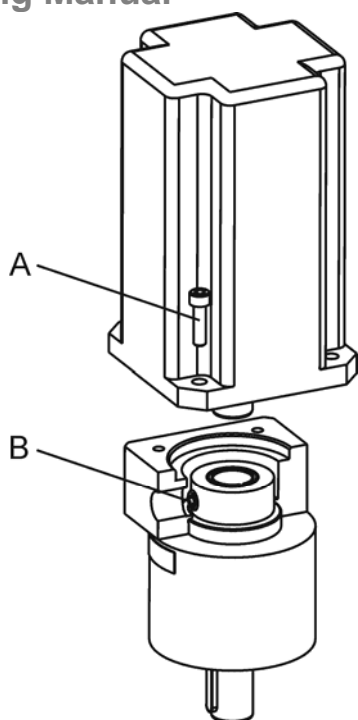
- ➔ Check the interfering edges by measuring, or by a measurement check based on our Internet specifications and the information of the motor manufacturer.



**Attention**

Distortion can damage the motor and the gear reducer.

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



- ➡ Loosen the threaded pin (B) in the clamping hub by one turn.
- ▽ Make sure that the motor allows itself to be moved into position “easily”.
- ➡ Position the motor so that the plane surfaces fit together.
- ▽ There is to be no gap between the motor and adapter flange.
- ➡ Coat the bolts (A) with screw-bonding agent (e.g. Loctite 243), and screw the motor to the adapter flange.
- ➡ Turn threaded pin (B) in the clamping hub to the tightening torque (Table 6.3).

Threaded pin motor assembly		
Gear reducer size alphira®	Tightening torque [Nm]	Width across flats [mm]
040	5,6	3
060	9,5	4
080	23	5
115	45	6

Table 6.3

- Fig. 6.3 ➡ Press the enclosed stopper plugs up to their stops in the mounting bores of the adapter flange.

### 6.3 Mounting on the gear output side

- ➡ Thoroughly clean the output shaft, centring, and fitting surface with a clean cloth.

#### 6.3.1 Mountings on the output shaft



#### 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 mounting or shrink-fitting a gear onto the output shaft: ensure that the maximum static axial forces of the output bearing (Table 6.4) are not exceeded.

Gear reducer size alphira®	040	060	080	115
F <sub>amax</sub> [N]	230	750	1600	2100

s<sub>0</sub> = 1,8    F<sub>r</sub> = 0

Table 6.4

## 6.4 Mounting the gear reducer onto your machine

- ➔ Please observe the instructions in the [„General Safety Instructions”](#) in section 3.3.1.
- ☺ Mount the gear reducer in such a way that the type plate remains legible.
- ➔ Coat the four screws with screw-bonding agent (e.g. Loctite 243), and screw the gear unit housing and your machine together.
- ☺ You can find the prescribed screw sizes and tightening torques in [Table 6.1](#).

## 6.5 Putting into operation

- ➔ Please observe the instructions in the [„General Safety Instructions”](#) in section 3.3.1.

# 7 Operation

## 7.1 Operating conditions

- ➔ Please observe the instructions in section [3.3.1 “General Safety Instructions”](#)  
The gear reducer must be installed in a clean and dry environment. Coarse dust and liquids of all kinds impair its function.
- ➔ Take care that no external oil gets near the gear output in the V3 mounting position (output shaft up).  
The specifications for lubricants and operating temperatures can be found in section 4.3.
- ➔ Avoid icing, which can damage the seals.  
Divergent operating conditions may make different lubricant quantities and different lubricants necessary.
- ➔ In these cases, please consult our Customer Service Department (see 1.1).

# 8 Maintenance

## 8.1 Shutdown, preparation

- ➔ Please observe the instructions in section [3.3.1 “General Safety Instructions”](#).
- ➔ 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 initial operation	After 500 operating hours or 3 months	Every 3 months	Yearly
Visual Inspection / 8.3.1	<b>X</b>	<b>X</b>	<b>X</b>	
Checking the tightening torques / 8.3.2	<b>X</b>	<b>X</b>		<b>X</b>

Table 8.1



### Attention

- No change of lubricant in gear reducers of this design!
- ➔ Never open the housing of these gear reducers.

The gear reducers have been filled with high-performance grease and sealed during manufacture. They are lubricated for their entire working life.

## 8.3 Maintenance Work

### 8.3.1 Visual Inspection

- ➔ Check the entire gear reducer by carrying out a thorough visual inspection for exterior damage
- ☺ If you have any questions about maintenance please consult our Customer Service Department (see 1.1).

### 8.3.2 Checking the tightening torques

- ➔ Check the tightening torques of the fastening bolts on the drive housing.
- ☺ You can find the prescribed tightening torques in [Table 6.1](#) in section 6.
- ➔ Check the tightening torque of the threaded pin on the motor mounting.
- ☺ You can find the prescribed tightening torques in [Table 6.3](#) in section 6.

## 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 lubricant loss, increased noise during operation or higher operating temperatures.

Error	Possible cause	Solution
Higher operating temperature	Dimensioning insufficient	Check the technical data
	Motor is heating the gear reducer	Check the wiring of the motor, replace the motor or provide adequate cooling
	Ambient temperature too high	Ensure adequate cooling
Increased noise during operation	Distortion in motor mounting	Please consult our Customer Service Department.
	Damaged bearings	
	Damaged gear teeth	
Loss of lubricant	Lubricant quantity too high	Wipe off discharged lubricant and continue to watch the gear reducer. Lubricant discharge must stop after a short time.
	Sealings not tight	Please consult our Customer Service Department.

Table 8.2

## 9 Supplementary information

- ☺ If you should need supplementary information (e.g. disassembly, or disposal), please contact our Customer Service Department (see 1.1).



### Attention

No change of lubricant in gear reducers of this design!

## 10 Appendix

### 10.1 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
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 10.1

### 10.2 Conversion table

Conversion		
Length	1 mm	0.03937 in
	1 m	1.094 yd
Space / Capacity	1 ccm	0.061 cu.in.
Weight	1 kg	2.205 lb
Torque	1 Nm	0.738 ft-lb
		8.85 in.lb.

Table 10.2