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Installation instructions

according to Annex VI of the EC Directive 2006/42/EC Mechanical Equipment and further product details

Elevator Machine

Model: *oms*Hypodrive AZHP 3

Please archive this document for future reference

OMS No.

Date of Manufacture
Month / Year

Translated from german original

List of Contents

1 Introduction

These instructions include pictograms for commenting on Warnings and Safety Issues.

Application Tip: Additional Comments and Information, no danger involved

Warning: of a general risk for the machine or a human safety hazard

Warning: of dangerous currents, a liability of serious damage to health or death

Warning: of hot surfaces, a liability of serious damage to health and / or serious material damage

Warning: of crush injuries, a liability of serious damage to health

Warning: of drawing in, a liability of serious damage to health

Warning: DANGER
Risk for the machine or a human safety hazard, a liability of serious damage to health or death

2 Safety Instructions for OMS Elevator Machines

2.1 Applicable Use

The OMS-Elevator Machine AZHP 3 is for operating electrically driven sheave drive elevators for passengers or goods according to EN 81-1. The installation and use of the AZHP 3 for other purposes is not applicable. The OMS ANTRIEBSTECHNIK are not liable for personal injury and or damage resulting from none applicable applications.

All Planning, installations and maintenance work may only be carried out by qualified personnel. Qualified personnel are such who having studied for qualifications, or are experienced, or have received instruction and have the knowledge relating to the relevant standards and directives, safety regulations and local knowledge required to install and maintain the machine and be able to recognise and access the risks appertaining to this machine. (Qualified Personnel, as defined in IEC 364).

This OMS – Elevator Drive is applicable to the 9th Directive of the Machine and Product Safety Law and the 2006/42/EC Machine Directive. It is part of a plant that it is to implement in an elevator system and is therefore not liable for CE certification.

The commencement of regular use is not permitted until the erection (according to Elevator Directive 98/16 EC) has been completed in the pre determined elevator system and the CE label has been applied to the elevator to show that the safety requirements have been fulfilled for the machine as supplied by the manufacturer.

All other required regulations and certificates (e.g. applicable to general use, maintenance and inspections) remain in force.

The drive manufacturer only respects the warranty for operation and safety of the drive if it is has been erected, maintained and operated according to the printed specifications supplied individually with each drive. The warranty is void if the parameters outlined in the operating, maintenance and control documentation have been exceeded. An incorrect installation or incorrect use of the system, and or violation of the standards outlined above, lead to a complete and absolute none liability of the drive manufacturer.

The motors should only be used in conjunction with frequency converters.

Customer supplied frequency converters must be set up according to their instruction sheets, in order to comply with the requirements of the OMS-Elevator Machine.

The OMS-Elevator Machine AZHP 3 is for operating elevators and has been designed for installation in an enclosed area (e.g. elevator shaft or machine room).

OMS Drives may only be stored, erected and run in dry closed areas. The IQ/OQ representative and the user must ensure that adequate measures are taken to avoid a contamination with building dust and or dirt.

The machine may only be stopped by the frequency converters and with the machine brake.

OMS-Elevator machines may only be operated when in technically good condition and within the parameters as described by OMS.

Applicable use also includes the following:
- Working according to the supplied instructions,
- Observing the regulatory safety and environmental requirements,
- Adherence and observance of the Elevator documentation and regulations.

2.2 None Applicable Use

OMS Drives may not be operated in potentially explosive or environmentally aggressive areas.

The double circuit safety brake is only designed for a limited number of emergency stops. It's use as a stand operation brake is not permissible.

Further operation is not permissible once the pre determined wear points have been achieved.

Permissible Limits:

- max. Motor Speed: refer to technical documentation.
- max. Drive Wheel Load: refer to technical documentation.
- max. Number of Starts / Hour = 240.
- Local ambient temperature during operating min.: 5° C, max.: 40° C.
- The technical data and specifications on the Motor Data Label are only valid for an installation height up to h ≤ 1000m over NN.
- Max. rel. Humidity: 85% at 20°C (none condensing).
- Operation under extreme climatic conditions must be clarified with OMS.

None applicable use also includes the following:
- Dry operation without oil or use of a lubricant other than specified.
- Securing the drive with bolts weaker than those specified.
- Opening the Gearbox when installed on the drive.

Important:

- All work related to; Transport, Electrical Connections, pre-Service Checks and Maintenance of the Drive System must be carried out by qualified technicians. Incompetent work can lead to serious personal injury and / or damage.

Warning! Special Notes appertaining to AZHP 3:

- The machine is very efficient and has a very low natural friction rate. The machine operates immediately after the brake has been released.

- During the installation of the Safety gear, it is important that the Machine Brake is available and that the brake can be operated at any time as and when required.

- Using the elevator when the Emergency Brake is not operable is forbidden. The operator is responsible for the welfare and safe running of the elevator and all persons within.

  Regular checks should not cause wear or stress which could lead to a lessening of elevator safety.
  Periodic tests can be done with test weights and nominal speed.
  Alternatively the test can be done with an empty car and nominal speed (up to $v = 2ms^{-1}$).

- The cabin may only be pulled out of the Safety gear by moving the cabin in the opposite direction that caused the Safety gear to holt the elevator. The elevator Machine may only be operated in a situation with the maximum loads as given by the machine specification. All other methods, which would put additional static or dynamic loads on the for example the Traction sheave, Motor or Gearbox are forbidden. OMS will not respect any warranty claims resulting from practices other than those laid out in this document.

- Ensure that the motor does not rest on or against the frame. If this should be the case, take appropriate action to remedy to free the motor. Take care to inspect the motor and the frame on each installation and document your actions.

2.3 Warranty and Liability for the Elevator Drive

- The drive manufacturer only respects the warranty for operation and safety of the drive if it is has been erected, maintained and operated according to the printed specifications supplied individually with each drive.
- The warranty is void if the parameters outlined in the operating, maintenance and control documentation have been exceeded.
- The customer is responsible for the qualified installation of the drive by certified personal.
- If damage or other problems are found on the elevator or the drive, then the system must be disabled, otherwise the operator will be liable for all damage and injury appertaining thereto.
- An incorrect installation or incorrect use of the system, particularly with respect to the forbidden procedures outlined above, or changes made to the machine or its components, lead to a complete and absolute none liability of the drive manufacturer.
- This is also applicable, when after damage has occurred, the operator and/or the installer and /or the maintenance company cannot supply a fully documented list of procedures relating to the erection, testing, maintenance and SOP's of the elevator (Elevator Book etc).

2.4 Dangers, that are associated with the Elevator Drive

Our elevator drives are at the cutting edge of technology and are delivered in a safe operating configuration. Any changes made by that customer or his operative that may affect the inherent safety of the elevator drive are not permissible.

The Drive Sheave and the Hand Wheel of the AZHP 3 are delivered by OMS without a safety cover and may only be operated in a secure Machine Room. Take care when working the Machine Room that an adequate safety distance is maintained away from the moving parts (yellow).

The elevator supplier is responsible for installing safety shields if required.

2.5 Instructions for Safe Use

If changes are observed during the service lift of the machine, e.g. wear, ageing etc. then the machine should be serviced and the changes dealt with, according to the OMS General- and Maintenance Instructions.

The gearbox may only be opened by OMS at our factory site; the warranty will otherwise become invalid.

2.6 Requirements and Qualification - Installation and Maintenance Personnel

All installations, maintenance work and repairs on the electrical parts of the machine may **only** be carried out by qualified personnel.
Qualified personnel are such who having studied for qualifications, or are experienced, or have received instruction and have the knowledge relating to the relevant standards and directives, safety regulations and local knowledge required to install and maintain the machine and to be able to recognise and assess the risks appertaining this machine. (Qualified Personnel, as defined in IEC 364).
OMS recommend that the technical personnel acquaint themselves with the machine before it is erected and taken into service. Please read the General- and Maintenance Instructions carefully, these instructions will aid you to find mistakes and technical deficiencies during the installation and operating life of the machine.

2.7 General Information

Should damage occur during transport, or should the machine appear during erection to have errors or be damaged, please contact OMS and inform us of the damage or error.

In case of damage caused by water, please contact OMS.

A decision as to whether the damage or error can be rectified on site or not, can first be taken after the customer has contacted OMS. OMS will then decide if the machine can be taken into service or whether the machine should be returned with the original packaging – to OMS.
Please retain the original packaging until after the machine has been taken into service.

OMS will not accept responsibility for the correct installation and function of the elevator in the shaft.
The responsibility for the correct installation and function of the elevator in the shaft lies with the elevator supplier and / or the elevator operator.

3 Installation and Preparing for use

3.1 Assembly

It is important that the planned frame or foundation for the elevator machine(s) has been calculated with an adequate reserve.
The frame must be stiff enough to resist the tension- and torque stresses that will occur during normal operation.

3.1.1 Elevator Machine, complete

Fasten the Machine in the required position via the four mounting holes in the Gearbox Supports. Recommended is a through and through fastening with complete bolts each with a securing nut.

Bolts: ***M 20 in Quality 10.9***
Torque: ***350 Nm***
Max. allowed uneveness of the surface: 0,05mm
If necessary, use shimps to achieve the requires eveness. If required, supporting brackets and distancing plates should be used. (see examples, Figs 16 and 17).

Pre Use Requirements:

Exchange the labelled sealing plug on the Gearbox Casing with the supplied Oil Dipstick or the supplied Air Bleeder Valve. Take care to observe the correct positioning of the Gearbox (See Figs. 10-15). Retain the sealing plug for possible future transportation of the Machine.

Important:
The Gearbox has been sealed against oil leakage during transport. The Gearbox is airtight due to the sealing plug(s). If the Gearbox were to be taken into use with the sealing plug(s) in place, then excess pressure may build up in the Gearbox, eventually causing the Gearbox to leak – oil will be pressed out through the Shaft Gaskets.
The Oil Dipstick does not seal the Gearbox.

Electrical Connections

Only qualified personnel may open the Terminal Box on the Motor and connect the machine to the electrical supply. **Only** qualified personnel may carry out repairs and service work on the electrical parts of the machine.
Disconnect the main switch beforehand and secure the switch against unintended operation!

"The Safety Rules for the Construction and Erection of Elevators" according to DIN – EN 81-1 must be observed at all times.

Important:
The electrical system for the machine has been designed according to: EN 60 204 – 1.

In order to ensure failure free function of the machine, it is recommended that all wiring should be shielded according to the standard EMV regulations. Avoid ground loops when connections include multiple shields.

Procedure:

1. Motor:
The electrical connections should be connected as per the diagram in the Motor Terminal Box. (See also: Appendix, Electrical Connections). Should a different wiring exit position be required, the Terminal Box can be turned by loosening the internal fixing screw and repositioning the Terminal Box.
Please take care when adjusting the fine wiring of the temperature monitor switches.

2. Frequency Converter:
The connection and setting up of the Converter together with the OMS-Elevator Machine must be carried out according to the instructions supplied with the Converter.

3. Incremental Encoder:
The Incremental Encoder (between Motor Cover and Hand wheel) is supplied with a 5m-shieded cable and a 2 row 15-pin connector, which should be connected to the Frequency Inverter. The shielding is wired to the plug casing, PIN 12 and the Incremental Encoder.
According to the Incremental Encoder used, the wiring for the connector can vary (See Appendix, Electrical Connections, Incremental Encoder).
Should the Connector on the Frequency Inverter be non-compatible, adapters and longer cables are optionally available (See Appendix).

4. Brake Solenoid:
The connection of the Brake Solenoid (Two Circuit Double Stroke Expanding Magnet), should be carried out according to the current regulations and requirements (See, Appendix, Brake Solenoid).

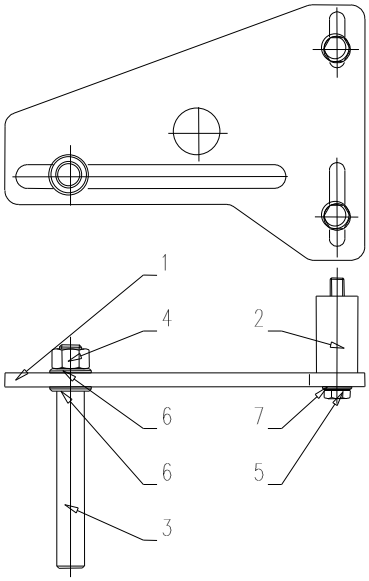
a) if the machine is accessible in a service room, then both Brake Magnet Circuits may be connected to a single Control Module.
b) in the machine is installed in an inaccessible position, and if emergency control and checking of each circuit will be done by purely electrical means, then each Magnet must be connected to two separate Control Modules, which in turn must be individually wired (for checking the individual Brake Circuits, Ref. 5.2.3- b1).

3.1.2 Safeguard Device against Rope Jumping

The safeguard devices must be fitted to the elevator machines. The Rope Jump Devices can be fitted after the cables have been installed. They must be adjusted so that they do not rub or bind and there must be a gap between the Ropes of between max. 1 – 2 mm.

The safeguard device against rope jumping is supplied **twice** and consists of the following components each:

- 2 Distancing Cylinders
- 1 Bracket
- 2 Bolts M 10x75
- 1 Safety Bolt M16



1. **Bracket 2**
2. **Cylinders**
3. **Bolt**
4. **Nut – M16 – 8**
5. **Bolt – M10 x 75– 8.8.**
6. **Washer A – 10,5**

Fig. 1: Assembly, Safeguard Device against Rope Jumping

Fitting the Safeguard Device against Rope Jumping and determining the rope run through direction:

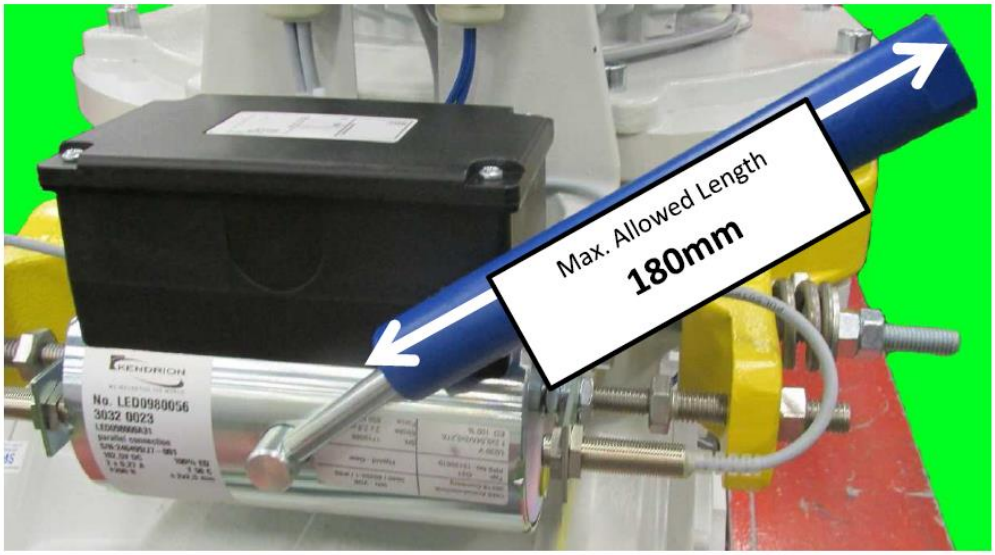
1. Loosen the Bolts M 10 x 75 (2 per Bracket)
2. Swing the Rope Jump Resistor into the required position.
3. Bolt the Bracket to the nearest available hole in the Gearbox casing using the bolts; M10x75.

Adjustment according to the Drive Sheave diameter:

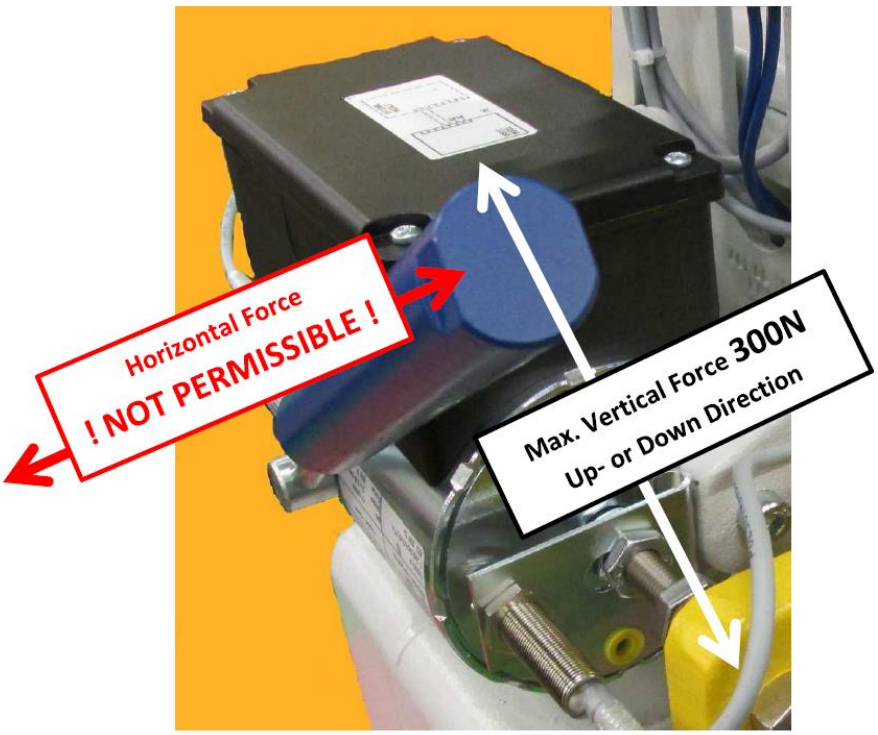
1. Loosen the M16 nut on the Safety Bolt.
2. Push the Safety Bolt along the slit to the required position.
3. Retighten the M16 nut on the Safety Bolt.

3.2 The Brake

3.2.1 Manual release lever



To open the brake it´s allowed to put an extension tube onto the manual release lever.
The maximum allowed length of the extension tube is **180mm**.
The manual release lever is allowed to be actuated in **vertical direction**. **ONLY!**
The maximum allowed force for actuating the manual release lever with extension tube is **300N**.



3.2.2 Setting the Brake

The required Magnet Field Strength and Spring Resistance is determined in the factory according to the rated torque of the Motor. Normally implementing a short overexcitation will open the Magnet, i.e. the Magnet is opened with a higher force.

To compensate for wear of the Brake Lining and allow for a visible wear check, a gap of 1,5mm is set between the Magnet Pins and their relevant Pressure Bolts.
(Control and Adjustment of this gap, Ref. 5.2.2).

Before the Elevator is taken into service, the function of the Brake System must be controlled. If the Braking Torque does not suit the local requirements, you can set the Braking Torque accordingly.

According to the rated torque of the Motor, the following Braking Torques have been pre set at the factory (T_B =1,2 *T_{Nenn}), per Braking Circuit (= per Braking Lever) (See Table):

Motor Rated Torque T *) [Nm]	**Brake Torque** p. Brake Lever B *) [Nm]	**Spring** Length (L) Pre Set [mm]	**Spring** Length (L) Min [mm]	**Magnet** Size Model	**Magnet** Rated Torque [N]	**AZHP 3** Model *)
Up to 90	108	76	74	031, 033	720	Standard : HD
120	120	73	69	041, 043	1100	HD ; HD Plus

*) See „Technical Data OMS-AZHP 3"

3.2.2 Adjusting the Brake Point:

1. With the Brake disengaged, loosen the frontal Nut M12 on the Brake Lever.
2. Pull the Safety Cover back. (See Fig. 11).
   The pre set Brake Spring Pressure can be adjusted by turning the Brake Spring Pressure Screw. (Turning clockwise increases the pre set Pressure).

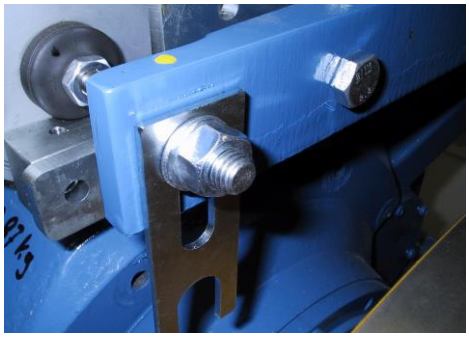


Fig 2: Loosened Brake Spring Pressure Screw

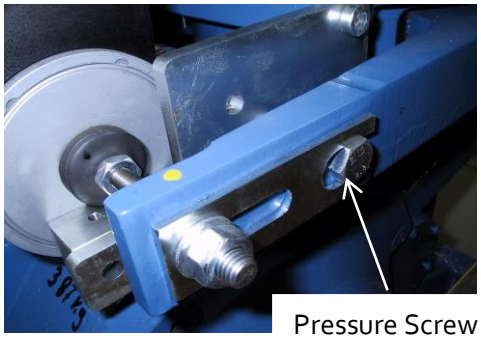


Fig. 3: Tightened Brake Spring Pressure Screw

3. Measure the pre set Spring length L between both the Contact areas. (See Fig. 5).

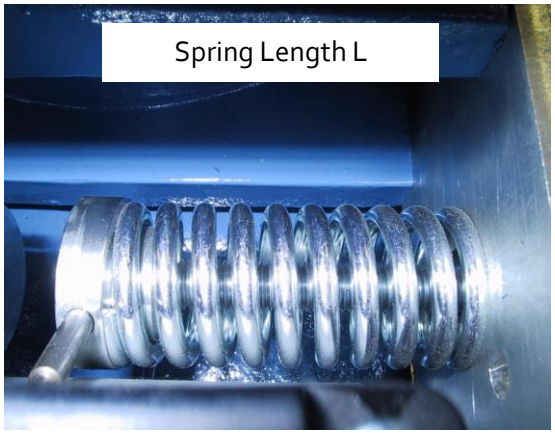


Fig. 4: Measuring the Spring length (L)

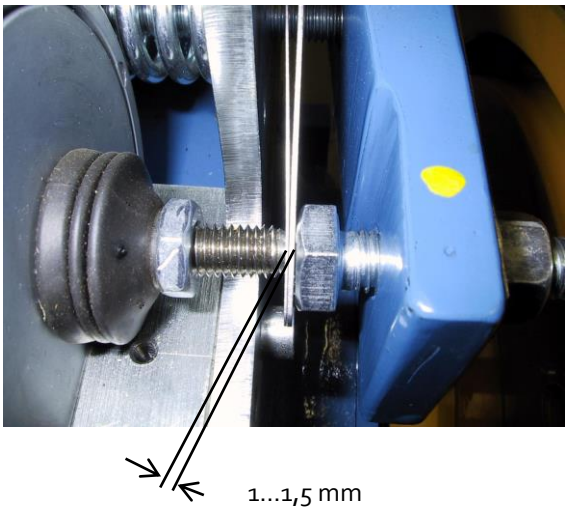


Fig. 5: Magnet Clearance

4. Once the required value has been achieved, move the Safety Cover forward into position over the head of the screw. If required carefully tighten the screw further.
5. Tighten the M12 nut, then check the Magnet clearance – using the Lever – as to whether the required clearance is available. If required, the Pressure Screw can be adjusted until the required 1,5mm clearance has been achieved.
6. Check whether the Brake Magnet correctly opens, mechanically by using the Control Lever, and electrically by using the Elevator Controls.

3.2.3 Control, Both Brake Circuits:

Comments: The procedure for conducting the final check of the Brakes as part of the Elevator Acceptance Test is not described in detail here. Please refer to the relevant safety regulations and requirements.

a) For an accessible machine,
If the machine is accessible in a Service Room or Elevator Shaft, then it is possible using a tool (heavy-duty screwdriver) to laterally open the Brake levers and simply check the operation of each Braking Lever individually.

b) By Remote Control
If the machine has been installed in an inaccessible position, then an electrical or mechanical Remote Control will be required.

b1) Separate External electrical Remote Control:
To check the single Braking Torque of each Brake Circuit, the Brake Levers can be individually switched through the Electromagnets.

b2) Mechanical Remote Control:
To check the Brake Levers individually two linkages can be optionally supplied. They can be fitted with corrosion proof activator cables enabling the operator to check the Brake Levers from an accessible position.

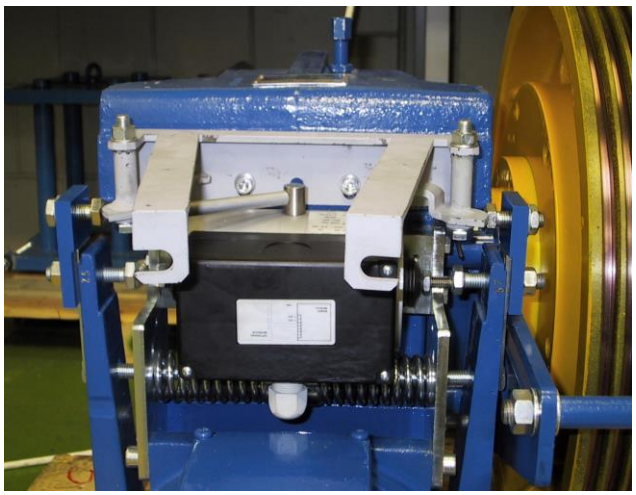


Fig. 6: Remote linkage for remotely opening the Brake Levers.

3.3 Emergency Release – Installation and Operation

The required ***Emergency Instructions*** – that must be placed adjacent to the Emergency Release – are not described here. Please refer to the relevant safety regulations and requirements**.**

a) for an accessible machine

Is the machine accessible in a Service Room or Elevator Shaft**,** then the Brake can be opened with the standard Lever on the Brake Magnet. If required the Elevator Cabin can be moved by turning the Hand Wheel on the Motor.

b) By Remote Control

If the machine has been installed in an inaccessible position**,** then an electrical or mechanical Remote Control will be required.

b1) External Electrical Remote Control: If an ***Emergency Power Source*** is available**,** then the Electromagnets and the Motor can be wired into the Emergency Power.

b2) mechanical Remote Control: The **brakes can be opened** using the (optional) external **Brake Lever linkages**. (Ref. 3.2.3- b2).

3.4 Adjusting the Brake Function Control

Fig. 7

The Sensor must be installed with a clearance of 3,0mm between the Sensor and the Brake Magnet Casing. The sensors must be adjusted when the Brakes are in an applied state.
After adjusting the sensor, you must test the function of the sensor.

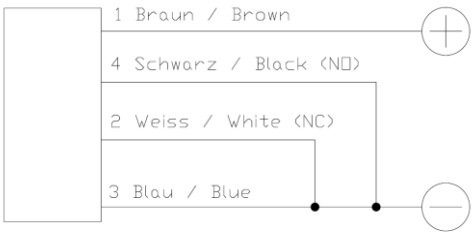
Inductive Brake Function Sensor Information:

Calculated switch clearance: 4,5mm
Standard Function – The electrical circuit is closed when the brake is open

Electrical Data:

Voltage:	10-30 V
Output (max):	200mA
Switch frequency (max).:	500Hz
Switch:	NC / NO
Connection:	Cable Length 2m

Connection Diagram, Output: DC



<u>Connector diagram NC / NO</u>

NO: Black - Blue
NC: White - Blue

3.5 Installing the Rope Clamp

During repair and revision periods a (optionally available) Rope Clamp can be fitted, so avoiding Rope slippage through the Traction Sheave.

The Rope Clamp must be fitted to one of the openings in the Traction Sheave. (See Fig. 9). Take care, that the lug on the Clamp Bracket snaps behind the frame that follows the opening. Thus preventing a slipping of the Rope Clamp after releasing the Locking Bolts.

Both Locking Bolts should be tightened so that the inner and outer bars lie parallel to each other. The inner bar is supported by the frame thus ensuring that all the ropes equally support the resulting forces.

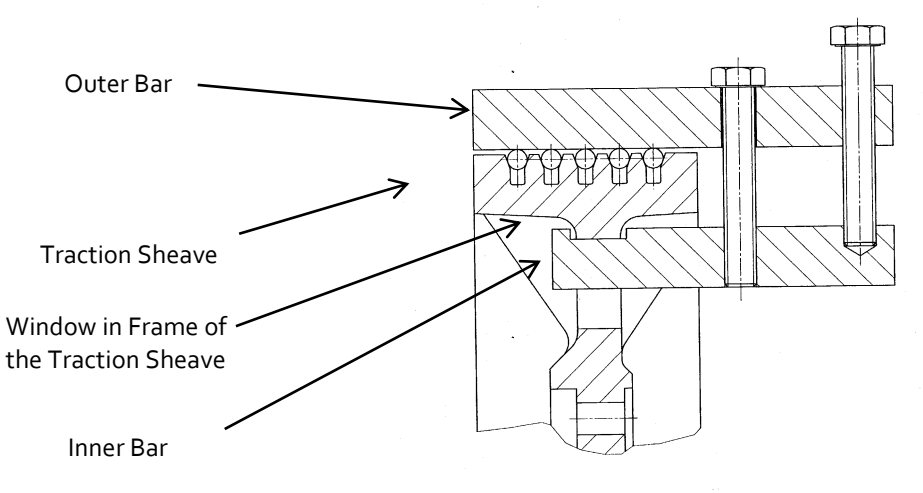


Fig. 8: Rope Clamp, fitted to the side of the Traction Sheave

When using a Rope Clamp ensure that:

1. It cannot collide with other parts of the machine.
2. It cannot get tangled in the vertical elevator ropes.
3. It cannot block the machine.
4. That the next following Rope Jumping Safeguard Device cannot support or obstruct the Rope Clamp. If necessary, remove the Bolt from the Safeguard Device.

It is not permissible to raise the cabin out of the trap by using the Rope Clamp, an additional „loose rope" and letting the balance weight fall.

4 Construction And Function

Due to the high efficiency ratio of approx. 96% the machine generates little excess heat, this ensures that the modules and aggregate parts and electronics are not exposed to excessive temperatures and therefore a detrimental effect – ageing and wear – on these parts due to temperature influence is kept to a minimum.

This also means that the oil in the gearbox can be regarded as a **Life-time-Lubrication**. In an ambient temperature of approx. 35°C and a continuous operation mode the gearbox oil can be used for 40,000 machine hours. Apart from the routine checks, the viscosity of the gear-box oil should be checked every 2 – 3 years (Ref. Chapter 6).

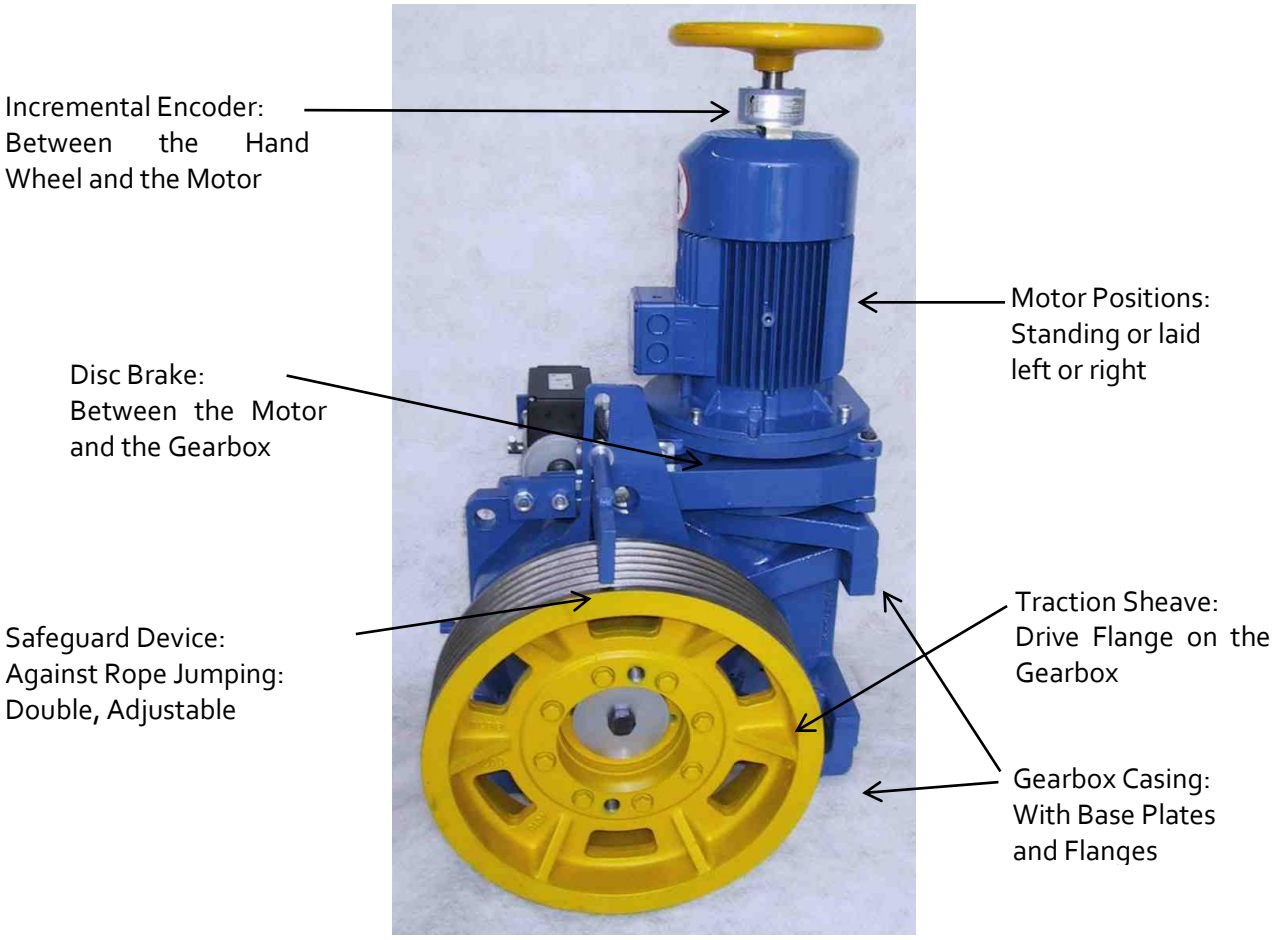


Fig. 9: OMS-Elevator Machine AZHP 3, General Layout

4.1 Technical Data

The efficiency of the OMS-Elevator Machine, relationship to the Elevator Cabin (1:1 or 2:1), Gearbox Version Specification, and possible installation constellations can be found in the Appendix:
„Technical Data OMS – Elevator Machine AZHP 3"

All measurements and fitting details for the OMS Elevator Machine can be found in the Appendix:
"Dimensions Sheet – Elevator Machine AZHP 3"

4.2 Noise Emission Information

All OMS elevator machines are subjected to a thorough noise emissions test before leaving our factory site.
The test is conducted according to DIN EN ISO 11200 at a mean distance of 1 meter to the machine surface.

Test procedure:
The machines are driven through Frequency Converters on a test rig in a sound absorbing room, the actual load corresponding to the load and the speed of the machine at constant travel speed. When working to the given limits, the machines fulfil the following noise emission requirements.

Machine	**typical Sound Pressure Level $L_{p,A}$**
AZHP 3 – LD, HD	61 dB(A) at n≤1.500 min^{-1} speed, Motor 15kW
AZHP 3 – HD+	62 dB(A) at n≤1.500 min^{-1} speed, Motor 20kW

Depending on the construction, these values may vary.

4.3 Manufacturers Identification Plate

The following information can be found on the manufacturers identification plate. For Example:

OMS ANTRIEBSTECHIK
36219 CORNBERG
GERMANY

AZHP 3-37HD+-11T-K605-02-B3
OMS Nr. - Baujahr xxxx-mmyy
OMS-Auftrag: xxxxxx
Kommission: xxxxxxxxx
Übersetzung: 36,85/1

Model: AZHP 3
Ratio: 37
Set Up Configuration: HD+
Motor Model: 11
Encoder: T
Traction Sheave: K605
Brake Model: 02
Mounting Configuration: B3
OMS-No. - xxxx-Month Year
MMYY

4.4 Modules and Additional Parts – Spare Parts

The OMS-Elevator Machine AZHP 3 consists of:

- Gearbox complete
- Motor, complete with Incremental Encoder (between Hand wheel and Motor Cover)
- Brake system, complete (including Brake Drum and Clutch)
- Traction Sheave
- Safeguard device against Rope jumping (2-x)

Optional:

- Rope Clamp
- Lever System (2-x, each for opening one Brake Circuit manually)
- Traction Sheave Brake, a safety item for controlling the speed of an ascending cabin as specified in EN 81

4.5 Alternative Configurations

The elevator machines can be supplied with the following alternative configurations:

- Gearbox: Ratio ***i = 18,99*** (Suspension. 2:1), ***i = 36,85*** (Suspension 1:1), ***i = 13,57*** (Suspension 2:1) and ***i=24,68*** Suspension (Suspension 1:1 and 2:1).
- Electric motors: various sizes
- Incremental Encoder with various signal outputs: SINE, HTL, TTL
- Brake solenoids and Brake Springs: various strengths and electrical controls
- Traction Sheave: various diameters (320, 450, 500, 560, 650 mm, others optional)
- Safeguard device against rope jumping: Various fitting lengths, corresponding to the traction sheaves, are available

4.6 Gearbox Variations and Applicable Mounting Configurations

The design of the OMS-Elevator Machine AZHP 3 enables an erection in various constellations:
The following diagrams show the Output Shaft and the dotted outline of the Traction sheave. In the standard Gearbox version, the Output Shaft is located to the left of the long axis of the Motor (Version A). The Drive Shaft can be optionally positioned to the right of the long axis of the Motor (Version B). According to the configuration, the Oil Dipstick or Air Bleeder Valve will be found on the highest position on the Gearbox Casing (See the notes on the diagram).

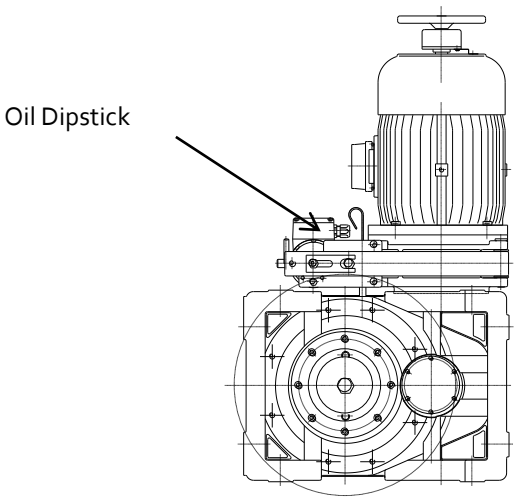


Fig. 10
Standard (Version A1), Motor vertical

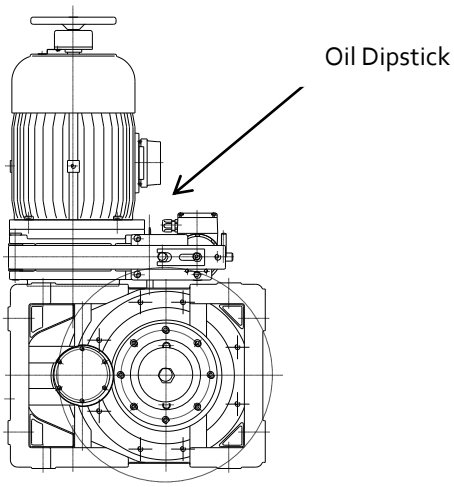


Fig. 11
Standard (Version B1), Motor vertical

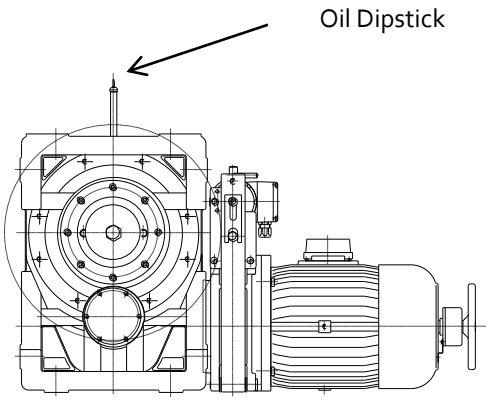


Fig. 12
(Version A3),
Motor Horizontal (low)

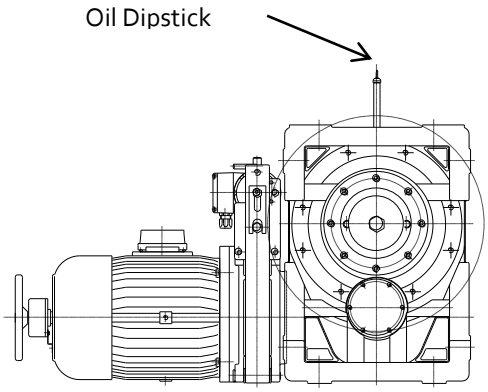


Fig. 13
(Version B3),
Motor Horizontal (low)

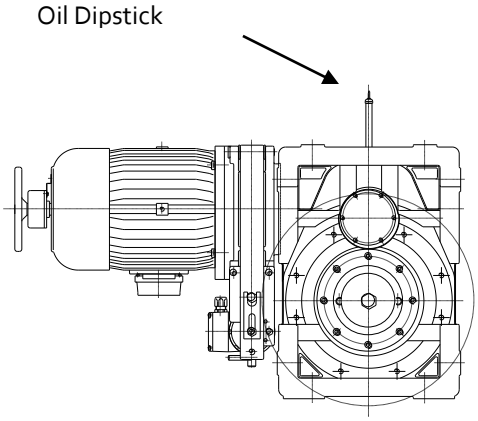


Fig. 14
(Version A2),
Motor Horizontal (high)

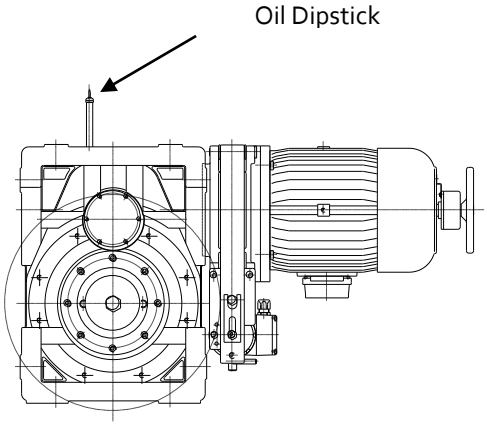


Fig. 15
(Version B2),
Motor Horizontal (high)

Comments:
The standard position of the Terminal Connector Box on the Motor frame is in the direction of the Brake solenoid but can be rotated with the Motor by 90° or 180°. To rotate the connector box, the motor fixing bolts must be unscrewed. Beforehand, disconnect the electrical supply and secure the machine against an unintentional power input. After repositioning the motor with the connector box, the bolts must be diagonally re-tightened (50Nm).

If the force acting on the cable has a torque component which is perpendicular to the direction of the Gearbox fixing bolts, then an additional bracket must be used that supports the drive unit in this perpendicular direction, thus preventing the fixing bolts from being adversely affected by the sheer strength forces due to the elevator load. (If you have any questions on this issue, please contact OMS).

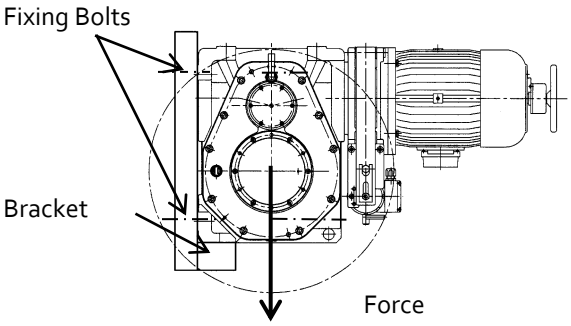


Fig. 16: Additional Bracket

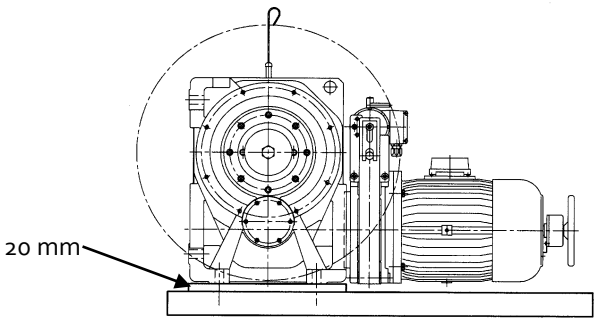


Fig. 17: Additional Distancing Plate

In the position: „Motor Horizontal Low", a larger motor (160) can be implemented for dealing with higher capacities. The lower outer edge of the motor will then intrude over the standing area occupied by the gearbox. Should there be a piece of the chassis frame available at this point, then a distancing plate of at least 20 mm must be placed under the gearbox standing area.

To ensure adequate lubrication and Gearbox efficiency, the elevator machine may only be erected as ordered.

5 Transport and Storage

5.1 Transport

All elevator machines are inspected and passed prior to leaving our factory site.

When you accept delivery of your machine, please check the packaging for signs of exterior damage. If you find damage which appears to have been caused in transit, then please document this damage in the presence of the delivery agent. The machine may not be taken into service.

The Machine leaves the OMS factory in an Oil tight state. If the Machine has to be transported after having been installed, then the oil Dipstick and/or Air Bleeder Valve must be removed and replaced with the original OMS Oil Sealing Plugs. If the plugs are not available, please order new sealing plugs from OMS.

The weight of the machine (without traction sheave) can be found in the table on page 37. The weights of the traction sheaves can also be found on this page.

5.2 Storage

The Elevator Machine must not be stored outside and may not be exposed to outdoor weather conditions. If it is planned to store the machine for a longer period of time before installing it, then the measure must be undertaken to ensure an adequate conservation of the machine.

A) Up to 3 Months Storage:

No special storage requirements.

Before the Elevator Machine is installed the following points should be observed:

- All the Brake Parts must be inspected (activate the Brake in case there should be light corrosive spots on the Brake Drum).
- Turn the Machine a few times by hand, (to ensure that the Motor Bearings are evenly greased).

B) Up to 18 Months Storage:

If it is planned to store the machine for a longer period of time before installing it, then the Machine can be ordered with the optional conservation kit. The Machine is then treated in the OMS factory and packed in a humidity proof yellow plastic foil.
If this wasn't the case, then:

- At the latest, after six months Storage the Gearbox must be filled to the highest bolt hole with Oil.
- **Warning: Oil Type: See the yellow label; only use one sort of Oil.**

- After filling with Oil, the Machine must be packed in a humidity proof (yellow) foil: (this foil can be ordered from OMS)
- Dry Storage is required.

Before the Machine is installed:
- **Reduce the Oil Level!** to the standard level (ref. Chapter 6.1.1)
- All the Brake Parts must be inspected (activate the Brake in case there should be light corrosive spots on the Brake Drum).
- Turn the Machine a few times by hand, (to ensure that the Motor Bearings are evenly greased).
- Install the Machine (Ref. Chapter 3. Installation and Preparing for use)

C) Longer than 18 Months Storage:

Optional factory conservation or procedures as in: **B) Up to 18 Months Storage**
Dry Storage is required.

Before the Machine is installed:
- Change all the Gearbox Oil. Take care to use the correct type of Oil and **observe the Oil Level** as outlined under: 6.1.1 and 6.1.3.
- All the Brake Parts must be inspected (activate the Brake in case there should be light corrosive spots on the Brake Drum)
- Turn the Machine a few times by hand, (to ensure that the Motor Bearings are evenly greased).
- If the Machine cannot be turned by hand, or the movement is stiff, then the Motor Bearings may have to be replaced.
- Install the Machine (Ref. Chapter 3. Installation and Preparing for use)

After a lenghty storage period, the manufactures warranty will have run out. If a further warranty period is required, then the Machine may be returned to OMS to be refurbished (new Bearings etc.), this will incur some expense for the customer.

Damage, that has been caused by negligible handling is not covered by our warranty specification.

6 Regular Use and Maintenance

The Safety- measures and instructions for the erection and use of elevator machines as according to: DIN EN 81: "Safety rules for the construction and installation of lifts – Particular applications for passenger and goods passengers lifts", Part 1 "Electrically operated passenger and goods lifts", "Technical rules for lifts" and other relevant regulations and instructions must be observed at all times.

The operator is responsible for the safe installation, control and maintenance according to the applicable regulations and standards.

6.1 Recommended Routine Maintenance

Item	***Maintenance Frequency***	***Source***
Oil Level, Control	Every 3 Months	Ref. 6.1.1
Oil Change	Ref. 5.1.2	Ref. 6.1.3
Bearing, Check (Audible)	In accordance with the regular elevator maintenance schedule, at least annually.	
Brake, Check	In accordance with the regular elevator maintenance schedule, at least annually.	Ref. 6.3
Traction Sheave, Check for wear	In accordance with the regular elevator maintenance schedule, at least annually.	
Electrical Wiring and Connections, Check for wear and loose connections	In accordance with the regular elevator maintenance schedule, at least annually.	
Cleaning the machine surfaces	When required, at least annually.	
Safety installations and mechanisms, Check for presence and function	In accordance with the regular elevator maintenance schedule, at least annually.	
Check bolt connection traction sheave / flange	In accordance with the regular elevator maintenance schedule, at least annually.	Test torque: Fitting bolts (M16 / 8x): 200 Nm Centric bolt (M20): 230 Nm

6.2 Error – Troubleshooting Errors

Error	*Possible Cause*	*Answer*
Unusual, none rhythmic operating noises	• Grinding / Scraping Bearings • Knocking / Jumping Gears • Regulator adjustment	• Call Customer Service • Check the parameters of the Frequency Converter
Oil Leak	• Seal damaged	• Call Customer Service
Brake does not switch	• Wiring is not OK	• Check all electrical connections

6.3 Gearbox Oil

6.3.1 Controlling the Oil Level

Check the oil level at every maintenance opportunity, the oil level is checked using the Oil Dipstick.

- The Oil Level must lie between the marks.

6.3.2 Controlling the Oil Viscosity

In normal situations with an average temperature of approx. 35°C the Gearbox has a „life time" oil filling and an Oil Change will not normally be required.
However, we would like you to check the viscosity of the Gearbox Oil regularly.

Control:

- Check the oil viscosity by letting a drop of oil fall from the Dipstick onto a piece of white paper. Compare the colour of the oil with the Oil Check Card.

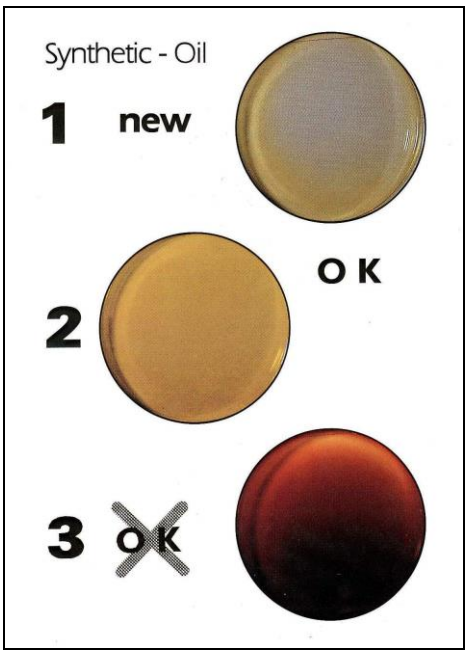


Fig. 18 Oil Check Card

- Oil colour straw yellow to mid brown: Oil good to still usable
- **Oil colour equally tone 3: Oil change required**
- **Oil colour dark brown to black: Oil no longer usable → Oil change**

6.3.3 Oil Change

Should you consider an oil change to be required, please adhere to the following instructions:

1. Place a suitable container below one of the Oil Drain Screws under the Gearbox. (The Gearbox has a capacity of 9,5ltr for versions A1 and B1, and 8ltr for versions A2, A3, B2, and B3).
2. Carefully open the Oil Drain Screw.
3. After all the oil has run out, replace the Drain Screw and tighten it.
4. Replace the oil, either through the Oil Dipstick opening or through the Air Release Valve opening.
5. Observe the filling level (see 6.1.1).
6. **Only fill the Gearbox with the authorised oil**:

   Klüber Syntheso D 220 EP Amount: according to installation version
   (Never mix with mineral oil!)
   Klübersynth GH 6-220 Amount: according to installation version
   (Never mix with mineral oil!)
   (Please contact OMS before using oil from other manufactures)

7. Close the opening, either with the Oil Dipstick or the Air Release Valve.

If oil is spilled during the oil change, then the spilled oil should be cleaned up immediately.

Used Oil is Special Waste!

6.4 Replacing the traction sheave

The traction sheave is, like the elevator ropes, prone to wear and must be changed according to the regulations governing elevators. The traction sheave is attached to an adapter flange on the output shaft.
The adapter flange and traction sheave are connected to each other by means of fitting screws and must be replaced together.

How to change the traction sheave:

1. Disable and secure the complete elevator system. (Observe the instructions of the elevator manufacturer).
2. Loosen and remove the ropes from the traction sheave. (Observe the instructions of the elevator manufacturer).
3. Should the safeguard device against rope jumping require adjustment, please consult chapter 3.1.2.
4. Secure the traction sheave against falling – use a rope loop.

5. Remove the fixing screw, the Nord-Lock-washer and the pressure plate.

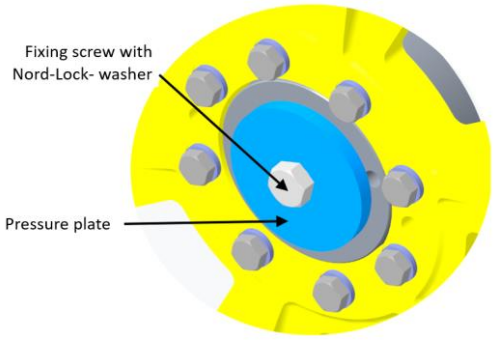


Fig. 19: disassembly traction sheave

6. Pull the traction sheave together with the adapter flange from the output shaft using the pull-off device (OMS-article-number: 19040020). To do this, use the two M16-threads in the adapter flange.

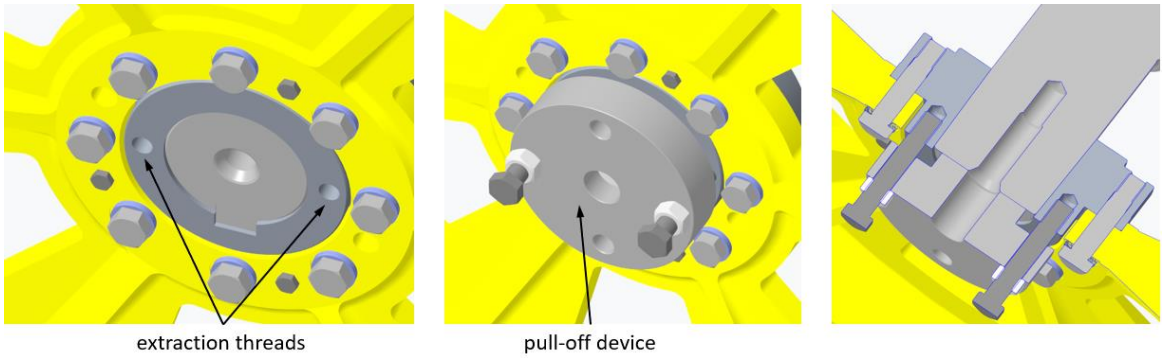


Fig. 20: disassembly traction sheave, pull-off device

7. Remove the feather key from the groove of the output shaft.
8. Clean the tapered seat of the output shaft.
9. Insert the new feather key into the groove of the output shaft (justified with the shaft end).

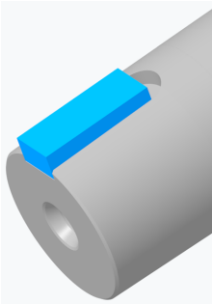


Fig. 21: assembly feather key

10. Align the groove of the new traction sheave with the feather key in the output shaft.
11. Push the traction sheave as far as possible onto the output shaft.

12. Mount the pull-on device (OMS-article-number: 19040021).

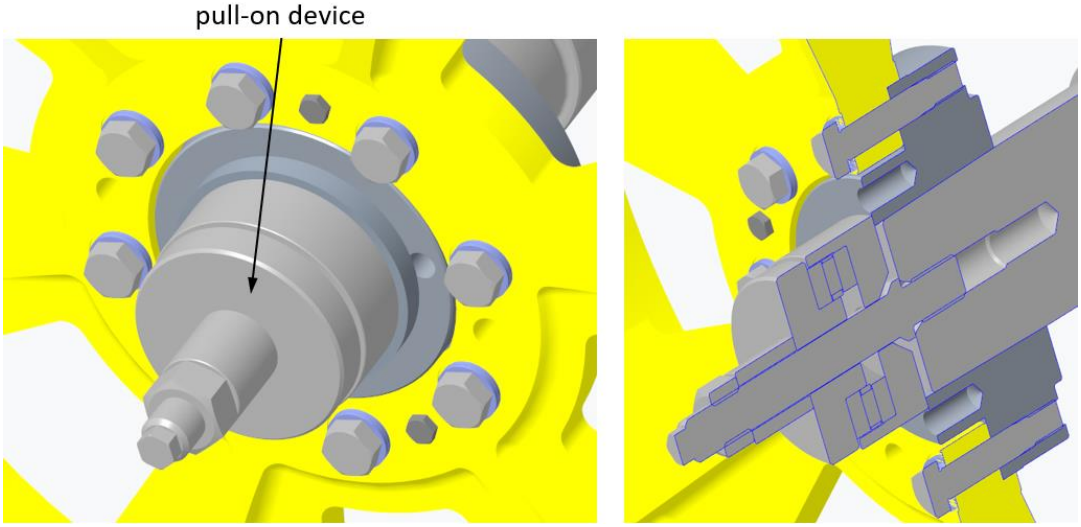


Fig. 22: pull-on device

- Screw the M24-threaded bolt of the device into the thread of the output shaft as far as it will go
- Use the nut on the M24- threaded bolt to pull the traction sheave onto the taper of the output shaft, maximum tightening torque of the nut 320 Nm
- Then loosen the nut again and remove the M24- threaded bolt of the device from the output shaft

13. Slide the new Nord-Lock-washer onto the new fixing screw (M20x105).
14. Lubricate the thread of the new fixing screw with LOCTITE 243.
15. Mount the pressure plate, Nord-Lock-washer and the fixing screw. Maximum tightening torque of the fixing screw 250 Nm.

6.5 Brake Maintenance

6.5.1 Control: Movement of the Brake Lever

Within the normal maintenance program of the elevator, the movement of the Brake Levers should be regularly controlled. Open the Brake Levers as described in 5.2.3 (Control both Brake Systems). The Brake levers must close lightly, if this is not the case, then the Bolt supporting the Brake Lever must be removed, cleaned, greased and then reinstalled (Ref. 6.3.3).

6.5.2 Control: Clearance and Brake Lining Wear

Comments: The brake system on elevators is a holding brake and frictional work is generated only when activated during a safety check, when the cabin is made to drop and then braked. Therefore, it is to be expected that the Brake Lining should only show minimal wear during normal use. Notwithstanding, within the regular maintenance program, the clearance between the Solenoid Plungers and the relevant Pressure Bolts in the Brake Levers should be controlled.

a) Clearance:

The Clearance may not be less than 1,0 mm.
Should the clearance have been reduced to 1mm, then the clearance must be re-adjusted to max. 1,5mm
(Ref. 3.2.1 and Fig.6).

Procedure:

1. Force the Solenoid Plungers back and measure the clearance between the Plungers and the Pressure Bolts (Fig. 6).
2. Loosen the Locking Nut, turn the Pressure Bolt and re-tighten the Locking Nut. Clearance Parameter S=1,5mm.
3. After the clearance has been adjusted, check the correct function of the Brake System by mechanically activating the Lever on the Solenoid and by electrically activating the Brake using the Elevator Controls.
4.

If it is no longer possible to adjust the clearance because the Bolts are touching the Brake levers, than the Brake levers must be fitted with new Brake Linings!

b) Brake Lining Wear:

The level of Lining wear determines the position of the Brake Lever. As the Brake Linings become worn, the Brake levers move toward the Brake Magnets.
The minimal allowed clearance is clearly marked on the Brake Levers.

Control of Brake Lining Wear:
The minimal allowed clearance can be read above the Pressure Bolt position. (Ref. Fig. 25).
If the minimal allowed clearance has been achieved, then both Brake Levers must be exchanged against Brake Levers with new Brake Linings.

6.5.3 Adjusting the Double Brake

If required OMS supply their elevator drives with a second brake magnet.
They can be adjusted as described in Chapter 3.2

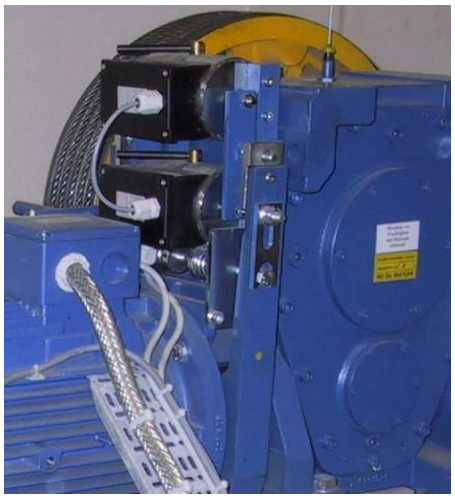
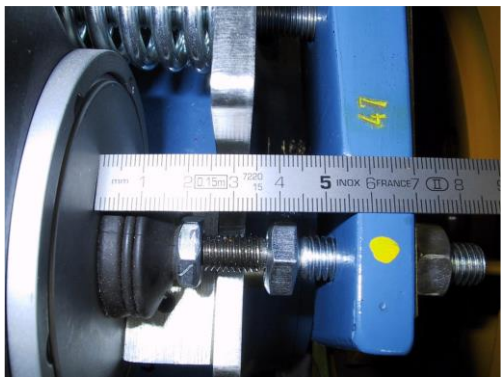


Fig. 23 Double Brake

Fig. 24 Connections Double Brake



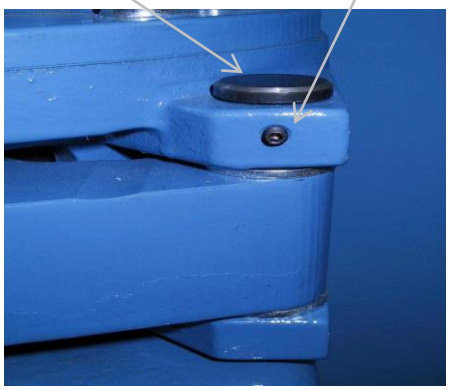


Fig. 25 Measuring the clearance between Brake Lever and Solenoid
Fig. 26 Coupling the Brake Lever

6.5.4 Replacing the Brake Lever (Ref. Fig. 26)

Disable and secure the complete elevator system. (Observe the instructions of the elevator manufacturer). When removing both brake levers there is no resistance available, the cabin will move!

- Always change both Brake Levers!
- Always complete the change on one side before moving on to the other side.
- In order to change a Brake Lever, the Compression Spring must be removed together with the Securing Washer and the Locking Bolt.
- Loosen the Socket Set Screw on the Hinged Bolt by 50%.
- Press the Hinged Bolt up (with a flat Screwdriver under the Bolt Head) and remove it.
- Remove the Brake Lever laterally and remove the Washers.
- Replace the Brake Levers in reverse order.
- Don't forget the Washers!
- Adjust the Brake, and control the brake function, as described in Chapter 5.2.

Important:

- Measure the clearance between the Brake Lever inside edge and the top edge of the Brake Solenoid, mark this parameter less 10mm as minimal clearance clearly on the Brake Lever. (E.g. with Hammer Stamp Numbers, Ref. Fig. 25).

When using new Brake Levers with new Linings, the Brake Point should first be set on the Spring Adjuster after activating the Brake a few times! (When first installed there is no resistance, the elevator cabin could slip).

6.5.5 Control: Rocker Arm for mechanically opening the Brake (optional)

If the optionally available Rocker Arms have been fitted, then the free movement of the Rocker Arms and the Activators must be checked as part of the regular maintenance program. If required the parts should be greased. The Rocker Arms should be checked for wear, if required the parts should be replaced.

6.6 Replacing the Incremental Encoder

Fig. 27: Securing the Incremental Encoder

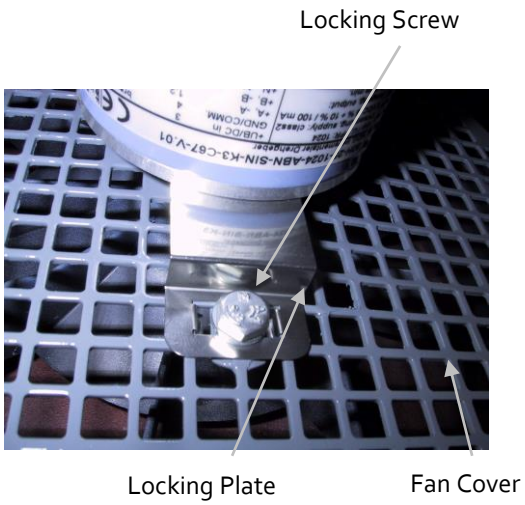


Fig. 28: Incremental Encoder Support

- Remove the Hand wheel, including Central Locking Screw and Washer.
- Loosen the two Radial Securing Screws that can be found under the Incremental Encoder (Ref. Fig. 27).
- The Locking Plate is secured with a screw.
- The re-assembly of the Incremental Encoder should be carried out in reverse order.

6.7 Replacing the Motor

Place the new Motor adjacent to the old Motor and compare the Technical Data.

Warning: The Motor can become hot during operation – take care, contact with a hot Motor can result in burn injuries!

- Remove the four bolts on the Motor Base, they can be found above the Brake Levers.
- Lift the Motor, using Eye Ring Bolts and a rope loop; the Eye Ring Bolts can be attached laterally to the Motor.
- **Warning:** if the Motor should fall, then it may become damaged, the Motor may not be lifted by the Hand wheel!
- Replace the elastic Clutch Gasket, and clean the Clutch Claw, e.g. with compressed air.
- Carefully line up the Clutch Claw with the Counterpart on the Gearbox Drive Shaft.
- Carefully retighten the Motor Bolts diagonally. (Torque **50 Nm**)

6.8 Replacing the Elastic Clutch Gasket

Between the Motor and the Gearbox a Claw Type Clutch with an elastic Clutch Gasket is installed. The Gasket is made from a heat and humidity resistant Polyurethane material. Should the Gasket become hard and brittle due to extreme environmental conditions, an increased backlash will become noticeable between the Drive Shaft and the activated Brake.

To replace the Clutch Gasket the Motor must be removed.

- Remove the four bolts on the Motor Base, they can be found above the Brake Levers.
- Note the position of the Hand wheel in relation to the Motor Cover.
- Lift the Motor, using Ring Bolts and a rope loop (the Ring Bolts can be attached laterally to the Motor) until the Clutch Claw can be seen.
- **Warning: The Motor may not be lifted by the hand wheel!**
- Replace the elastic Clutch Gasket, and clean the Clutch Claw, e.g. with compressed air.
- Replace the Motor, taking care that the Hand wheel lines up with the Motor Cover – as previously noted – thus carefully lining up the Clutch Claw with the Counterpart on the Gearbox Drive Shaft.
- Carefully retighten the Motor Bolts diagonally. (Torque **50 Nm**)

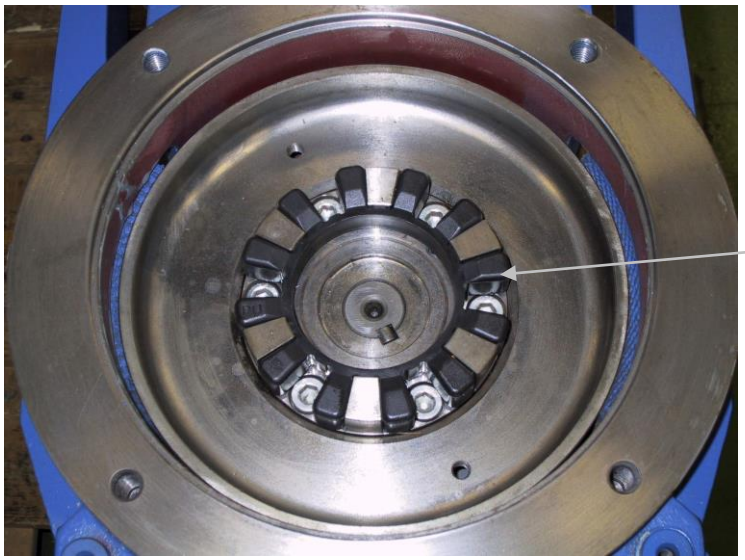


Fig. 29: Coupling Claw between Motor and Gearbox

7 Disassembly

7.1 Disassembly of the Elevator Drive

Remove the Oil Dipstick and replace it with the supplied Sealing Plug. The Gearbox is not sealed when the Oil Dipstick is fitted.
To disassemble the Elevator Drive carry through the same procedure as during the assembly – but in reverse order.

7.2 Scrapping the Elevator Drive

- The Gear Wheels, Axles and Bearings can be scrapped as standard steel scrap.
- The forged parts can also be scrapped as standard steel scrap.
- The Motor Winding and the Brake Unit are mainly brass and bronze and must be scrapped as such.
- Oil and Grease must be removed and disposed of accordingly.

8 Addendum

Technical Data OMS Elevator Machine AZHP 3-1

Dimensions OMS Elevator Machine AZHP 3
Motor Positioning of Version A and B

Electrical Connections

Technical Releases
(Page 1 and 2)

We shall be pleased to receive your questions, comments and suggestions:

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ADDENDUM A

Technical Data OMS – Elevator Machine AZHP 3

(Technical changes reserved – Last Changes 07/2024)

Gearbox:

Input-Revolution, max.: $n = 2000\ min^{-1}$
efficiency: $\eta,n = > 96\ \%$
typical backlash range : 4' to 8' (arc. minutes)
sound pressure level ($n \leq 1.500\ min^{-1}$ / 15kW Motor): $L_{p,A} = 61$ dB(A)*, AZHP 3 LD / HD
sound pressure level ($n \leq 1.500\ min^{-1}$ / 20kW Motor): $L_{p,,,A} = 60$ dB(A)*, AZHP3 HD+

* typical, measured on OMS power load brake in acoustic chamber driven by frequency inverter, load and speed corresponding to constant travel speed. Depending on the construction, these values may vary.

		Application						
car suspension		**2 : 1**		**1 : 1**			**2 : 1**	
			HD		**HD**	**HD+**	**HD**	**HD**
gear ratio	**i**	**18,99**	**18,99**	**36,85**	**36,85**	**36,85**	**13,57**	**24,68**
input-torque, max.	**T**	**150 Nm**	**150 Nm**	**100 Nm**	**100 Nm**	**138 Nm**	**150 Nm**	**150 Nm**
output shaft max. torque	**T**	**2800 Nm**	**2800 Nm**	**3700 Nm**	**3700 Nm**	**4900 Nm**	**2000Nm**	**3700Nm**
max.axle torque	**F**	**37 kN**	**53 kN**	**40 kN**	**53 kN**	**65 kN**	**50 kN**	**53 kN**
for car load up to	**Q**	**2000 kg**	**2000 kg**	**1050 kg**	**1300 kg**	**1600 kg**	**1600 kg**	**2500 kg**
for car speed up to	**v**	**2 m/s**						

Motor: (for frequency converter use only)
Three phase - Induction -Motor: 4-pols, IP 54, motor protection: PTC, integral fans,
Model / diameter B: Model: 132 / B = 260; Model: 160 / B = 315
motor-nominal torque up to: T = 118 Nm

Incremental encoder: HTL, TTL, Sinus

Brake: Twin Circuit Double Stroke Expanding Magnet, single or tandem operation.

Drive Sheave:
radius: D = 320, 400, 450, 500, 560, 650 mm *)
weight: G = 34, 37, 46, 52, 59, 86 kg *)
width: C = 112 mm *), F = 235mm
125 mm (only by dia. Ø 320mm) *)
rope diameter: D, s = 10, 11 mm *)
number of cables: n = 4 – 7 *)
*) options upon request

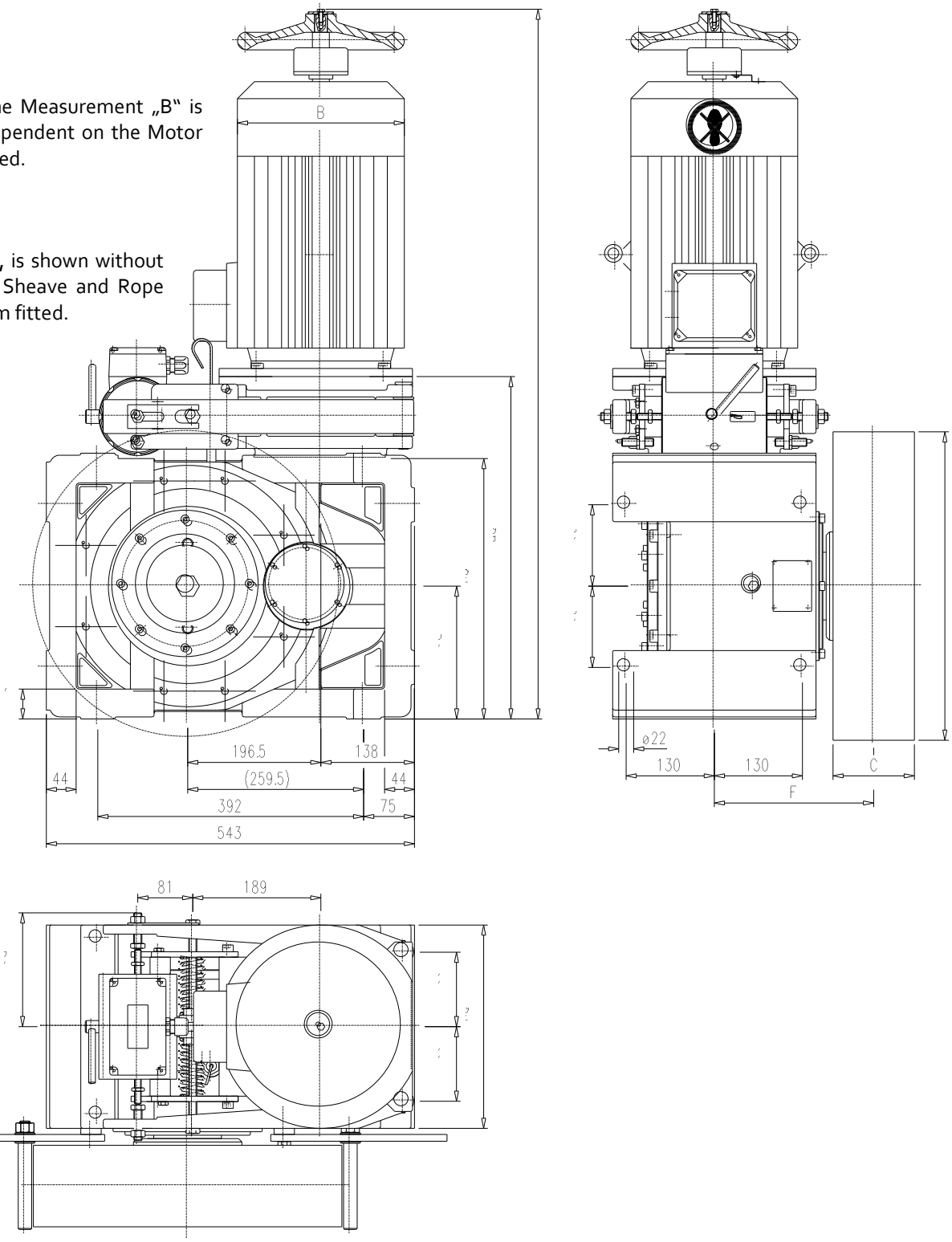
Dimensions:
total height A according to motor dimensions: (weight of drive, all inclusive without traction sheave):

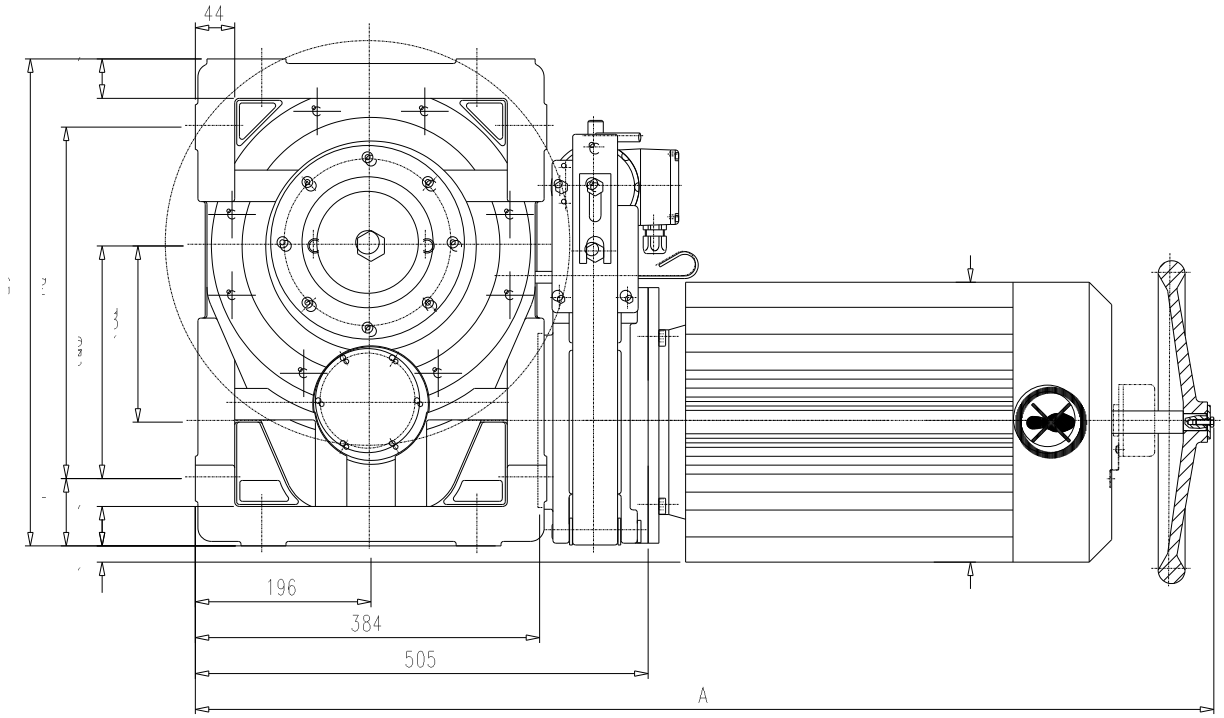
Other Dimensions:
Please refer to the Dimensions Sheet

Motor Model	**P_{nenn}** kW	**T_{nenn}** Nm	**n_{nenn}** min^{-1}	**f** Hz	**A** mm	**G** kg
132	7,5	41,4	1740	60	1017	307
132	7,5	63,4	1145	40	1047	317
132	11	60,7	1745	60	1047	317
160	15	69,4	2070	70	1136	357
160	13	84,7	1465	50	1136	357
160	12	98,0	1170	40	1136	386
160	17	92,0	1765	60	1136	386
160	20	92,3	2070	70	1136	386
160	14,5	118	1170	40	1164	402
160	20,5	111	1765	60	1164	402

The Measurement „B" is dependent on the Motor used.

This diagram, is shown without the Traction Sheave and Rope Safety System fitted.

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196
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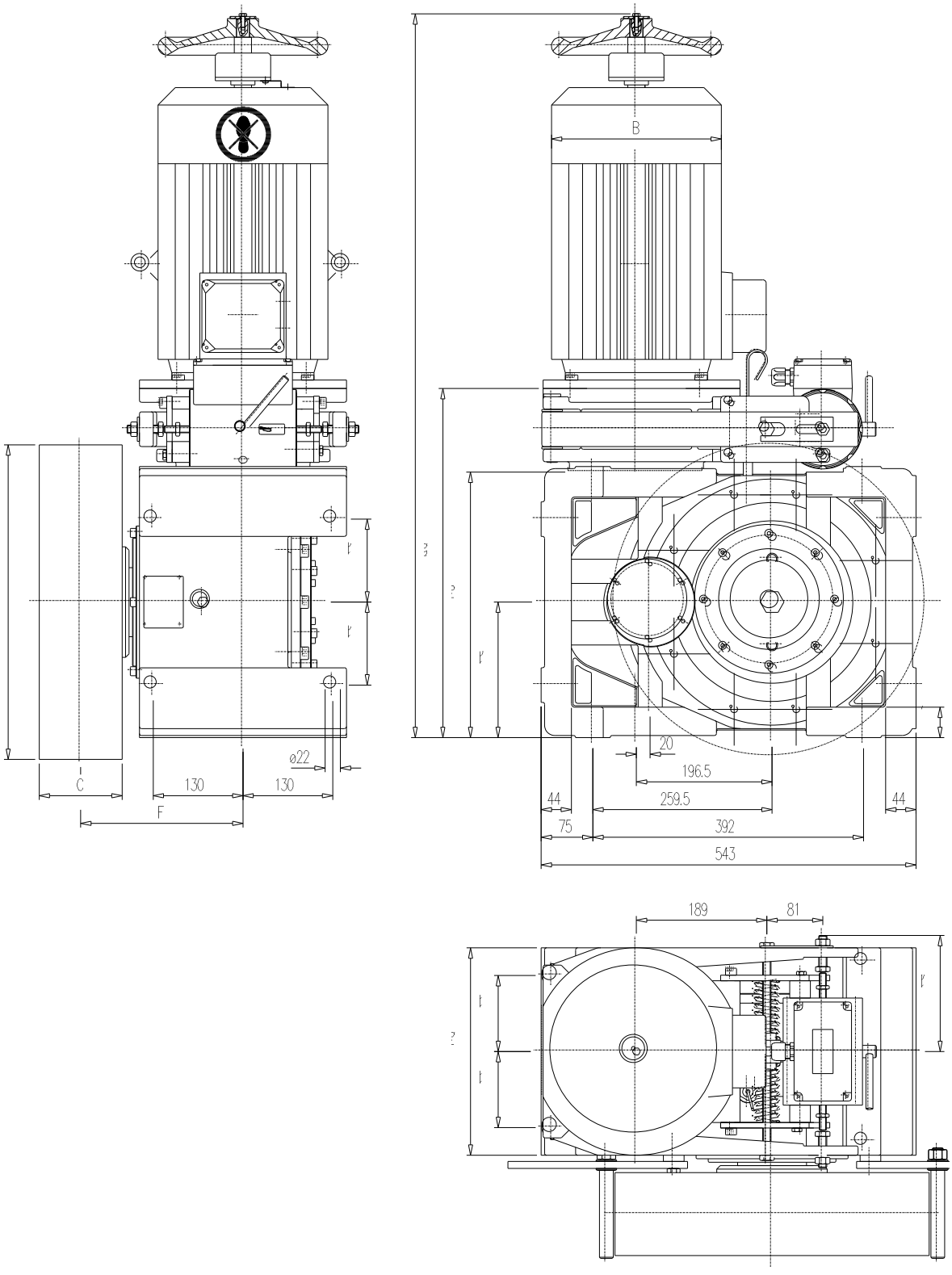
B
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C
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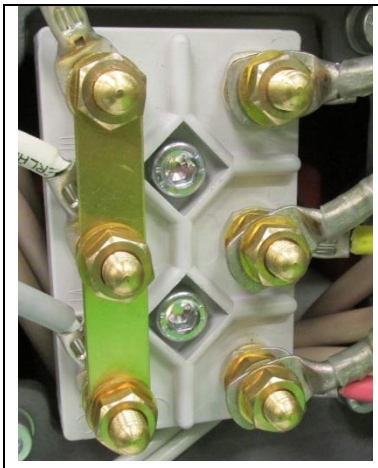
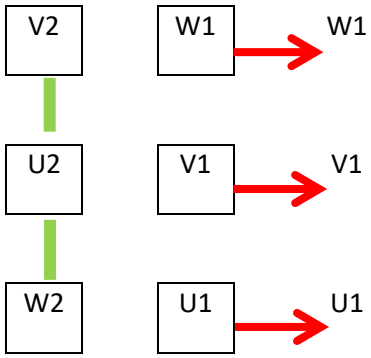
189
81

1. Wiring Diagram for Asynchronous Motor

Junction Box:





Star- connection

Jumper between V2and U2 and U2 and W2!

Motor cable (consisting of U1 ; V1 ; LW1 and PE) connecting as follows :

U1 to U1 ; V1 to V1 ; W1 to W1 - PE(green-yellow) always first

Attention:

For Fi-operation the following must be observed:

You have to use a filter between the Fi and the motor, which is limiting the increase speed of the voltage from the Fi to the motor connecting points to a limit of $\delta U/\delta t \leq 500V/\mu s$.

Higher increasing speed of the voltage can damage the motor windings (short circuit is possible).

2. Wiring Diagram for Incremental Encoder, Extensions & Adapter

Encoder output

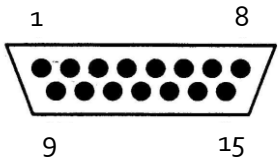
	Sinus	TTL	HTL
output	Sin. / cos.	Square	Square
supply	+ 5V	+ 5V	+ 8V to + 30V

2.1 Connections, Encoder (Sinus / TTL / HTL)

Output SUB D 15 Pol. Plug

PIN - No.	Signal		PIN - No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ±: Channel 2, N ±: Reference



View from the Plug side
(Comment: the shielding connection to PIN 12 is only required for SIN/COS Encoder to "Dietz FU")

2.2 Encoder Extension Cable, l = 5m

SUB D 15 Pol. Socket to SUB D 15 Pol. Plug
OMS Part No. 3034 0060

PIN – No.	Signal		PIN – No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ± : Channel 2, N ±: Reference

C

/s

PIN - No.	Signal		PIN - No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ± : Channel 2, N ±: Reference

2.3 Connections, Adapter for „KEB" Frequency Converter, l = 0,25m

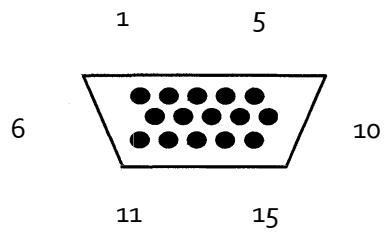
SUB D 15 Pol. Socket to SUB D 15 Pol. Plug - 3 - rows
OMS Part No. 3034 0061

PIN - No.	Signal		PIN – No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ± : Channel 2, N ±: Reference

PIN - No.	Signal		PIN - No.	Signal
1	-		9	B+
2	-		10	-
3	A-		11	-
4	B-		12	**supply**
5	-		13	**GND**
6	-		14	R-
7	-		15	R+
8	A+		**Case**	Shield

A ±: Channel 1, B ± : Channel 2, R ±: Reference



viewed from the plug side

2.4 Connections, Adapter for „Ziehl-Abegg" Frequency Converter, l = 0,25m

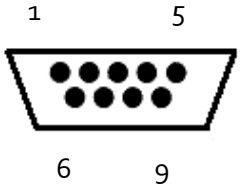
SUB D 15 Pol. Socket to SUB D 9 Pol. Plug
OMS Part No. 3034 0102

PIN - No.	Signal		PIN - No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ±: Channel 2, N ±: Reference

PIN - No.	Signal
1	A+
2	B+
3	-
4	supply
5	GND
6	A-
7	B-
8	-
9	GND
Case	Shield

A ±: Channel 1, B ±: Channel 2,



viewed from the plug side

2.5 Connections, Adapter for "Danfoss" Frequency Converter, l = 0,25m

SUB D 15 Pol. Socket to Phoenix Socket, 8 Pol.
OMS Part No. 3034 0126

PIN - No.	Signal		PIN - No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ±: Channel 2, N ±: Reference

PIN - No.	Signal
1	supply
2	GND
3	A+
4	A-
5	B+
6	B-
7	N+
8	N-
	Shield

A ±: Channel 1, B ±: Channel 2, N ± Reference

Plug: Phönix Part. No. 1840421

2.6 Connections, Adapter open ended cable, l = 0,25m

SUB D 15 Pol. Socket to 9 open wires
OMS Part No. 3034 0127

PIN - No.	Signal		PIN - No.	Signal
1	A+		9	-
2	A-		10	-
3	**supply**		11	-
4	**GND**		12	Shield
5	B+		13	-
6	B-		14	-
7	N+		15	-
8	N-		**Case**	Shield

A ±: Channel 1, B ±: Channel 2, N ±: Reference

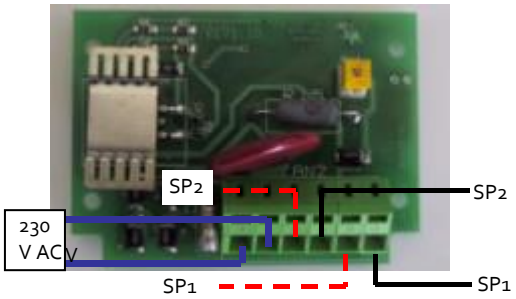
Wire - No.	Wire Colour	Signal
1	brown	supply
2	black	A+
3	red	A-
4	orange	B+
5	yellow	B-
6	blue	N+
7	grey	N-
8	white	GND
9	cord	Shield

A ±: Channel 1, B ±: Channel 2, N ± Reference

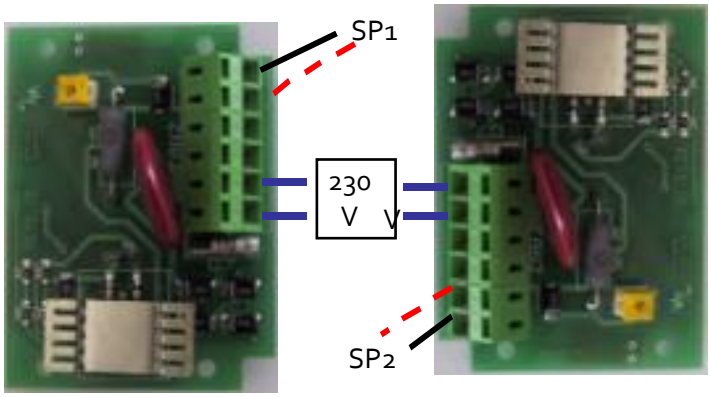
5. Mains Connections, OMS Braking Solenoid

Connection Voltage: 230V AC
Nominal current: 2 x 0,26A (parallel) resp. 0,52A (series-connected)

Connection with one control module;
Both solenoid coils are connected in parallel.

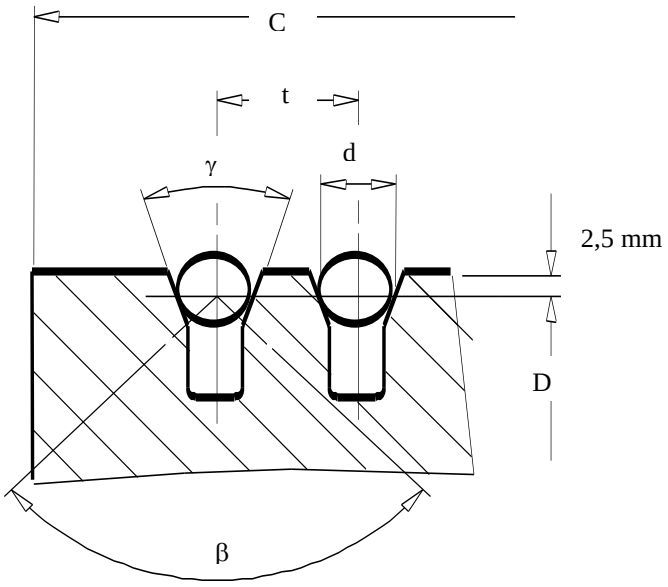


Connection with two control modules;
Both solenoid coils are connected independently.

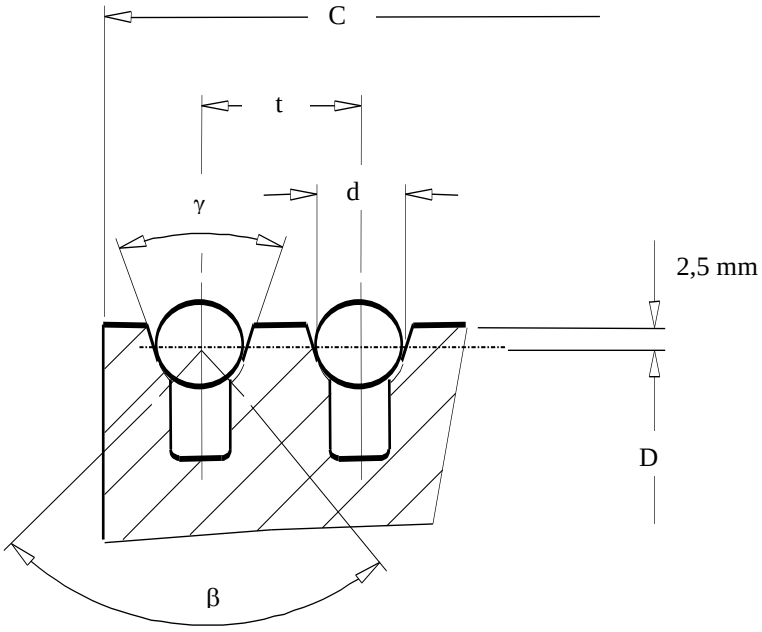


Two pieces Traction Sheave with a flanged connector, Material: GG 25 (ca. 230HB)
Optional: Hardened Guides 50HRC.

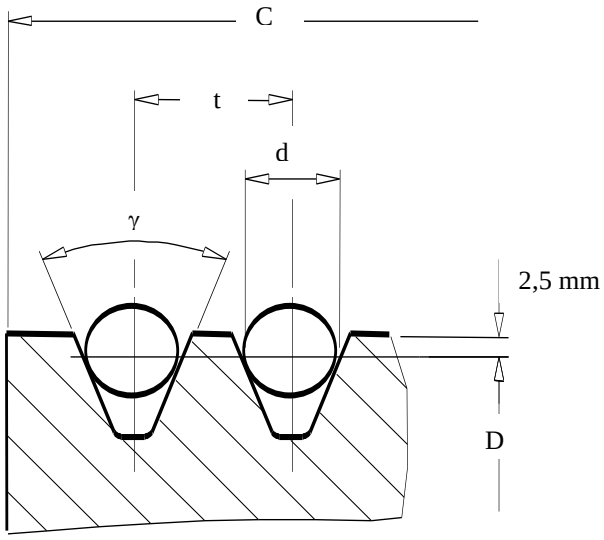
Standard Traction Sheave –Undercut Wedged Guides



Special Traction Sheave – Undercut Semicircular Guides



Special Traction Sheave – Wedged Guides sans Undercut



Available Traction Sheaves

Model	Traction Sheave	Guides		Dimensions				Weight
	D in mm	z	D	C	T	β°	γ°	kg
K3..	320	6-10	8	125	12-17	80-104	35-45	34
K4..	400	5-6	8-10	112	17	80-104	35-45	40
K4..	450	5-6	8-11	112	17	80-104	35-45	46
K5..	500	6	8-11	112	17	80-104	35-45	52
K5..	560	6	8-11	112	17-20	80-104	35-45	59
K5..	560	6-7	8-14	130	17-20	80-104	35-45	65
K6..	650	6	8-11	112	17-20	80-104	35-45	86
K6..	650	6-7	8-14	130	17-20	80-104	35-45	96
K7..	750	4-7	8-14	90+112+130	17-20	80-104	35-45	
Special Traction Sheaves								
	420-950	3-8	8-14	90-140	any	80-104	35-45	-

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Version	Revision Date:	Date of last issue: 02.04.2020	Print Date:
2.1	13.01.2022	Date of first issue: 16.06.2015	13.01.2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name : Klübersynth GH 6-220

Article-No. : 012161

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Sub-stance/Mixture : Lubricating oil

Recommended restrictions on use : Restricted to professional users.

1.3 Details of the supplier of the safety data sheet

Company : Klüber Lubrication München
Geisenhausenerstr. 7
81379 München
Deutschland
Tel: +49 (0) 89 7876 0
Fax: +49 (0) 89 7876 333
info@klueber.com

E-mail address of person responsible for the SDS : mcm@klueber.com
Material Compliance Management

National contact : Klüber Lubrication Deutschland
Geisenhausenerstraße 7
81379 München
Deutschland
Tel.: +49 89 7876 0
Fax: +49 89 7876 565
customer.service.de@klueber.com
www.klueber.com

1.4 Emergency telephone number

Emergency telephone number : +49 89 7876 700 (24 hrs)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)
Not a hazardous substance or mixture.

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2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)
Not a hazardous substance or mixture.

Additional Labelling
EUH210 Safety data sheet available on request.

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical nature : polyalkylene glycol oil

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	specific concentration limit M-Factor Notes Acute toxicity estimate	Concentration (% w/w)
Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate	945-730-9 01-2119511174-52-XXXX	Aquatic Acute1; H400 Aquatic Chronic3; H412	M-Factor: 1/	>= 1 - < 2,5

For explanation of abbreviations see section 16.

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SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled	:	Remove person to fresh air. If signs/symptoms continue, get medical attention. Keep patient warm and at rest. If unconscious, place in recovery position and seek medical advice. Keep respiratory tract clear. If breathing is irregular or stopped, administer artificial respiration.
In case of skin contact	:	Remove contaminated clothing. If irritation develops, get medical attention. In case of contact, immediately flush skin with plenty of water. Wash clothing before reuse. Thoroughly clean shoes before reuse.
In case of eye contact	:	Rinse immediately with plenty of water, also under the eyelids, for at least 10 minutes. If eye irritation persists, consult a specialist.
If swallowed	:	Move the victim to fresh air. If unconscious, place in recovery position and seek medical advice. Keep respiratory tract clear. Do NOT induce vomiting. Rinse mouth with water. Never give anything by mouth to an unconscious person.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms	:	No information available.
Risks	:	None known.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment	:	No information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing	:	High volume water jet

media

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products : Carbon oxides
Nitrogen oxides (NOx)

5.3 Advice for firefighters

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Exposure to decomposition products may be a hazard to health.

Further information : Standard procedure for chemical fires.
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Evacuate personnel to safe areas.
Use personal protective equipment.
Ensure adequate ventilation.
Refer to protective measures listed in sections 7 and 8.

6.2 Environmental precautions

Environmental precautions : Do not allow contact with soil, surface or ground water.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

For personal protection see section 8.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Avoid inhalation of vapour or mist.
Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the ap-

plication area.
Wash hands and face before breaks and immediately after handling the product.
Do not ingest.
Do not repack.
Do not re-use empty containers.
These safety instructions also apply to empty packaging which may still contain product residues.
Keep container closed when not in use.

Hygiene measures : Wash face, hands and any exposed skin thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Store in original container. Keep container closed when not in use. Keep in a dry, cool and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in accordance with the particular national regulations. Keep in properly labelled containers.

Storage class (TRGS 510) : 10, Combustible liquids

7.3 Specific end use(s)

Specific use(s) : Specific instructions for handling, not required.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine	Workers	Inhalation	Long-term systemic effects	4,11 mg/m3
	Workers	Skin contact	Long-term systemic effects	1,17 mg/kg bw/day
Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate	Workers	Inhalation	Long-term systemic effects	3,5 mg/m3

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	Workers	Inhalation	Acute systemic effects	28 mg/m3
	Workers	Dermal	Long-term systemic effects	0,5 mg/kg bw/day
	Workers	Dermal	Acute systemic effects	4 mg/kg bw/day
pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxy-phenyl)propionate)	Workers	Inhalation	Long-term systemic effects	9,5 mg/m3
	Workers	Skin contact	Long-term systemic effects	27 mg/kg

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine	Fresh water	0,00002 µg/l
	Marine water	0,000002 µg/l
	Fresh water sediment	0,00467 mg/kg
	Marine sediment	0,000467 mg/kg
	Soil	0,000934 mg/kg
Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate	Fresh water	0,002 mg/l
	Marine water	0,0002 mg/l
	Fresh water sediment	3,43 mg/kg
	Marine sediment	0,343 mg/kg
pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate)	Fresh water	0,086 mg/l
	Marine water	0,0086 mg/l

8.2 Exposure controls

Engineering measures

none

Personal protective equipment

Eye protection : Safety glasses with side-shields

Hand protection
- Material : Nitrile rubber
- Break through time : > 10 min
- Protective index : Class 1

Remarks	:	For prolonged or repeated contact use protective gloves. The break through time depends amongst other things on the material, the thickness and the type of glove and therefore has to be measured for each case. The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.
Respiratory protection	:	Not required; except in case of aerosol formation.
Filter type	:	Filter type A-P
Protective measures	:	The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	:	liquid
Colour	:	yellow
Odour	:	characteristic
Odour Threshold	:	No data available
Melting point/range	:	No data available
Boiling point/boiling range	:	No data available
Flammability (solid, gas)	:	Not applicable
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Flash point	:	>= 250 °C Method: ISO 2592, open cup
Auto-ignition temperature	:	No data available

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Decomposition temperature		
Decomposition temperature	:	No data available
pH	:	8,0 (20 °C) Concentration: 100 %
Viscosity		
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	220 mm2/s (40 °C)
Solubility(ies)		
Water solubility	:	partly soluble
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Vapour pressure	:	< 0,001 hPa (20 °C)
Relative density	:	1,050 (20 °C) Reference substance: Water The value is calculated
Density	:	1,05 g/cm3 (20 °C)
Bulk density	:	No data available
Relative vapour density	:	No data available

9.2 Other information

Explosives	:	Not explosive
Oxidizing properties	:	No data available
Self-ignition	:	No data available
Evaporation rate	:	No data available
Sublimation point	:	No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
No hazards to be specially mentioned.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Hazardous reactions : No dangerous reaction known under conditions of normal use.

10.4 Conditions to avoid
Conditions to avoid : No conditions to be specially mentioned.

10.5 Incompatible materials
Materials to avoid : No materials to be especially mentioned.

10.6 Hazardous decomposition products
No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Product:

Acute oral toxicity : Remarks: This information is not available.

Acute inhalation toxicity : Remarks: This information is not available.

Acute dermal toxicity : Remarks: This information is not available.

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Acute oral toxicity : LD50 (Rat): > 5.000 mg/kg

Acute dermal toxicity : LD50 (Rat): > 2.000 mg/kg
Method: OECD Test Guideline 402
GLP: yes
Assessment: The substance or mixture has no acute dermal

toxicity

Skin corrosion/irritation

Product:
Remarks : This information is not available.

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:
Species : Rabbit
Assessment : No skin irritation
Method : OECD Test Guideline 404
Result : No skin irritation

Serious eye damage/eye irritation

Product:
Remarks : This information is not available.

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:
Species : Rabbit
Assessment : No eye irritation
Method : OECD Test Guideline 405
Result : No eye irritation

Respiratory or skin sensitisation

Product:
Remarks : This information is not available.

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Assessment	:	Did not cause sensitisation on laboratory animals.
Result	:	Did not cause sensitisation on laboratory animals.

Germ cell mutagenicity

Product:

Genotoxicity in vitro	:	Remarks: No data available
Genotoxicity in vivo	:	Remarks: No data available

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Genotoxicity in vitro	:	Test Type: Ames test Test system: Salmonella typhimurium Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: negative GLP: yes

Carcinogenicity

Product:

Remarks	:	No data available

Reproductive toxicity

Product:

Effects on fertility	:	Remarks: No data available
Effects on foetal development	:	Remarks: No data available

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Reproductive toxicity - Assessment : - Fertility -
No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments.

Repeated dose toxicity

Product:
Remarks : This information is not available.

Aspiration toxicity

Product:
This information is not available.

11.2 Information on other hazards

Endocrine disrupting properties

Product:
Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Further information

Product:
Remarks : Information given is based on data on the components and the toxicology of similar products.

SECTION 12: Ecological information

12.1 Toxicity

Product:
Toxicity to fish : Remarks: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Toxicity to daphnia and other aquatic invertebrates	:	Remarks: No data available
Toxicity to algae/aquatic plants	:	Remarks: No data available
Toxicity to microorganisms	:	Remarks: No data available

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Toxicity to fish	:	LC50 (Oryzias latipes (Japanese medaka)): 1,3 mg/l Exposure time: 96 h
Toxicity to algae/aquatic plants	:	EC50 (Desmodesmus subspicatus (green algae)): 0,55 mg/l Exposure time: 72 h
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to microorganisms	:	EC50 (activated sludge): Exposure time: 3 h Method: OECD Test Guideline 209
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 0,12 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea)

12.2 Persistence and degradability

Product:

Biodegradability	:	Remarks: No data available
Physico-chemical removability	:	Remarks: No data available

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Biodegradability : Result: rapidly biodegradable
Biodegradation: 75 %
Exposure time: 28 d
Method: OECD Test Guideline 301C

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).
This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

Components:

Reaction mass of 3-methylphenyl diphenyl phosphate, 4-methylphenyl diphenyl phosphate, bis(3-methylphenyl) phenyl phosphate, 3-methylphenyl 4-methylphenyl phenyl phosphate and triphenyl phosphate

:

Bioaccumulation : Bioconcentration factor (BCF): 220

Partition coefficient: n-octanol/water : log Pow: 4,5

12.4 Mobility in soil

Product:

Mobility : Remarks: No data available

Distribution among environmental compartments : Remarks: No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher..

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Product:

Additional ecological information : Harmful to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : The product should not be allowed to enter drains, water courses or the soil.
Do not dispose of with domestic refuse.
Dispose of as hazardous waste in compliance with local and national regulations.

Waste codes should be assigned by the user based on the application for which the product was used.

Contaminated packaging : Packaging that is not properly emptied must be disposed of as the unused product.
Dispose of waste product or used containers according to local regulations.

The following Waste Codes are only suggestions:

Waste Code : unused product
13 02 06*, synthetic engine, gear and lubricating oils

uncleaned packagings
15 01 10, packaging containing residues of or contaminated by hazardous substances

SECTION 14: Transport information

14.1 UN number or ID number

Not regulated as a dangerous good

14.2 UN proper shipping name

Not regulated as a dangerous good

14.3 Transport hazard class(es)

Not regulated as a dangerous good

14.4 Packing group

Not regulated as a dangerous good

SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006 - DE
(Commission Regulation (EU) 2020/878)

Klübersynth GH 6-220

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14.5 Environmental hazards

Not regulated as a dangerous good

14.6 Special precautions for user

Not applicable

14.7 Maritime transport in bulk according to IMO instruments

Remarks : Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)	:	Not applicable
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	:	This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57).
REACH - List of substances subject to authorisation (Annex XIV)	:	Not applicable
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer	:	Not applicable
Regulation (EU) 2019/1021 on persistent organic pollutants (recast)	:	Not applicable
Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals	:	Not applicable
Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.	:	Not applicable
Water contaminating class (Germany)	:	WGK 2 obviously hazardous to water Classification according to AwSV, Annex 1 (5.2)
TA Luft List (Germany)	:	Total dust: others: 3,18 % Inorganic substances in powdered form: Not applicable Inorganic substances in vapour or gaseous form: Not applicable Organic Substances:

portion Class 1: < 0,01 %
others: 96,82 %

Carcinogenic substances:
Not applicable
Mutagenic:
Not applicable
Toxic to reproduction:
Not applicable

Volatile organic compounds : Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
Volatile organic compounds (VOC) content: 0,06 %

15.2 Chemical safety assessment
This information is not available.

SECTION 16: Other information

Full text of H-Statements

H400 : Very toxic to aquatic life.
H412 : Harmful to aquatic life with long lasting effects.

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office

of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

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List of changes

No.	Description	Pages	Date
1	Replacing the traction sheave	32, 33	26.02.2024
2	Check bolt connection traction sheave / flange	28	22.07.2024