

- Stepless drives
- Spur and worm gears
- Planetary gears
- Special gears
- Frequency inverter motors
- DC and AC servo drives

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## Operating Instructions

### Table of contents

1.	Declaration .....	2
2.	Warranty and liability .....	2
3.	Gear description .....	2
4.	Gear types .....	2
5.	Safety .....	3
5.1	General safety information .....	3
5.2	Standards and Guidelines .....	3
5.3	Persons .....	3
6.	Gear units and geared motors .....	3
6.1	Gearboxes .....	3
6.2	Motor .....	3
6.3	Delivery condition .....	4
6.4	Painting .....	4
6.5	Transport, storage .....	4
6.6	Storage .....	4
6.7	Assembly .....	4
6.8	Installing the motor to the gearbox .....	4
6.9	Installing the gearbox to the machine .....	4
6.10	Commissioning and operation .....	4
6.11	Electrical connection of the motor .....	5
7.	Maintenance, disposal .....	5
7.1	Gearbox .....	5
7.2	Transmission oil .....	5
7.3	Motor .....	6
7.3.1	Replacement of brushes in DC motors .....	6
7.4	Disposal .....	6
8.	Malfunctions .....	6
9.	Installation Position .....	7
10.	Quantities and types of oil .....	8
10.1	Oils and grease .....	10

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## 1. Declaration

This guide contains all the necessary information for the safe use of Heytraction gears, geared motors and motors.

The operator has to make sure that all persons concerned have read, understand and will observe these instructions.

## 2. Warranty and liability

Warranty is only valid if the operating instructions are observed.

Exceptions are:

Ignoring the instructions for:

transport, storage, installation, commissioning, operation and maintenance

Operation with non-permissible operating data

Operation without gear oil

Operation with damaged parts

Conversions and repair without written permission by Heytraction

## 3. Gear description

Actuators, gears and gear motors are used for transmission of rotational speed and torque.

Series K and R actuators are mechanical, infinitely variable all-steel gears

## 4. Gear types

These operating instructions apply to the standard version of the actuators, gears and gear motors of the series:

Actuator	K2					R4			R5	
Actuator with spur gear	K21	K22	K23-K27	K239-K269	K230-R260	R41	R42	R430-R460	R51	R52
Actuator with spur and bevel gear		K22W2	K23W2-K27W2	K239W3-K269W3						
				K239W3-K269W3		R41W3	R42W3	R430W3		
								R430W10-R460W10	R51W10	R52W10
								R430W15-R460W15	R51W15	R52W15
Actuator with worm gear	K2S1									
Spur gears	G21	G22	G23-G27	G239-G269						
	GN21	GN22	GN23-GN27	GN239-GN269						
	GS21	GS22	GS23-GS27	GS239-GS269		GS41	GS42	GS430-GS460	GS51	GS52
	GF21	GF22	GF23-GF27	GF239-GF269						
Spur gear with worm gear				G239C32-G269C32 G239C42-G269C42 G239C52-G269C52 G239C62-G269C62						
Spur gear with bevel gear		GF22W2	GF23W2-GF27W2	GF239W3-GF269W3						
Spur gears								GS71	GS72	
Spur gear with worm gear										
Planetary gears	GPT55	GPT75	GPT90	GPT120	GPT155					
	GPR75	GPR100	GPR125	GPR150						
Planetary Gear Motor	GPTM055..	GPTM075..	GPTM120..	GPTM120..	GPTM155..					
Worm gears										
Bevel gears										

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## 5. Safety

### 5.1 General safety information

These safety notes do not claim to be complete.

At the time of delivery the gear and gear motor are at the state of the art and fully reliable.

To prevent hazards to persons or damage to property, the gear may only be used in technically perfect condition.

Observance of the relevant accident prevention regulations is obligatory for operation of the devices.

Risk of injury due to rotating shafts; clothing and body parts might be entangled.  
 Personal injury of burns from hot bodies.  
 Damage to persons and machines due to loose screws or shaft connections.

Installation and maintenance work must be carried out only when gear is stationary. Motor must be disconnected and secured against accidental switch-on.

### 5.2 Standards and Guidelines

The standards and directives relevant for the site must be observed.

The gear or geared motor was designed for industrial applications.

The gear is not subject to the Machinery Directive 2006/42/EC and CE labelling, since it is regarded as a machine component.

Within the scope of the directive, the operation is prohibited until it has been determined that the machine in which this gear is fitted, complies with the provisions of the directive.

### 5.3 Persons

Any work at the gear (transport, installation, electrical connection, commissioning, maintenance) may only be carried out by qualified personnel.

## 6. Gear units and geared motors

### 6.1 Gearboxes

Gearboxes without ventilation or with pressure valves are dustproof and water-jet proof according to Protection Class IP65.

Gearboxes with ventilation may only be used in a clean, dry environment.

The gearbox should be used at ambient temperatures between -10° C and + 40° C.

The operating temperature should not exceed +80° C, measured at the centre of the gearbox after about 2hrs of constant load.

The upper limit temperature for mineral oil and seal rings under continuous operation is 80° C.

The permissible operating data (torque, speed, shaft power and temperature) must not be exceeded. These operating data are specified on the nameplate, in the catalogue and on the data sheet.

### 6.2 Motor

The standard motor is dust and splash-proof according to Protection Class IP54.

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The specified protection class and temperature class for the motor (see type plate) must be observed. Please refer to the operating instructions or the note inside the terminal box for correct connection of the motor and other components (brake). Radial and axial run-out tolerances of motor flange and shaft should be "N" according to DIN 42955. The permissible operating data (performance, speed, temperature) must not be exceeded. These operating data are indicated on the nameplate.

### 6.3 Delivery condition

Delivery is possible with or without motor.  
 The gearbox is factory-filled with oil.  
 Gearboxes with pressure ventilation are sealed by a locking screw.  
 The locking screw is included in the delivery.  
 Gearboxes with ventilation are sealed by a locking screw.  
 The locking screw is included in the delivery.

### 6.4 Painting

Gear units are delivered unpainted.  
 When painting, please cover sealing rings and mounting surfaces. After painting, remove covers.

### 6.5 Transport, storage

Please use sufficiently dimensioned and appropriate means of transport. Details on the weight of the device can be found in the catalogue. Damage to the gearbox must be avoided.

### 6.6 Storage

The gearboxes should be stored for no longer than 1 year after delivery. Storage should be in the position of use, covered and with the locking screw in place. Bare surfaces should be slightly oiled. Storage should be in a dry place at -5° C to 25° C. Prolonged storage time reduces the service life of gear oil, gear grease and lubricant for roller bearings and seals.

### 6.7 Assembly

Clean and dry any mounting surfaces with non-aggressive, fat-dissolving agents.  
 Do not use compressed air, as this might damage the seals.  
 Always use appropriate tools for mounting couplings, discs, cogs and chain wheels to the shaft. Hammering or forcing on without support might result in damage to the gearbox or motor.  
 Take care to fasten screws without tension.  
 Screws for the flanges and feet should be of Strength Class 8.8.

### 6.8 Installing the motor to the gearbox

Precisely align the motor shaft and the bore of the drive side of the gear to each other. Imprecise alignment can lead to bearing damage and rupture of the shaft.  
 Special assembly instructions for planetary gears are included in the delivery.

### 6.9 Installing the gearbox to the machine

Precisely align the output shaft of the gearbox and the machine shaft to each other. Imprecise alignment can lead to bearing damage and rupture of the shaft.  
 Special assembly instructions for the shrink disc or clamping hub are included in the delivery.

### 6.10 Commissioning and operation

If the gearbox has to be vented, replace the locking screw by the vent screw.  
 If the gearbox has pressure ventilation, replace the locking screw by the pressure vent valve.

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Turn on the drive

Warm up the drive

Run drive at full load

The gearbox has reached a thermally steady state, once the temperature increase does not exceed 2° C/h

Check gearbox for leaks.

With geared motors, make sure that the motor fan's cooling air stream can pass freely around the gearbox.

Series K actuators are delivered in operational condition. They can be operated in both directions of rotation, and adjusted even at standstill.

Series K actuators are completely closed and can therefore be assembled and operated in any position.

Series R actuators, as well as most of the attached spur gear units are completely closed and can be mounted and operated in any position.

### 6.11 Electrical connection of the motor

After checking the voltage and frequency values, the drive motor should be connected by qualified personnel according to the wiring diagram (located inside the terminal box cover).

With pancake motors

The motor armature voltage has to match the armature voltage of the power supply unit.

With DC shunt motors

Armature voltage and field voltage of the motor have to match the armature voltage and field voltage of the power supply unit.

## 7. Maintenance, disposal

### 7.1 Gearbox

Maintenance schedule

Visual inspection for oil leakage and running noise during commissioning

First visual inspection for oil leakage and running noise after about 6 months

Regular visual inspection for oil leakage and noise every 6 months

Every 10,000 operating hours or at least every 2 years: Oil change

At least every 10 years: General overhaul

### 7.2 Transmission oil

We recommend an oil change approximately every 8,000 hours of operation because soiled oil causes increased wear.

Bring the gearbox to temperature, then empty all the oil through drain plug M... DIN 910. We recommend to rinse residual pollution out of the gearbox. For this purpose, pour in oil, shut drain screw and drain oil again after a short run. Then shut drain screw and fill in specified amount of oil. Tightening torque for the drain screw is  $M_a \sim 10\text{Nm}$ .

The drain screw seal A16x20x1, 5 DIN7603 (HEYTRACTION SNR: ..... ) should be renewed.

Check drive for damage

Check radial shaft seals for leaks. Radial shaft seals are wear parts

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### 7.3 Motor

#### 7.3.1 Replacement of brushes in DC motors

Checking the carbon brushes in DC shunt motors is required after approx. 1,000 hours of operation, in pancake motors after 3,000 hours of operation (with form factor better than 1.1). Since brush wear depends on the average engine speed, these are approximate values.

### 7.4 Disposal

When disposing of the gearbox, the relevant national regulations have to be observed.

## 8. Malfunctions

Fault	Possible cause	Solution
Drive does not run	No voltage	Check connection
	Electrical connection incorrect	Check voltage supply
	Load too high	Reduce load
Motor is rotating, gearbox output shaft is not	Shaft breakage due to excessive load	Contact Heytraction
	Slipping shaft connection	Contact Heytraction
	Load too high	Reduce load
Increased operating temperature	Motor heats up gearbox	Ensure sufficient cooling
	Ambient temperature too high	Ensure sufficient cooling
Increased running noise	Damage to gearbox	Contact Heytraction
	Strained motor mounting.	Contact Heytraction
	Bearing failure	Contact Heytraction
	Damaged gear teeth	Contact Heytraction
Loss of lubricant in motor or gearbox	Seal defective.	Contact Heytraction

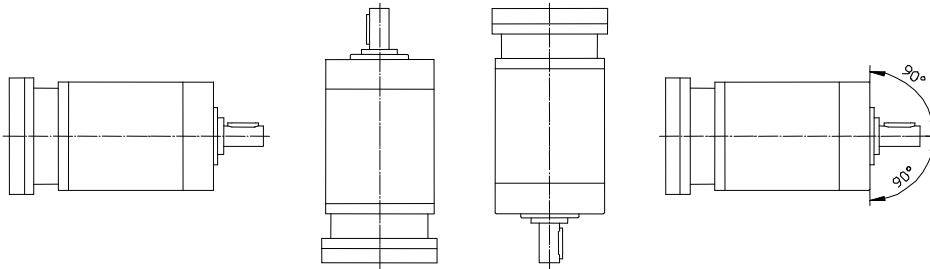
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## 9. Installation Position

H	VO	VU	H90
Horizontal	Vertical	Vertical	Horizontal
	Output top	Output bottom	Swivel 90 °



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## 10. Quantities and types of oil

Gearbox			Oil or grease	Filling quantity cm <sup>3</sup> for Types B3, B5, B14	Designation	
K2			Heytraction-Oil	130	Independent of position	2
K21			Heytraction-Oil/ Mobilgear 600 XP 220	130/70	Independent of position	2
K22			Heytraction-Oil/ Mobilgear 600 XP 220	130/110	Independent of position	2
K23-K27			Heytraction-Oil/ Mobilgear 600 XP 220	130/120	Independent of position	2
K239-K249			Heytraction-Oil/ Mobilgear 600 XP 220	130/230	Independent of position	2
K259-K269			Heytraction-Oil/ Mobilgear 600 XP 220	130/215	Independent of position	2
K230-K240			Heytraction-Oil/ Mobilgear 600 XP 220	720	Independent of position	2
K240-K260			Heytraction-Oil/ Mobilgear 600 XP 220	660	Independent of position	2
K2S1					Independent of position	2
R4			Heytraction-Oil	300	Independent of position	2
R41			Heytraction-Oil	450	Independent of position	2
R42			Heytraction-Oil	500		
R430-R460			Heytraction-Oil/ Mobilgear 600 XP 220	300/550	Independent of position	2
R5			Heytraction-Oil	600	Independent of position	2
R51			Heytraction-Oil		Independent of position	
R52			Heytraction-Oil		Independent of position	
W2			Unimoly Oil 460	70	Independent of position	2
W3			Unimoly Oil 460	75	Independent of position	2
W10			Unimoly Oil 460	100	Independent of position	2
W15			Unimoly Oil 460	150	Independent of position	2
G21			Mobilgear 600 XP 220	70	Independent of position	2
G22	GN22	GS22	Mobilgear 600 XP 220	110	Independent of position	2
G23-G27	GN23-GN27	GS23-GS27	Mobilgear 600 XP 220	120	Independent of position	2
G239-G249	GN239-GN249	GS239-GS249	Mobilgear 600 XP 220	230	Independent of position	2
G259-G269	GN259-GN269	GS259-GS269	Mobilgear 600 XP 220	215	Independent of position	2
G51			Mobilgear 600 XP 220		vented	
GS41			Mobilgear 600 XP 220	110	Independent of position	2
GS42			Mobilgear 600 XP 220	260	Independent of position	2
GS430-GS460			Mobilgear 600 XP 220	420	vented	3
GS51			Mobilgear 600 XP 220	150	Independent of position	2
GS52			Mobilgear 600 XP 220	500	Independent of position	2
GS71			Mobilgear 600 XP 220	420	Independent of position	2
GS72			Mobilgear 600 XP 220	1100	Independent of position	2
GPT55 +	i=3...10		Mobilgrease 28	12		1
GPTM055..	i=9...100		Mobilgrease 28	20		1
GPT75 +	i=3...10		Mobil SHC 629	20		1
GPTM075..	i=9...100		Mobil SHC 629	35		1
GPT90 +	i=3...10		Mobil SHC 629	40		1
GPTM090..	i=9...100		Mobil SHC 629	80		1
GPT120 +	i=3...10		Mobil SHC 629	100		1
GPTM120..	i=9...100		Mobil SHC 629	170		1
GPT 155 +	i=3...10		Mobil SHC 629	180		1
GPTM155..	i=9...100		Mobil SHC 629	350		1
GPR75	i=3...7		Mobil SHC 629	14		1
	i=9...36		Mobil SHC 629	24		1
	i=48...343		Mobil SHC 629	31		1
GPR100	i=3...7		Mobil SHC 629	35		1
	i=9...36		Mobil SHC 629	48		1
	i=48...343		Mobil SHC 629	80		1
GPR125	i=3...7		Mobil SHC 629	80		1
	i=9...36		Mobil SHC 629	150		1
	i=48...343		Mobil SHC 629	250		1
GPR150	i=3...7		Mobil SHC 629	180		1



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	i=9...36		Mobil SHC 629	250		1
	i=48...343		Mobil SHC 629	420		1

1	The oil quantities specified relate to installation position H (Design B3, B14, B5) insofar as the gears are not independent of position.
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2	Used independently of position, sealed
---	--

3	Venting at start-up, Replace locking screw by Vent screw
---	--

Series K and R actuators are filled at the factory with a special oil filling adapted to this gearbox type, which is designed as lifetime lubrication.

The drive is thus maintenance-free.

Only this Heytraction oil ensures optimum and trouble-free operation of the drive.

In cases of oil loss or gear repairs, Heytraction oil must be used under any circumstances.

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### 10.1 Oils and grease

	Mineral oil	Synthetic oil	Mineral grease	Synthetic grease	Traction fluid
Heytraction	none	none	none	none	Heytraction oil
Mobile	Mobilgear 600 XP 220 *	Mobil SHC 629 *	Mobilux 2	Mobilgrease 28 *	none
Esso	Spartan EP 220	Glycolube 150	Beacon EP2 *		none
Aral	Degol BG220	Degol GS 150	Aralup HL 2		none
Castrol	Alpha SP220	Alphasyn PG 150	Sheerol AP2 *		none
Fuchs	Renolin CLP 220	Renolin PG 150	Renolit FWA 160		none
Klüber	Klüberoil GEM 1-220 Unimoly Oil 460 *	Klübersynth GH 6-150	Klüberplex BEM 41-132		none
Shell	Omala 220	Tivela S 150			none
BP	Energol GR-XP 220	Enersyn SG-XP 150	Energrease LS 2		none

Do not mix different sorts of oil and grease