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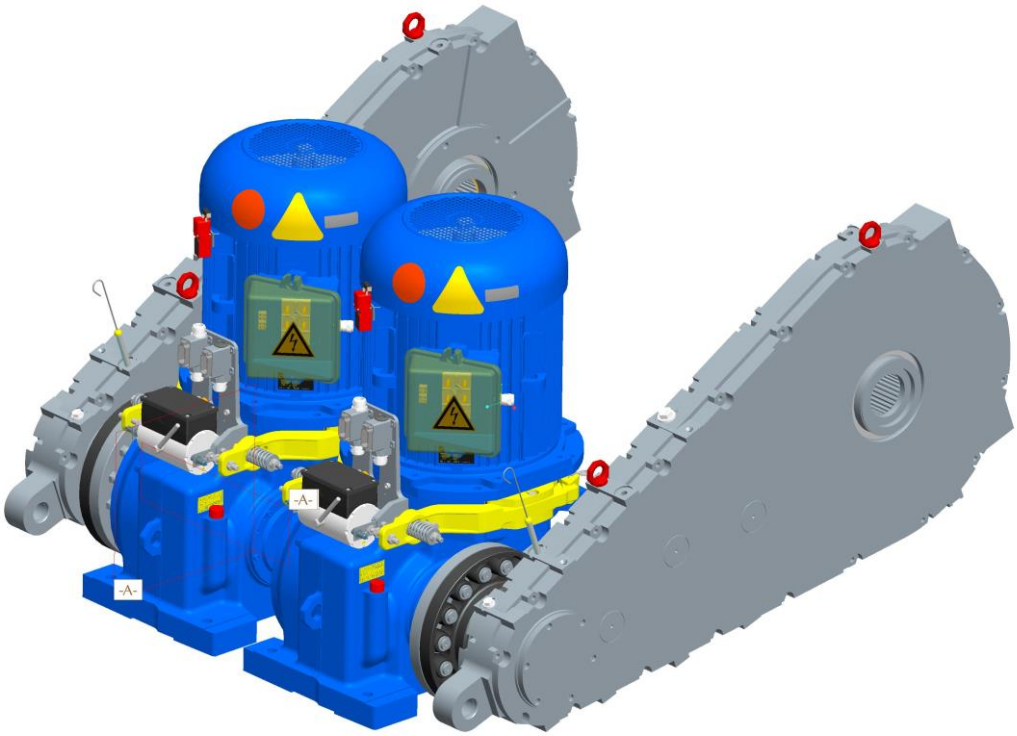
Installation instructions

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

Escalator Machine

Model: *oms* Hypodrive EC 2 - 25

Coupling Machine ; Duplex Machine ; Dual Machine



Please archive this document for future reference

OMS No.

Date of Manufacture
Month / Year

Translation 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 Escalator Machines

2.1 Applicable Use

The OMS – escalator traction machine EC 2 - 25 is solely intended for usage in escalators and passenger conveyors (travelators, moving walks) for public transportation according to EN 115 : 2017 and DIN EN ISO 12100 part 1 + 2.
The installation and use of the EC 2-25 for other purposes is not applicable. The OMS ANTRIEBSTECHNIK is not liable for personal injury and or damage resulting from none applicable usage.

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 – escalator drive is applicable to the 9th Directive of the Machine and Product Safety Law *(9. Verordnung zum Geräte- und Produktsicherheitsgesetz [Maschinenverordnung])* and the 2006/42/EC Machine Directive. It is part of a machine, namely an escalator or a travelator and is therefore not liable for CE certification.
The commencement of regular use is not permitted until the traction machine has been correctly installed into the escalator or travelator and the manufacturer has applied the CE label to the escalator or travelator to certify that the safety requirements have been fulfilled for the complete product / 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 used motors are generally suitable for frequency inverter operation, provided the slew rate limit of the motors is adhered to. Customer supplied frequency converters must be set up according to their instruction sheets, in order to comply with the requirements of the OMS-Escalator Machine, and with the national EMI directives.

The escalator traction machine is only intended for installation and usage in an enclosed area.

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.

Stopping of a running traction machine is via frequency inverter control or via the machine brake. In emergency situations braking may be via an external, auxiliary brake on the escalator main shaft. Make sure that when braking with such an auxiliary brake *only*, the traction machine is not dynamically overloaded. When braking with an auxiliary brake, this should preferably be engaged together with the machine brake.

OMS-Escalator 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 Escalator documentation and regulations.

2.2 Non Applicable Use

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

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

Permissible Limits:

- max. Motor Speed: refer to technical documentation;
- Local ambient temperature during operating min.: 0° C max. 45° C and 55° C for 1h.; with motor heating from -10°C up to 45°C, with additional gear box heating from (for intermediate gear box too)-35°C up to 45°C
- Local ambient temperature without operating: -20°C max. 60°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
- 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 EC 2 - 25:

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

- **At initial start-up, the motor must accelerate to normal speed and be run for min. 30 seconds, before a lower standby speed can be used! This is mandatory to warrant lubrication of the upper Hypoid bearing via the integral oil pump.**

2.3 Warranty and Liability for the Escalator 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 Escalator 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, 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 escalator.

2.4 Dangers, that are associated with the Escalator Drive

Our escalator 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 escalator drive are not permissible

2.5 Instructions for Safe Use

If changes are observed during the service life of the machine, e.g. wear, ageing etc. then the machine should be serviced and the changes dealt with, according to this OMS Operating Manual.
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.

3 Installation

3.1 Assembly

Prior to installation, the intended frame or foundation upon which the escalator machines are to be installed must always have been calculated and proved adequate.
The frame must be rigid enough to withstand all and any bending and torsional forces that may occur during operation.

Fix the machine in the position as in the order using the four mounting holes in the gear unit base. Using the through-holes in the support frame and bolts and nuts to ensure secure attachment is recommended.

Bolts: *M 20 quality 12.9*
Torque: *550 Nm*
Max. allowed uneveness of the surface : 0,05mm
If necessary, use shimps to achieve the requires eveness.

3.1.1 Assembling the intermediate coupling

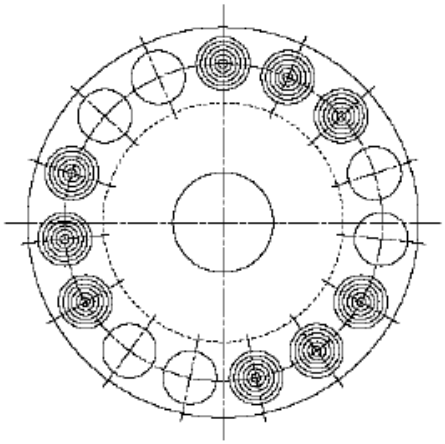
The number of bolts in the coupling flange is according to the motor power..

Fig. 1a
Front view : coupling flange with bolts

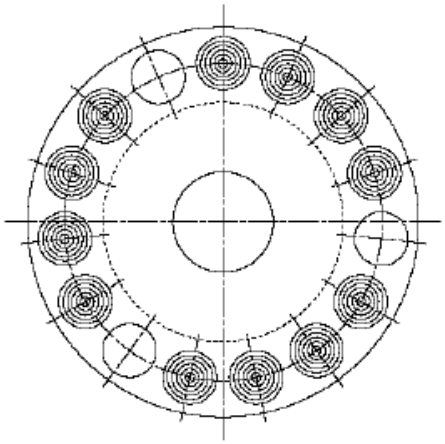
Fig. 1b
Side view

Tighten the nuts of the bolts with 120Nm!

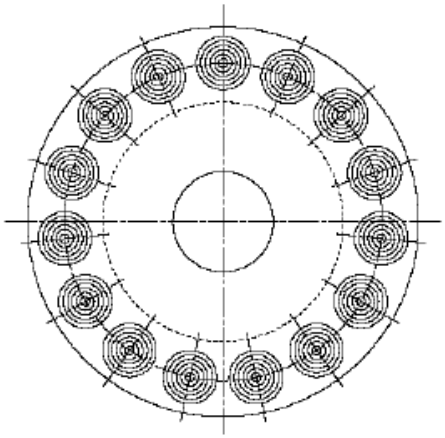
The mounting positions of the bolts according to the motor power is shown in the following graphic :



15kW @1500rpm: 9 buffers
11.7kW @1500rpm: 9 buffers
11.7kW @1200rpm: 9 buffers
11.7kW @1000rpm: 9 buffers



24kW @1500rpm: 12 buffers
18.6kW @1500rpm: 12 buffers
18.6kW @1200rpm: 12 buffers
15kW @1200rpm: 12 buffers
15kW @1000rpm: 12 buffers



30kW @1500rpm: 15 buffers
27kW @1200rpm: 15 buffers
24kW @1200rpm: 15 buffers
22kW @1000rpm: 15 buffers
18.6kW @1000rpm: 15 buffers

3.1.2 Adjusting the Drive unit to the Intermediate gear

Put some grease on the inner toothing of the intermediate gear outputshaft before you mount it onto the escalator shaft.
We recommend : Klüber - Unimoly HTC Metallic.
When mounting the gear boxes take care that they will have no tensions to each other or in themselves.
.
For the alignment of the two coupling flanges note the following :

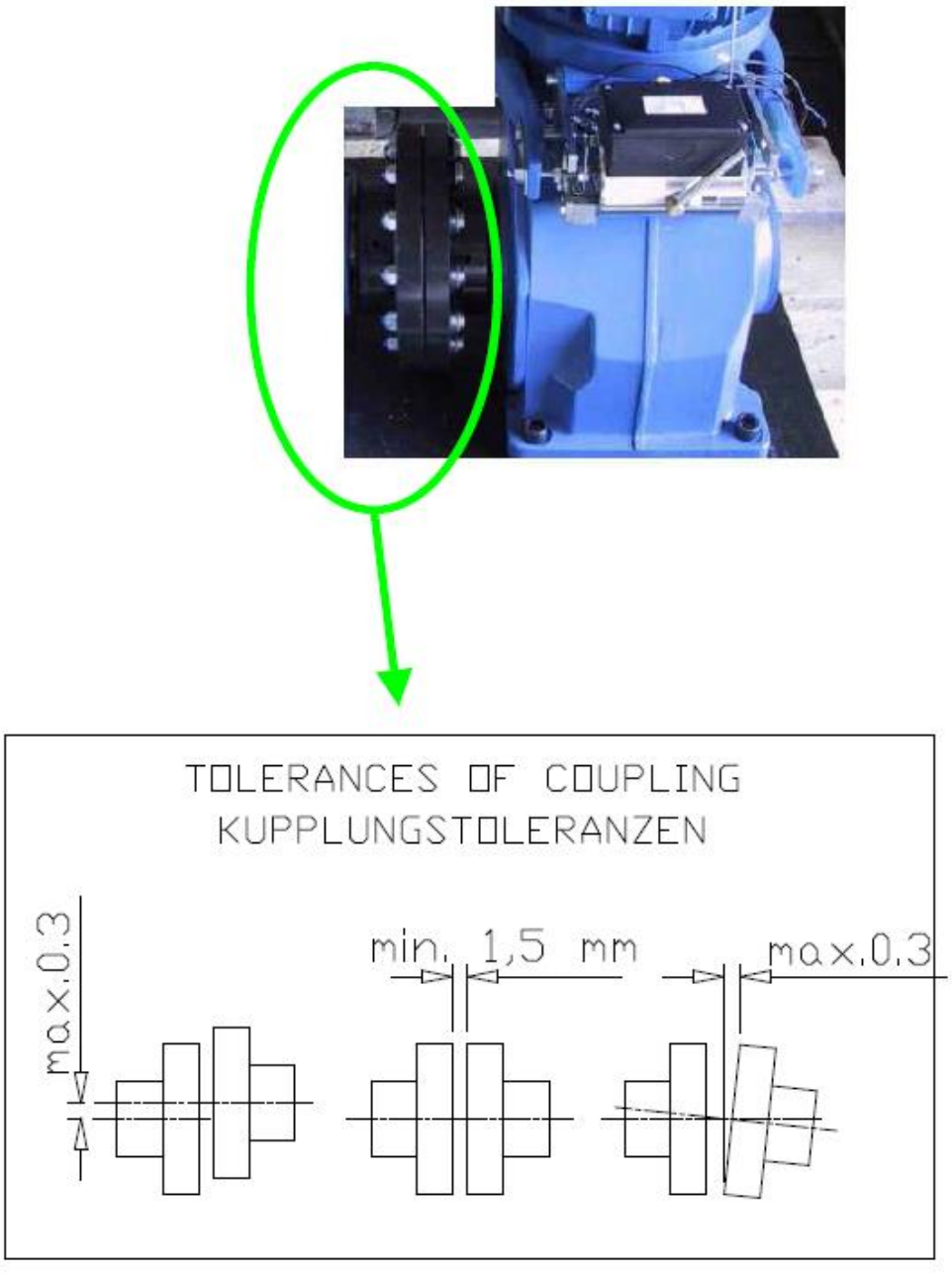
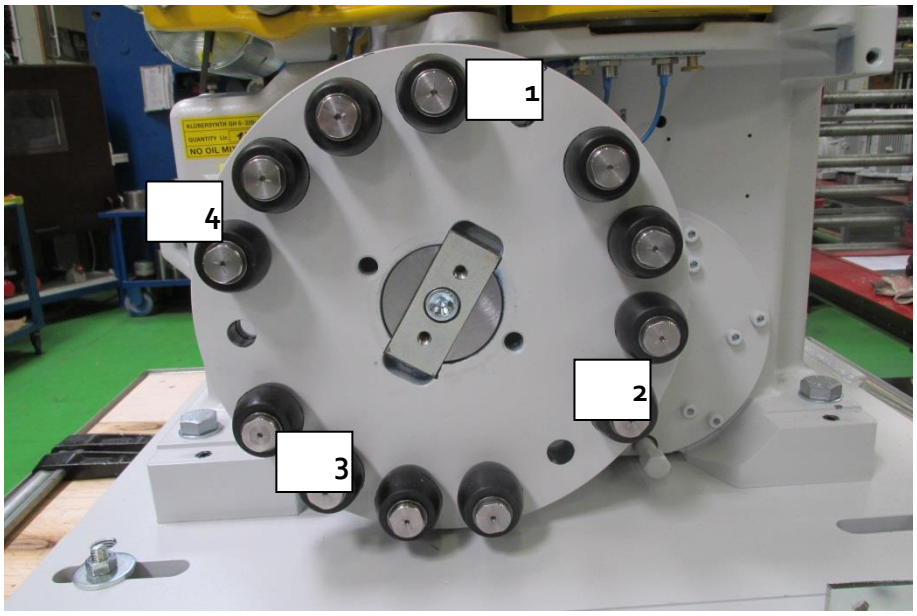
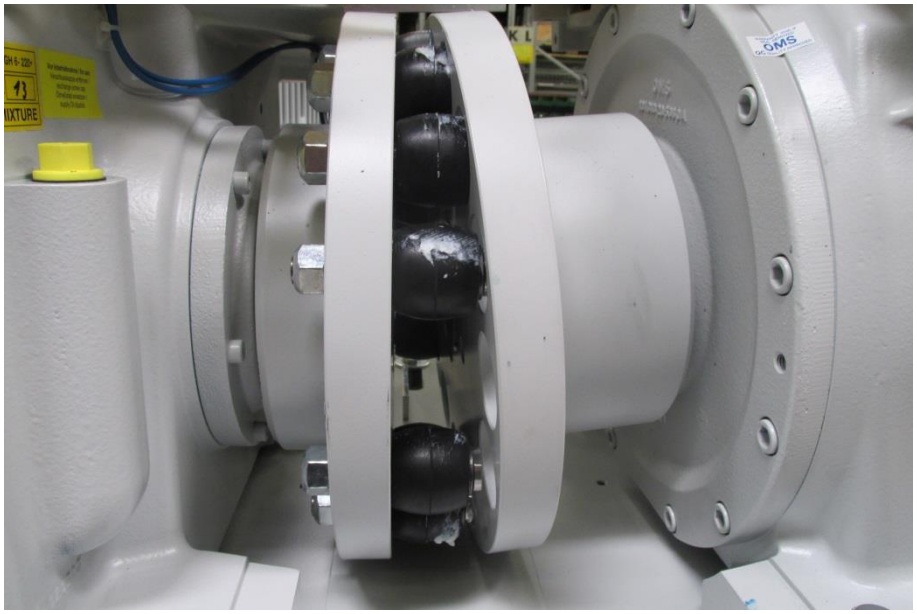


Fig. 2

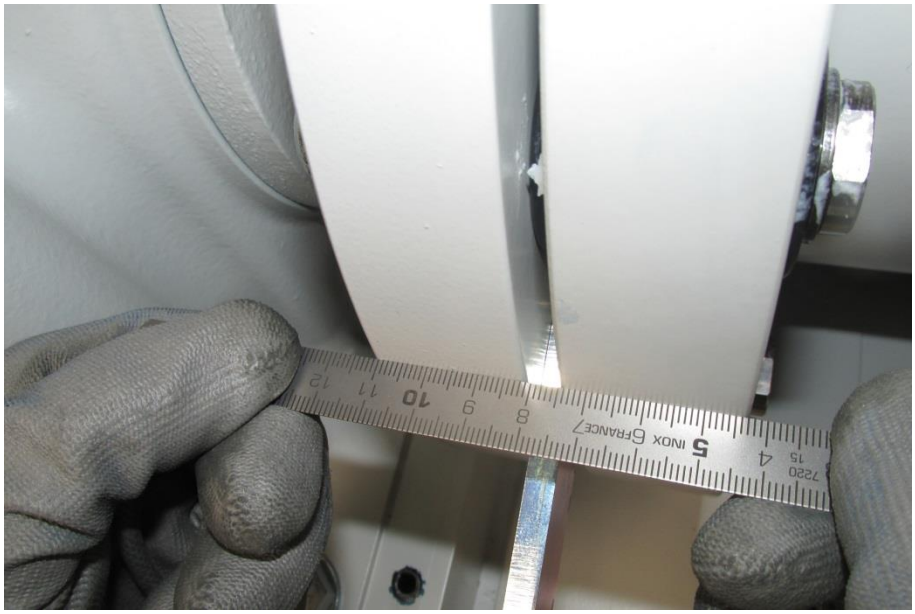


Measurement – and control points 1-4; incremental angle 90°

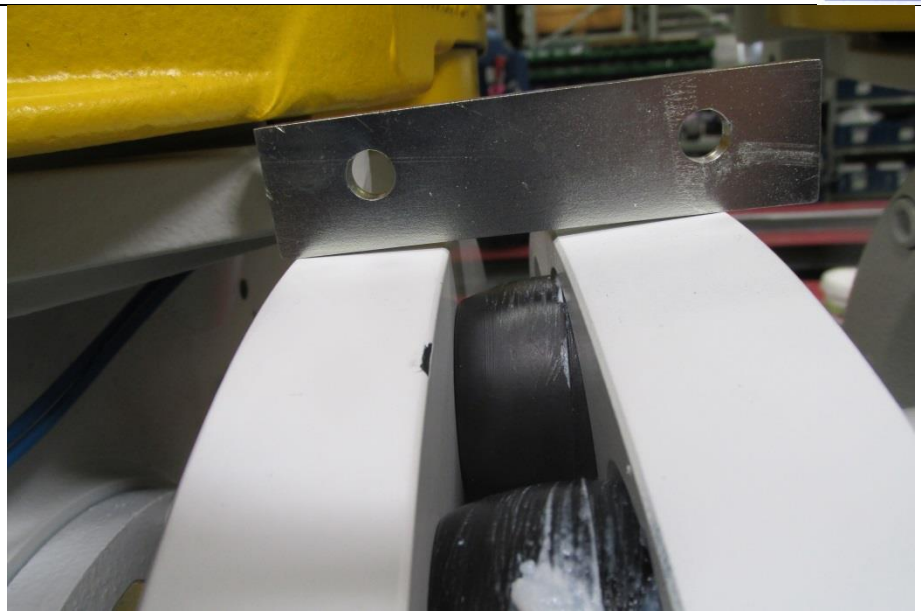


Move the bolts of the first coupling flange into the holes of the second coupling flange

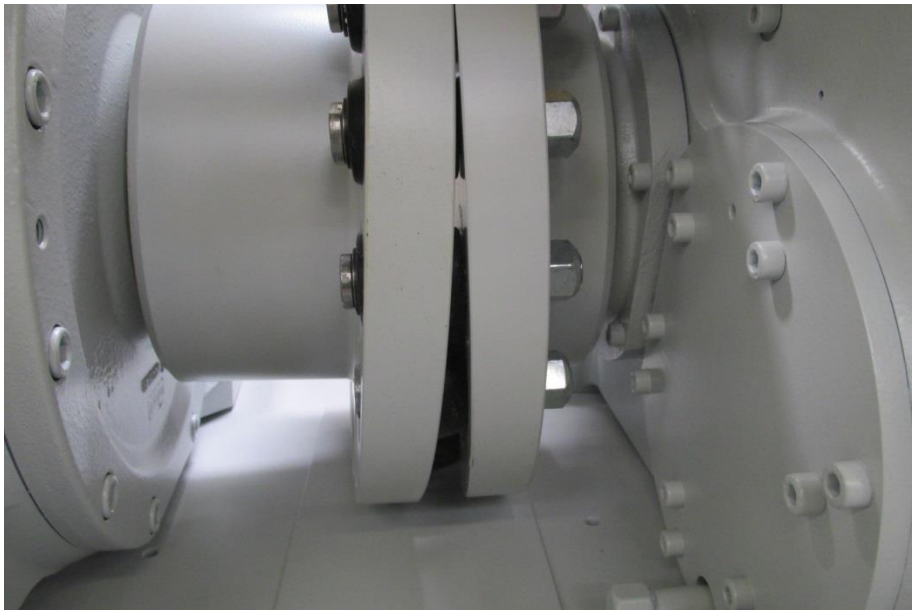
To adjust the distance between the coupling flanges (min. 1,5mm – max. 6mm) it will be helpful to put some distance gauges between the coupling flanges at the points 1-4



After assembling the coupling the following dimensions must be proofed at the points 1-4:
Parallelism, axial alignment and angular alignment of the coupling flanges
If necessary readjust it



Angular alignment must be smaller then 0,1° or 0,3mm



Wrong assembling: assembled like this the gear box will become an oil leak and the rubbers of the bolts will be destroyed soon

Check the rubbers of the bolts every year. Is one rubber destroyed all rubbers must be exchanged, but latest after 5 years in use.

3.2 Before commissioning:

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. Retain the sealing plug for possible future transportation of the Machine.
Check the oil level before use.

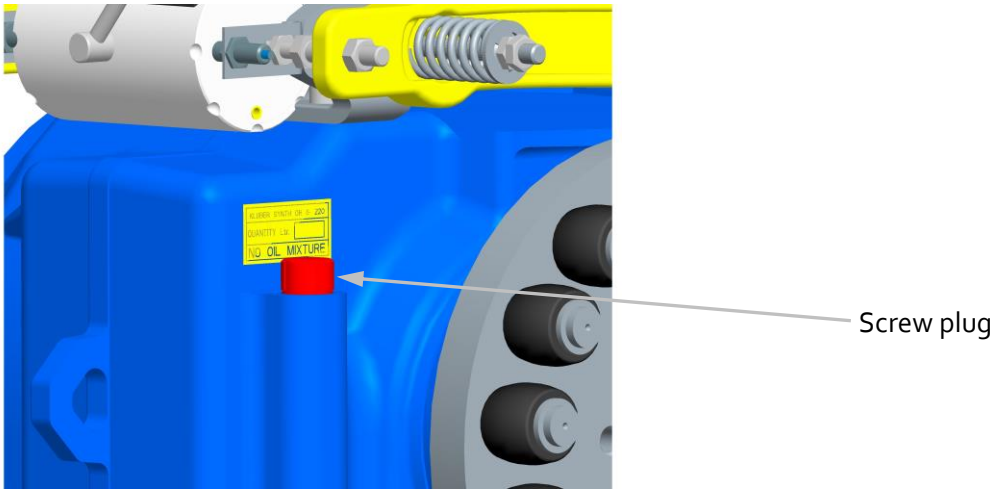


Fig. 3a

At the intermediate gear you have to change the sealing plug onto the oil neck against the oil dip stick. **Depending to the ordered angular mounting position** of the intermediate gear **the respective sealing plug** must be exchanged against a air ventilation screw (see Fig. 3b, 3c oder 3d**The assembling of the intermediate gear is only allowed into the ordered mounting position.**

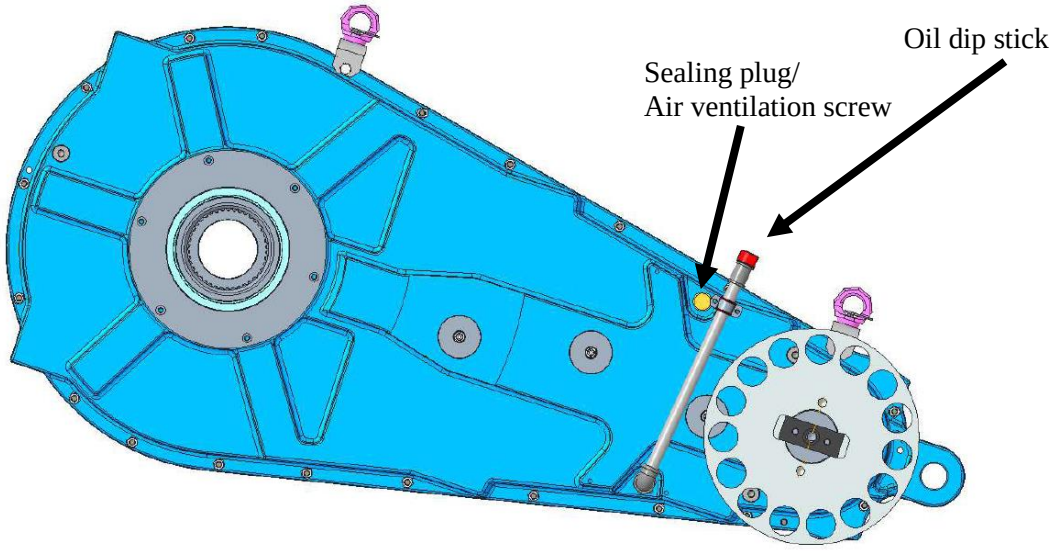


Fig. 3b Intermediate gear, oil dip stick and air vent screw, **angular mounting position approx. 17°**

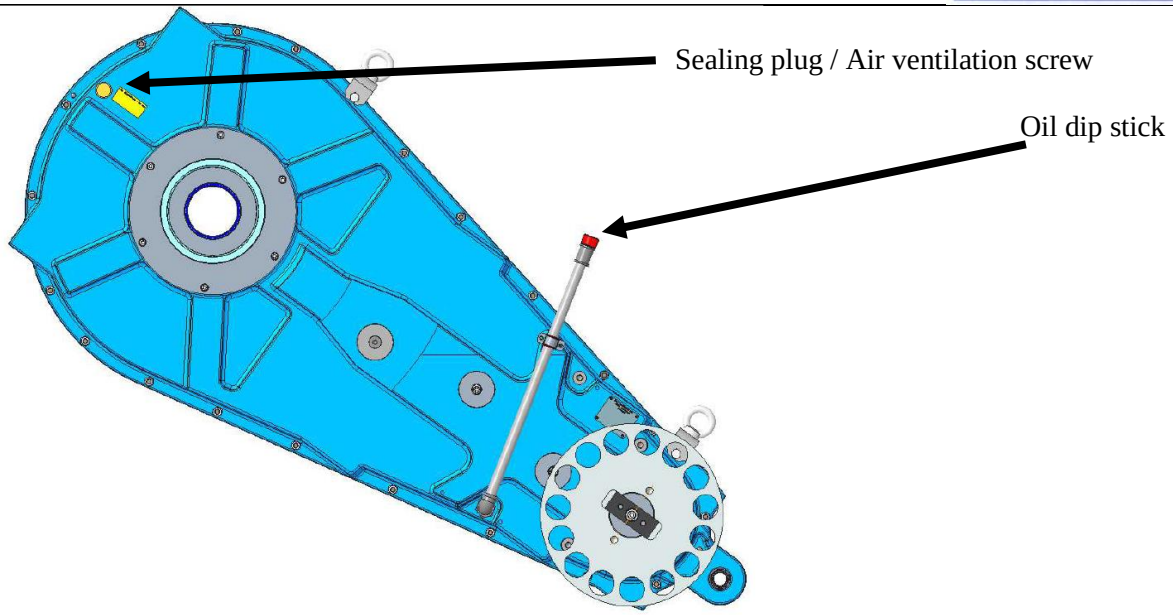


Fig. 3c Intermediate gear, oil dip stick and air vent screw, **angular mounting position approx. 36°**

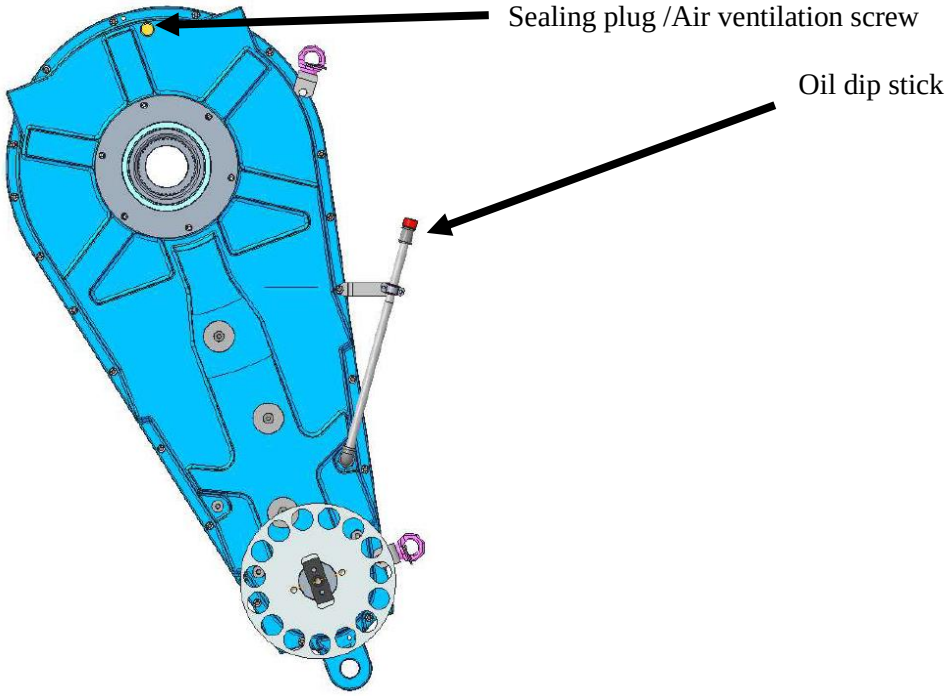


Fig. 3d Intermediate gear, oil dip stick and air vent screw, **angular mounting position approx. 70°**

Annotation:

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 Gear-box, eventually causing the Gearbox to leak – oil will be pressed out through the Shaft Gaskets.
The Oil Dipstick does not seal the gear box.

3.3 Special climate conditions

Temperature is falling below the dew point, especially:

-humid and hot & humid climate :

Motor heating is mandatory in every instance where condensation due to the temperature falling below the dew point is possible

Where the temperature in the machine room can reach T ≥ 45°C, 1 or 2 blowers in the step band are required to blow colder air from in between the step band Into the machine room
For temperature T_{amb} ≤ -20°C heating of gear box (oil) is mandatory a thermostat controller is required

3.4 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.***

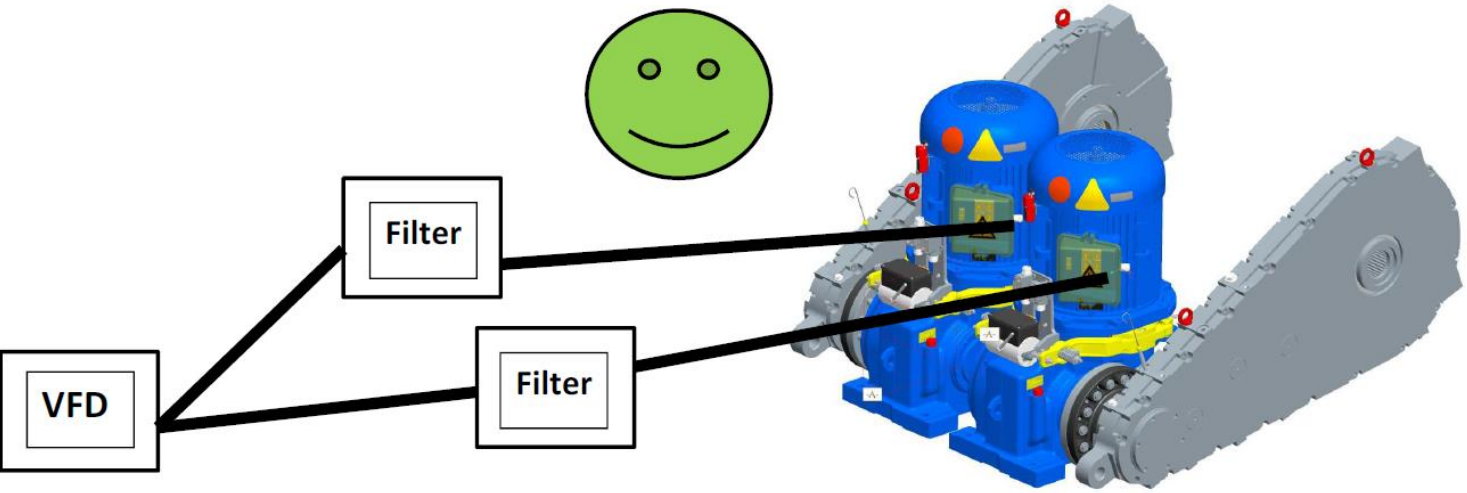
Disconnect the main switch beforehand and secure the switch against unintended operation!

When you finish the work in the terminal box you have to close it! Before applying power and unscrewing the switch again. Always use isolated tools!

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

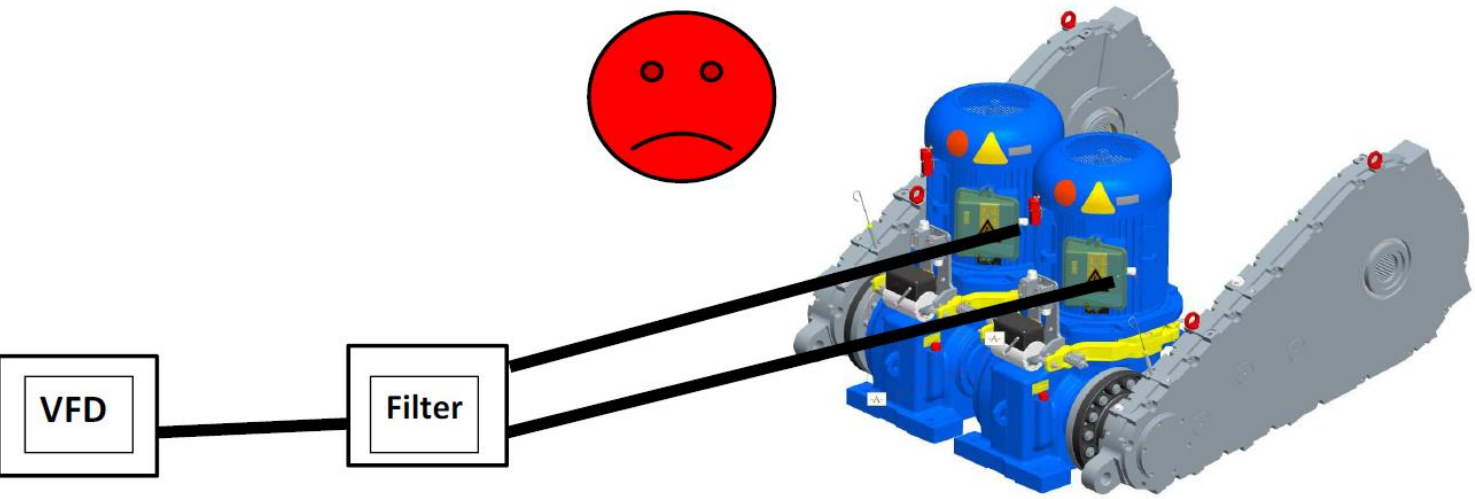
Procedure:

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 screws and repositioning the Terminal Box. Fasten the terminal box and tighten the inner screws with torque of 20 Nm.
Please take care when adjusting the fine wiring of the temperature monitor switches..



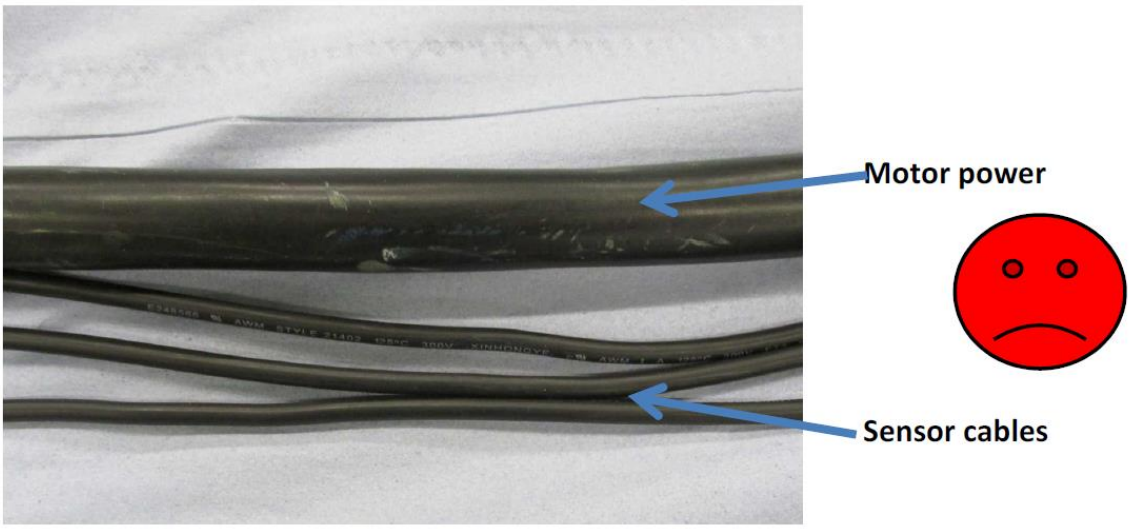
Each motor needs its own filter ($\delta U / \delta t \leq 500V/\mu s$)

The maximum allowable slew rate of the filter is $\delta U / \delta t \leq 500V/\mu s$



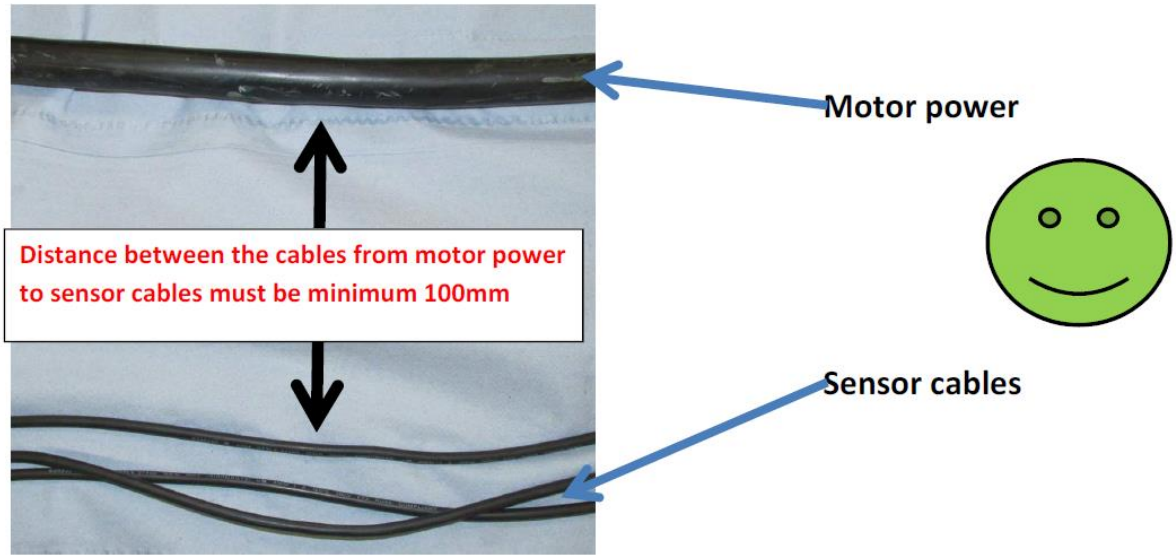
Not allowed!

This configuration may burn the motor!



Not allowed!

Capacitive coupling of transients from the motor power cable may destroy the sensors!



Optimized cable installation to protect the sensor cables against interference radiation (EMI)

Cables for the inductive sensors should use a cable screen

When using a frequency inverter : δ**U / δt ≤ 500V/μs** is the max. allowable slew rate

2. Brake Solenoid:

The brake solenoid (Two Circuit Double Stroke Expanding Magnet) must be connected according to the various requirements (see connection of the brake magnet to the power supply in the Appendix). Supply voltage generally 230V AC (± 10% max.)

a) for a single circuit brake (O-21 or O-31) both left and right solenoid circuits are controlled by one module.
b) for a double circuit brake both sides of the solenoid (O-22 , O-32or A42) are controlled by an individual module. For earthquake unsafe regions the electrical connection of the two modules is made individually, too (O-23 , O-33 or A43).

Attention! Special note appertaining to Dual - and Duplex machine: The motors and the brake solenoids must be connected in a way if one solenoid will fail out both motors are to stop!

4 Construction and Function

The OMS escalator machine is a high capability traction machine, compromised of several sub-units for different tasks.
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.

The oil shelf life – dependant on usage and environment – usually reaches 30.000h or more.
For average ambient temperatures of approx. 30°C and under continuous operating methods the oil can be used for up to 30,000 operating hours. In addition to the usual checks every 2 years the lubrication properties of the oil should be checked for (see chapter 6).

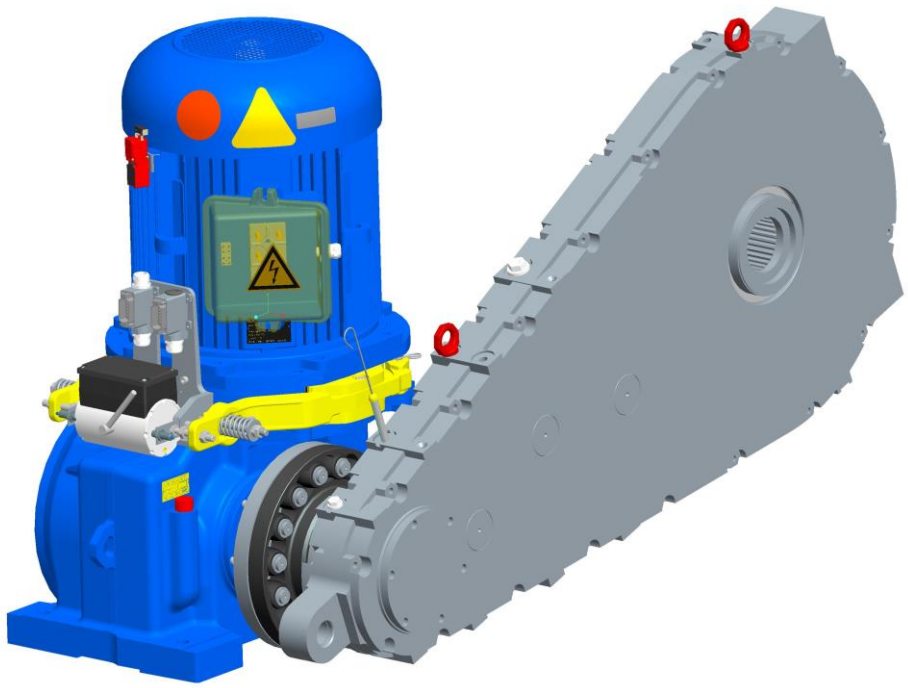


Fig. 4a EC 2-25 Coupling machine, consisting of 1x Drive unit, 1x Intermediate coupling und 1x Intermediate gear

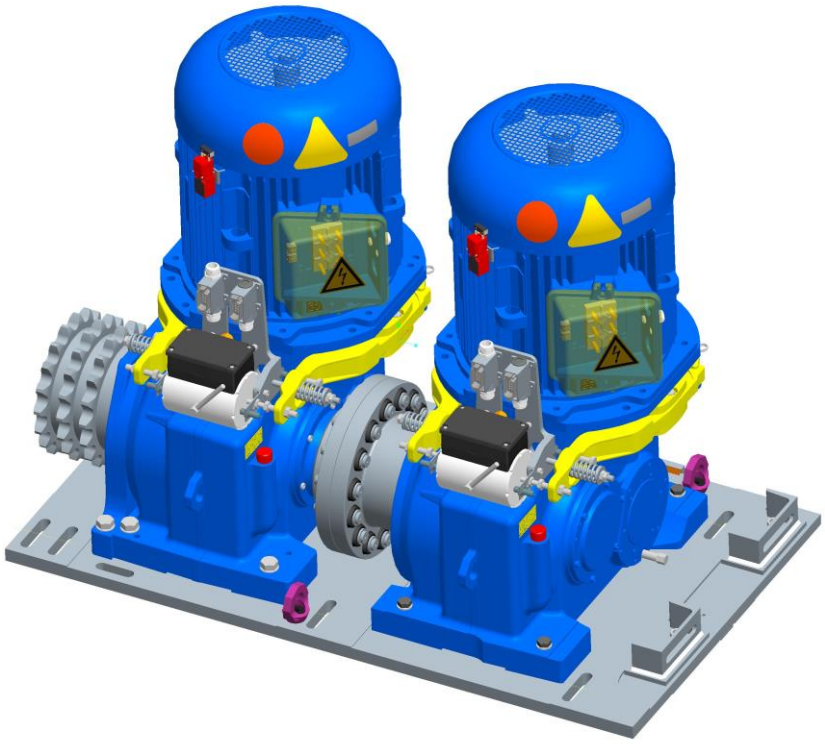


Fig. 4b : Dual machine, consisting of 2x Drive unit, 1xIntermediate coupling, 1xBasic plate and 1x Chain wheel
Annotation for fastening the gear boxes onto the basic plate :
Torque for the screws : M20 - 8.8 : 320Nm ; M16 - 8.8 : 180Nm

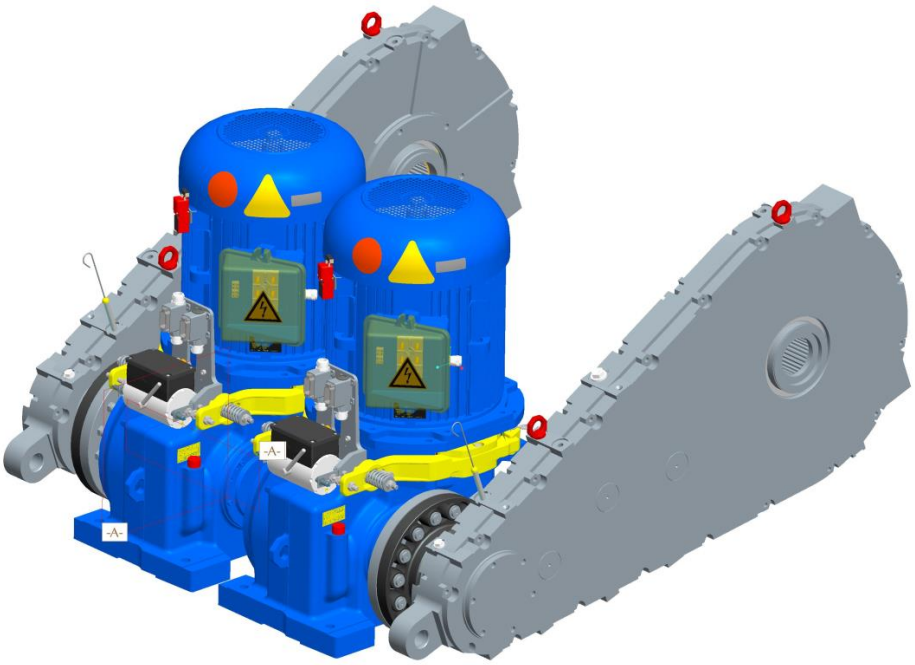


Fig. 4c : EC 2-25 Dulex machine, consisting of 2x Drive unit, 2x Intermediate coupling. und 2x Intermediate gear

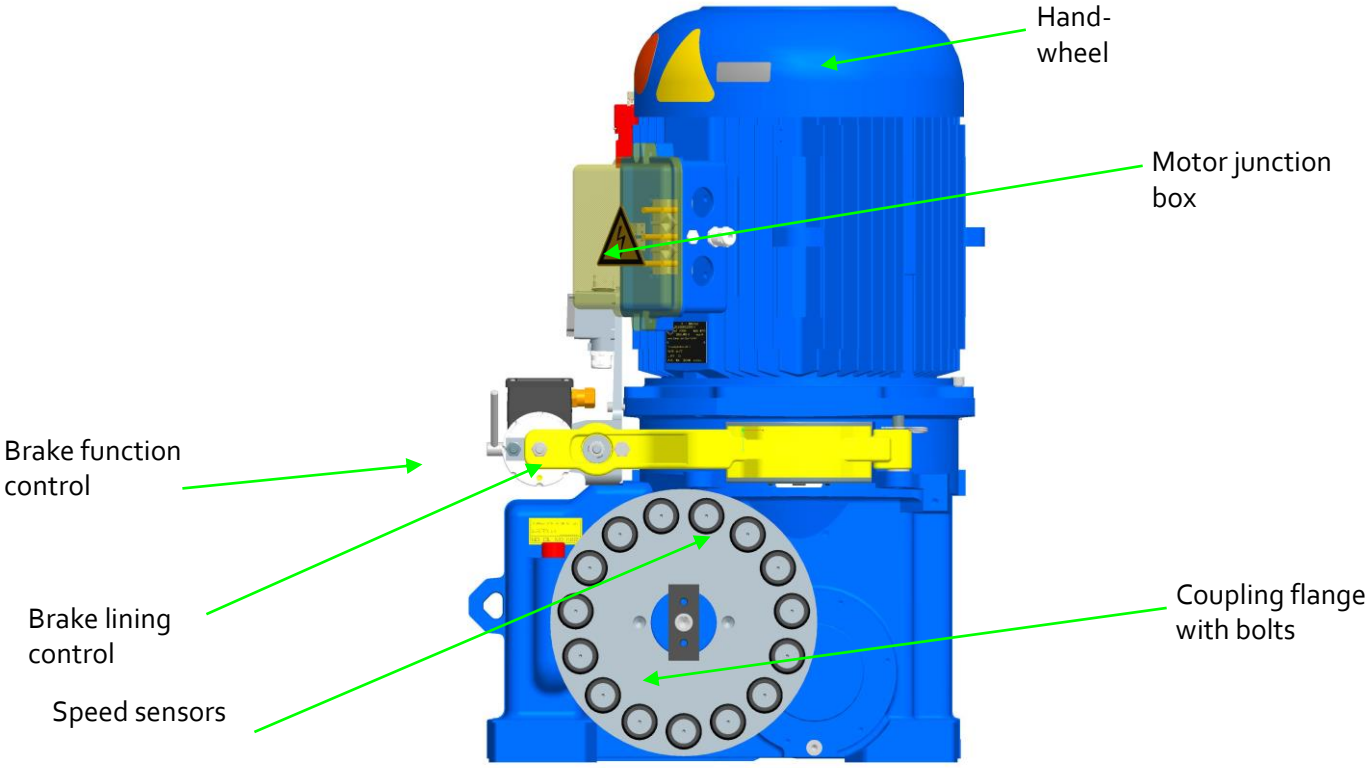


Fig. 4d: Design of the OMS machine EC 2-25 with intermediate coupling

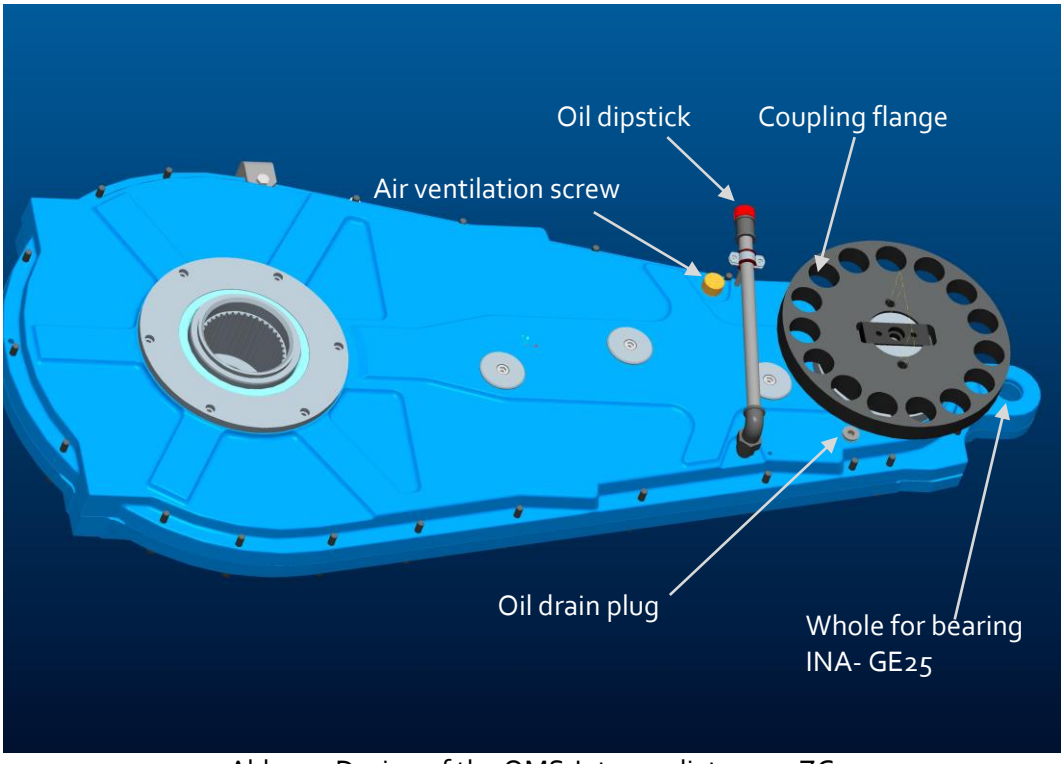


Abb. 4e: Design of the OMS-Intermediate gear ZG

4.1 Technical Data

Please refer to the Appendix for details of the OMS escalator machine's working capacity, sheet:
„Technical data for escalator machine EC 2 – 25".

All dimensions and connecting dimensions for the OMS escalator machine are given in the Appendix:
„Dimensioned drawing of the escalator machine EC 2 - 25".

4.2 Noise Emission Information

The A-weighted sound pressure level L_{pA} in dB(A), measured according to DIN EN ISO 11200 is measure at 1 m distance to the traction machines surface.
The traction machines will meet the below sound emission figure under the condition of an empty running escalator:

Machine type	**Max. sound emission L_{pA} [dB(A)]**
EC 2 - 25 without intermediate gear	typ. 64,0 at motor speed < 1.500 min^{-1} 25% load dependet on performance and application

If you have any further questions regarding noise emissions, please contact OMS.

4.3 Manufacturers Identification Plate

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

OMS ANTRIEBSTECHIK
36219 CORNBERG
GERMANY

EC 2 - 25
OMS Nr. - Baujahr xxxx-MMJJ
OMS-Auftrag: xxxxxx
Kommission: xxxxxxxxx
Übersetzung: 19,99/1

Model: EC 2 - 25
Ratio:
OMS-No. – Month Yearxxxx-mmyy

Intermediate gear:

OMS Antriebstechnik
36269 Cornberg
Germany

OMS-No.:	ZG .xxxxxx
Unit-No.:	xxxxxxx
Deliv. Date :	Month Year
Type :	ZG / D x
Ratio :	i = xx : 1

OMS-Number
Contract Number
Delivery Date
Type of gear
Ratio

4.4 Modules and Additional Parts

The OMS escalator machine EC 2 - 25 consists of:

- Gear, compl.
- Motor, compl. (with Hand wheel and brake drum)
- Brake system, compl. (solenoid, brake levers, brake spring, rod)
- Function monitoring devices
  - Brake function monitoring (optional)
  - Brake lining wear monitoring (optional)
- Safety devices
  Speed sensors (NRD monitoring) (optional)
- Intermediate gear ZG

4.5 Alternative equipment

The escalator machines can also be fitted with the following alternative components:

- Gearbox ratio: i = 18,7 ; 20 ; 22,4 ; 24
- Motor selection

Standard-features:

- Terminal box with metric thread
- 3 Winding earthing contact (bimetal opener)
- Colour: gentian blue RAL 5010,
- Protection class IP 55
- Motor power S1 operation

4- pole 50Hz (1500rpm)	6- pole 50Hz (1000rpm)	6- pole 60Hz (1200rpm)
11,7 kW	11,7 kW	11,7 kW
15 kW	15 kW	15 kW
18,6 kW	18,6 kW	18,6 kW
24 kW	22 kW	24 kW
30 kW		27 kW

- Switching impulse voltage test 2 x U_B +1000V (1min Test time)
  od. (2 x U_B + 1000V) +20% 1sec. Test time
- Brake drum and hand wheel assembled
- Motor shaft and BS end shield provided for magnetic encoders (9 tapped holes M4)

Motor voltage

50 Hz	60Hz
200 - 208 V	200 - 208 V
220 - 240 V	220 V
350 V	
380 - 415 V	380 V
440 V	440 V
460 - 480 V	460 - 480 V
	575 - 600 V

4.6 Spare parts

The following components can be exchanged:

- Gear housing
  - Exchange gearbox
  - Sealing kit input shaft
  - Coupling, elastic clutch gasket
  - Sprocket wheel
  - Oil dipstick, Gearbox oil
- Motor, complete (including Hand wheel, Brake drum, claw coupling)
- Brake
  - Brake solenoid in size O 31(single circuit) - O 32, O 33 double circuit)
  - Brake lever pair with brake lining
  - Spring single circuit/ springs - dual circuit
  - Brake lever bolts
- Sensor technology
  - Over and underspeed controls
  - Brake lining wear control
  - Braking function controls

5 Transport and Storage

5.1 Transport

All 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 total weight from the machine depends from the motor power.
Gearbox weight separate : approx. 400 kg
Motor weight by BG 160 : approx. 160 – 200 kg
Motor weight by BG 180 : approx. 200 - 300 kg
Motor weight by BG 225 : approx. 300 - 340 kg
Intermediate gear ZG : approx : 500-520kg

5.2 Lifting the machine

Always use the appropriate lifting tackle to lift the elevator machine, otherwise it may fall!
Only high strength eyebolts may be used to lift the gear unit!
The gear housing is equipped with threaded holes for eyebolts (4x M12).

Lifting the gear unit using the eyebolts on the motor is prohibited as these are ***only designed to carry the weight of the motor!***

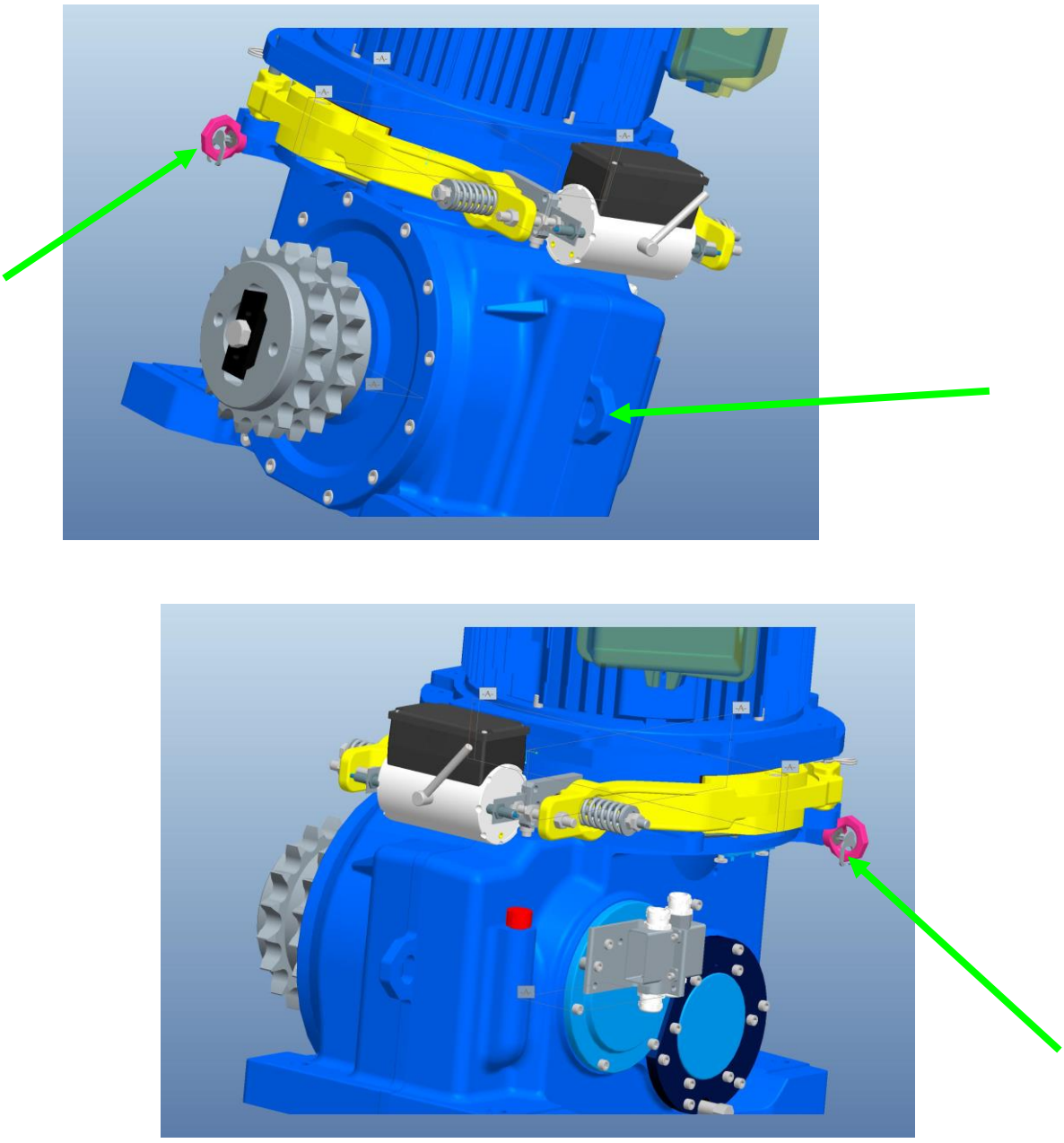
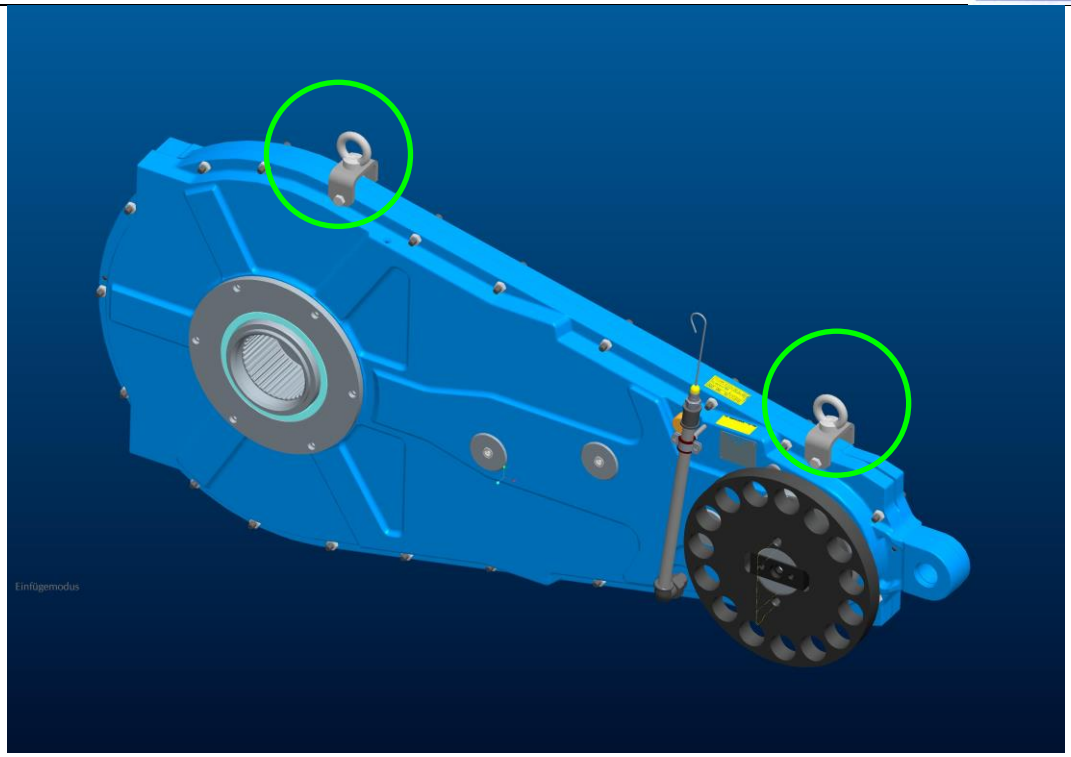
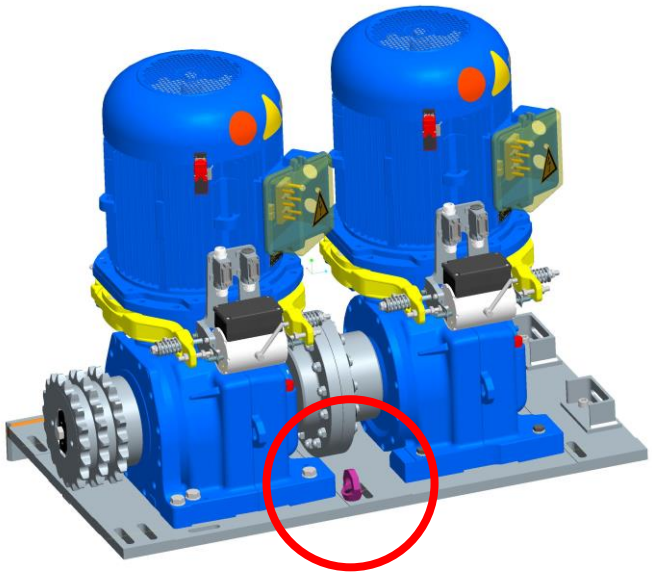


Fig. 5a



Lifting the Dual-machine
There are 3 holes with thread M20 for eye bolts for lifting the Dual-machine.



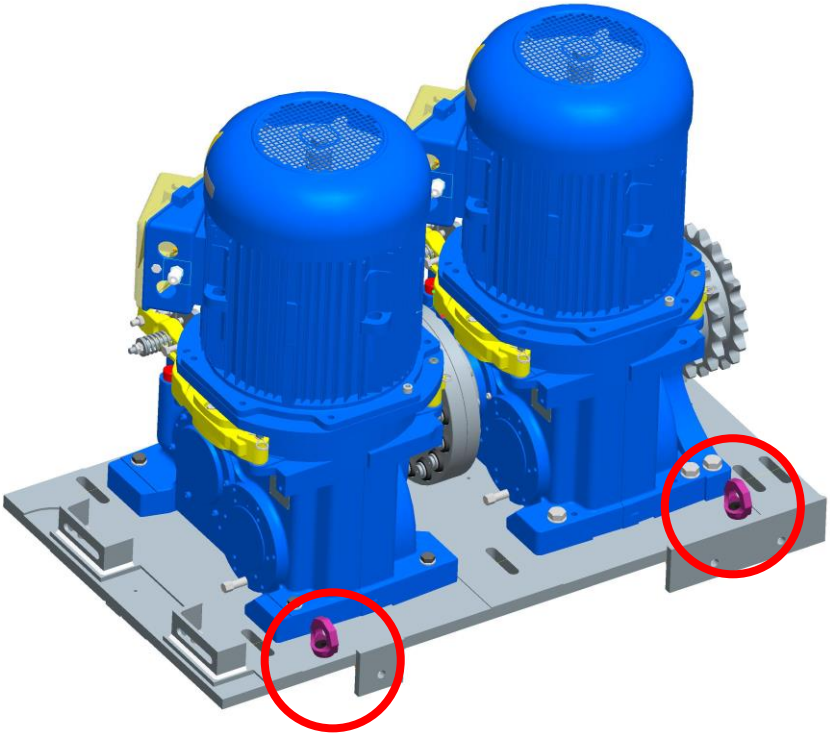


Fig. 5b

5.3 Storage

The 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 installing the machine, please note:
- Check all brake components (remove any slight rust film on the brake drum by braking).
- Turn the Machine a few times by hand, (to ensure that the Motor Bearings are evenly greased).

B) For storage up to 18 months:

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 5. 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 5. 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 regulations for operation, service and inspection according to the valid safety regulations like EN 115 „Safety rules for the construction and installation of escalators and moving walks" as well as all other applicable national and international regulations must be adhered to.

The operator is responsible for the safe installation, control and maintenance according to the applicable regulations and standards. Before beginning of the maintenance switch off the main switch and against inadvertent switching on secures!
For inspection, repair work and service and similar operations the access to the escalator or passenger conveyor must be restricted for unqualified persons, namely passengers by using appropriate provisions.

6.1 Recommended Routine Maintenance

Item	***Maintenance Frequency***	***Source***
Oil Level, Control	Every 3 Months	See 6.3.1
Oil change	Introduction - after 10.000 h.	See 6.3.3
Bearing, Check (Audible)	In accordance with the regular escalator maintenance schedule, at least annually.	
Brake, Check	In accordance with the regular escalator maintenance schedule, at least annually.	See 6.4
Wear of chain wheel	In accordance with the regular escalator maintenance schedule, at least annually	
Electrical Wiring and Connections, Check for wear and loose connections	In accordance with the regular escalator 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 escalator maintenance schedule, at least annually.	

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

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.**

Interval:

1. after approx. 10.000 h.
2. after approx. 20.000 h.
3. ; 3……. + 5000h Intervals

The oil must be exchanged at least every 5 years of operation

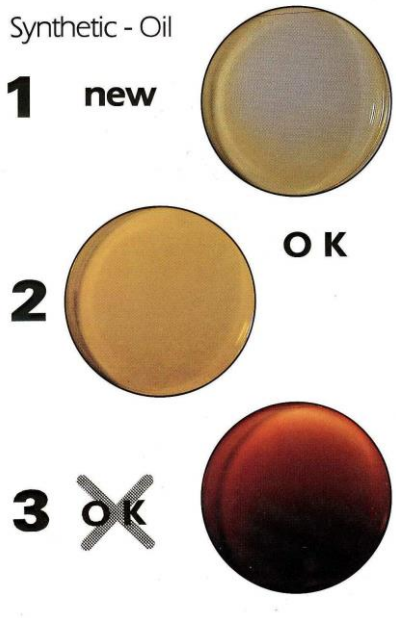


Fig. 6

- Oil colour straw yellow to mid brown: Oil good to still usable
- **Oil colour equally tone 2: 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 beneath the oil drain plug on the bottom of the gears. The volume of oil is approx. in the gear box and in the intermediate gear box 13 l.
2. Carefully open the oil drain plug.
3. Clean the oil drain plug thoroughly.
4. After all the oil has drained, refasten the oil drain hole.
5. Fill the oil by pouring it into the dipstick opening.
6. Please note the filled level (see 6.3.1).
7. Only use the specified oil grade:

   Klüber Syntheso D 220 EP Quantity: 13 l
   Klübersynth GH 6-220Quantity: 13 l
   (**never mix with other grades of oil**
   (Only use other oil grades after consulting OMS)

8. Close the filling opening with the dipstick.

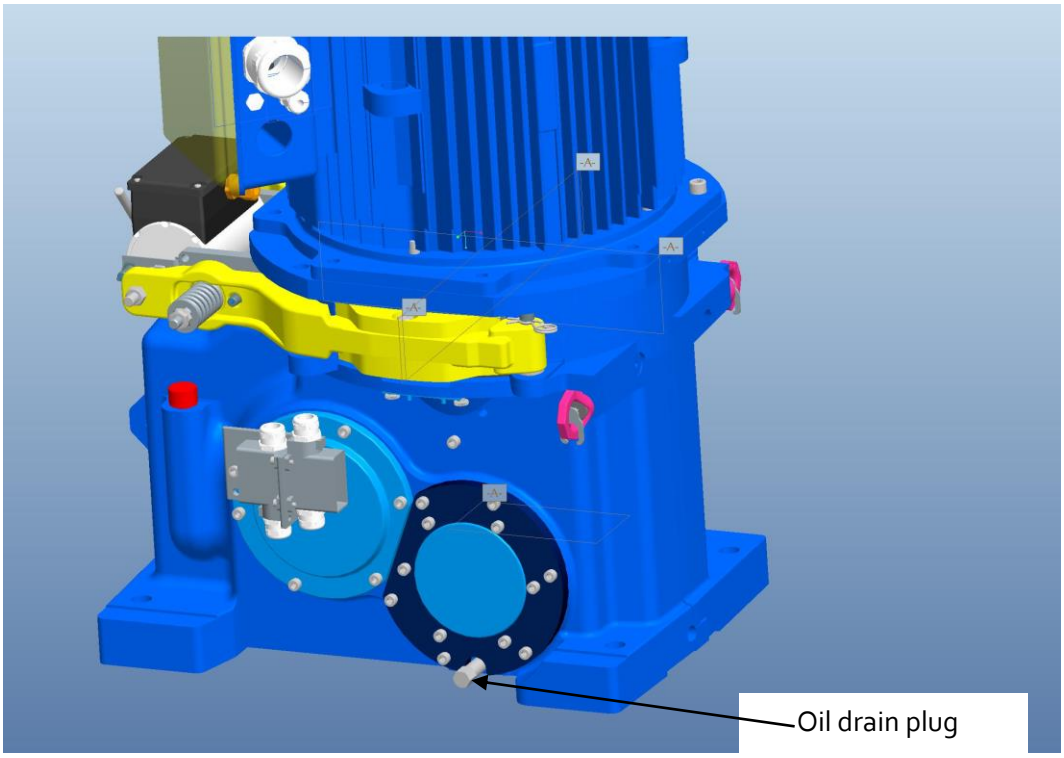


Fig. 7a

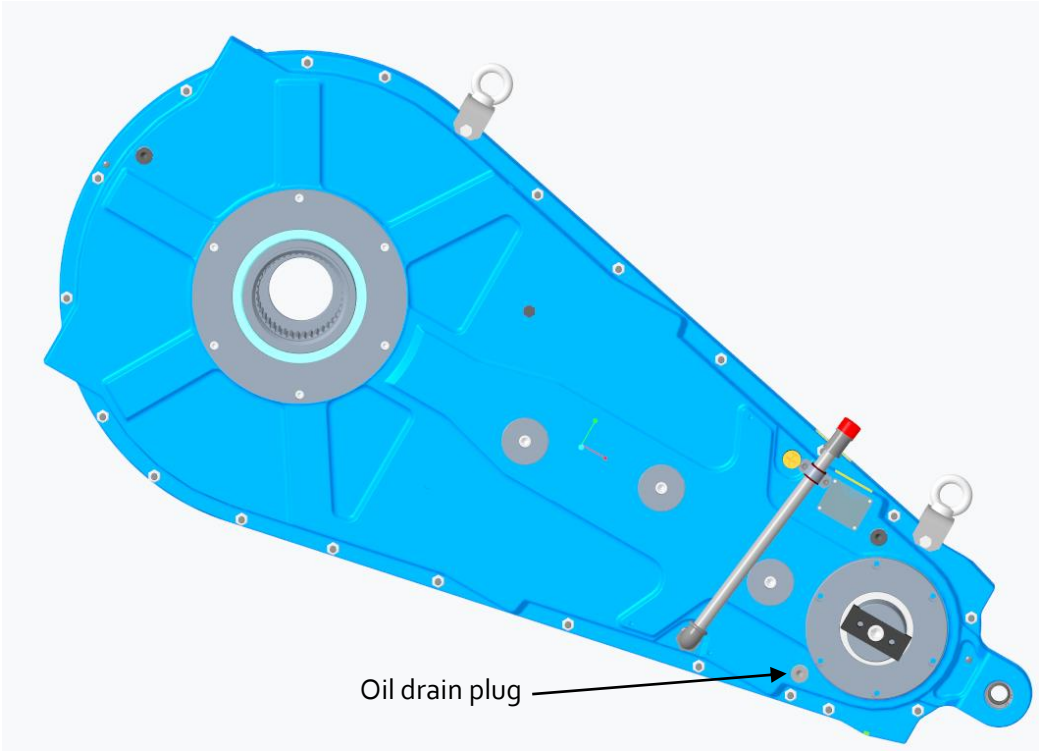


Abb. 7b

General comments:

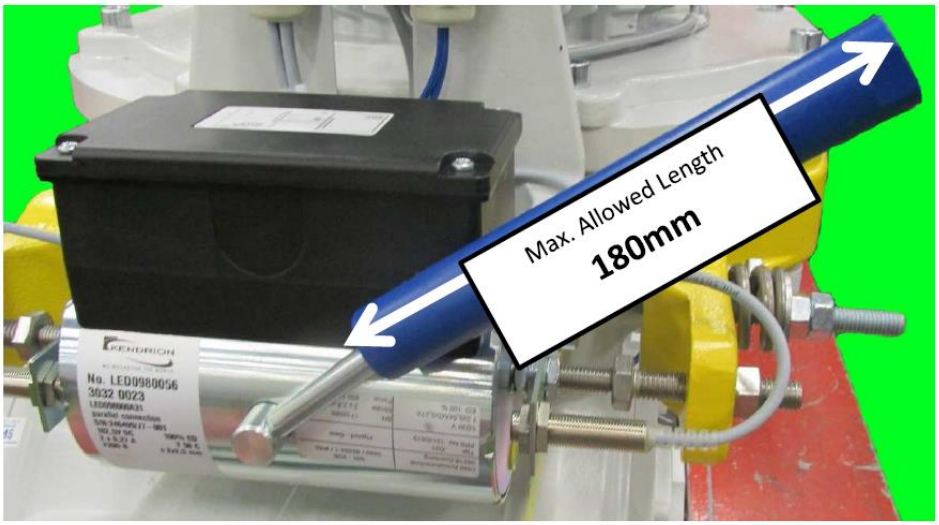
The loss of lubricating properties and the dark brown to black discoloration of the oil result after long maintenance intervals, due to particles or dirt collecting in the oil bath, due to moisture in the gear housing, high ambient temperature and the resulting temperature in the machine room. Please note: These conditions accelerate the end of the oil lubricating properties. Therefore: In case of doubt change the oil.

Any oil that escapes during an oil change or as the result of a leak must be removed immediately.

Used synthetic oil that has been replaced is special waste!

6.4 Brake Maintenance

6.4.1 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**.

6.4.2 Control: Movement of the Brake Lever

During the usual maintenance intervals the brake levers of the escalator equipment must be checked for easy movement. To do this, each individual brake lever must be opened as described under 6.4.8 (check the two brake circuits). The brake lever must close again with easy movement. If necessary the brake lever joint pin must be tightened (see 6.4.4) and regreased before being refitted.

6.4.3 Clearance and Brake Lining Wear

a) Air 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. 1,5 mm
(Ref. 6.4.6 and Fig. 10a + 10b).

Procedure:

1. Force the Solenoid Plungers back and measure the clearance between the Plungers and the Pressure Bolts (Fig. 10a + 10b).
2. Loosen the Locking Nut, turn the Pressure Bolt and re-tighten the Locking Nut with T = **80Nm**. Clearance Parameter S=1,5mm.
3. After adjusting the clearance open the brake mechanically using the air lever on the magnet and check electrically via the plant controls.

b) Brake Lining Wear:

The amount of brake lining wear determines the position of the brake lever. With increasing brake lining wear the brake lever approaches the inside of the magnet.

Control of Brake Lining Wear:

If the minimal allowed clearance has been achieved, then both Brake Levers must be exchanged against Brake Levers with new Brake Linings.

6.4.4 Replacing the Brake Lever

Stop and secure the escalator against movement (adhere to the relevant instructions of the escalators manufacturer). When dismounting both brake levers, no holding torque will be available anymore, and the escalator may start moving!

- Always change both Brake Levers!
- The brake levers on each side are always replaced one after the other.
- To replace the brake lever, the compression spring must be removed along with the locked pressure washer and the clamping bolt.

Straight braking levers :

- Pull out the splint.
- Push up the joint pin (with a flat screwdriver under the bolts head) and pull the pin out.
- Lift out the lever to the side, at the same time removing the intermediate washers.
- A lever with new brake linings is fitted in reverse order.
- Do not forget to reinstall the intermediate washers!
- Adjust the brakes, and check braking capacity, as described in section 6.4.4

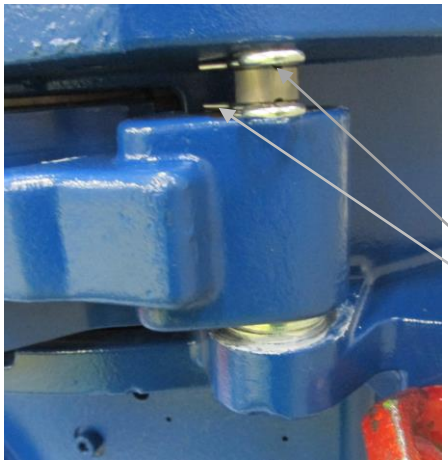
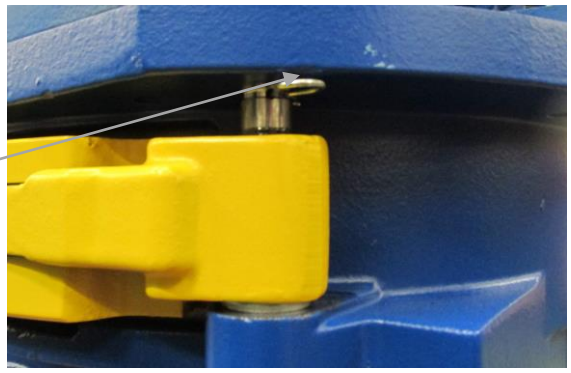


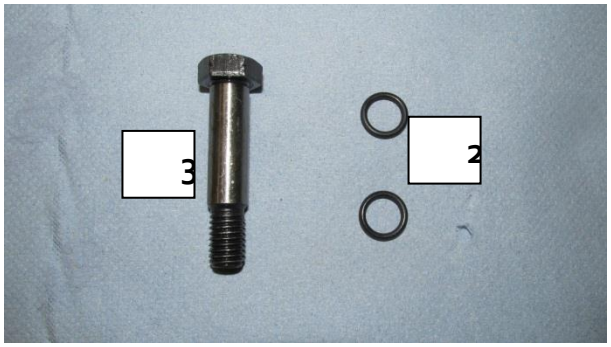
Fig. 8a old version



new version / with movable brake shoe

Brake levers with movable shoes :

Parts :

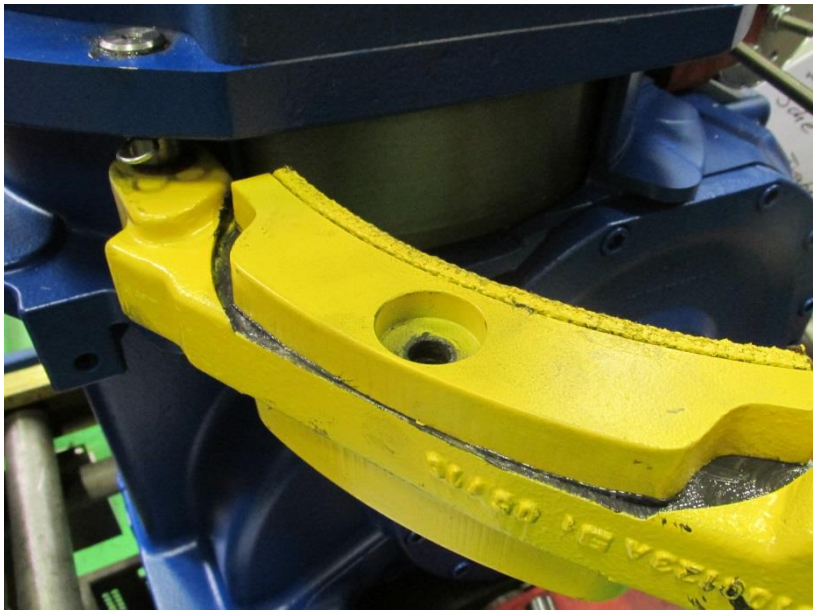


1 – brake shoe
2 – 2 x o-ring
3 – screw (M10x50 DIN609)

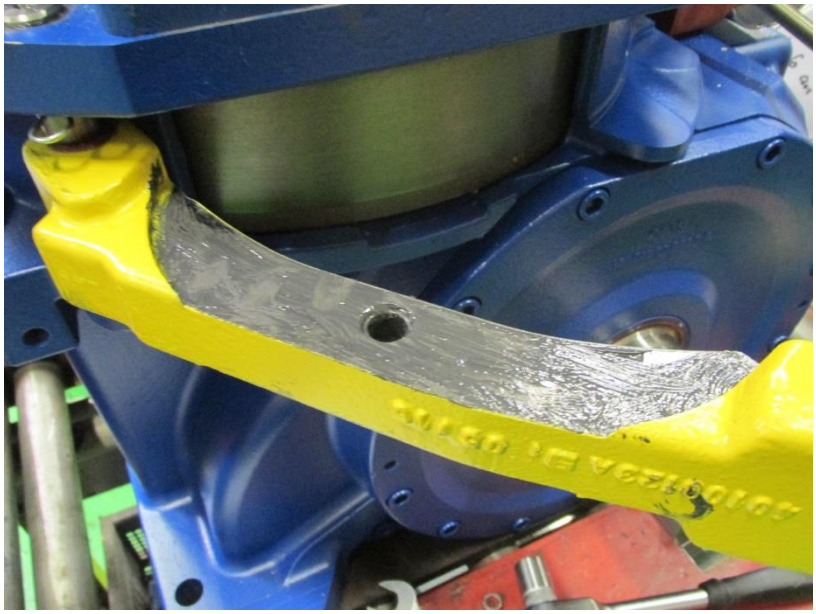
Exchanging the movable brake shoe :

Remove the nuts and the spring from the brake-rod. Open the brake.

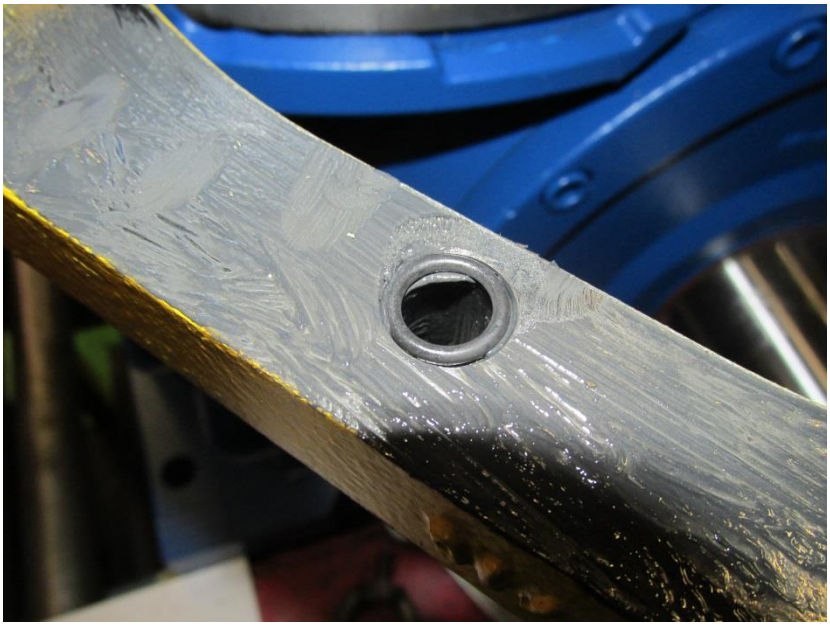
Loose the screw and remove it together with the washer .

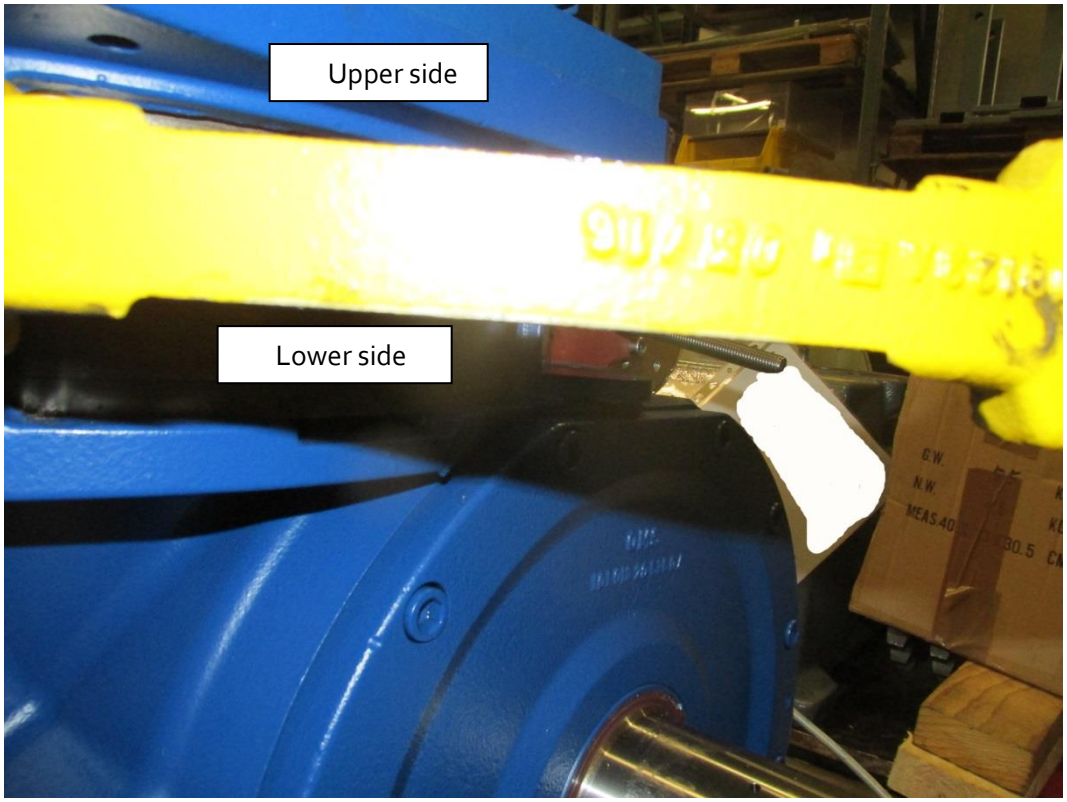


Remove the brake shoe and the o-rings (upper and lower side).



Clean the surface from the brake lever. Apply grease it again with grease (OMS recommends MOLYKOTE Longtherm 2 plus).
Insert the new o-rings 2 into the grooves of the brake lever (upper and lower side).

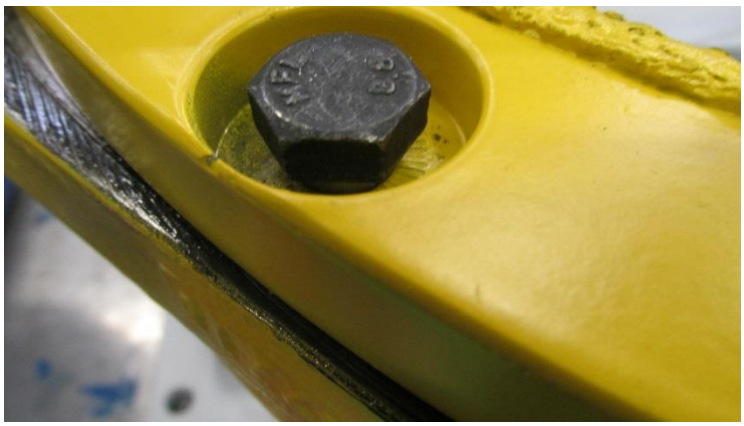




Put the brake shoe 1 onto the brake lever. The step hole is upper side, the thread is lower side. Take care not to damage the o-rings!

Now put the screw 3 into the hole of the brake shoe.

Tigthen the screw with torque T = 30 Nm.



The head of the screw is not allowed to touch the surface of the brake shoe.

Install and adjust the brake. (see 6.4.4)

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.

6.4.5 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 over excitation 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 plungers of the solenoid and the adjusting bolts in the brake levers.
(Control and Adjustment of this gap, Ref. 6.4.3).

Before the Escalator is taken back into operation, the function of the Brake System must be controlled. If the braking torque does not suit the local requirements, you need to set the braking torque accordingly.

6.4.6 Adjusting the brake torque of one circuit braking system:

1. Loosen the locking nut M12 at the closed brakes threaded rod.
2. The pre set Brake Spring Pressure can be adjusted by turning the clamping nut. (Turning clockwise increases the pre set Pressure).

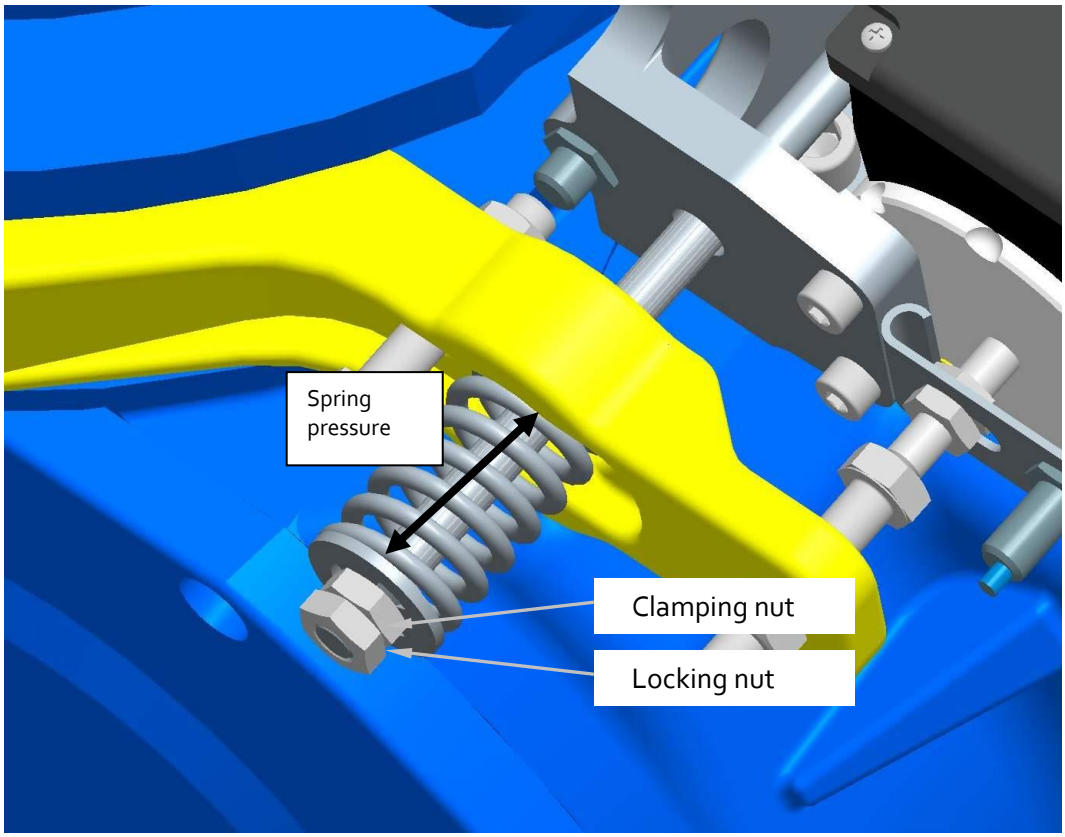


Fig. 9

3. Spring pressure preset (4mm), is adjusted during the field inspection.

At the double circuit brake both sides must be adjusted separately.

Straight brake lever :

4. Tighten the hex nut M12. By manually retracing the solenoids plungers check if the gap of 1.5mm is present. If necessary, the required gap of 1.5mm can be obtained by readjusting the set screw in the braking lever.

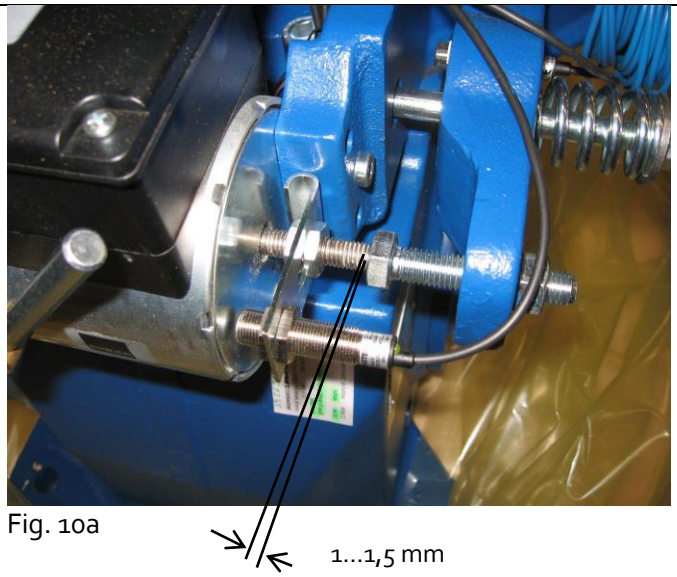


Fig. 10a

Brake lever with movable shoes (high power traction units)

4. -Loose the locking nut M12
   -Turn in the adjustment bolt.
   -Energize the brake solenoid and move out the plungers.
   -Turn out the adjustment bolt so that it does just touch the solenoid plungers
   -(see Fig. 9b).
   -Turn the adjustment bolt 2/3 of a revolution further outwards (mark a face of the hex bolt and advance it by nearly 4 faces – this corresponds to approx. 1,1mm at a thread pitch of 1,75mm).
   -Tighten the locking nut M12.

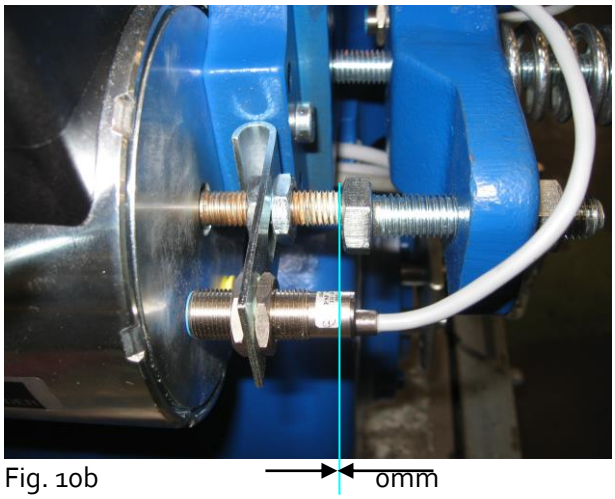


Fig. 10b

5. Check whether the brake magnet completely opens, mechanically with the central air lever and electrically by energizing the brake solenoid.

6.4.7 Adjusting the brake moment of the double circuit braking system:

Fig. 11 Version: Spring outside

1. Loosen the lock nut M12 on both bolts on the springs of the closed brakes.

2. for further adjustment refer to 6.4.6

Tighten the counter nut only if the brake is adjusted finally, torque = 25Nm!

6.4.8 Checking the two brake circuits:

Note: The procedure for the brake acceptance inspection within the scope of the escalator acceptance inspection is not described here in detail. Please note the required safety regulations.

a) If the machine is accessible
If the machine is accessible in an operations room, you can individually open each brake lever to the side with the aid of a tyre lever (heavy screwdriver) and check the simple holding torque of the respective other brake lever.

b) Separate electrical remote control: To check the simple holding torque of each braking circuit, the brake levers can be individually controlled separately by the two existing magnetic coils. This requires a Type O 32 or O 33.

6.5 Replacing the motor

If it is necessary to replace the motor after a long service life or if the motor is defective, an elastic coupling ring is supplied for the replacement.

Attention: **the motor surface may be hot – allow time to cool down. Danger of burning your skin exists otherwise !**

- Stop the escalator and secure it against accidentally starting up again.
- Release the brakes by pressing the manual lever on the brake magnet and fix the lever with a wooden wedge to prevent it from moving
- Remove the switch (hood-type switch, controller for overspeed and temperature monitoring) from the motor.
- The motor connection cable on the motor must not be removed. It must only be disconnected at the contactor.
- Remove the 8 motor threaded fasteners.
- Raise the motor using a rope and the eye bolts to be fixed to the side of the motor.
- Replace the elastic coupling ring; at the same time clean the claw coupling e.g. by blowing the dirt out.
- To replace the motor mark a coupling claw on the motor with a gap in the gear coupling and in this way carefully guide the coupling claws into each other while putting down the motor.
- Tighten the fixing screws several times by tightening the diagonally opposite screws one after the other. (Torque approx. **80 Nm**)
- Fit the components in the reverse order.
- Connect all the electric switches and systems.
- Check the electric connections and the correct rotational direction of the motor.

6.6 Replacing the elastic coupling ring

A claw coupling with an elastic coupling ring is located between the motor and the gears. The coupling ring is made of polyurethane material, essentially moisture and heat resistant.
The abrasion of the elastic coupling ring depends on climate and usage.
We recommend an inspection of the elastic coupling ring after 2 years and the replacement after 4 years of usage.

6.7 Adjusting the braking function sensor

Sensor mounted on switching lug

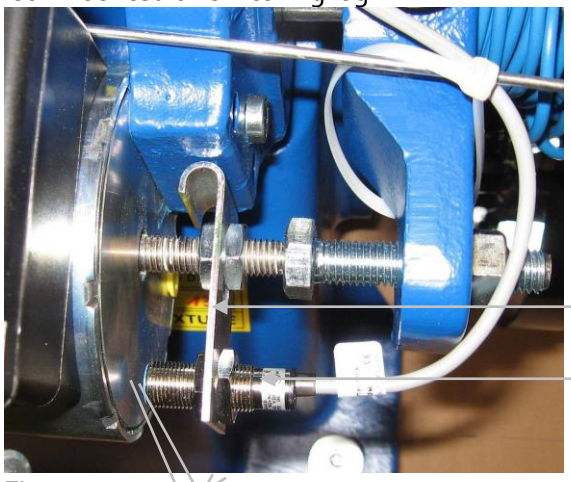


Fig. 13a

- The switching lug must be fitted onto the thread of the brake magnet tappet.
- The sensor must be installed in the front drill hole with an air clearance of 3,0mm between the sensor and brake solenoid. The sensors must be adjusted while the brakes are closed.

Sensor mounted with straight holder

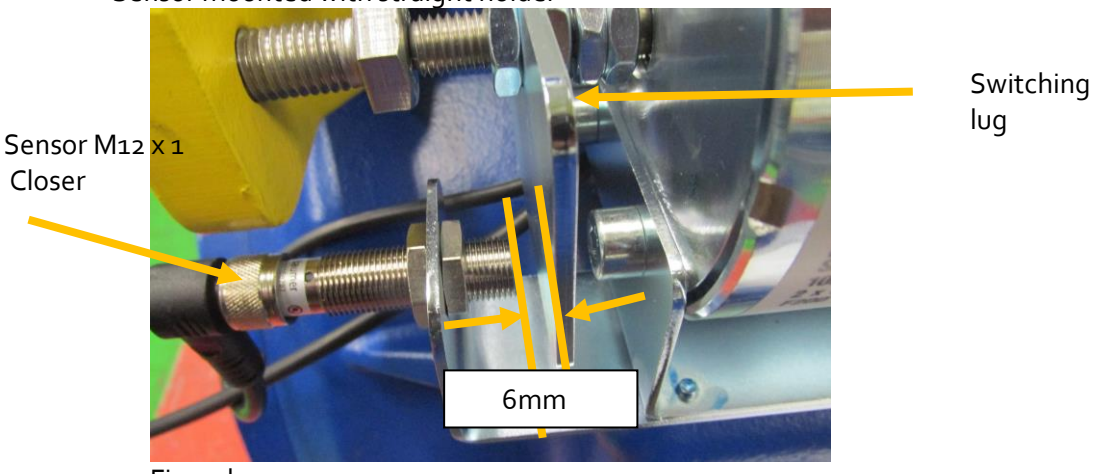


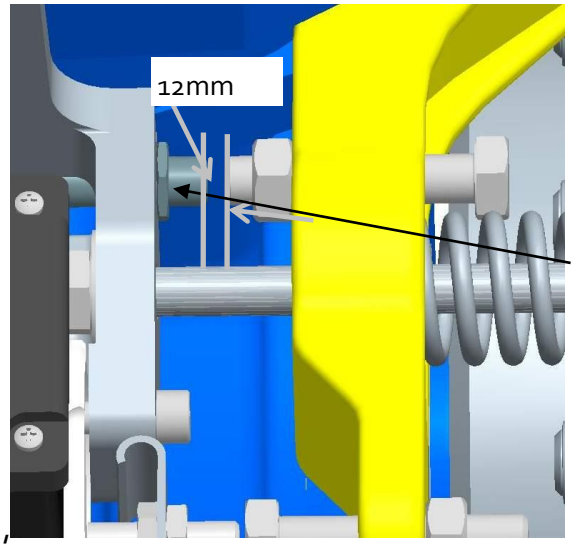
Fig. 13b

The sensor is mounted with a straight holder, the switching lug is moving to the sensor when opening the brake
The air clearance between sensor an switching lug must be adjusted to 6mm, solenoid without power and airgap from the plunger must be adjusted 1,5mm

Inductive Brake Function Sensor Information:

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

6.8 Adjusting the break lining wear control



Sensor M12 x 1 CLOSER

Fig. 14

The sensor for the brake lining wear monitoring is fitted in the drill hole of the brake lever.
Clearance 12mm : (end of life detection)

- A clearing of 12mm is set for new machines in the factory, and should not need to be adjusted. The sensor responds, if the brake lining at the front edge of the brake lever has reached a thickness of 1mm. The machine can still be used, but the brake linings are close to " end of life " and need to be replaced. Then the levers must be replaced.
- If it is necessary to replace the two brake levers the distance of 12mm must be checked and if necessary reset to 12mm for the new linings.

Attention : For the straight brake levers the clearance must be 11mm!

Information about the inductive brake lining wear sensor:

Calculated switch clearance: 4,5mm
Standard Function – electric circuit is closed when the brake lining is worn.

6.9 Adjustment of Non Reversal Device (NRD) and Speed Sensor

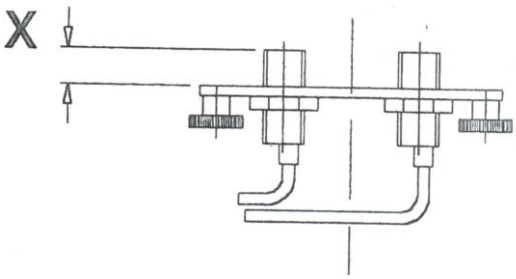


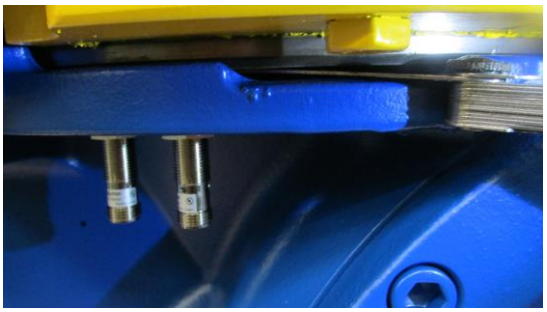
Fig. 15

1. <u>Change sensor</u>

- Disconnect wires from sensor
- Unscrew the sensor plate
- Measure of sensor depth X
- Unscrew the sensors

- Screw in the new sensors at measure X in the sensor plate
- Install the sensor plate
- Function test and adjustment

<u>Variant without holder</u>

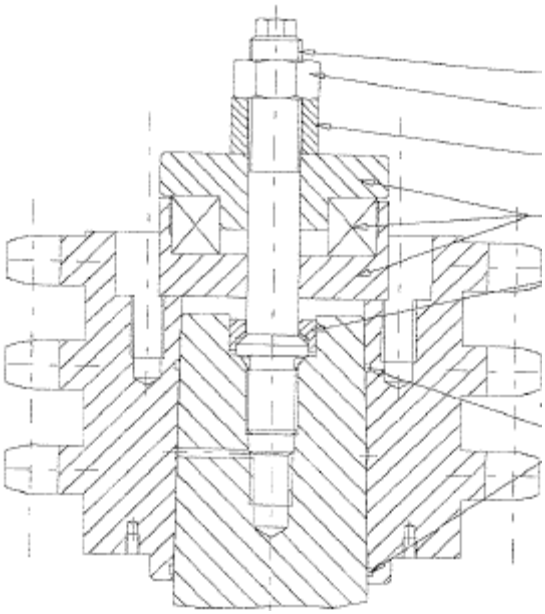


- <u>Exchange the sensor</u>
-
- .Disconnect the wires from the sensor
- .Dismount the lock nut
- .put a screw driver or similar through the hole and feel if there is an surface or a nut, turn the brake drum until there is a surface over the nut
- .srcew in the sensor until he touches the brake drum, than turn it out 1 rotation
- .check the gap with a gauge (1mm) and secure the sensor with the lock nut

6.10 Mounting of chain Wheel / flange of intermediate coupling

- Clean the shaft and the chain wheel and grease them.
- Place the O-rings into the chain wheel.
- Place the chain wheel at the shaft and align it that the bar can be inserted.
- Place the mounting device:
  Screw the bolt into the shaft and tighten it with 100Nm
  Insert the bar into the chain wheel and the shaft
  Place the axial bearing, spacer and nut
  Tighten the nut with 500Nm
- Remove the mounting device
- Insert the regular bar of the chain wheel and tighten the hexagonal screw with 350Nm (coupling at the gear box) or 160Nm (coupling at the intermediate gear)

Mounting device :



Bolzen / Bolt

Mutter / Nut DIN 934 M24
Distanzbuchse / Spacer

Axiallager / Axialbearing

Riegel / Bar

Runddichtringe / O-rings

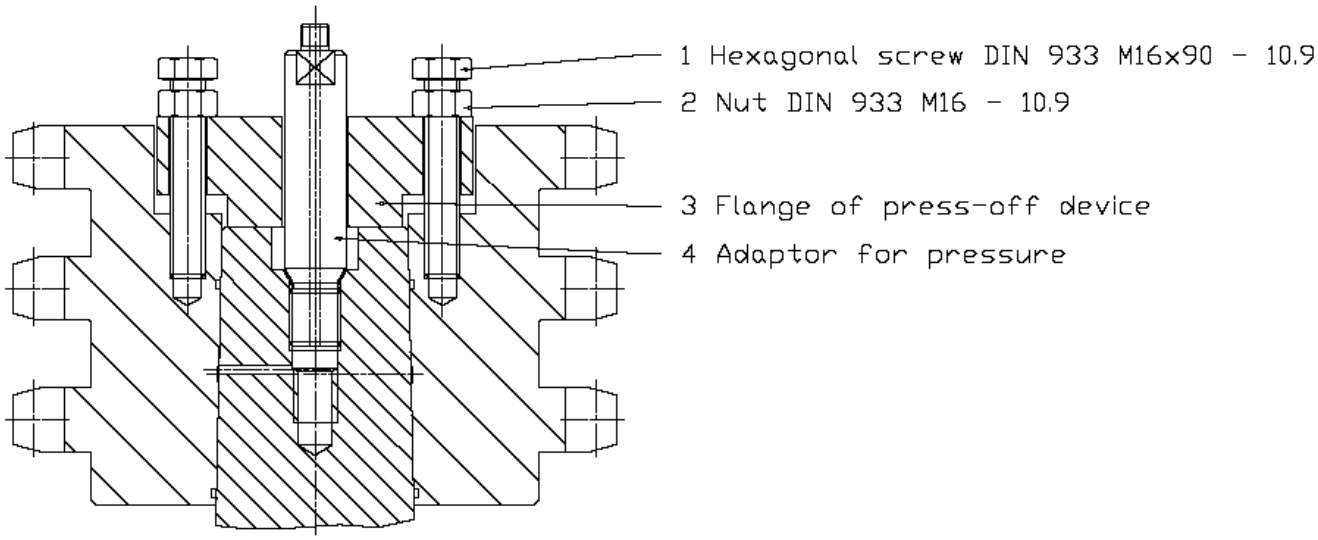
6.11 Dismounting of chain wheel / flange of intermediate coupling

- Dismantle the hexagonal screw (M20) of the chain wheel and remove the bar.
- Srew in the adaptor for pressure oil (4) and tighten it with 100 Nm.
- Turn the nuts (2) to the head of the srews (1). Grease the srews.

- Place the flange of the special tool "press-off device " in position.

- Turn the srews (1) by hand into the chain wheel.
- Turn the nuts (2) down to the flange of the press-off device.
- Tighten them steady and crosswise with max 250 Nm.
- If the chain wheel is not removable at this torque, additional feed pressure oil with an hydraulic pump into the adaptor (4).
- Remove the press-off device and the chain wheel.

Press off device :



7 Disassembly

7.1 Disassembly of the Escalator 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 Escalator Drive carry through the same procedure as during the assembly – but in reverse order.

7.2 Scrapping the Escalator 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

Dimension sheet

Electrical Connections
(Page 1)

Technical Releases

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

OMS Antriebstechnik
Bahnhofstraße 12
36219 Cornberg

Tel.: 05650 – 969 – 0
Fax: 05650 – 969 - 100

E-Mail: info@oms-antrieb.de

Homepage: www.oms-antrieb.de

Gear :

input-torque, max:	T max. = 220 Nm
input speed:	n = 1000, 1200 and 1500 rpm
efficiency:	η,n = > 96 %
starting efficiency :	η,s = > 90 %
average oil temperature:	T = 70 K above ambient temperature
oil operating time up to:	t = 40.000 h
oil quantity :	13 l
Toothing :	life time durability
bearing life time:	146.000 h up to 200.000h
with equivalent loading:	$p_{.equiv.}$ = 0,5 up to 0,62 * nominal motor power
Sound pressure level:	$L_{p,A} \leq$ 64 dB(A) at 1500min^{-1},25% load, motor P_{Nom} 24kw, mains operated $L_{p,A} \leq$ 64 dB(A) at 1000min^{-1},25% load motor P_{Nom} 22kw, mains operated Dependet on performance and application
gear ratio:	i = 18,7 ; 20 ; 22,4 or 24
for escalator speed:	v = 0,5 up to 0,75 m/s
version:	Single- and Tandem-Units for chain-driving suitable for driving escalators and travelators
position at machine room:	Left (single machine) (look from escalator to landing conditions)
Satisfied safety requirements :	DIN EN 115-1:2017 and ASME A 17

Intermediate gear ZG (Coupling- and Duplex machine)

Ratio :	i = 4,00 ; 4,64 ; 5,27 or 5,54
oil quantity :	13l
Motor :	three phase induction motor, 4-; 6- and 8 poles, IP 55, integrated fan, suitable for frequency converter
motor protection :	PTC or bimetal-switch
frequency:	50 Hz or 60 Hz
type :	type 225 vertical
motor-nominal torque :	T,n to 220 Nm
Brake:	double action safety shoe brake
braking torque :	free adjustable up to ≤ 2,4* T,n

Chain wheel (only Dual):

version :	duplex or triplex,
size :	(20A-24A or 20B-24B) (1 ¼", 1 ½", 1 ¾"),
number of teeth :	z = 17 up to 27
Standard :	DIN 8187 / 8188 (ANSI)
Dimension:	see overleaf, total height XX according to motor type

Machine Monitoring:

optional for:	brake function monitor
	brake lining wear monitor
	vibration measuring sensor
oil bath:	temperature, level

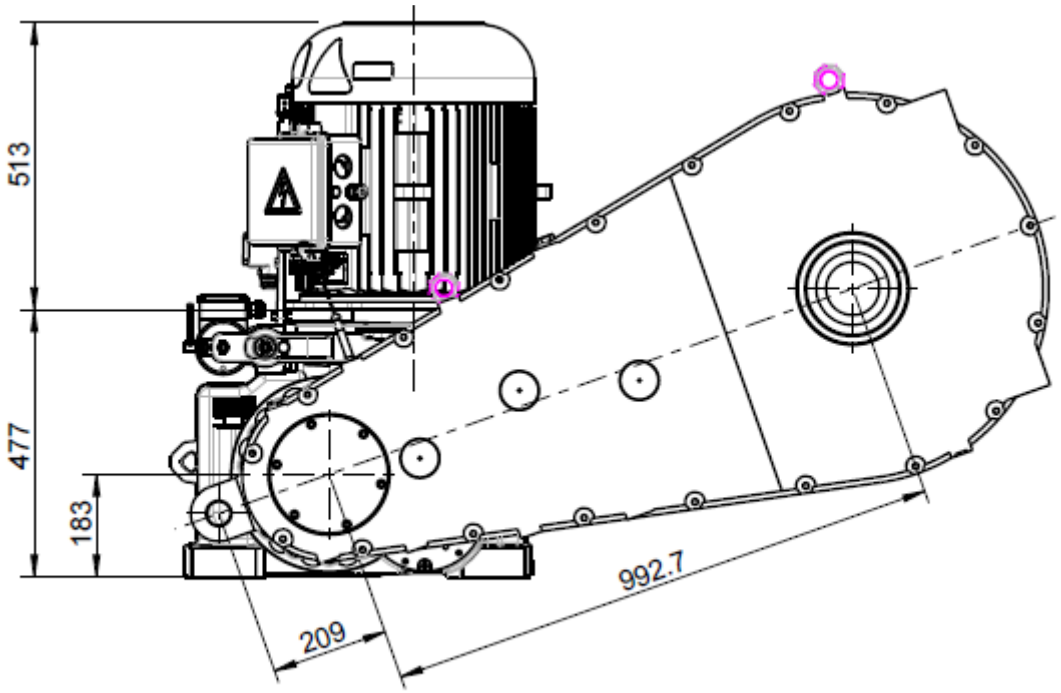
Safety-Sensors:

optional for:	overspeed / machine reversing (NDR)
	Brake distance monitoring

Versions of drive units :

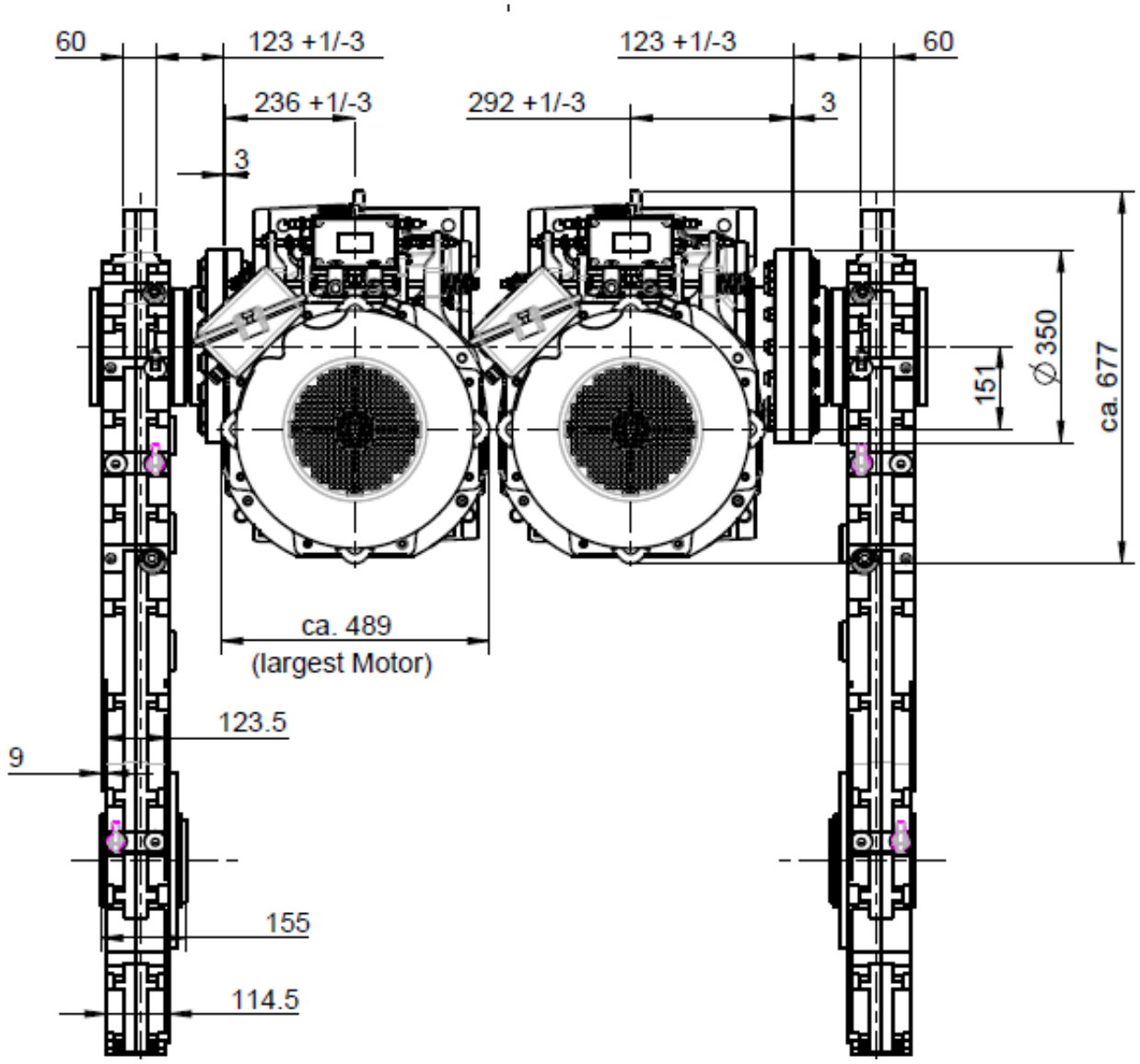
Coupling machine :	1x gear box with motor and 1x intermediate gear
Duplex machine :	2x gear box with motor and 2x intermediate gear
Dual machine :	2x gear box with motor connected with intermediate coupling, mounted on a ground plate

Side view . Coupling and Duplex Machine

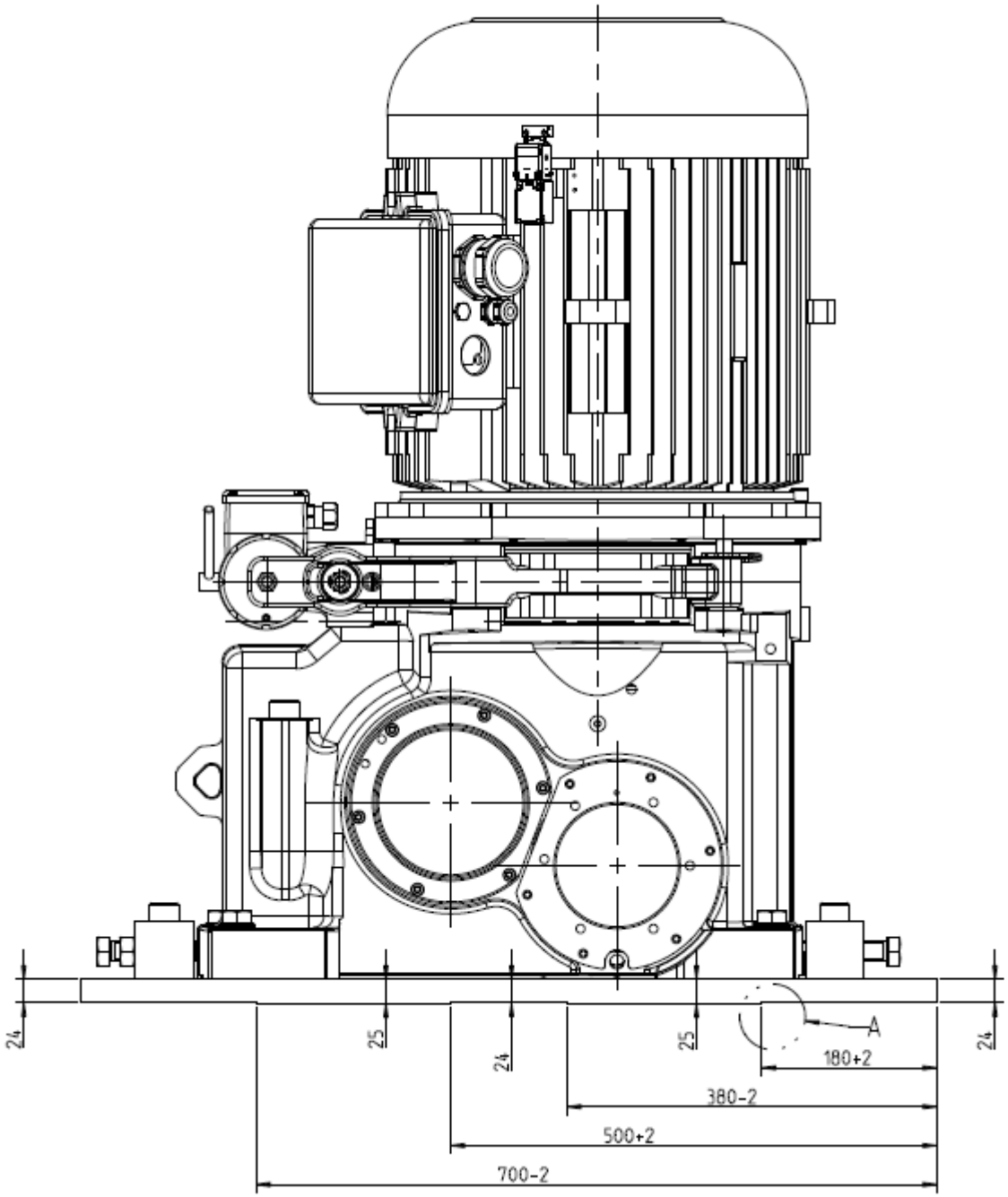


Totally high depends from the motor power and the type

Top view : Duplex Machine

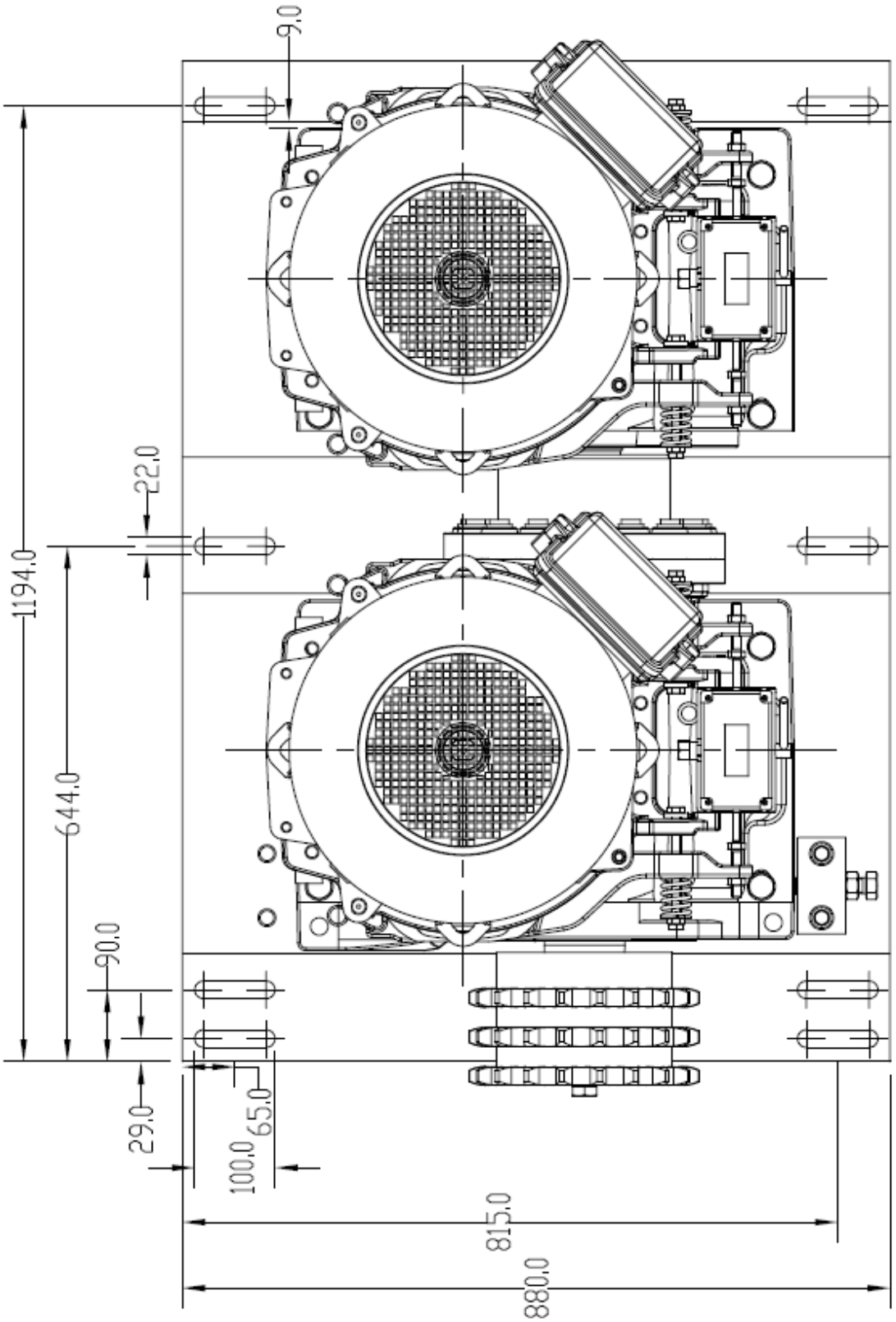


Side view : Dual Machine

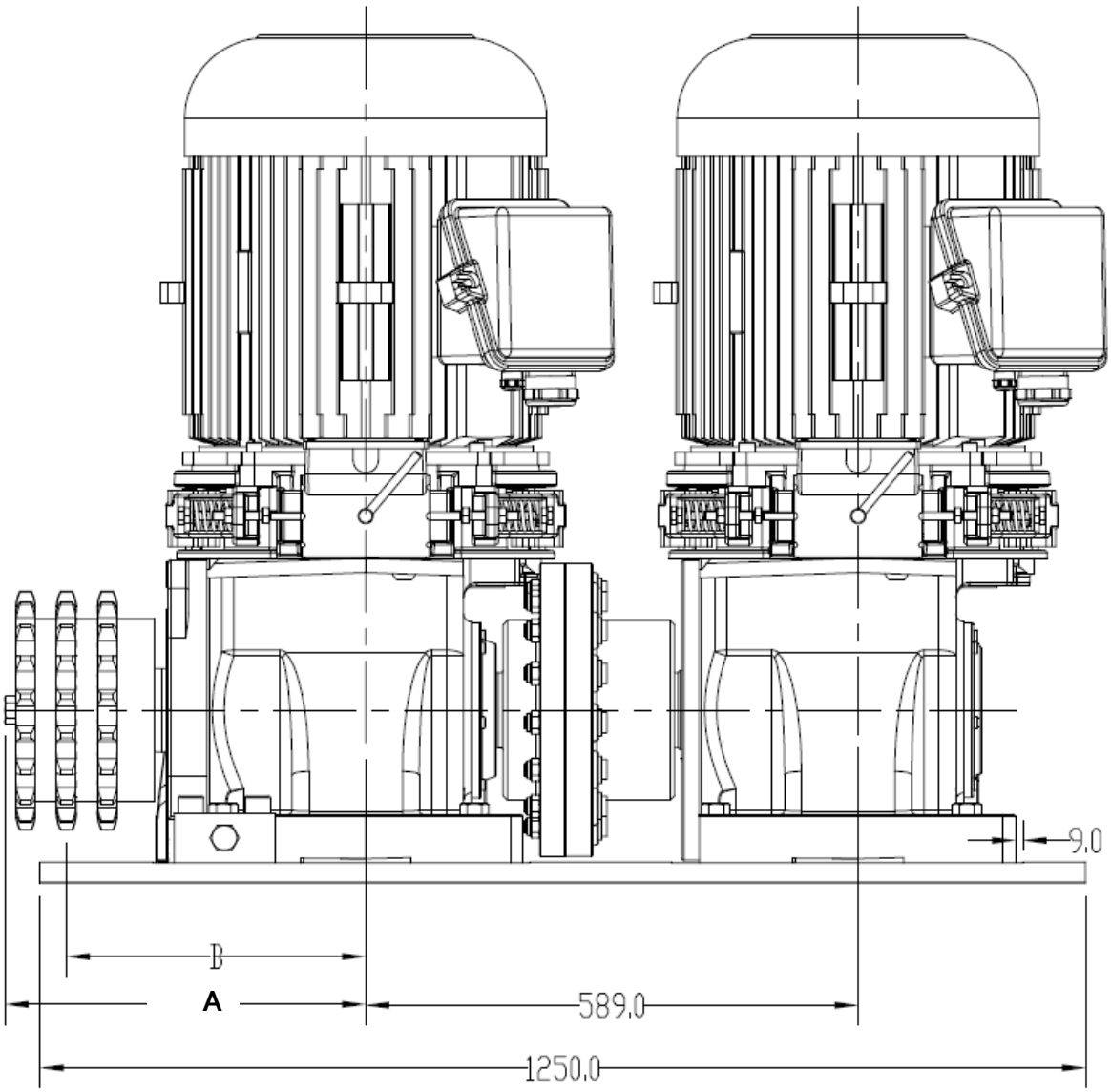


Totally high depends from the power and type of motor

Top view : Dual Machine



Front view : Dual Machine

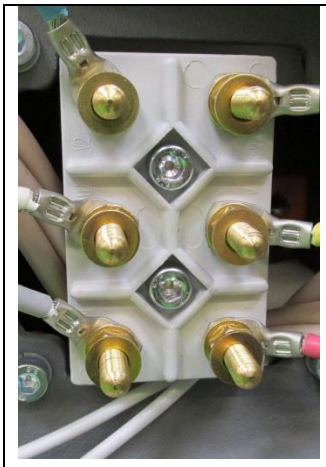
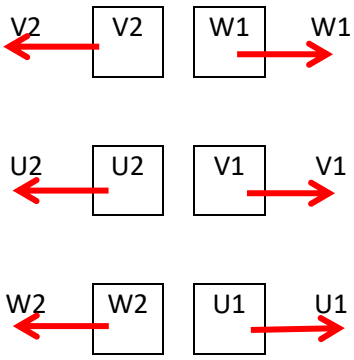


Measure A and B is depending of the kind of chain wheel

1. Terminal diagram for E - motor
Terminal box:

The machine's motor must be wired for star/delta operation with a 7 way cable (3 + 3 +PE).

Connecting to mains voltage

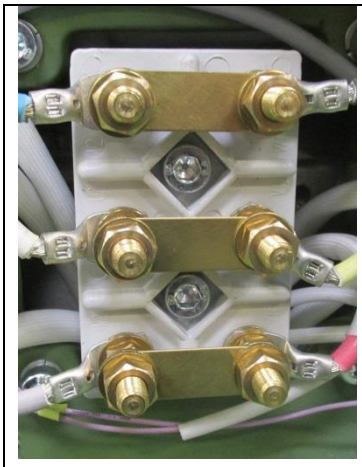
<table>
<tr>
<td>  </td>
<td> 
</td>
<td>Star_Delta-Connecting

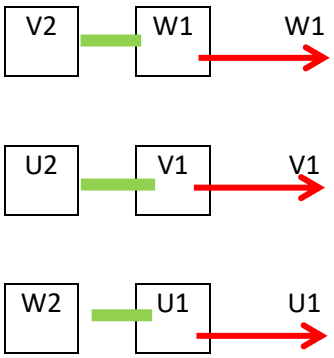
No jumper!

Motor cable (consisting of U1 ; V1 ; W1 ; U2 ; V2 ; W2 and PE) connecting as follows :

U1 to U1 ; V1 to V1 ; W1 to W1 ; U2 to U2 ; V2 to V2 ; W2 to W2 - PE(green-yellow) always first</td>
</tr>
</table>

Connecting to Frequency inverter





Delta-Connecting

Jumper between U1-U2 and –V1-V2 and W1-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:

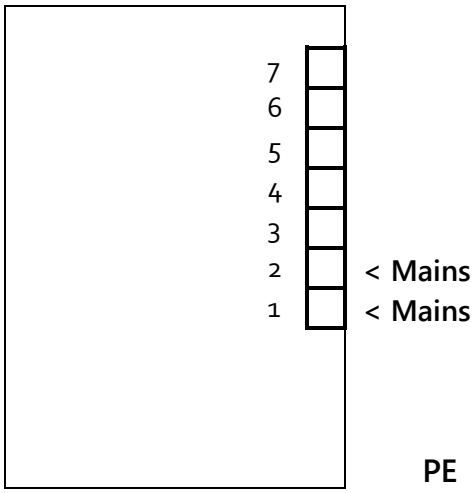
You have to use a filter between the Fi and the motor, which is limiting the increase speed of the voltage from the Fi to the motor connecting points to a limit of $\delta U/\delta t \leq 500V/\mu s$.

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

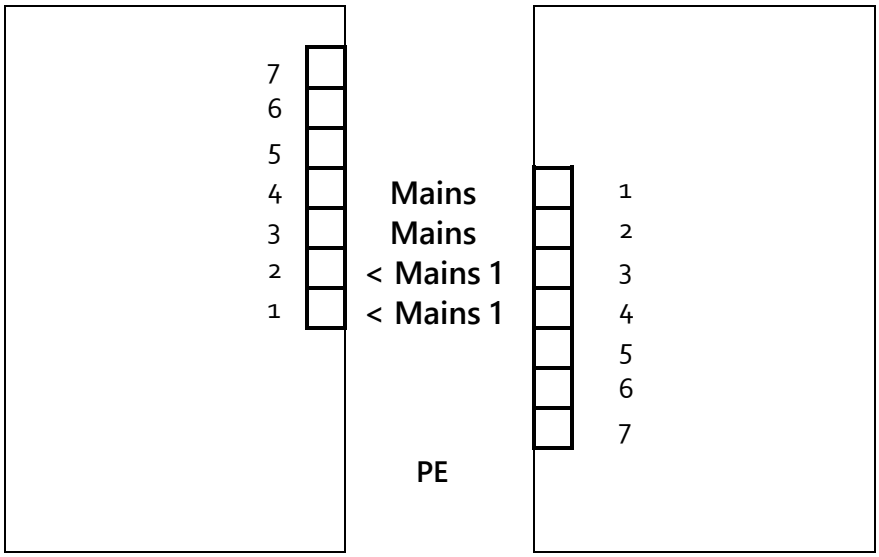
2. Mains supply connection for OMS brake magnet

Typ O 3X

Connection with one control switch;
Both magnetic circuits are controlled together.

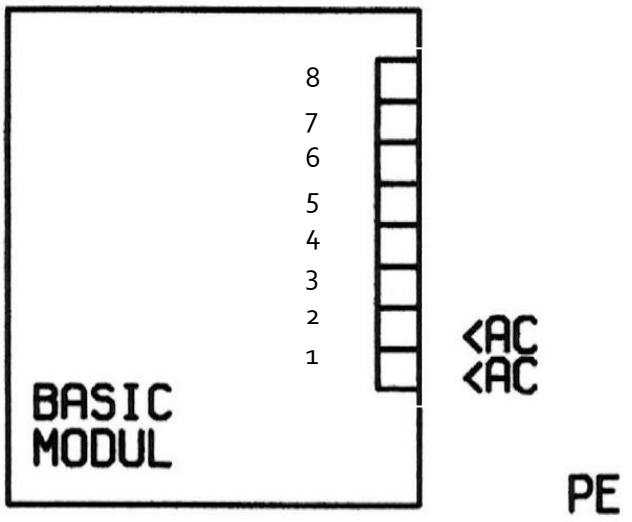


Connection with two control switches;
Each magnetic circuit is controlled independently.



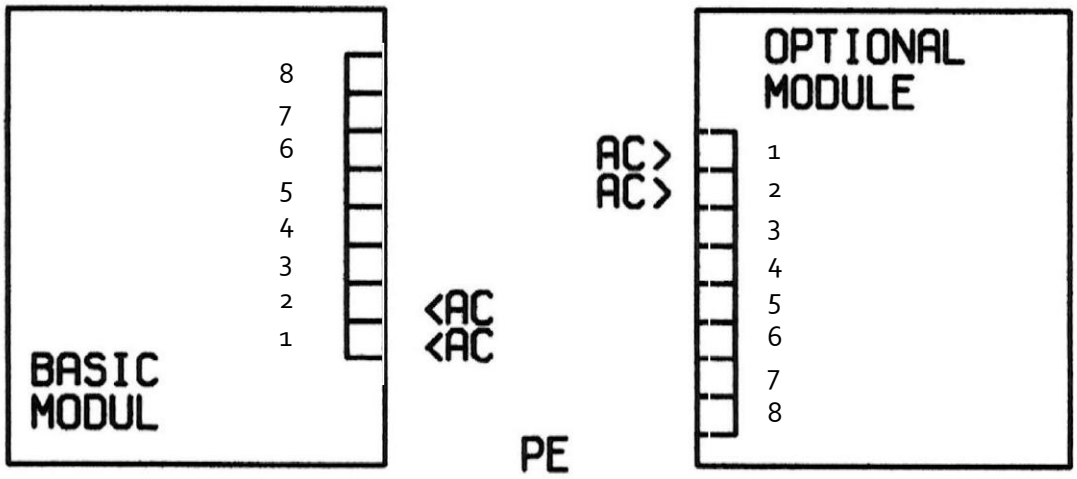
Typ A 4X

Connection with one control switch;
Both magnetic circuits are controlled together.



Connection with two control switches;
Each magnetic circuit is controlled independently.

.



Wiring of the sensor signals to the Wieland type connectors:

The pin assignment is agreed upon with the customer individually and is available to the customer accordingly.

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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)

Chronic aquatic toxicity, Category 3 — H412: Harmful to aquatic life with long lasting effects.

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2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard statements : H412 Harmful to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**
P273 Avoid release to the environment.

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.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical nature : polyalkylene glycol oil

Hazardous components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration limits M-Factor Notes	Concentration (% w/w)
bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine	15721-78-5 239-816-9 01-2119930672-39-XXXX	Aquatic Chronic3; H412		>= 1 - < 2,5
diphenyl tolyl phosphate	26444-49-5 247-693-8	Aquatic Acute1; H400 Aquatic Chronic1; H410	M-Factor: 1/1	>= 0,25 - < 1
triphenyl phosphate	115-86-6 204-112-2	Aquatic Acute1; H400 Aquatic Chronic2; H411	M-Factor: 1/1	>= 0,25 - < 1
bis(methylphenyl) phenyl phosphate	26446-73-1	Aquatic Acute1; H400	M-Factor: 1/1	>= 0,25 - < 1

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	247-708-8	Aquatic Chronic1; H410		

For explanation of abbreviations see section 16.

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.

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SECTION 5: Firefighting measures

5.1 Extinguishing media

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

Unsuitable extinguishing media : High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Fire may cause evolution of:
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. In the case of respirable dust and/or fumes, use self-contained breathing apparatus. 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 application 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) : Consult the technical guidelines for the use of this substance/mixture.

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	13,127 mg/m3

	Workers	Inhalation	Acute systemic effects	39,38 mg/m3
	Workers	Skin contact	Long-term systemic effects	0,938 mg/kg
	Workers	Skin contact	Acute systemic effects	2,81 mg/kg
pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate)	Workers	Inhalation	Long-term systemic effects	9,5 mg/m3
	Workers	Skin contact	Long-term systemic effects	27 mg/kg
triphenyl phosphate	Workers	Inhalation	Long-term systemic effects	5,2 mg/m3
	Workers	Skin contact	Long-term systemic effects	5,55 mg/kg bw/day

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 mg/l
Remarks:	No data available	
pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate)	Fresh water	0,086 mg/l
	Marine water	0,0086 mg/l
triphenyl phosphate	Fresh water	0,004 mg/l
	Intermittent use/release	0,003 mg/l
	Marine water	0,0004 mg/l
	Sewage treatment plant	5 mg/l
	Fresh water sediment	1,103 mg/kg dry weight (d.w.)
	Marine sediment	0,11 mg/kg dry weight (d.w.)
	Soil	0,218 mg/kg dry weight (d.w.)
	Oral	16,667 mg/kg

8.2 Exposure controls

Engineering measures
Maintain air concentrations below occupational exposure standards.

Personal protective equipment
Eye protection : Safety glasses with side-shields conforming to EN166

Hand protection

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Material	:	Nitrile rubber
Protective index	:	Class 1
Remarks	:	For prolonged or repeated contact use protective gloves. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. 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.
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

Appearance	:	liquid
Colour	:	yellow
Odour	:	characteristic
Odour Threshold	:	No data available
pH	:	No data available
Melting point/range	:	No data available
Boiling point/boiling range	:	No data available
Flash point	:	>= 250 °C Method: ISO 2592, open cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	No data available

Lower explosion limit	:	No data available
Vapour pressure	:	< 0,001 hPa (20 °C)
Relative vapour density	:	No data available
Density	:	1,05 g/cm3 (20 °C)
Bulk density	:	No data available
Solubility(ies)		
Water solubility	:	partly soluble
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity		
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	220 mm2/s (40 °C)
Explosive properties	:	Not explosive
Oxidizing properties	:	No data available

9.2 Other information

Sublimation point	:	No data available
Self-ignition	:	No data available

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

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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 toxicological effects

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:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:

Acute oral toxicity : LD50 (Rat): > 2.000 mg/kg
Method: OECD Test Guideline 423
GLP: yes
Assessment: The substance or mixture has no acute oral toxicity

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

diphenyl tolyl phosphate:

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

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

triphenyl phosphate:

Acute oral toxicity : LD50 (Rat): > 20.000 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity : LC50 (Rat): > 200 mg/l
Exposure time: 1 h
Test atmosphere: dust/mist

Method: OECD Test Guideline 403
Assessment: The substance or mixture has no acute inhalation toxicity

Acute dermal toxicity : LD50 (Rabbit): > 10.000 mg/kg
Method: OECD Test Guideline 402

bis(methylphenyl) phenyl phosphate:

Acute oral toxicity : LD50 (Rat, male and female): > 5.000 mg/kg

Acute dermal toxicity : LD50 (Rat, male and female): > 5.000 mg/kg

Skin corrosion/irritation

Product:

Remarks: This information is not available.

Components:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:

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

diphenyl tolyl phosphate:

Species: Rabbit
Assessment: No skin irritation
Result: No skin irritation

triphenyl phosphate:

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

bis(methylphenyl) phenyl phosphate:

Assessment: No skin irritation

Serious eye damage/eye irritation

Product:

Remarks: This information is not available.

Components:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:
Species: Rabbit
Assessment: No eye irritation
Method: OECD Test Guideline 405
Result: No eye irritation
GLP: yes

diphenyl tolyl phosphate:
Species: Rabbit
Assessment: No eye irritation
Result: No eye irritation

triphenyl phosphate:
Species: Rabbit
Assessment: No eye irritation
Method: OECD Test Guideline 405
Result: No eye irritation
GLP: yes

bis(methylphenyl) phenyl phosphate:
Assessment: No eye irritation

Respiratory or skin sensitisation

Product:
Remarks: This information is not available.

Components:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:
Species: Guinea pig
Assessment: Did not cause sensitisation on laboratory animals.
Result: Did not cause sensitisation on laboratory animals.

diphenyl tolyl phosphate:
Assessment: Does not cause skin sensitisation.
Result: Does not cause skin sensitisation.

triphenyl phosphate:
Species: Guinea pig
Assessment: Does not cause skin sensitisation.
Method: OECD Test Guideline 406
Result: Does not cause skin sensitisation.
GLP: yes

bis(methylphenyl) phenyl phosphate:
Result: Does not cause skin sensitisation.

Germ cell mutagenicity

Product:

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

Components:

triphenyl phosphate:

Genotoxicity in vitro	:	Test Type: reverse mutation assay Species: Salmonella typhimurium Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: negative
Germ cell mutagenicity- Assessment	:	Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity

Product:
Remarks: No data available

Components:

triphenyl phosphate:

Carcinogenicity - Assessment	:	No evidence of carcinogenicity in animal studies.

Reproductive toxicity

Product:

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

Components:

triphenyl phosphate:

Effects on foetal development	:	Species: Rabbit Application Route: Oral General Toxicity Maternal: NOAEL: >= 200 mg/kg body weight

Teratogenicity: NOAEL: >= 200 mg/kg body weight
Developmental Toxicity: NOAEL: >= 200 mg/kg body weight
Embryo-foetal toxicity: NOAEL: >= 200 mg/kg body weight
Method: OECD Test Guideline 414
Result: No effects on fertility and early embryonic development were detected.

Reproductive toxicity - Assessment : No toxicity to reproduction
No effects on or via lactation

Repeated dose toxicity

Product:
Remarks: This information is not available.

Components:

triphenyl phosphate:
Species: Rat
NOAEL: 105 mg/kg
Application Route: Oral
Method: OECD Test Guideline 408

Species: Rabbit
NOAEL: 1.000 mg/kg
Application Route: Dermal

Aspiration toxicity

Product:
This information is not available.

Components:

triphenyl phosphate:
No aspiration toxicity classification

Further information

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

Components:

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

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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	:	Remarks: No data available
Toxicity to microorganisms	:	Remarks: No data available

Components:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:

Ecotoxicology Assessment

Acute aquatic toxicity	:	Harmful to aquatic life.
Chronic aquatic toxicity	:	Harmful to aquatic life with long lasting effects.

diphenyl tolyl phosphate:

Toxicity to fish	:	LC50 (Oryzias latipes (Orange-red killifish)): 1,3 mg/l Exposure time: 96 h
Toxicity to algae	:	ErC50 (Desmodesmus subspicatus (green algae)): 0,55 mg/l Exposure time: 72 h Test Type: Growth inhibition
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 0,12 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea)
M-Factor (Chronic aquatic toxicity)	:	1

Ecotoxicology Assessment

Chronic aquatic toxicity	:	Very toxic to aquatic life with long lasting effects.

triphenyl phosphate:

Toxicity to fish	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 0,4 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 0,36 mg/l Exposure time: 48 h Test Type: static test
Toxicity to algae	:	NOEC (Pseudokirchneriella subcapitata (green algae)): 0,25 mg/l Exposure time: 96 h Method: OECD Test Guideline 201 EL10 (Pseudokirchneriella subcapitata (green algae)): 0,25 mg/l Exposure time: 96 h Method: OECD Test Guideline 201
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to microorganisms	:	NOEC (activated sludge): 100 mg/l Exposure time: 28 h
Toxicity to fish (Chronic toxicity)	:	NOEC: 0,037 mg/l Exposure time: 30 d Species: Oncorhynchus mykiss (rainbow trout)
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 0,254 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea) Method: OECD Test Guideline 211
M-Factor (Chronic aquatic toxicity)	:	1

bis(methylphenyl) phenyl phosphate:

Toxicity to fish	:	LC50 (Oryzias latipes (Orange-red killifish)): 1,3 mg/l Exposure time: 96 h
Toxicity to algae	:	EC50 (Desmodesmus subspicatus (green algae)): 0,27 mg/l Exposure time: 72 h Test Type: Growth inhibition
M-Factor (Acute aquatic toxicity)	:	1
Toxicity to microorganisms	:	EC50 (Bacteria): > 10.000 mg/l Exposure time: 3 h Test Type: Respiration inhibition
Toxicity to daphnia and other aquatic invertebrates (Chron-	:	EC50: 0,31 mg/l Exposure time: 21 d

ic toxicity)		Species: Daphnia magna (Water flea) NOEC: 0,12 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea)
M-Factor (Chronic aquatic toxicity)	:	1

Ecotoxicology Assessment

Acute aquatic toxicity	:	Very toxic to aquatic life.
Chronic aquatic toxicity	:	Very toxic to aquatic life with long lasting effects.

12.2 Persistence and degradability

Product:

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

Components:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:

Biodegradability	:	Test Type: aerobic Result: Not rapidly biodegradable Biodegradation: 1,38 % Exposure time: 28 d Method: OECD Test Guideline 301F

diphenyl tolyl phosphate:

Biodegradability	:	Result: rapidly biodegradable

triphenyl phosphate:

Biodegradability	:	Test Type: aerobic Inoculum: activated sludge Result: Readily biodegradable. Biodegradation: 83 - 94 % 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:

bis(4-(1,1,3,3-tetramethylbutyl)phenyl)amine:

Partition coefficient: n-octanol/water : log Pow: 10,82 (25 °C)

diphenyl tolyl phosphate:

Bioaccumulation : Bioconcentration factor (BCF): 220

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

triphenyl phosphate:

Bioaccumulation : Species: Oryzias latipes (Orange-red killifish)
Exposure time: 18 d
Concentration: 0,01 mg/l
Bioconcentration factor (BCF): 144

Partition coefficient: n-octanol/water : log Pow: 4,6 (20 °C)

12.4 Mobility in soil

Product:

Mobility : Remarks: No data available

Distribution among environmental compartments : Remarks: No data available

Components:

diphenyl tolyl phosphate:

Distribution among environmental compartments : Adsorption/Soil
Medium: Water
Koc: 5560

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..

Components:

diphenyl tolyl phosphate:

Assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT).. This substance is not considered to be very persistent and very bioaccumulating (vPvB)..

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

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.

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:

SECTION 14: Transport information

14.1 UN number

ADR : Not regulated as a dangerous good

IMDG : Not regulated as a dangerous good

IATA : Not regulated as a dangerous good

14.2 UN proper shipping name

ADR : Not regulated as a dangerous good

IMDG : Not regulated as a dangerous good

IATA : Not regulated as a dangerous good

14.3 Transport hazard class(es)

ADR : Not regulated as a dangerous good

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IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.4 Packing group

ADR	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA (Cargo)	:	Not regulated as a dangerous good
IATA (Passenger)	:	Not regulated as a dangerous good

14.5 Environmental hazards

ADR	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA (Passenger)	:	Not regulated as a dangerous good
IATA (Cargo)	:	Not regulated as a dangerous good

14.6 Special precautions for user

No special precautions required.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

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 - 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 (EC) No 850/2004 on persistent organic pollutants	:	Not applicable
Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals	:	Not applicable
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)	:	See Annex XVII to Regulation (EC) no 1907/2006 for Conditions of restriction

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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 1 slightly water endangering
Classification according to AwSV, Annex 1 (5.2)

TA Luft List (Germany) : Total dust:
others: 3,54 %

Inorganic substances in powdered form:
Not applicable
Inorganic substances in vapour or gaseous form:
Not applicable
Organic Substances:
portion Class 1: 0,1 %
others: 96,36 %

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: 50,05 %
Remarks: VOC content excluding water

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.
H410 : Very toxic to aquatic life with long lasting effects.
H411 : Toxic to aquatic life with long lasting effects.
H412 : Harmful to aquatic life with long lasting effects.

Full text of other abbreviations

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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; AICS - Australian Inventory of Chemical Substances; 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

Classification of the mixture:		**Classification procedure:**
Aquatic Chronic 3	H412	Calculation method

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the product's suitability for particular applications and do not justify any contractual legal relationships.

List of changes

No.	Description	Pages	Date
1	TÜV- certificate brake system removed	72	21.02.2024