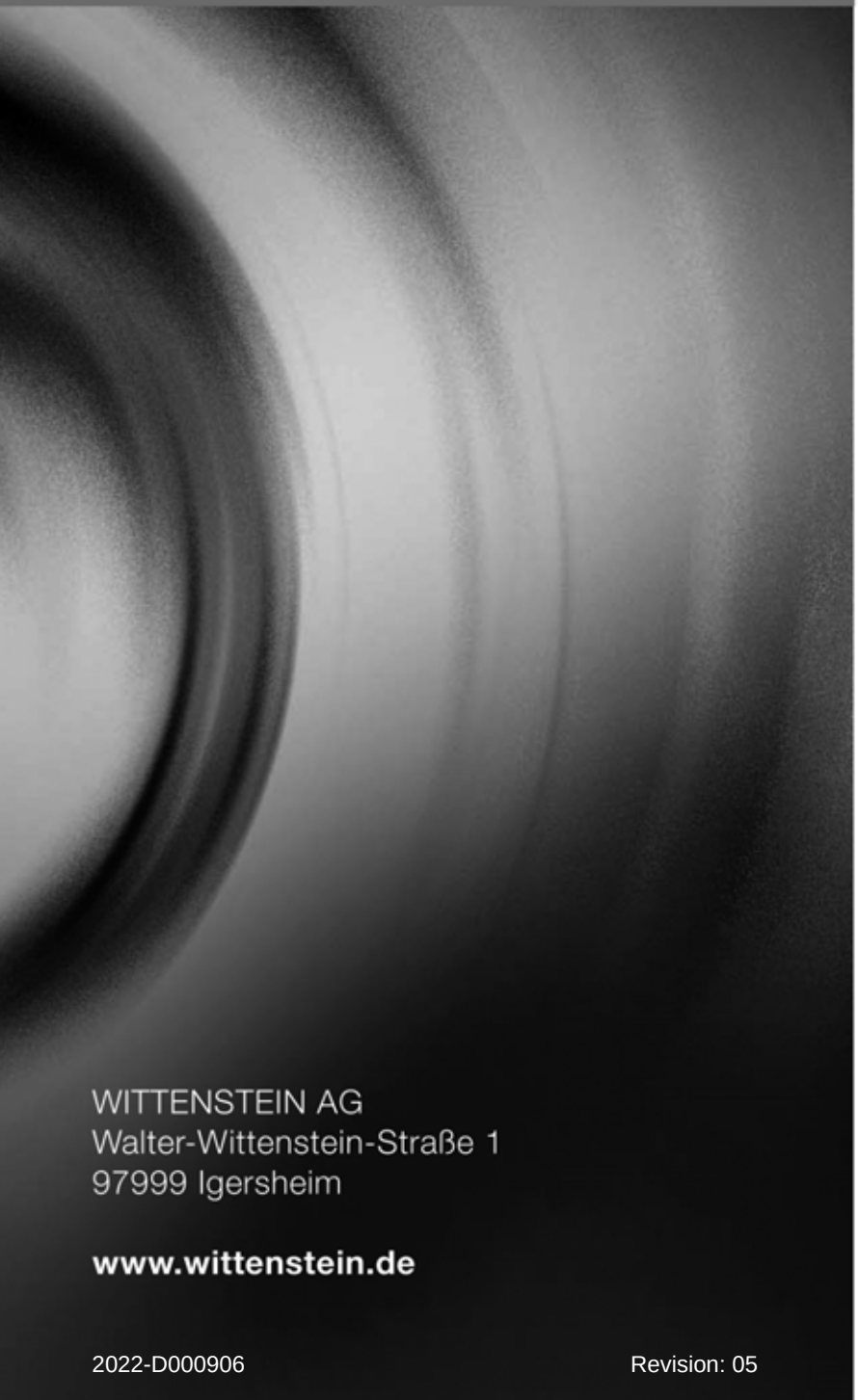
EPM

Lift Machine

Operating Manual



WITTENSTEIN AG
Walter-Wittenstein-Straße 1
97999 Igersheim

www.wittenstein.de

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WITTENSTEIN

WITTENSTEIN alpha

WITTENSTEIN electronics

WITTENSTEIN motion control

WITTENSTEIN cyber motor

WITTENSTEIN intens

WITTENSTEIN bastian

WITTENSTEIN aerospace & simulation

1 Contents

2 General

2.1 Technical description and terms

The EPM 100/300/500 Planetary Elevator Drive (hereinafter known as “elevator drive”) is designed and built to propel a passenger lift.

2.2 To whom this manual is addressed

This manual is addressed at all those involved in the installation, operation and servicing of this elevator drive.
The operating instructions should be read through carefully and complied with before any work is carried out on the elevator drive. Please pass on the safety information contained herein to all other persons concerned.

2.3 The signs and symbols in this manual

➲ An „Instruction“ tells you to do something.

∇ An „Inspection“ determines whether the device is ready for further work.

☺ A „User tip“ shows you an easier or better way to do something.

The safety symbols are explained in detail in the chapter about „Safety“.

2.4 Exclusion of liability

The manufacturer does not accept liability for damage or injury ensuing from improper handling of the lift machine.
If the installed wear monitor of the brake is not used or connected, then **WITTENSTEIN alpha GmbH** will not accept liability for damages or injuries resulting from wear and tear of the brake.

2.5 Modifications, reconstructions

Modifications or reconstructions of the lift machine may only be carried out with the express written authorisation of **WITTENSTEIN alpha GmbH**.
Use only original parts when you maintain or retrofit the lift machine (e.g. hand wheel). **WITTENSTEIN alpha GmbH** does not accept any liability for damage or injury resulting from the use of third-party parts.

Driving wheel

Use only driving wheels that have been recommended by **WITTENSTEIN alpha GmbH**. The monitoring of wear is the responsibility of the operator or the authorised regulatory agency.

Auxiliary brake on the driving wheel

WITTENSTEIN alpha GmbH accepts no liability for the function of an auxiliary brake attached later to the driving wheel.

2.6 Customer service

Our customer service department will be glad to help you with any technical questions:

WITTENSTEIN alpha GmbH
Customer Service
Walter-Wittenstein-Str. 1
D-97999 Igersheim
Tel.: +49 (0) 79 31 / 493-12900
Fax: +49 (0) 79 31 / 493-10903
E-Mail: service-alpha@wittenstein.de

2.7 EC machinery directive

Under the terms of the EC machinery directive (98/37 EC), the elevator drive is not classified as an independent machine but as a component for integration in a machine or system.
Initial operation is prohibited until it has been confirmed that the machine in which this product is installed complies with the terms of the EC directive.

2.8 Manufacturer modifications

WITTENSTEIN alpha GmbH reserves the right to carry out technical modification/improvements to this product as required.

2.9 Copyright

3 Safety

3.1 Intended use

The lift machine is designed to drive a passenger lift according to DIN EN 81-1.
According to this standard the passenger lift must have a catch feature for downward motion and a safety device against overspeeding (upwards). These devices may **under no circumstances** affect deceleration greater than
1 x g = 9.81 m/s².

Please refer to the calculation log attached to the order confirmation for the maximum permissible loads. Furthermore, all specifications in the calculation log must be complied with in the design of the whole installation.

3.2 Improper use

Every usage exceeding the restrictions mentioned above (especially higher loads) is not compliant with the regulations, and is thus prohibited.
Under no circumstances may the emergency-off torque be exceeded. To prevent excessive forces in case of an emergency-stop, both the cabin as well as the counterweight need to be suspended with springs.
The loading case **"springing counterweight"** is prohibited!

➲ Please contact our customer service department if you have any technical questions (see Chapter 2.6).

It is forbidden to operate the lift machine when:

- it has not been mounted according to regulations (e.g., securing the driving wheel),
- it has not been installed according to regulations (e.g., fastening bolts),
- the brake has not been inspected according to chapter 0,
- the lift machine is heavily soiled (e.g. mortar, cement), or
- it is operated without lubricant.

3.3 Personnel

The elevator drive may only be installed, serviced and dismantled by specialist personnel, trained and authorised for this task by the system constructor.
Work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.

3.4 Symbol Description

These operating instructions use the following warning symbols:

DANGER!
This symbol indicates a risk of injury to the user and others.

Attention
This symbol indicates a risk of damage to the drive unit.

Environment
This symbol indicates a contamination hazard for the environment.

3.4.1 General safety instructions

Working on the lift machine

DANGER!

Improperly executed work can lead to injury and damage.

➲ Make sure that the lift machine drive is only installed, maintained, and dismantled by trained technicians. The contractor responsible for constructing the installation must select, instruct and commission these technicians for these tasks. Work on the electrical system may only be performed by trained electricians or specially instructed personnel under the supervision of a trained electrician.

DANGER!

Debris flung through the air can cause grave injury.

➲ Before putting the lift machine into operation, check that there are no impurities or tools near the lift machine.

Attention

Loose or overloaded screw connections can cause damage.

➲ Always use a calibrated torque wrench to tighten and check all screw connections for which a tightening torque has been specified.

Operation

DANGER!

Touching hot surfaces can cause burns.

➲ Do not touch the lift machine if its operating temperature is too high, or use suitable safety equipment (e.g. gloves).

DANGER!

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

➲ Keep a sufficient distance to rotating machinery.

Maintenance

DANGER!

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

➲ Ensure that no one can start the machine while you are working on it.

DANGER!

Even only briefly running the machine during maintenance work can lead to accidents if the safety devices have been put out of function.

➲ Check that all safety devices are mounted and activated.

Attention

Exceeding the permitted emergency-off moments can cause damages.

➲ Maintain the permitted moments even while inspecting the safety devices (e.g. catch feature).

➲ Avoid the loading case “springing counterweight”.

Lubricants

DANGER!

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

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

DANGER!

Hot oil may cause scalding.

➲ When changing oil, protect yourself against contacting hot oil.

Attention

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

➲ Only re-fill with the lubricant type that is in the gear reducer.

➲ If you wish to use another lubricant, carry out a complete oil change (with flushing).

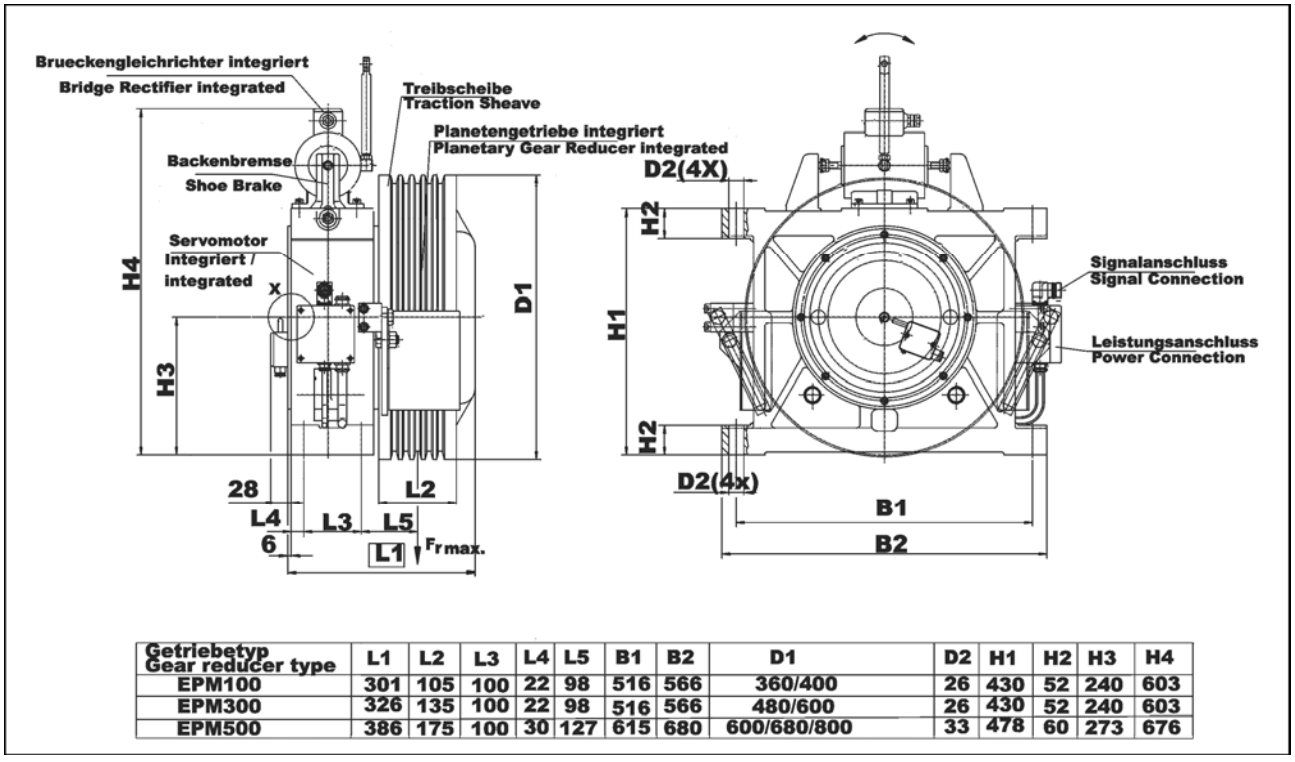
Environment

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

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

4 Technical Data

4.1 Dimensions



Getriebetyp Gear reducer type	L1	L2	L3	L4	L5	B1	B2	D1	D2	H1	H2	H3	H4
EPM100	301	105	100	22	98	516	566	360/400	26	430	52	240	603
EPM300	326	135	100	22	98	516	566	480/600	26	430	52	240	603
EPM500	386	175	100	30	127	615	680	600/680/800	33	478	60	273	676

The above diagram shows the main elevator drive dimensions.

4.2 Weight

The overall weight of the elevator drive is between 200 kg and 504 kg.

☺ The table in Chapter 5.1 should assist you with a more exact calculation of the weight.

4.3 Electrical connections

WITTENSTEIN alpha GmbH will not accept liability for consequences resulting from the incorrect or negligent installation or adjustment of the actuator and elevator drive operating parameters.
Please observe the installation, operation and safety instructions in the servo actuator documentation.
The elevator drive motor is designed for a DC bus voltage of 560 V.

DANGER!

Electric shocks endanger your life.

➲ Ensure that work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.

➲ Protect all current-carrying parts (e.g. exposed wiring) against unintentional contact.

4.4 Oil quantities and types

The transmission unit is filled at the factory with synthetic transmission oil in the viscosity class ISO VG 220 (Fuchs, Renolin PG 220). The amount depends on the size of the transmission unit

- EPM 100 = 400 cm³
- EPM 300 = 800 cm³
- EPM 500 = 1300 cm³

The table below contains all approved oils:

Hersteller Manufacturer	Schmiermittel Lubricant
Aral	Degol GS 220
BP	Energol SG-XP 220
DEA	Polydea CLP 220
Fuchs	Renolin PG 220
Klüber	Klübersynth GH 6-220
	Syntheso HT 220/ Syntheso D 220 EP
Mobil	Glygoyle 30 / Glygoyle HE220
Molyduval	Syntholube G 220 EP
Optimol	Optiflex 220
Shell	Tivela Oil WB (PG 220)
Tribol	800/220

4.5 Performance data and specifications

The performance data are individually co-ordinated for each order and a specifications sheet is provided with the order confirmation.
The specifications must be complied with during the construction of the overall system. Generally the following data are valid:

	EPM 100	EPM 300		EPM 500	
Ratio i	8,2	21	31	21	31
max. Starting Torque T_{2B} [Nm]	900	1900	2800	3400	4800
Emergency Stop*)1 T_{2Not} [Nm]	2000	4750	7000	8500	12000
max. Radial Load F_{rmax} [kN]	22	55	55	70	70

Table 4.2

*)1 in the service life of the lift machine the emergency-stop moment may occur at most 1000 times!

5 Transportation

5.1 Position, weight

The elevator drive does not need to be transported in any special position or direction. However, make sure that all electrical components are well protected from damage.
The overall weight of the elevator drive is comprised of the individual weights of the elevator drive unit and the traction sheave. It will range between 200 kg and 504 kg. The following table of individual weights should assist you with a more exact calculation of the overall elevator drive weight.

Weights EPM 100	
Elevator drive (without traction sheave):	
EPM 100	~ 160 kg
Traction sheaves (Width of rim 105 mm) with fastening bolts:	
Nominal diameter = 360 mm	~ 40 kg
Nominal diameter = 400 mm	~ 47 kg

Weights EPM 300	
Elevator drive (without traction sheave):	
EPM 300	~ 200 kg
Traction sheaves (Width of rim 135 mm) with fastening bolts:	
Nominal diameter = 480 mm	~ 83 kg
Nominal diameter = 600 mm	~ 117 kg
Nominal diameter = 680 mm	~ 135 kg

Weights EPM 500	
Elevator drive (without traction sheave):	
EPM 500	~ 300 kg
Traction sheaves (Width of rim 175 mm) with fastening bolts:	
Nominal diameter = 480 mm	~ 114 kg
Nominal diameter = 520 mm	~ 130 kg
Nominal diameter = 600 mm	~ 148 kg
Nominal diameter = 680 mm	~ 166 kg
Nominal diameter = 800 mm	~ 204 kg

5.2 Transportation by lifting equipment

DANGER!

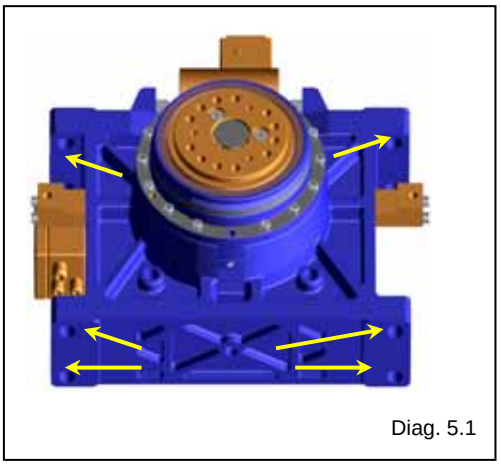
Falling loads or torn-off fixtures could injure persons standing below.

- ➲ Never stand under suspended loads.
- ➲ Keep a safe distance from the fixtures where possible.

Attention

The elevator drive could be damaged if it falls/is dropped or put down roughly.

- ➲ Only use lifting equipment and fixtures designed to carry the weight of the elevator drive.
- ➲ To transport the elevator fix 4 eye bolts (e.g. according to DIN 580) on the top ends of the housing (Diag. 5.1). The installation position/direction can be varied to suit individual requirements and the top ends of the housing will change according to the selected position.
  It is also permitted to pass a carrying belt through the openings of the traction sheave.
- ➲ Never use the brake as a fixture point.
- ➲ Check that the load is handled and raised/lowered carefully.
- ➲ Do not lower the load onto electrical components (e.g. cable boxes).
- ➲ Please be aware that the centre of gravity may shift, depending on the assembly status (with/without traction sheave).
- ➲ To transport a traction sheave, pass a carrying belt through one of the openings.



Diag. 5.1

6 Installation, Initial operation

DANGER!

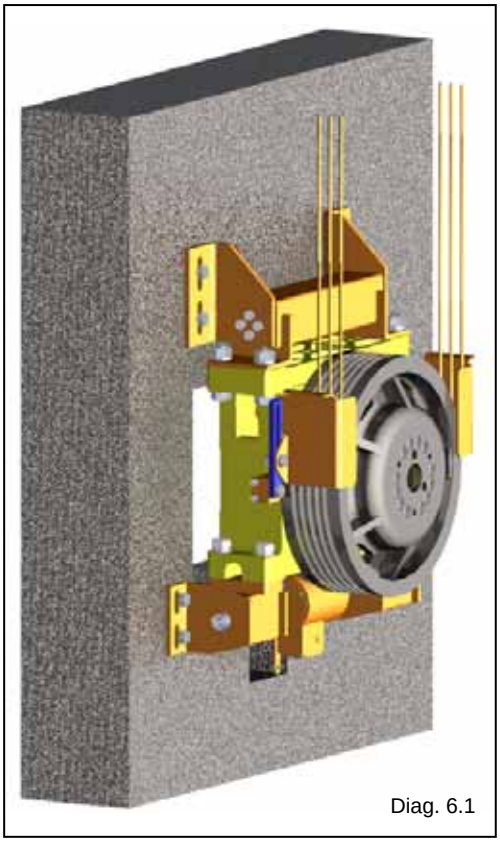
Incorrectly performed work could cause injuries and damage.

- ➲ The elevator drive may only be installed, serviced and dismantled by specialist personnel, trained and authorised for this task by the system constructor.
  Work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.

6.1 Preparation, material

The elevator drives are supplied either fully assembled or with a separate traction sheave. Where required, please refer to Chapter 6.2.1 for traction sheave assembly instructions.

The elevator drive can be fixed at both the bottom or top ends of the elevator shaft. For the mounting please adhere to the standards and directives of noise control (e.g. VDI 2566). We recommend the Alpha assembly set or a comparable vibration damping mounting.
Fasten the elevator drive at 4 different points, each with 2 screw-bolts, whereby 2 fastening points serve to take up the vertical forces and 2 fastening points to take up the tilting moment. (Diag. 6.1)
Ensure that the drive unit fastening bolts are screwed down to at least 1.5 to 2 times the thread length (depending upon the material used).
The following table indicates the materials required for various types of installation.



Diag. 6.1

EPM 100 and EPM 300		
Type of installation	Materials required	
Screw-in fastenings	8 8	screw-bolts M24 DIN 933 8.8 seating rings DIN 6916
Through-bolt fastenings	8 16 8	screw-bolts M24 DIN 933 8.8 seating rings DIN 6916 nuts DIN 6915

Other mounting positions
Other mounting positions could infringe patents of Kone, Kartanontie 1, SF-0330 Helsinki berühren.

EPM 500		
Type of installation	Materials required	
Screw-in fastenings	8 8	screw-bolts M30 DIN 933 8.8 seating rings DIN 6916
Through-bolt fastenings	8 16 8	screw-bolts M30 DIN 933 8.8 seating rings DIN 6916 nuts DIN 6915

6.2 Mechanical installation

6.2.1 Installing the traction sheave

The elevator drives are supplied either fully assembled or with a separate traction sheave. Please observe the following instructions if you should need to install a traction sheave.

➲ Check to make sure you have all required fastening bolts (see table below for amounts).

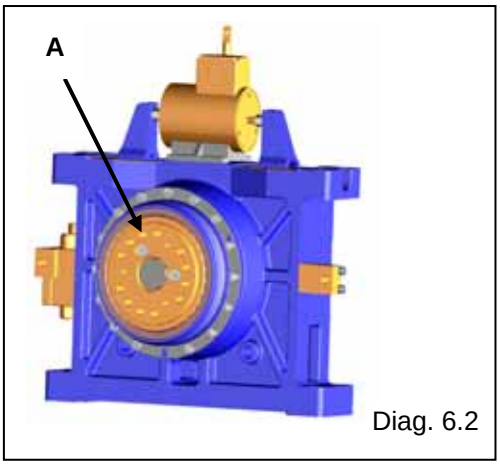
Elevator drive	Screw-bolts	Tightening torque
EPM 100	12X. M10x30 DIN 912 10.9	68 Nm
EPM 300	12X. M16x30 DIN 912 10.9	280 Nm
EPM 500	12X. M20x45 DIN 912 10.9	560 Nm

➲ Please read the instructions in Chapter „Transportation“, before moving the traction sheave with lifting equipment.

➲ Clean the plane surfaces of the output flange (A) and traction sheave thoroughly. (Diag. 6.2)

➲ Position the traction sheave so that two of the oil refill holes on the flange are accessible and insert the fastening bolts.

➲ Fasten the bolts crosswise in at least two steps (see table for tightening torques).



Diag. 6.2

6.2.2 Installing the complete elevator drive

➲ Please read the instructions in Chapter „Transportation“, before moving the elevator drive with lifting equipment..

➲ Position the elevator drive and screw in the fastening bolts (8 x).

Elevator drive	Screw-bolts	Tightening torque
EPM 100	M24 DIN 933 8.8	640 Nm
EPM 300	M24 DIN 933 8.8	640 Nm
EPM 500	M30 DIN 933 8.8	1400 Nm

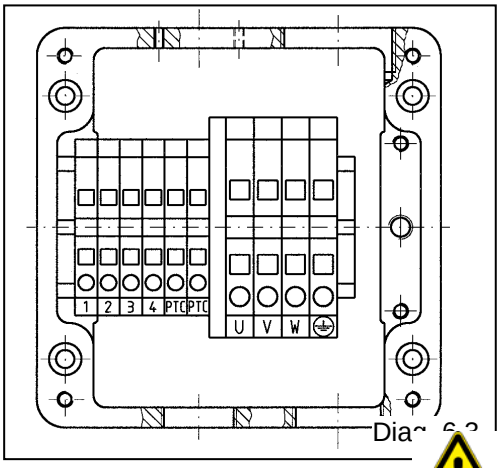
➲ Fasten the bolts crosswise in at least two steps (see table for tightening torques).

6.2.3 Remote brake operation

If the elevator drive is not directly accessible, ensure that the brake can be released (e.g. Bowden cable).

6.3 Electrical installation

6.3.1 Technical data



Diag. 6.3

Motor

The elevator drive has a brushless, three-phase AC servo motor. For commutation and speed control a rugged resolver is integrated.
Always use screened cables to connect the motor. The screen may not be used for protective earthing or strain relief purposes and should provide good contact at both the motor and controller ends.

The power cables, temperature sensor (PTC) cables and electrical connection of the wear monitoring limit switch (brake) are all connected via the X1 terminal box.

➲ Make sure all cable screw glands are properly tightened.
➲ Close any cable screw glands not required.

DANGER!

Electric shocks endanger your life.

➲ Ensure that work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.
➲ Protect all current-carrying parts (e.g. exposed wiring) against unintentional contact.

Controllers

For operation, the servo motor requires suitable servo controllers. The following examples are digital drive converters with constant DC bus voltage for low-loss speed control of three-phase AC motors and an IGBT fast-switching power semiconductor for pulse-width modulation.

☺ Please refer to the controller documentation for instructions about the screening, earthing and arrangement of filters in line with EMC regulations. Please observe these instructions carefully.

Recommended controllers:

Hersteller / Manufacturer	TYP/TYPE
alpha	APM
Control Techniques	UNI 2401LFT / 2402LFT / 2403LFT / 3401LFT / 3402LFT / 3403LFT
Dietz-electronic	Multidrive VVVF DSV 5445-020...060/400 LIFT
KEB	COMBIVERT 14 / 15 / 16F.4.F1G-4i14 / 17 / 18F.4.F1H-4i14 / 19F4.R-4i14
SIEI	Avy-2055-KBM / Avy-2075-KBM / Avy-3110-KBM / Avy-3150-KBM / Avy-4220-KBM /

Depending on the manufacturer, you may require the following additional components:
- mains filter, - choke, - braking resistor, - resolver interface, - elevator software

Lift magnet - brake

The lift magnet is equipped with two bridge rectifiers. These need to be loaded with an alternating voltage of 230V AC and will then convert this to a direct voltage of 205V DC. Other supply voltages are available on request.

➲ Always check the information on the lift magnet name-plate.

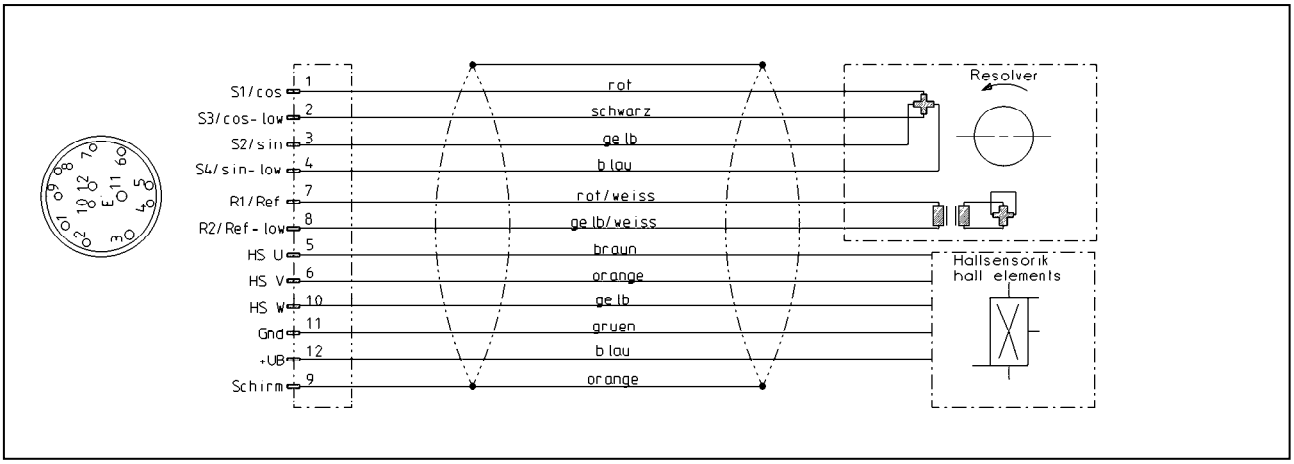
The connections use terminal box X5.

Normal operation: parallel connection

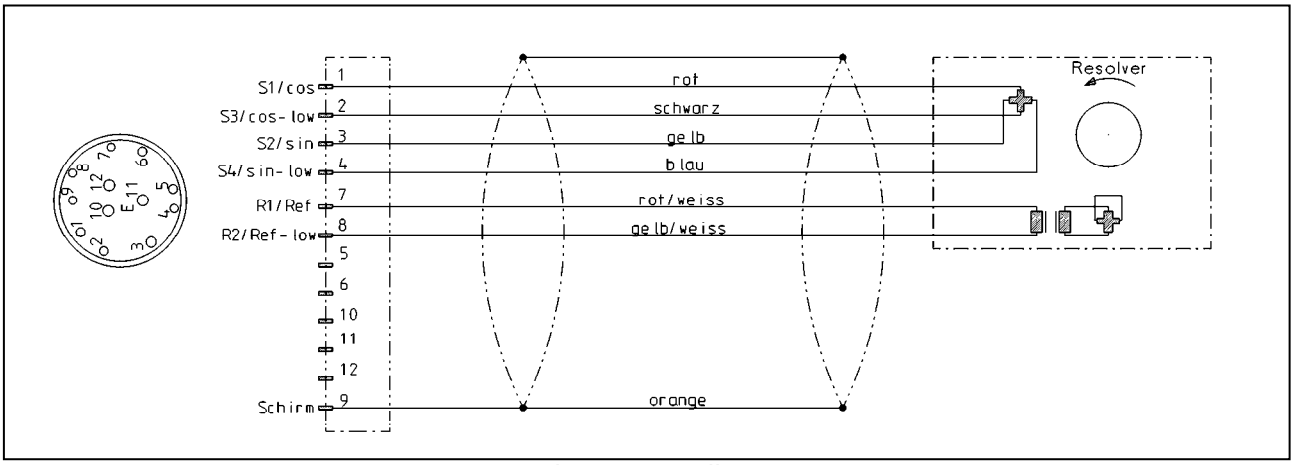
Test operation: one magnet opened for each brake with a push-button

Resolver, Hall sensor

The signal cable (for the resolver and Hall commutation) is connected via a (SFDB12TNNN000) X3 12-pin plug.



Diag. 6.4 applies for EPM 100 and EPM 300

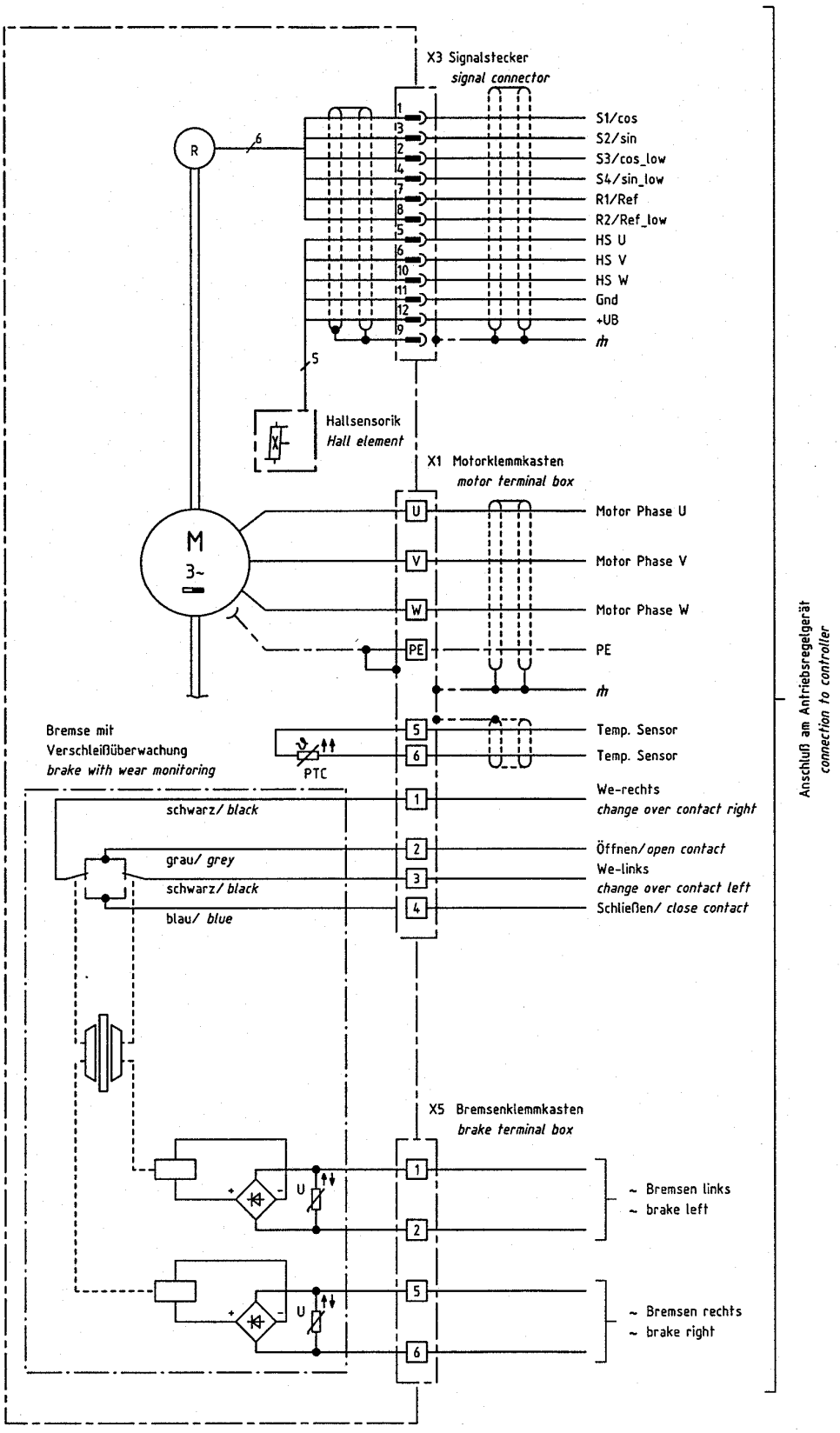


Diag. 6.5 applies to EPM 500

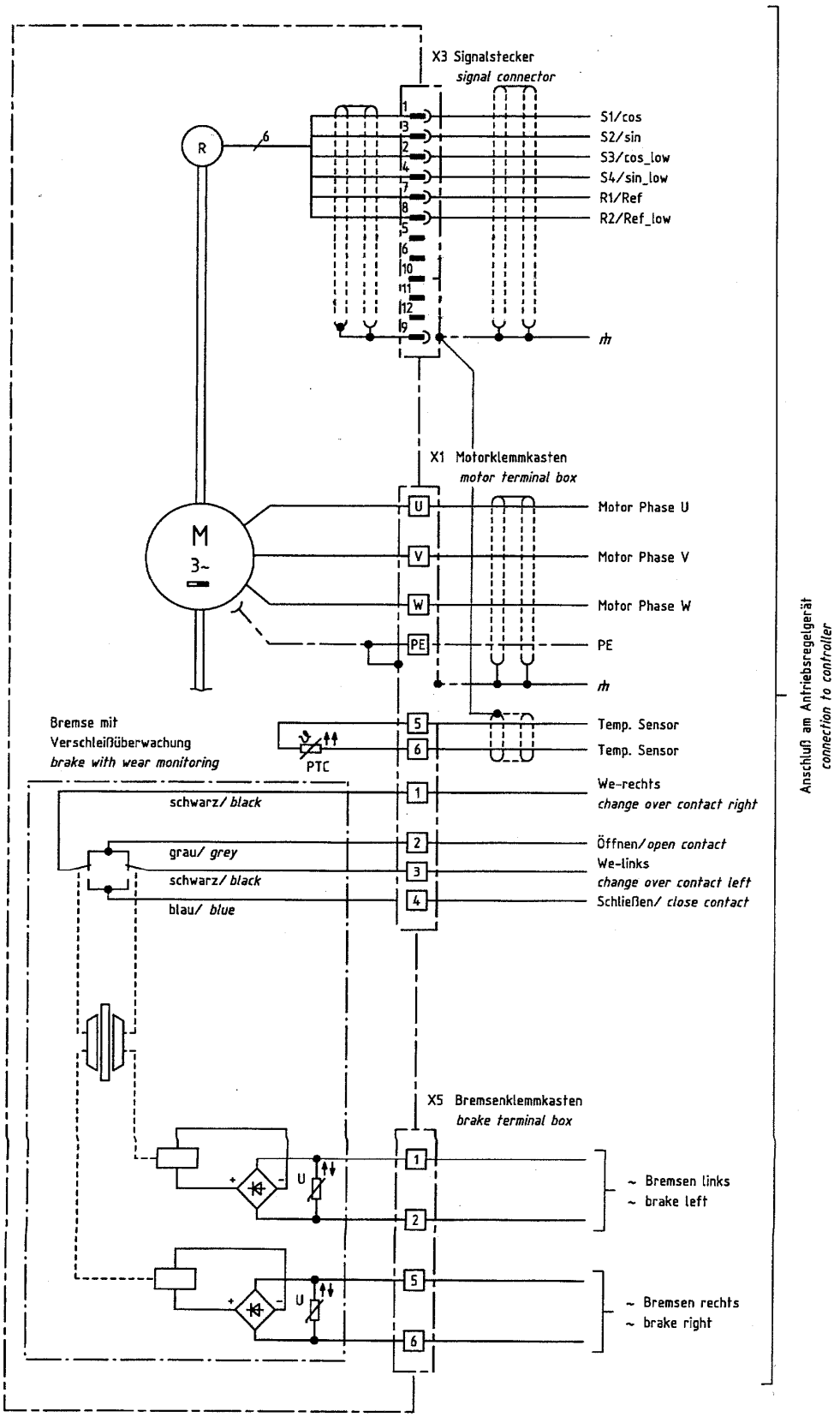
Technical Data

Technical data	EPM 100	EPM 300	EPM 500
1. Motor			
1.1 DC bus voltage [V]	600	600	600
1.2 max. torque [Nm]	120	80	165
1.3 max. current (RMS) [A]	32	40	77,8
1.4 Continuous stagn. current (RMS) [A]	6,5	11,2	23,6
1.5 Torque constant [$Nm/A_{eff/RMS}$]	3,75	2,0	2,1
1.6 Number of pairs of poles	9	9	6
2. Resolver			
2.1 Function	1 x BRX	1 x BRX	1 x BRX
2.2 Number of pairs of poles	1	1	1
2.3 Input voltage [Vrms]	6-12	6-12	6-12
2.4 Exciter frequency [kHz]	4-10	4-10	4-10
2.5 Ratio	0,5±5% at 5 kHz 0,5±10% at 4-10 kHz		
2.6 Excitation	$E_{R1-R2} = E\sin \varpi t$		
2.7 Output	$E_{S1-S3} = KE_{R1-R2}\cos\Theta$ $E_{S2-S4} = KE_{R1-R2}\sin\Theta$		
2.8 Impedance Z_{RO} [Ohm]	400 at 6 kHz	400 at 6 kHz	400 at 6 kHz
2.9 Impedance Z_{SO} [Ohm]	240 at 6 kHz	240 at 6 kHz	240 at 6 kHz
2.10 Impedance Z_{SS} [Ohm]	300 at 6 kHz	300 at 6 kHz	300 at 6 kHz
2.11 Impedance Z_{RS} [Ohm]	300 at 6 kHz	300 at 6 kHz	300 at 6 kHz
3. Temperature sensor			
3.1 Type	PTC160	PTC160	PTC160
3.2 Resistance at 20 to140ºC [Ohm]	< 250	< 250	< 250
4. Servo controller			
4.1 Power supply [V AC]	3 x 400	3 x 400	3 x 400
4.2 Recomm. PWM frequency [kHz]	12 – 16	12 – 16	12 – 16
4.3 min. PWM frequency [kHz]	9	9	9
5. Lift magnet			
5.1 Coil voltage [V DC]	205	205	205
5.2 System voltage [V AC]	230±10%	230±10%	230±10%
5.3 System frequency [Hz]	50/60	50/60	50/60
5.4 Current consumption [A]	0,4	0,4	0,4
6. Limit switch (brake wear)			
6.1 Voltage [V AC]	230	230	230
6.2 max. current [A]	5	5	5
7. Protection class			
7.1 Elevator Drive EPM	IP 41	IP 41	IP 41

6.3.2 Connection plan EPM 100/300

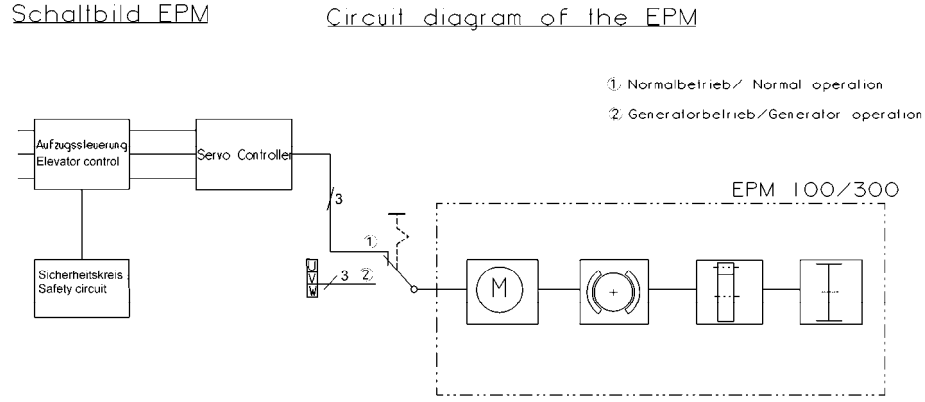


6.3.3 Connection plan EPM 500



6.3.4 Operation mode switching device

☺ If the elevator drive is **not** equipped with an AES auxiliary controller for emergency operation, we prescribe the installation of an operation mode switching device, due to the low friction in the transmission unit. When in the “Emergency Operation” mode, this switching device should cut off the servo controller from the motor and short-out the motor windings U, V and W. The motor then functions as a regenerative brake.



Diag. 6.6

6.4 Inspections before initial operation

6.4.1 General

- ➲ Thoroughly check the whole elevator drive for visible signs of external damage or loss of oil.
- ➲ Check the oil level as described in Chapter 8.3.2.
- ➲ Check the tightening torques as described in Chapter 8.3.8.
- ➲ Check the rope jump-off safety device as described in chapter 8.3.9.

6.4.2 The brake

The brake is a holding brake, therefore its use as a deceleration brake during normal operation is not permitted.

DANGER!

The brake is a safety component. Brake failure could lead to serious injuries and damage.

- ➲ Carry out the prescribed inspections and adjustments carefully.
- ➲ Do not put the elevator drive into operation before all inspections and adjustments have been carried out.

- ➲ Check the spring resistance measurement „X“ as described in Chapter 8.3.3.
- ➲ Check the clearance gap „S“ as described in Chapter 8.3.4 and readjust, if necessary.

7 Operation, emergency operation

7.1 Operating conditions

Install the elevator drive in a clean, dry environment. Heavy dust and fluids of any kind will prevent optimal functionality. The ambient temperature should be between –10°C and +50°C. The operating temperature should not exceed +90°C.

The elevator drive is designed for an operating cycle of 60% or 240 journeys per hour, as experienced in normal operation. .

The brake is designed as a holding brake: its use as a deceleration brake is therefore not permitted in normal operation. The brake torque and clearance gap (see Chapter 8.3.3 and Chapter 8.3.4) are set at the factory and need to be checked before initial operation and at each maintenance interval. The brake torque is calculated to ensure that there is still sufficient braking power if a brake component should fail.

7.2 Emergency operation

DANGER!

The brake is a safety component. Brake failure could lead to serious injuries and damage.

- ➲ Only use the hand lever in emergencies.
- ➲ Only move the elevator cage at low speeds.

- ➲ Make sure there is an indicator mark to show whether the elevator cage is present in a door-opening zone.

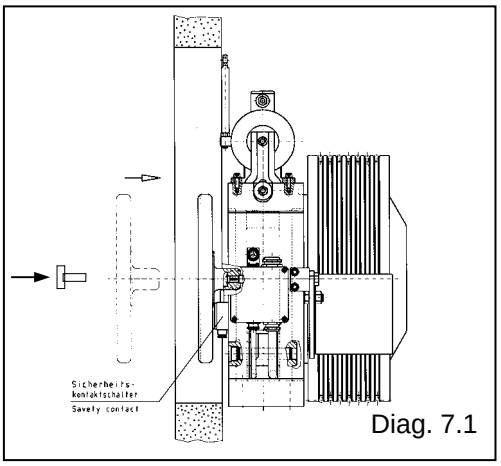
7.2.1 Hand-powered emergency operation

DANGER!

Due to the low friction in the transmission unit, the elevator cage may start moving as soon as the hand lever is released.

- ➲ Use a mode switching device to cut the servo controller off from the motor and short-out the motor windings U, V and W. The motor then functions as a regenerative brake.
- ➲ Always carry out these safety measures before using the hand lever.

If the machine is equipped with a handwheel or bevel gear drive the elevator cage can also be moved manually after releasing the hand lever.



Diag. 7.1

Operation with the handwheel

➲ Fit the handwheel and secure with a screw-bolt (Diag. 7.1).
➲ Hold the hand wheel securely to prevent unintentional motion when the brake is released.
➲ Pull the hand lever (e.g. via remote control) and hold to release the brake.
∇ Make sure that the elevator cage is only moved slowly. To brake, let go of the hand lever.
➲ Once the elevator cage has reached a standstill with released brake, it can be moved in the required direction with the hand wheel on the motor.
➲ Stop the elevator cage at a door-opening zone.

Attention

Do not fix on the handwheel during normal operation – this could damage the elevator drive.

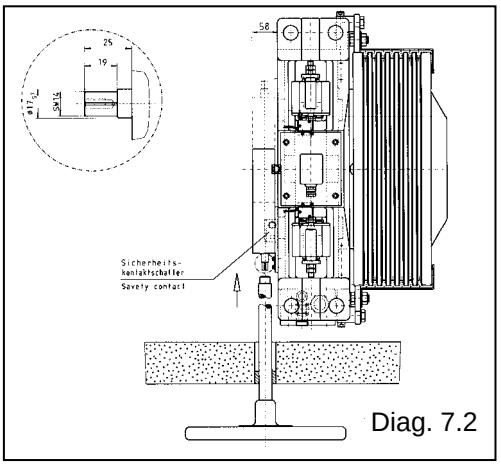
➲ Always remove the handwheel after emergency operation.

➲ Cancel the motor short circuit switch after emergency operation.

☺ The short-circuit wiring should be integrated into the elevator system safety circuit.

Operation with a bevel gear drive

The bevel gear drive is operated via a handwheel with a longer shaft.



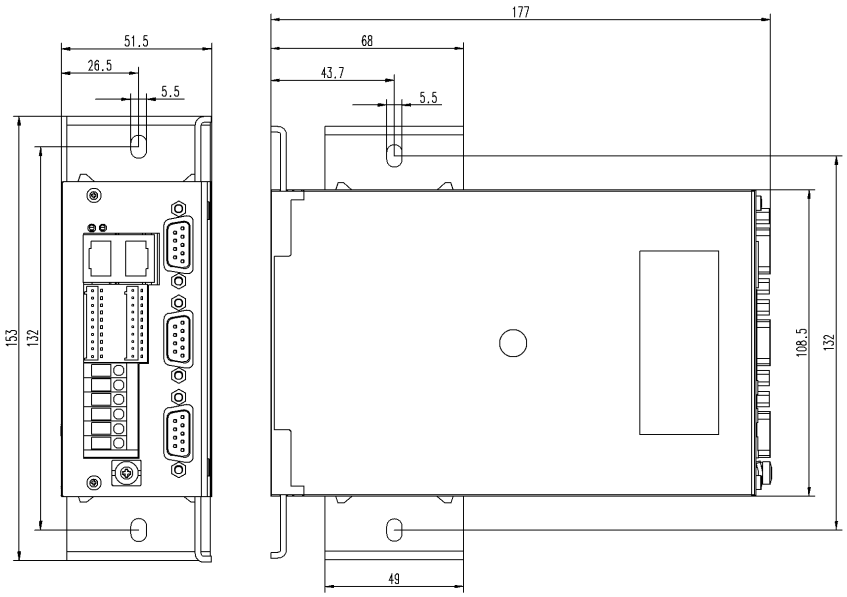
Diag. 7.2

➲ Press the handwheel in about 10 mm (Diag. 7.2).
➲ Hold the hand wheel securely to prevent unintentional motion when the brake is released.
➲ Pull the hand lever (e.g. via remote control) and hold to release the brake.
∇ Make sure that the elevator cage is only moved slowly. To brake, let go of the hand lever.
➲ Once the elevator cage has reached a standstill with released brake, it can be moved in the required direction with the hand wheel on the motor.
➲ Stop the elevator cage at a door-opening zone.
➲ Always remove the handwheel after emergency operation.
➲ Cancel the motor short circuit switch after emergency operation.

☺ The short-circuit wiring should be integrated into the elevator system safety circuit.

7.2.2 Electrically-powered emergency operation (applies only to EPM 100 / 300)

WITTENSTEIN alpha GmbH provides battery-powered remote control operation with the aid of an AES auxiliary controller, for roomless elevators with no direct access to the drive unit (Diag. 7.3) .
The main drive motor is then battery-powered at 48V.
Integrate the enabling signal for the AES auxiliary controller into the safety circuit.



Diag. 7.3

The motor can achieve 60% of its full output torque and, depending on the weight of the load, can be moved either in the selected direction or with regenerative braking.

- if the torque is sufficient the elevator can be moved in the selected direction.
- If the torque is insufficient, the elevator will be moved with regenerative braking.

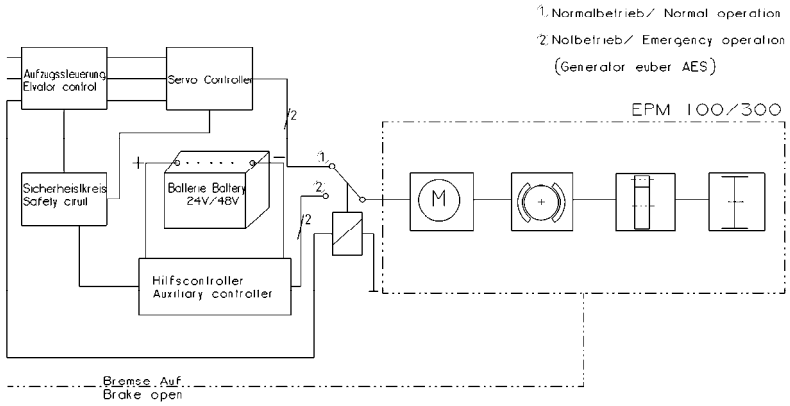
The output speed will be reduced by factor 15.

☺ Please refer to the separate instruction manual for information about operation of the AES.

Attention

Incorrect connection can seriously damage the auxiliary controller.

➲ Always connect the auxiliary controller directly to the elevator drive (see. connection scheme).



Diag. 7.4

8 Maintenance

DANGER!

Incorrectly performed work could cause injuries and damage..

➲ Ensure that the elevator drive is only installed, serviced and dismantled by specialist personnel. Work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.

8.1 Shutting down the lift, preparation

➲ Shut down and secure the lift with rope clamps, before beginning any maintenance work.

DANGER!

Unintentional operation of the lift system during maintenance work could lead to serious injuries.

➲ Make sure that no-one can start the lift system while you are working on it.

➲ Ensure that the elevator cannot move off unintentionally (e.g. fasten the cage and counter weight).

8.2 Maintenance schedule

Maintenance work / refer to Chapter...	Maintenance intervals			
	At initial operation	After first 500 hours of operation or 3 months	Every 3 months	Once a year
Visual inspection / 8.3.1	X	X	X	
Inspect oil level / 8.3.2	X	X		X
Check spring measurement „X“ / 8.3.3	X	X	X	
Check clearance gap „S“ and thickness of brake pad / 8.3.4	X	X	X	
Check functionality of limit switch / 8.3.5				X
Check limit switch measurement „Y“/ 8.3.6	**if necessary (signal from limit switch)**			
Check the electrical contacts / 8.3.7				X
Check the tightening torques / 8.3.8	X	X		X
Check the rope jump-off safety device / 8.3.9	X	X		X

Table 8.1

8.3 Maintenance work

8.3.1 Visual inspection

➲ Thoroughly check the whole elevator drive for visible signs of external damage or loss of oil.

8.3.2 Oil level

The oil provided is normally sufficient to last the life cycle of the transmission unit. The oil level should be checked to make sure there is no hidden damage.

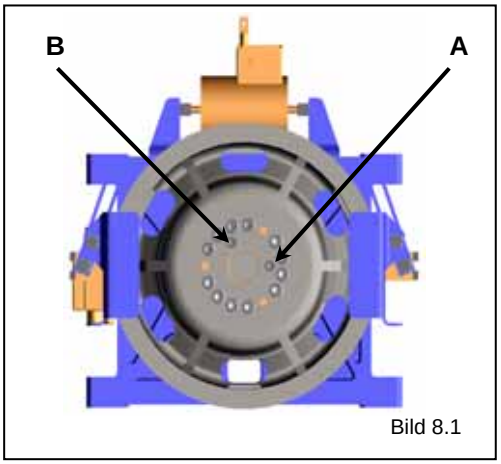


Bild 8.1

Checking the oil level

➲ Turn the traction sheave until one of the oil plugs (A) is in the horizontal position and the other (B) is positioned above it (Diag. 8.1).
➲ Unscrew plug A.
∇ If no oil drains out, the oil level is too low. Please refer to the instructions for Oil level is too low!
∇ If a little oil drains out, the oil level is correct and the plug can be screwed back in, as described below:
➲ Degrease the plug and apply sealing adhesive to it (e.g. Loctite 573)..
➲ Screw in the plug with a tightening torque of 12 Nm (at EPM 100) or 15 Nm (at EPM 300 and 500).

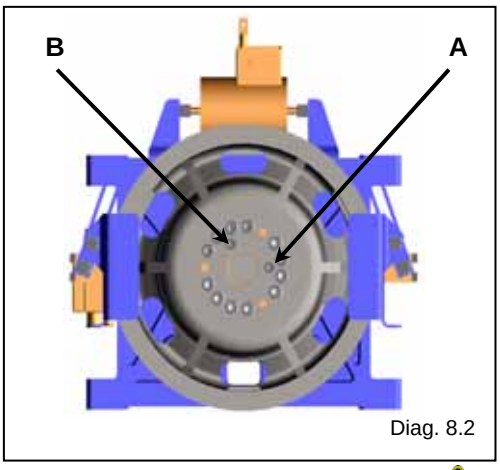
Oil level is too low!

Attention

Low oil level is an indication of possible oil leakage from the transmission unit.
➲ Check the transmission unit thoroughly for signs of leakage or damage.

Never mix different oils! This could reduce the lubrication properties of the oil and could damage or destroy the elevator drive transmission unit.
➲ For refilling purposes, always use the type of oil which is already in the transmission unit.
➲ If you wish to use a different type of oil first carry out a complete oil change (with thorough rinsing).

➲ Unscrew the plug of the check hole (A), as described in Checking the oil level.



Diag. 8.2

➲ Open the top oil plug (B) (Diag. 8.2) and refill oil.
☺ It is easier to refill the oil by using a funnel and flexible tubing.
∇ The correct oil level has been reached once oil drains out of the check hole (A).(Diag. 8.2).
➲ Degrease the plug and apply sealing adhesive to it (e.g. Loctite 573).
➲ Screw in the plug with a tightening torque of 12 Nm (at EPM 100) or 15 Nm (at EPM 300 and 500).

Oil change

DANGER!

Do not operate the elevator during maintenance work – even briefly. Operation while the safety devices are deactivated could lead to serious accidents.

➲ Always ensure that all safety devices are attached and activated.

Attention

Never mix different oils! This could reduce the lubrication properties of the oil and could damage or destroy the elevator drive transmission unit.

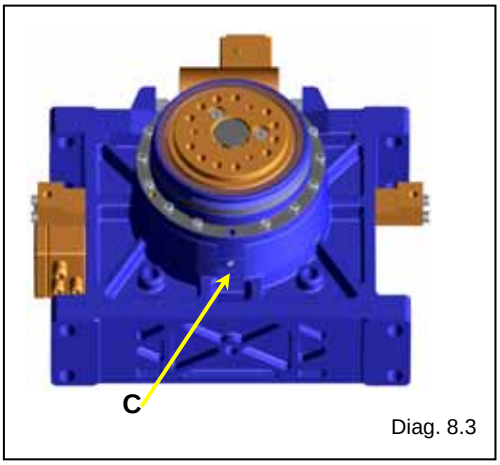
➲ For refilling purposes, always use the type of oil which is already in the transmission unit.
➲ If you wish to use a different type of oil first carry out a complete oil change (with thorough rinsing).

Please see Chapter 4.4 for a list of approved oils.

Environment

Oil is a hazardous substance which could pollute the ground and water systems.

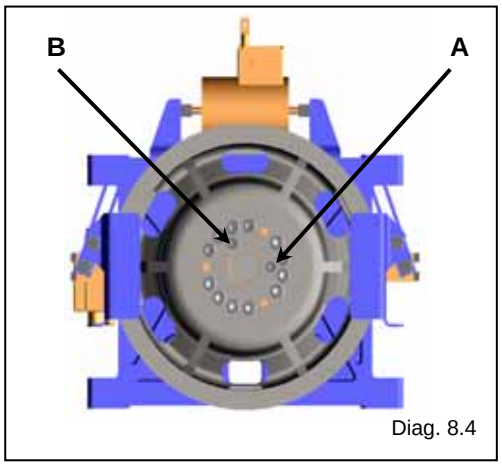
➲ Collect all drained oil in a suitable container and dispose of in line with the regulations applicable in your country.



Diag. 8.3

➲ Bring the transmission unit up to the operating temperature.
➲ Drain the oil from the bottom oil plug (Diag. 8.3).
➲ Open the top plug to vent the transmission unit.
☺ The transmission unit will still contain oil and dirt residues. We recommend flushing these out:
- Screw in the bottom plug, refill oil and screw in the top plug.
- Let the elevator drive run briefly and then drain off the oil again.

➲ Degrease the plug and apply sealing adhesive to it (e.g. Loctite 573).



Diag. 8.4

- ➲ Screw in the bottom plug with a tightening torque of 12 Nm (at EPM 100) or 15 Nm (at EPM 300 and 500).
- ➲ Unscrew the plug of the check hole, as described in Checking the oil level.
- ➲ Refill the correct amount of oil and check the oil level at the check hole.
  - EPM 100 = 400 cm³
  - EPM 300 = 800 cm³
  - EPM 500 = 1300 cm³
- ∇ The correct oil level has been reached once oil drains out of the check hole (Diag.).
- ➲ Degrease the plug and apply sealing adhesive to it (e.g. Loctite 573).
- ➲ Screw in the plug with a tightening torque of 12 Nm (at EPM 100) or 15 Nm (at EPM 300 and 500).

8.3.3 Checking the spring resistance measurement „X“

The brake force is set at the factory and needs to be checked before initial operation and at each maintenance interval. The brake torque is calculated to ensure that there is still sufficient braking power if a brake component should fail.

- ➲ See the table below (8.2) for the correct settings for your elevator drive.

Type	EPM 100	EPM 300	EPM 500
Measurement „X“ [mm]	56 to 57	56 to 57	74 to 75
Maximum measurement [mm]	61	63	82

Table 8.2

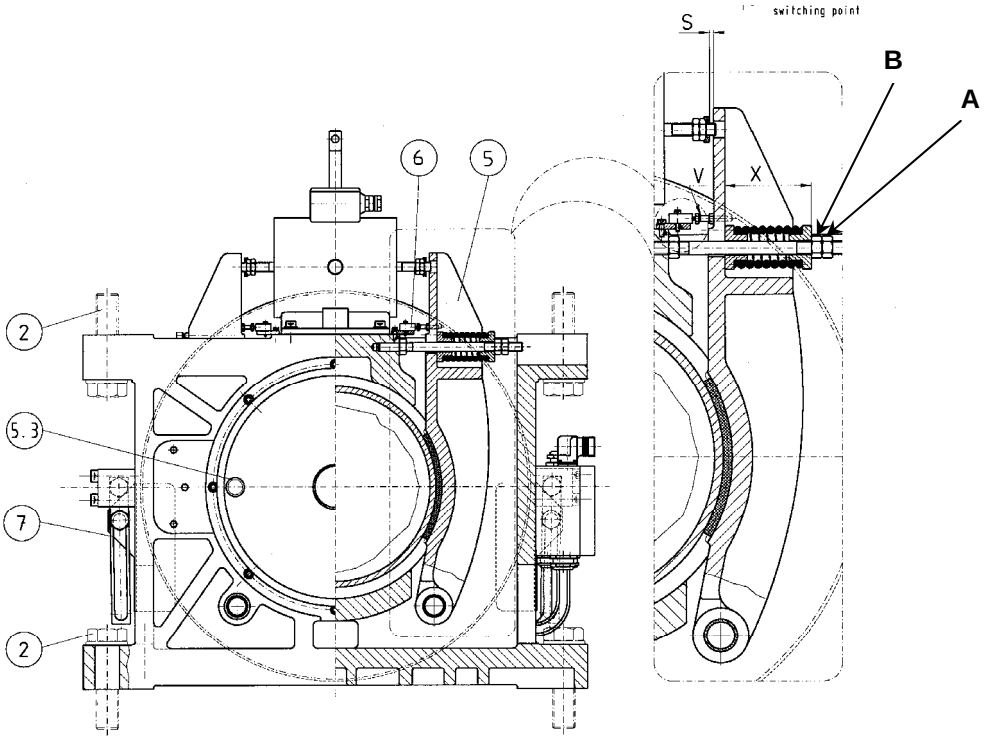
DANGER!

Setting the wrong measurement could lead to serious accidents.

- ➲ Always make sure you set the correct measurement.
- ➲ When you reduce the brake torque, never exceed the maximum measurement.

- ➲ Check that the brake is closed and the lift magnet is **not** actuated.

➲ Check the spring resistance measurement „X“ at both springs, with the help of a calliper (Diag. 8.5). If necessary, adjust the measurement as follows:



Diag. 8.5

➲ Unscrew the locknut (A).
➲ Adjust the measurement at nut (B).
➲ Retighten the locknut (A) and check the measurement once again.

Reducing the braking torque

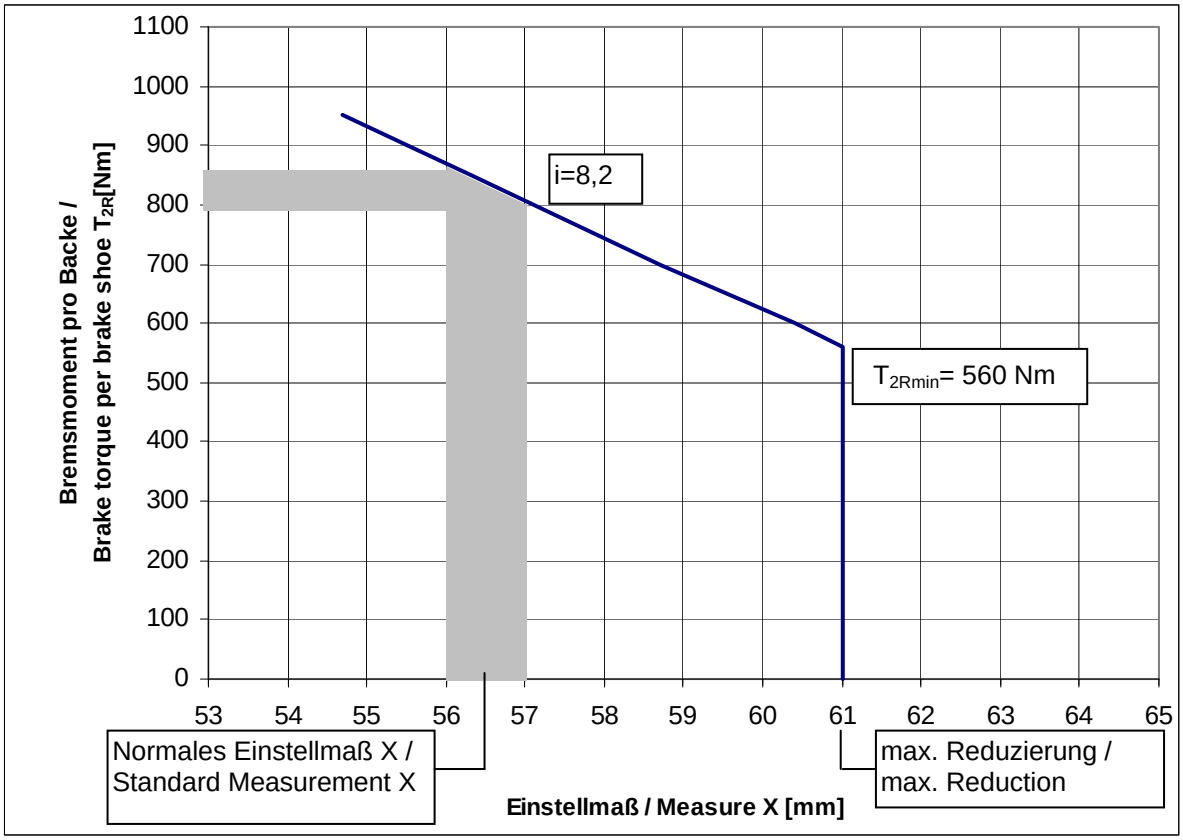
DANGER!

If the braking torque is set too low this could cause serious accidents.

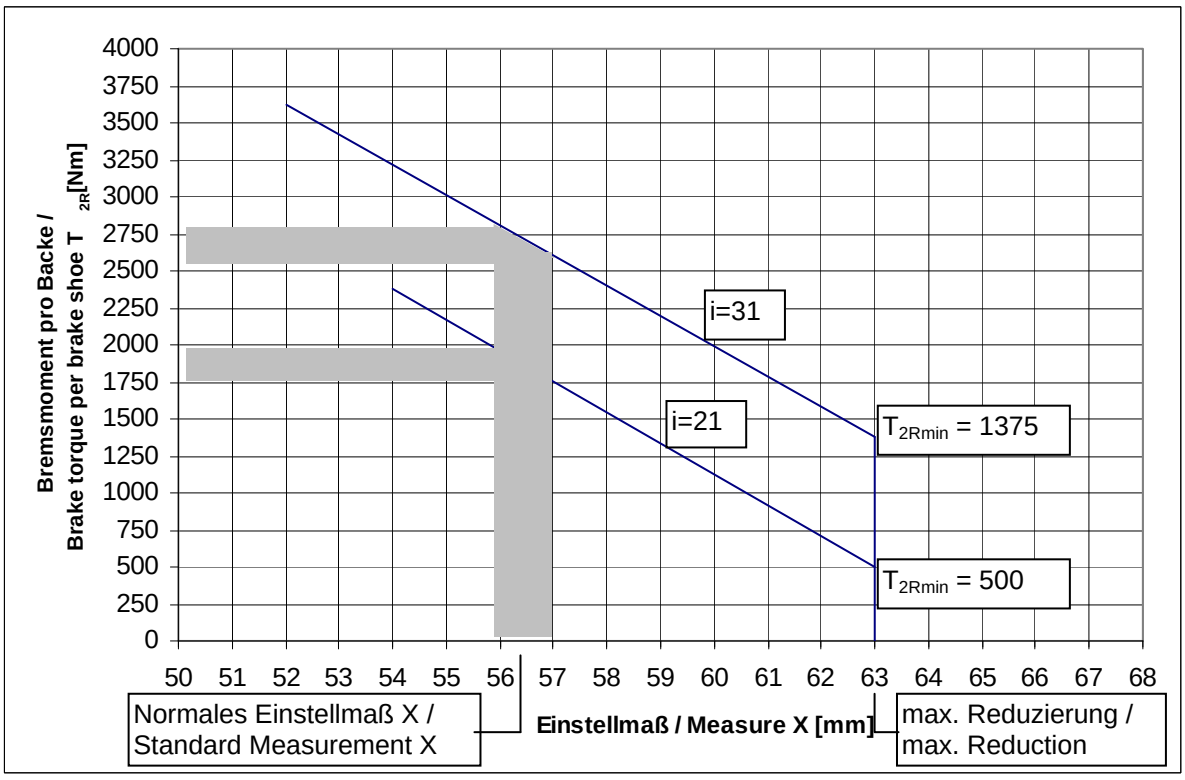
➲ When reducing the braking torque, never exceed the maximum spring resistance measurement.

If you need to reduce the braking torque, the spring resistance measurement „X“ can be increased to the maximum.

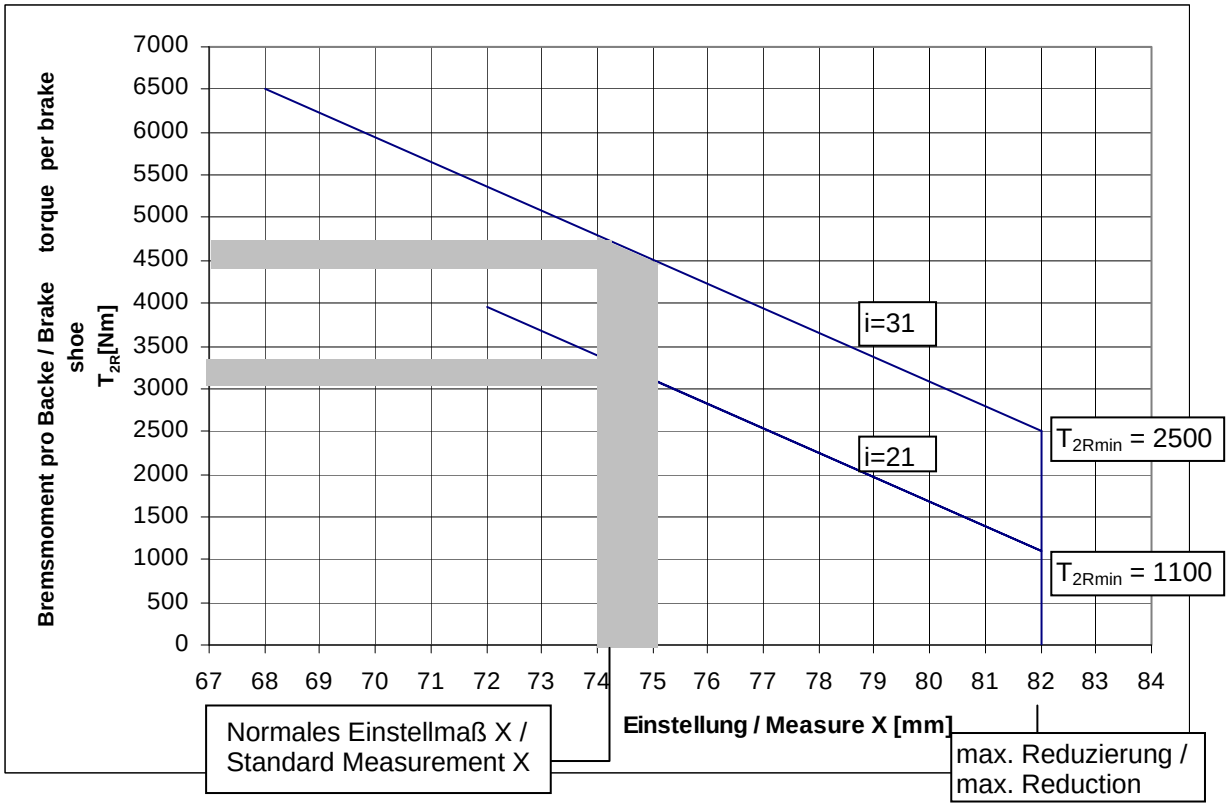
∇ Ensure that the adjusted braking torque is in line with the standards in your country (EN81 etc.).



EPM 100



EPM 300



EPM 500

8.3.4 Checking the clearance gap „S“

The clearance gap between the brake shoes and the pistons of the lift magnet is set at the factory and needs to be checked before initial operation and at each maintenance interval.
The gap „S“ decreases as the brake pads are worn down. Regular checks and timely readjustment are needed to ensure that that „S“ is never smaller than 0.8 mm. The spring resistance „X“ and brake functionality should be checked at the same time.

➲ Refer to the lift magnet nameplate for the correct stroke measurement (5 mm or 3 mm).

The correct clearance gap for a stroke of **3 mm** is 1.2 to 2.0 mm.

➲ For strokes of **5 mm** please contact our customer service dept. (see Chapter 2.6).

DANGER!

Setting the wrong measurement could lead to serious accidents.

➲ Always make sure you set the correct measurement.
➲ Make sure that the thickness of the brake pads is never less than 3 mm.

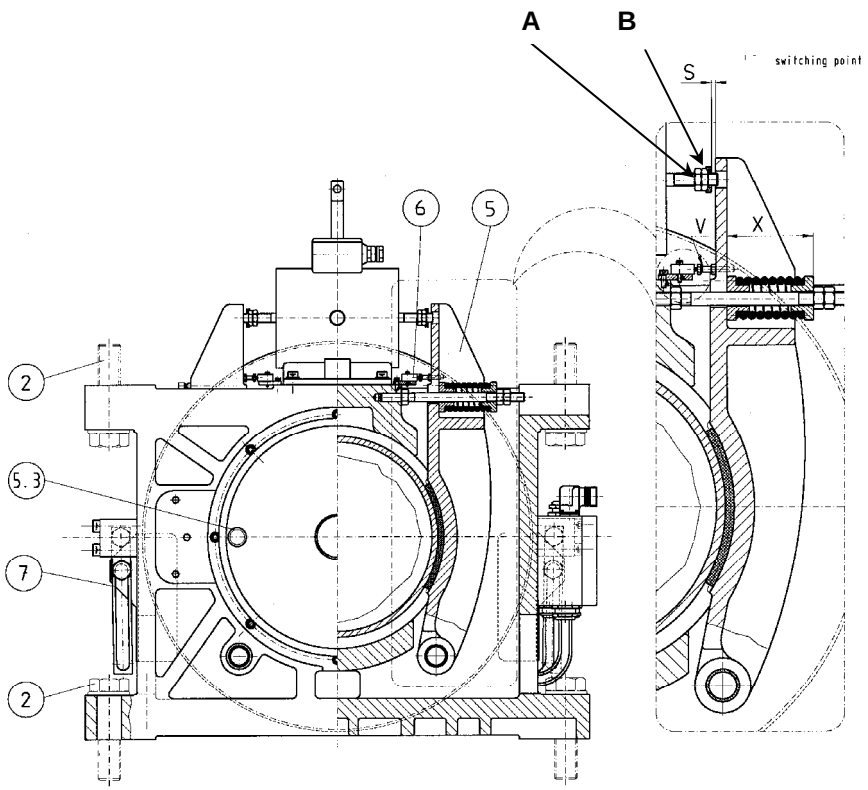
- ➲ Check that the brake is closed and that the lift magnet is **not** actuated.
- ➲ Move the pistons back to their final inner position.
- ➲ Remove the plastic plugs (5.3) from the input flange.
- ➲ Check the thickness of the brake pads, with the aid of lighting.
- ➲ When the brake pads reach the minimum thickness of 3mm we recommend completely replacing both brake levers rather than just renewing the brake pads.

DANGER!

The brake is a safety component. Incorrectly carried out work could lead to serious injuries and damage.

- ➲ The brake levers should only be changed by specially trained personnel or contact our customer service department (see Chapter 2.6)

- ➲ Press the plastic plugs back into the input flange.
- ➲ Check the clearance gap „S“ at both brakes, with the help of a thickness gauge (Diag. 8.6). If necessary, adjust the gap as follows:



Diag. 8.6

- ➲ Unscrew the locknut (A).
- ➲ Adjust the measurement at nut (B).
- ➲ Retighten the locknut (A) and check the measurement once again.

8.3.5 Checking the functionality of the limit switch

To monitor the maximum wear of the brakes, two limit switches have been installed on the housing (also see connection schedules in chapters 6.3.2 and 6.3.3).

➲ Check the functionality of the limit switch with a continuity checker.

8.3.6 Adjusting measurement „Y“ at the limit switch

To monitor the maximum wear of the brakes, a limit switch has been installed on the housing .
The measurement „Y“ is pre-set by **WITTENSTEIN alpha GmbH** and marked with sealant paint.
When the brake pad wears out, the limit switch is activated and sends a signal to the control system. The limit switch needs to be readjusted afterwards.

➲ Refer to the lift magnet nameplate for the correct stroke measurement (5 mm or 3 mm).

For strokes of 3 mm:
The correct measurement „Y“ for a stroke of 3 mm is 1.2 mm. This is 1.5 revolutions of the adjustment screw.

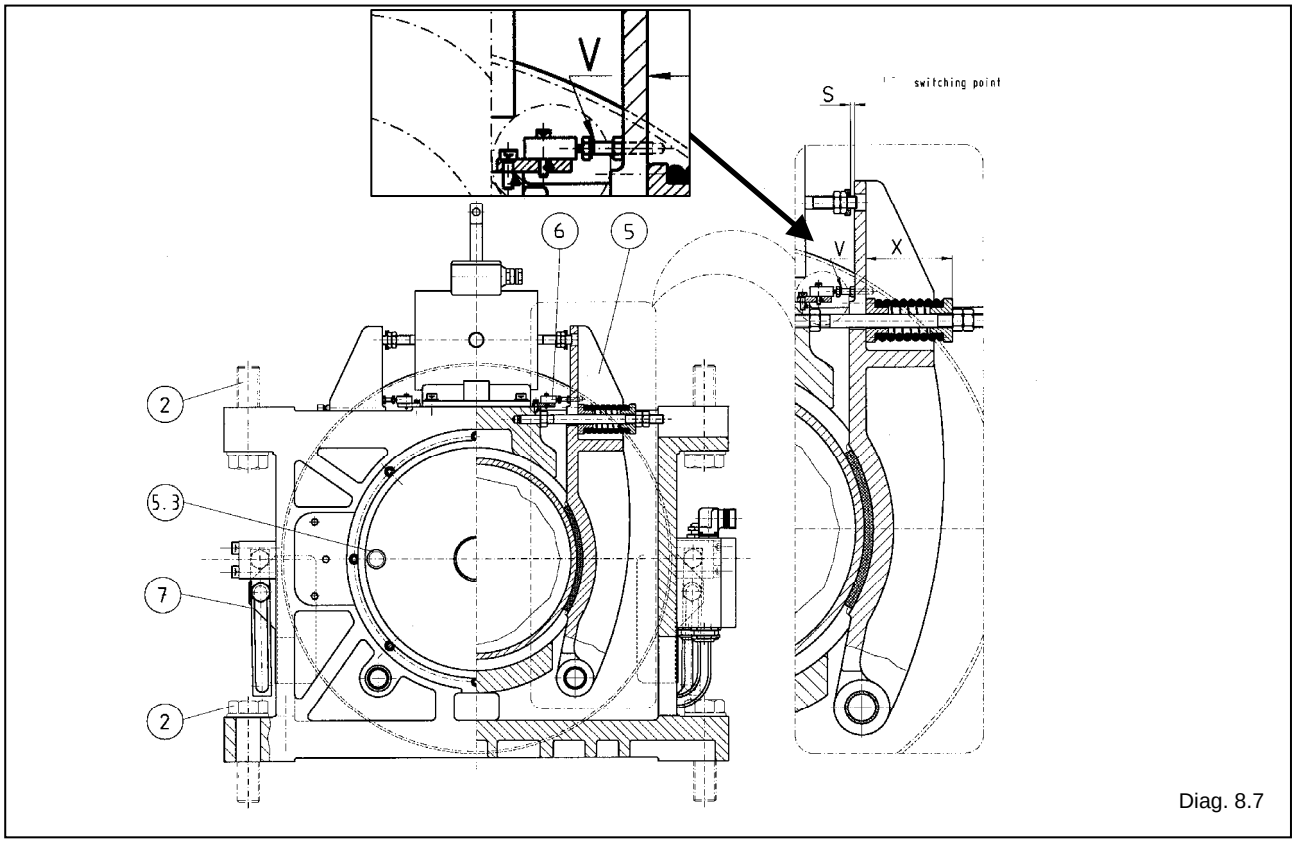
For strokes of 5 mm:
The correct measurement „Y“ for a stroke of 5 mm is 2.4 mm. This is 3 revolutions of the adjustment screw.

DANGER!
Setting the wrong measurement could lead to serious accidents.

➲ Always make sure you set the correct measurement.
➲ Make sure that the thickness of the brake pads is never less than 3 mm..

➲ Check the thickness of the brake pads as described in Chapter 8.3.4 .
➲ Check that the brake is closed and that the lift magnet is **not** actuated.

➲ Unscrew the locknut and turn the screw (V) until it reaches the switching point of the limit switch plunger (Diag. 8.7).



Diag. 8.7

☺ To locate the switching point, either use a continuity checker or press the plunger until it clicks.

For strokes of 3 mm:

➲ Turn back the screw 1.2 mm from the switching point position (= 1.5 screw revolutions).

For strokes of 5 mm:

➲ Turn back the screw 2.4 mm from the switching point position (= 3 screw revolutions).).

8.3.7 Checking the electrical contacts

➲ Check the electrical contacts for optimal functionality.

8.3.8 Checking the tightening torque

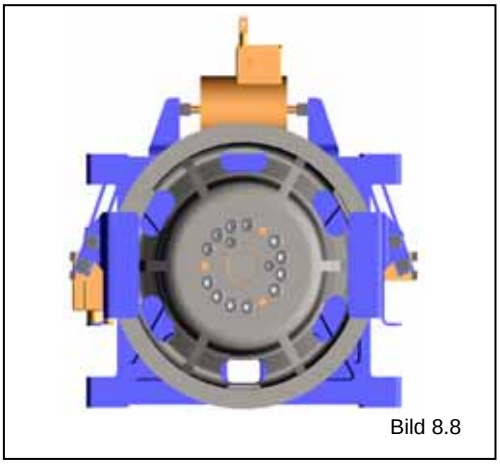


Bild 8.8

➲ Check the tightening torque of all twelve traction sheave fastening bolts (Diag. 8.8).

Elevator drive	Screw-bolts	Tightening torque
EPM 100	M10x30 DIN 912 10.9	68 Nm
EPM 300	M16x30 DIN 912 10.9	280 Nm
EPM 500	M20x45 DIN 912 10.9	560 Nm

➲ Check the tightening torque of all eight elevator drive fixture bolts .

Elevator drive	Screw-bolts	Tightening torque
EPM 100	M24 DIN 933 8.8	640 Nm
EPM 300	M24 DIN 933 8.8	640 Nm
EPM 500	M30 DIN 933 8.8	1400 Nm

8.3.9 Checking the rope jump-off safety device

DANGER!

The rope jump-off device (2 guard plates) is a safety component. It prevents the ropes jumping off the traction sheave and provides operator protection at the rope entry point.

➲ Only operate the elevator drive with correctly installed guard plates

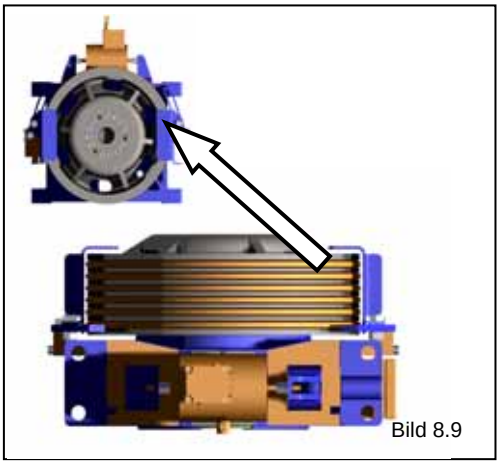


Bild 8.9

➲ Check that the guard plates cover the point at which the ropes enter the traction sheave (Diag. 8.9).
➲ Check that the guard plates are set to a maximum clearance of 2 to 3 mm from the ropes.
➲ If necessary, unscrew the rope jump-off safety device and adjust the position. Retighten the screw-bolts with a torque of 100 Nm.

8.4 Initial operation after maintenance work

➲ Attach all safety devices .
➲ Carry out a test run before releasing the elevator system for normal operation.

8.5 Malfunction list (troubleshooting)

➲ Seek an immediate solution if you notice lubricant loss, increased noise during operation, or increased operating temperatures.

Error	Possible cause	Solution
Increased operating temperature	Selected construction too weak for task, nominal operating exceeded.	Check the technical specifications.
	Motor is heating the gearhead	Check the controller's settings
	Ambient temperature too high	Ensure adequate cooling.
Increased noise during operation	Damaged bearings	Please consult our technical service department.
	Damaged gear teeth	
	Incorrect controller parameters	
	Screen of the motor cable improperly laid.	Check the motor line
Loss of lubricant	Lubricant quantity too high	Wipe off discharged lubricant and continue to watch the gearhead. Lubricant discharge should stop after a short time.
	Seals not tight	Please consult our technical service department.
Motor does not start	Power supply interrupted	Check the connections
	Wiring of motor and/or encoder or resolver not correct	Check the wiring of the motor phases and the motor encoder or resolver
	Incorrect controller parameters	Check that the motor parameters are suitable for the implemented gear drive.
Wrong direction of rotation	Incorrect controller parameters	Check the control parameters.
Motor is droning and has a high power consumption.	Wiring faulty	Check the wiring
	Drive is blocked	Check the drive
	Error in the encoder line	Check the encoder line
	Incorrect controller parameters	Check that the motor parameters are suitable for the implemented gear drive.
	Brake does not release	(see error “Brake does not release”)
Brake does not release	Incorrect brake connection	Check the connection for correct polarity and voltage
	Short circuit in the coil or at body of brake coil	Please consult our technical service department.
Holding brake slips	Stopping torque of the brake exceeded	Check the construction plan.
Inaccurate positioning of the cabin	The lifting capacity is not given.	Please consult our technical service department.
	Brake acts too soon.	Check the brake's settings.
Jerky starts and stops	Erroneous settings of the brake times.	Check the settings of the brake times.

Table 8.8

9 Changing components

DANGER!

Incorrectly performed work could cause injuries and damage.

➲ Ensure that the elevator drive is only installed, serviced and dismantled by specialist personnel. Work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.

9.1 Preparation

➲ Shut the system down and make sure that the elevator drive or individual components can be removed without danger to the overall lift system.

DANGER!

Unintentional operation of the lift system during dismantling work could lead to serious injuries.

➲ Make sure that no-one can start the lift system while you are working on it.

➲ Ensure that the elevator cannot move off unintentionally (e.g. fasten the cage and counter weight).

9.2 Disconnecting the electrical connections

➲ Unplug the signal cable.

DANGER!

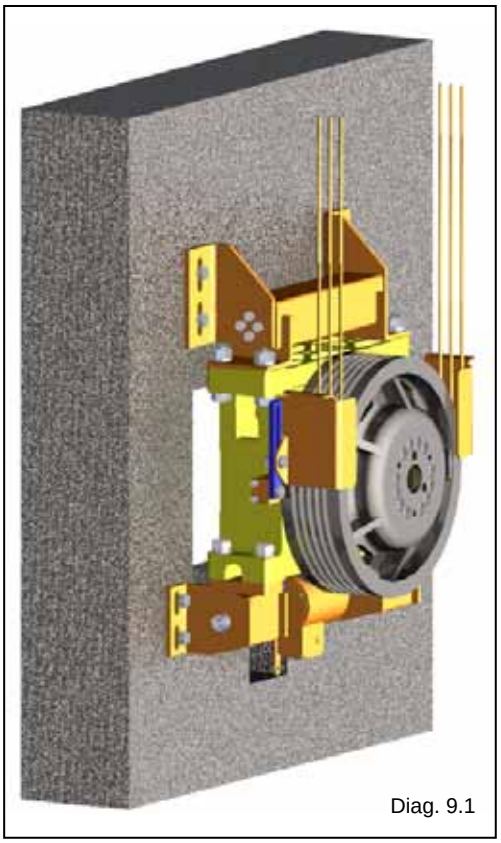
Electric shocks endanger your life.

➲ Ensure that work on the electrical system may only be carried out by qualified electricians or specially trained personnel, supervised by a qualified electrician.

➲ Protect all current-carrying parts (e.g. exposed wiring) against unintentional contact.

➲ Disconnect the electrical connections in the terminal boxes from the motor and brake.

9.3 Removing the complete elevator drive



Diag. 9.1

➲ Please read the instructions in Chapter „Transportation“, before moving the elevator drive with lifting equipment.

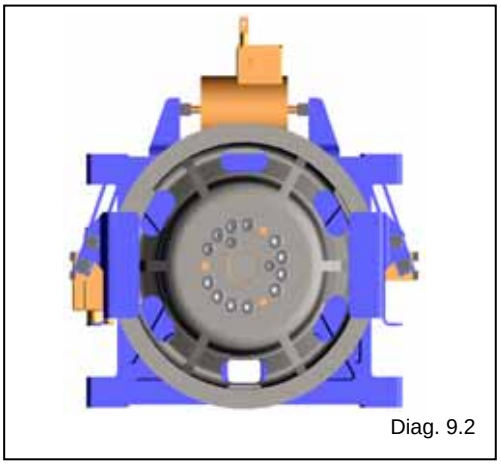
➲ Unscrew the eight fastening bolts and lift out the elevator drive. (Diag. 9.1.)

9.4 Changing the traction sheave

➲ Please read the instructions in Chapter „Transportation“, before moving the traction sheave with lifting equipment.

Dismantling

➲ Unscrew the twelve fastening bolts and press the traction sheave down, off the output flange. (Diag. 9.2)



Diag. 9.2

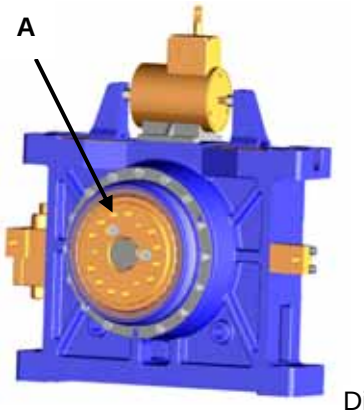
Installation

Only use traction sheaves recommended by **WITTENSTEIN alpha GmbH**. The operator and/or the authorised supervisory authorities are responsible for monitoring the wear.

➲ Check to make sure you have all required traction sheave fastening bolts (see table below for amounts).

Elevator drive	Screw-bolts	Tightening torque
EPM 100	12X. M10x30 DIN 912 10.9	68 Nm
EPM 300	12X. M16x30 DIN 912 10.9	280 Nm
EPM 500	12X. M20x45 DIN 912 10.9	560 Nm

Table 9.1



Diag. 9.3

➲ Please read the instructions in Chapter „Transportation“, before moving the traction sheave with lifting equipment.

➲ Clean the plane surfaces of the output flange and traction sheave thoroughly. (Diag. 9.3)

➲ Position the traction sheave and insert the fastening bolts.

➲ Fasten the bolts crosswise in at least two steps (see table 9.1 for tightening torques).

9.5 Changing the brake levers

DANGER!

The brake is a safety component. Incorrectly carried out work could lead to serious injuries and damage.

➲ The brake levers should only be changed by specially trained personnel or contact our customer service department (see Chapter 2.6)