

Operating instructions

LIFTKET B13 / LIFTKET B15
Electric chain hoists



Please do not use the hoist until all operators have carefully read this manual and have signed the form on the last page.

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1 Safety advice

1.1 Regulations

In the German Federal Republic and in the countries of the European Union the assembly, first use, certification and maintenance of hoisting machines is basically regulated by the following regulations and by the instructions contained in this Operating manual.

European Directives	
2006/42/EC	EC Machinery Directive
2014/30/EG	EC Directive on electromagnetic compatibility
2014/35/EG	EC Directive on electrical equipment designed for use within certain voltage limits

Regulations of the German Professional Association (Accident Prevention Regulations)	
DGUV Regulation 1 (BGV A1:2009)	Principles of prevention
DGUV Regulation 3 (BGV A3:2005)	Electrical facilities and equipment
DGUV Regulation 52 (BGV D6:2000)	Cranes
DGUV Regulation 54 (BGV D8:1997)	Winches, lifting and pulling equipment
DGUV Rules 100-500 (BGR 500-2.8:2008)	Operation of work equipment
DGUV Principle 309-001 (BGG 905:2004)	Principles of checking of cranes

Harmonized Regulations	
EN ISO 12100:2010	Safety of machinery
EN 14492-2:2006+A1:2009	Cranes - Power driven winches and hoists
EN 818-7:2002+A1:2008	Chains for lifting purposes; Quality Grade T
EN ISO 13849-1:2008	Safety-related parts of control systems; General principles for design
EN 60034-1:2010	Rotating electrical machines; Rating and performance
EN 60034-5:2001+A1:2007	Degrees of protection provided by the integral design of rotating electrical machines
EN 60204-1:2006	Electrical equipment of machines, general requirements
EN 60204-32:2008	Electrical equipment; requirements for hoisting machines
EN 60529:1991+A1:2000+A2:2013	Degrees of protection provided by enclosures (IP-Code)
EN 60947-1:2007+A1:2011	Low-voltage switchgear and control gear; general statements
EN 61000-6-2:2005	Electromagnetic compatibility, immunity for industrial environments
EN 61000-6-3:2007+A1:2011	Electromagnetic compatibility, emission standard for residential, commercial and light-industrial environments
EN 61000-6-4:2007+A1:2011	Electromagnetic compatibility, emission standard for industrial environments
EN 82079-1:2013	Preparation of for use, structuring, content and presentation

Standards and Technical Specifications	
FEM 9.511:1986	Rules for the design of series lifting equipment, classification of mechanisms
FEM 9.683:1995	Selection of hoisting and travelling motors
FEM 9.751:1998	Power driven series hoist mechanisms, safety
FEM 9.755:1993	Measures for achieving safe working periods

The manufacturing plant accepts no warranty obligation whatsoever upon non-compliance with any of the instructions of the above safety regulations or of this Operating manual.


In other countries, the respective national regulations are to be considered.


1.2 Proper use of electric chain hoists

Electric chain hoists are designed to lift and to lower loads vertically and to travel horizontally with lifted loads (using trolleys).

The manufacturer's liability for losses due to the improper use of electric chain hoists is excluded. All risks are borne by the operator.


Electric chain hoists may only be operated by persons who have been trained for this by the operator. They must be familiar with these Operating instructions, which should be available at all times. Do not operate the electric chain hoist until all operators have thoroughly familiarised themselves with the contents of these Operating instructions, and have acknowledged this by signing the designated field on the rear cover of this booklet.

CAUTION	It is also the responsibility of the operator to ensure that all suspension points of the electric chain hoist are designed to safely withstand the forces exerted. The electric chain hoist may only be operated if it has been suspended as specified and if thereby it is ensured that during the lifting process at any time the outgoing chain can safely run out of the hoist due to its own weight. Disregarding the above instruction will cause the chain to jam and thereby the hoist to be damaged.	
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ATTENTION	<p>Prior to first use please make sure that all electrical connections were made as specified, that all wires are intact, and that power to the device can be disconnected from the mains using a master separator switch.</p> <p>Only qualified persons (experts) may perform works on the electric chain hoist, and only after the master switch of the crane has been switched off and locked, and the work area has been secured.</p>	
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These Operating instructions serve the safety of the works performed on and with the electric chain hoist. The below safety advice must be observed under all circumstances. When compiling these safety instructions we did not strive for completeness. You should keep this manual clean, complete and in a legible condition.

Should you have any questions or problems, please contact your competent local representative.


NOTE	<p>The manufacturer does not accept any responsibility for damages or malfunctions due to any of the following causes:</p> <ul style="list-style-type: none"> • Improper operation; • Voluntary modifications to the hoisting device; • Unprofessional work on and using the hoisting device; • Operational errors; • Non-compliance with these Operating instructions. 	
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1.3 Application conditions

	Application range	Notes
Temperature	-20°C ... +40°C	Coil heating (option)
Air humidity	maximum 85%	May not fall below the dew point
Electric protection	IP 54	IP 55 (option)
Insulation class	F (155°C)	
Use at altitude	Maximum 1,000 metres above sea level (NN)	

NOTE	For different application conditions or when used in aggressive environments please contact the manufacturer.	
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1.4 Prohibitions for use

ATTENTION	Non-compliance with the following prohibitions for use may cause fatal or severe bodily harm (invalidity).	
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It is prohibited:

- **To transport persons in any way whatsoever**
- **To operate in inching mode**
- **To use of the slip clutch in an operational way (emergency end-position limitation)**
- **For people to stay underneath the load (except for designs in accordance with DGUV V17 (BGV C1))**

- To move loads heavier than the nominal load;
- To pull loads that are tilted or to drag loads;
- To tear off loads;
- To remove the cover of vessels which are under vacuum;
- To move a trolley by pulling the control pendant or the control cable, even if these are;

- To use the chain as a suspension or to tie the load;
- To operate with a chain that is longer than indicated on the chain box;
- To start use prior to inspection by a trained specialist or expert;
- To carry out repairs without specialist knowledge;
- Please carry out repairs only when the mains supply switch is off and secured, and when the hoist is not loaded;
- To exceed the maximum permitted switch-on duration;
- To operate the hoist once the deadline for the periodic health and safety inspection has been exceeded.

1.5 Operating instructions


Caution	Non-compliance with the following prohibitions for use may cause damage to property and light or medium bodily injury.	
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- The load may only be moved once it has been properly suspended on the hook and if there are no persons located within the danger zone (DGUV Specification 54 (BGV D8)).
- The load must be placed vertically under the electric hoist before lifting.
- Do not turn the chain over edges.
- Do not lower the double fall hook enough to allow the chain to become slack.

- Consult the manufacturer if the hoist is to be used in an aggressive environment
- Consult the manufacturer when transporting red-hot melts or similar hazardous materials.

- After an actuation of the emergency stop button, the cause of its use must be eliminated by expert personnel. The emergency stop button may only be reset afterwards.
- Operators should always use the lowest available speed when lifting loads lying on a plane. Loose suspensions must first be tightened before lifting.
- When operating the hoist at a range of heights reachable by hand, do not touch the part where the chain enters the unit, and take other proper safety measures to avoid this.

1.6 Spare parts

NOTE	Use only original fastening elements, replacement part and accessories. The manufacturing plant accepts liability only for these.	
	The manufacturing plant excludes all liability for damages due to the use of non-original parts and accessories.	

2 Technical overview

2.1 Assembly possibilities

Based on the building block principle that enables easy assembly, the system enables the unproblematic conversion of the electric chain hoist from a single chain fall version to a double chain fall version. The hoists can be used in a fixed design, with manual or electric trolleys. Large lifting and operating heights are possible.

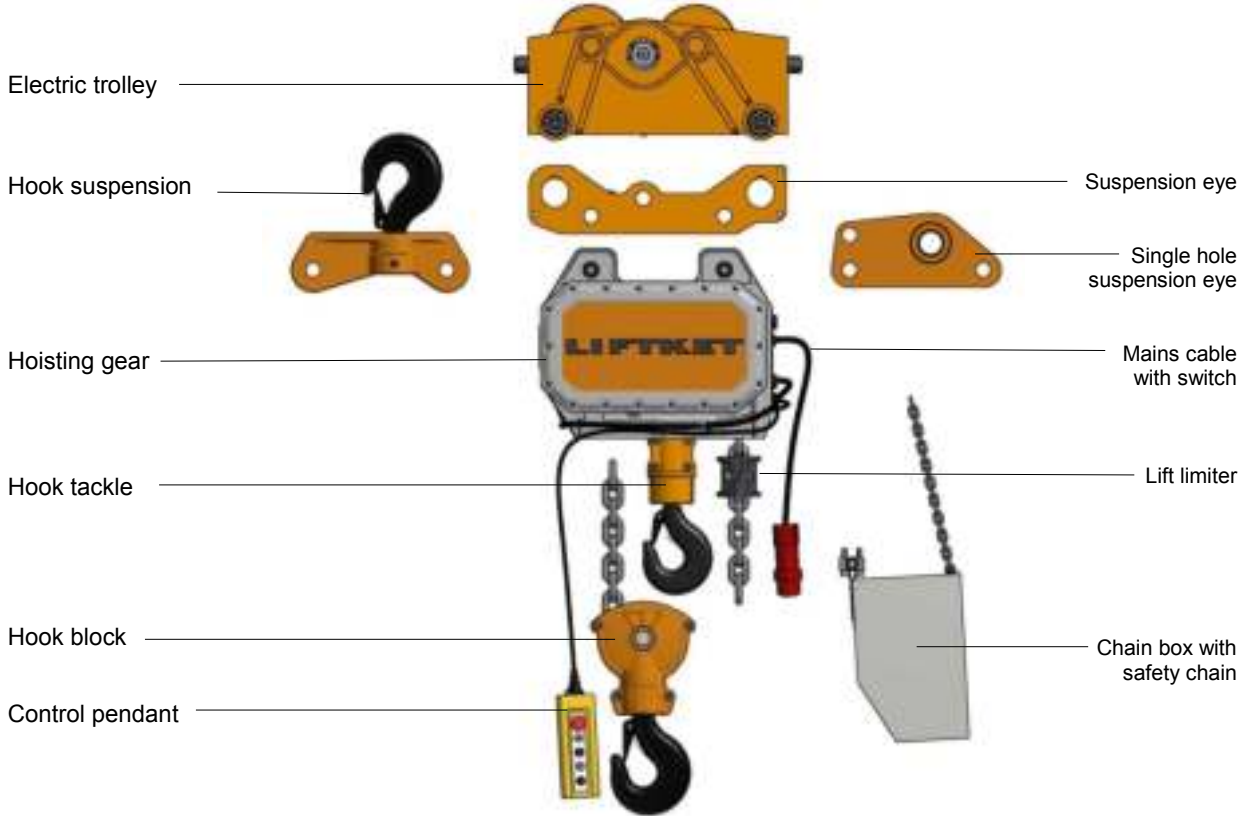


Diagram No. 1: Assembly possibilities

2.2 Fitting the load chain

CAUTION	Use only original chains from the manufacturer! These chains meet the high requirements for load and service life.	
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Single fall version

Double fall version

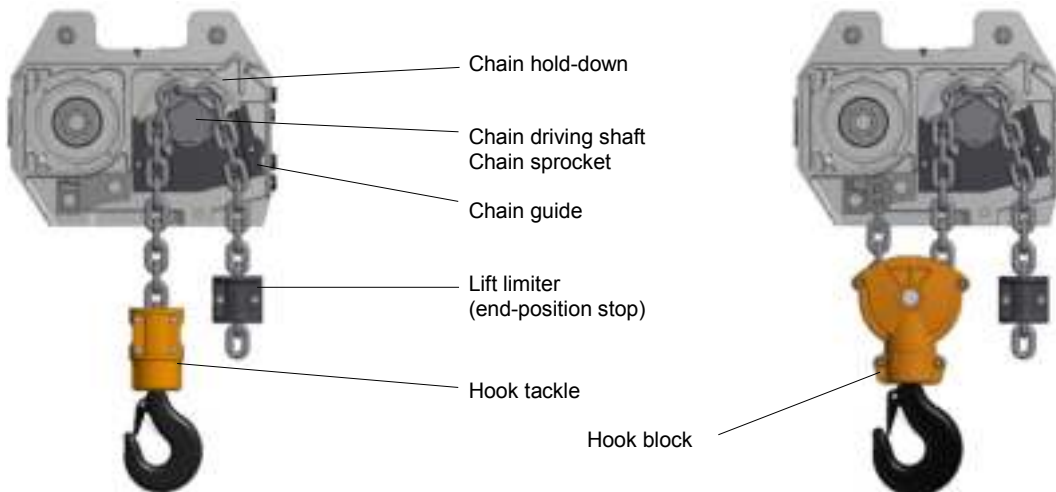


Diagram No. 2: Position of the load chain

2.3 Sectional view

- 1 Casing
- 2 Drive gear
- 3 Gear cover
- 4 Load chain
- 5 Chain guide
- 6 Chain hold-down
- 7 Low voltage control
- 8 Cover for low voltage control
- 9 Motor with brake unit and fan
- 10 Fan cover

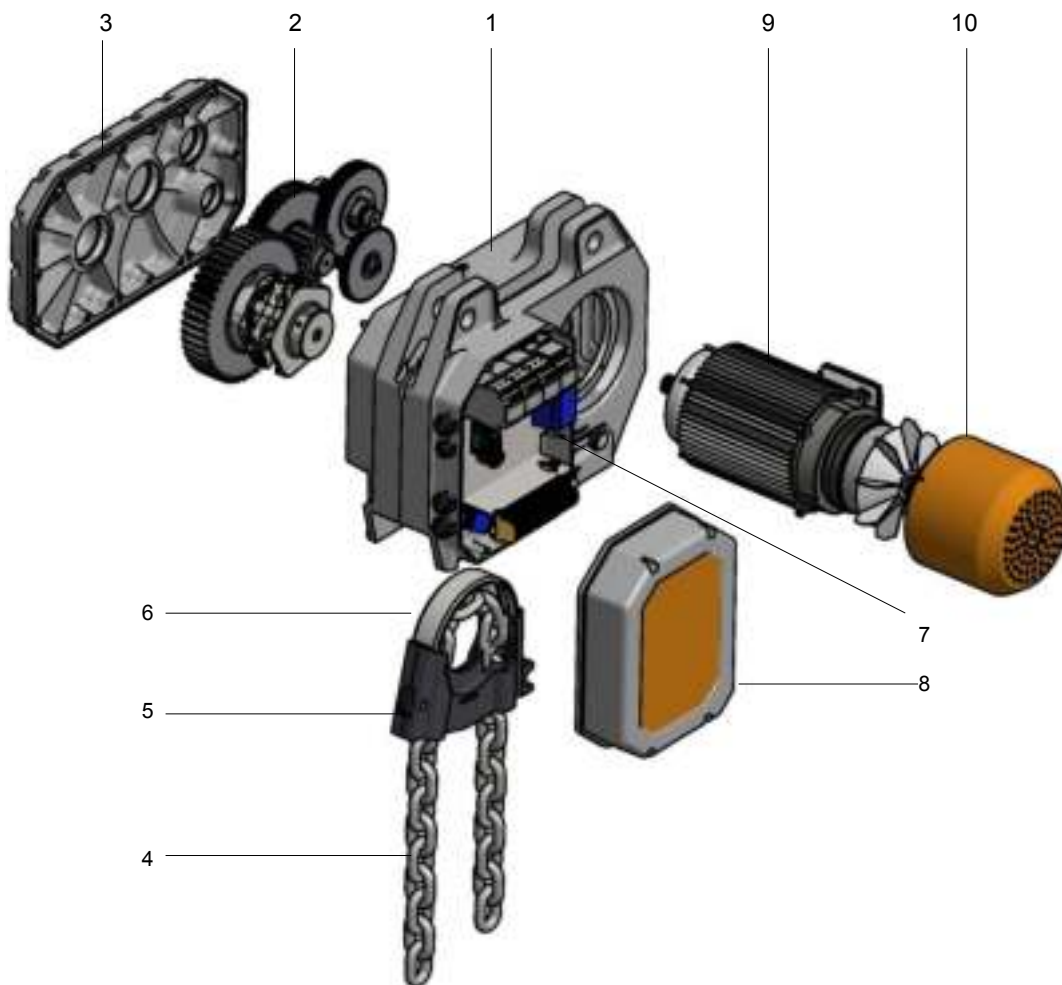
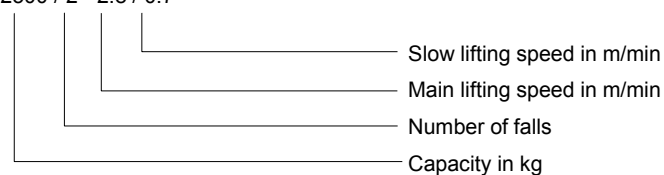


Diagram No. 3: Electric chain hoist sectional view

2.4 Explanation of type designation


Example: Model 13

Type 12500 / 2 - 2.8 / 0.7



The technical data are contained in the documentation provided with the hoist.


3 Transportation and storage

CAUTION	Transportation works should be performed by trained personnel only.	
	The manufacturing plant does not accept any liability whatsoever for damages due to unprofessional transportation or storage.	

3.1 Transportation

Prior to delivery we have checked the hoist and its accessories and have packaged it properly.

Following receipt please check the goods for shipment defects and for completeness, including also the documentation.

CAUTION	Do not transport hoists on damaged pallets.	
	Do not throw or overturn hoists.	
	Transportation with damaged transportation fasteners is prohibited.	
	Do not expose hoists to rain and moisture.	

3.2 Storage

Store hoists in a dry and clean condition under the following conditions:

- Indoors storage
- Storage temperature range between -20°C ... +40°C
- Do not allow large swings in temperature and corrosive environments
- Maximum air humidity: 85%
- No aggressive environment
- No direct sun radiation

4 Assembly


4.1 Mechanical assembly

4.1.1 Hook tackle

The hook tackle is used to attach loads for hoists of a single fall version.
Pursuant to DGUV Regulation 54 (BGV D8 Article 24) assembly must be carried out by a trained specialist.



Diagram No. 4: Hook tackle assembly

CAUTION	During maintenance check the condition of the hook (for wear and centre punch spacing).	
	Also check the condition of the hook bearing, of the safety latch and of the hook nut safeguard. If required, clean and grease the axial bearing. The hook nut of the load hook of the hook tackle is secured by a spring-pin inserted at a right angle to the shaft.	

For the assembly of the hook tackle please tighten the connection screws using the following torque values:

	Max. load capacity [kg]	Screws	Quantity	Tightening torque [Nm]
Hook tackle for chain 16×45	6300	M12×60 DIN 912-8.8	4	50
Hook tackle for chain 17.3×48	7500	M12×60 DIN 912-8.8	4	50

Table No. 1: Tightening torques for screw connections

4.1.2 Hook block

The hook block is used to attach the load in the double fall version of hoists.
Pursuant to DGUV Regulation 54 (BGV D8 Article 24) assembly must be carried out by a trained specialist.




Diagram No 5: Hook block assembly

For the assembly of the hook block please tighten the connection screws using the following torque values:


	Max. load capacity [kg]	Screws	Quantity	Tightening torque [Nm]
Hook block for chain 16×45	12500	M12×50 DIN 912-8.8	4	50
Hook block for chain 17.3×48	15000	M12×50 DIN 912-8.8	4	50


Table No. 2: Torques values for screw connections

CAUTION	<p>During maintenance check the condition of the hook (for wear and centre punch spacing).</p> <p>Also check the condition of the chain sprocket, of the safety latch and of the hook nut safe-guard.</p> <p>If required, clean and grease the axial bearing.</p> <p>The hook nut of the load hook of the hook block is secured by a spring-pin inserted at a right angle to the shaft.</p>	
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4.1.3 Stationary suspension

4.1.3.1 Suspension with suspension eye

CAUTION	Do not use other bolts than the original suspensions bolts. In particular, do not use screws to connect the electric chain hoist to its suspension elements.	
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NOTE	Use the two bolts to fasten the provided suspension eye to the boreholes on the case of the hoist configured for this purpose. Place the washer discs onto the bolts and secure the bolts with the self-locking nuts.	
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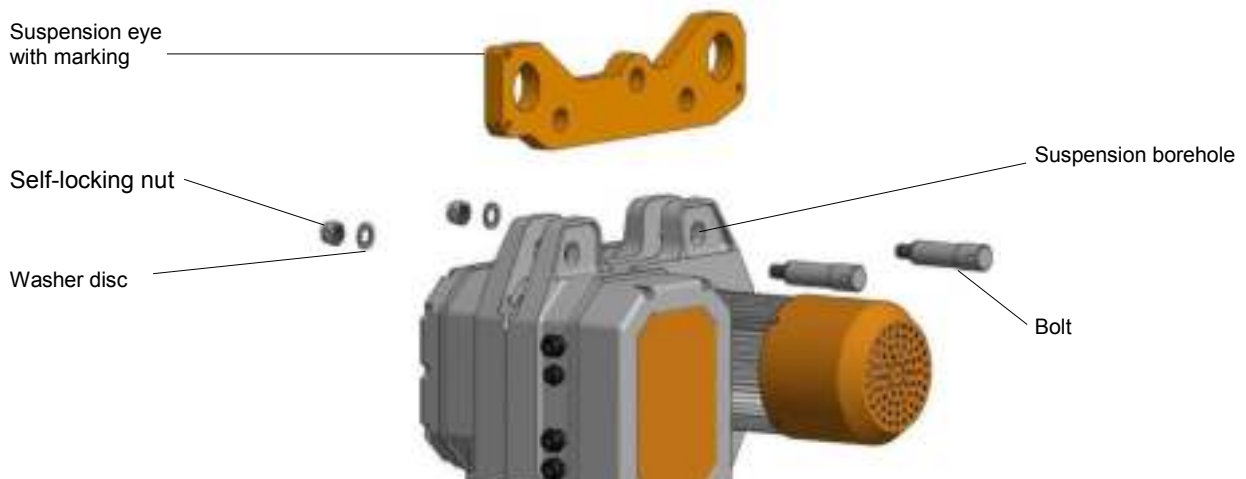




Diagram No 6: Suspension with suspension eye

4.1.3.2 Suspension with single hole suspension eye

CAUTION	Do not use other bolts than the original suspensions bolts. In particular, do not use screws to connect the electric chain hoist to its suspension elements.	
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NOTE	Use the two bolts to fasten the provided single hole suspension eye to the boreholes on the case of the hoist configured for this purpose. Place the washer discs onto the bolts and secure the bolts with the self-locking nuts.	
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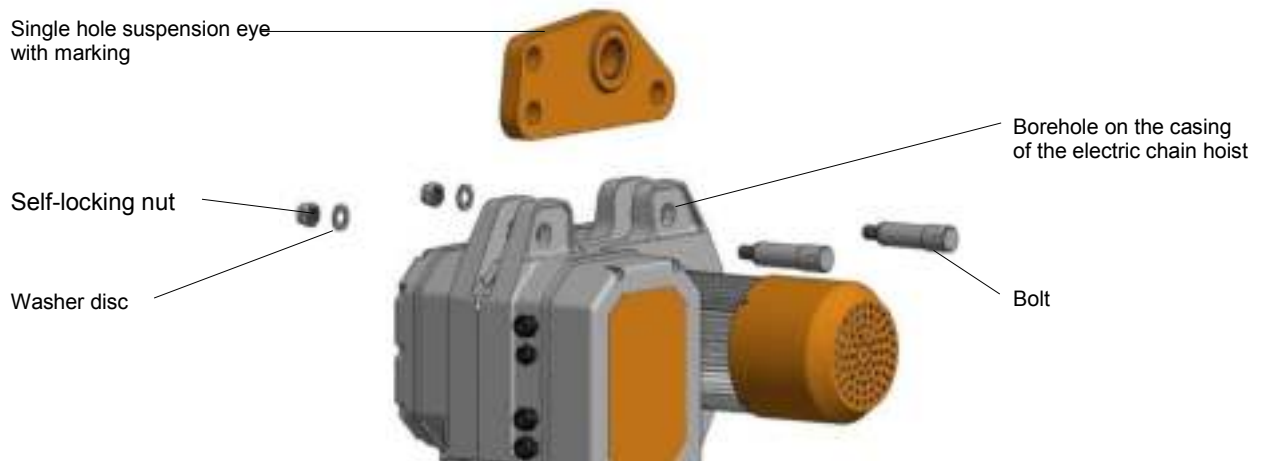



Diagram No 7: Suspension with single hole suspension eye

CAUTION	<p>Assemble the single hole suspension eye to ensure that the centre of the suspension hole falls in line with the centre of gravity of the load in case of both single and double fall versions.</p> <p>Of the symbols referring to the single fall or double fall versions (hook tackle and hook box) the marking corresponding to the actual hoist version must be on the side of the chain box.</p> <p>When changing the number of falls for a hoist fitted with a single-hole suspension eye the suspension eye is to be disassembled from the hoist casing. After this it should be turned at an angle of 180° and re-assembled again.</p>	
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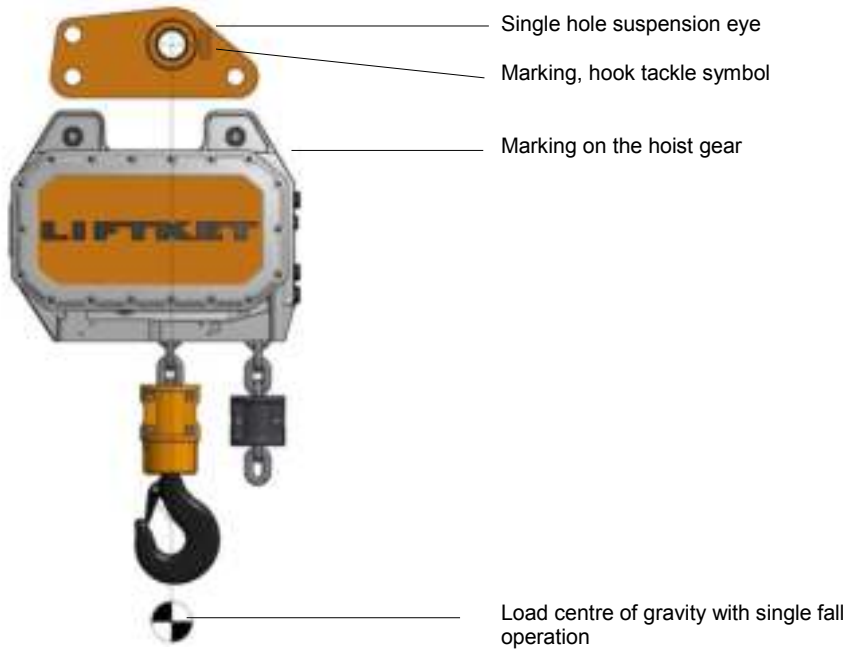


Diagram No 8: Position of single hole suspension eye with single fall operation

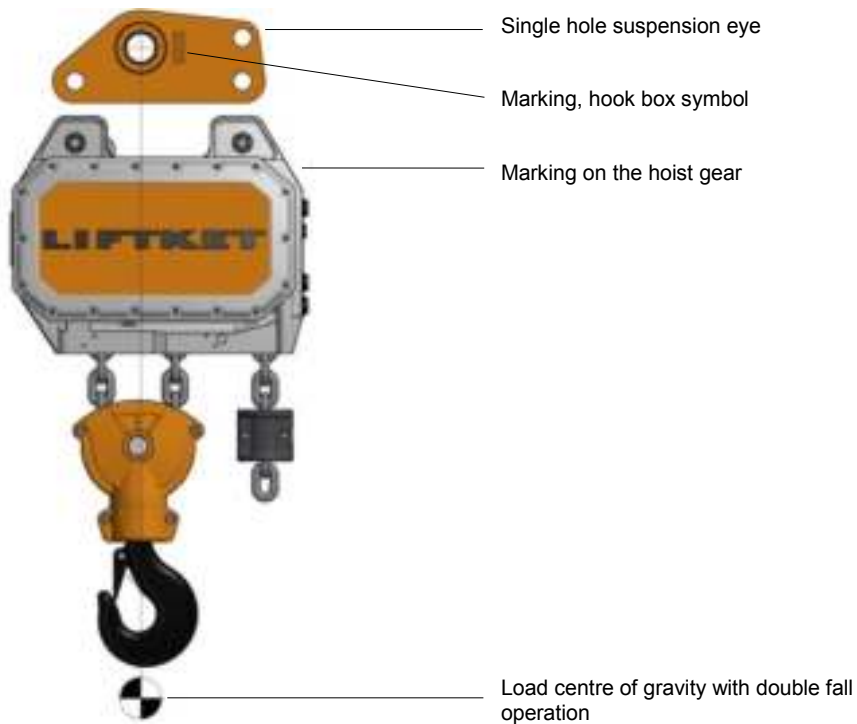




Diagram No. 9: Position of single hole suspension eye with double fall operation

4.1.3.3 Suspension with suspension hook

CAUTION Do not use other bolts than the original suspensions bolts. In particular, do not use screws to connect the electric chain hoist to its suspension elements. 

NOTE Use the two bolts to fasten the suspension hook to the boreholes configured on the hoist casing. Place the washer discs onto the bolts and secure the bolts with the self-locking nuts. 

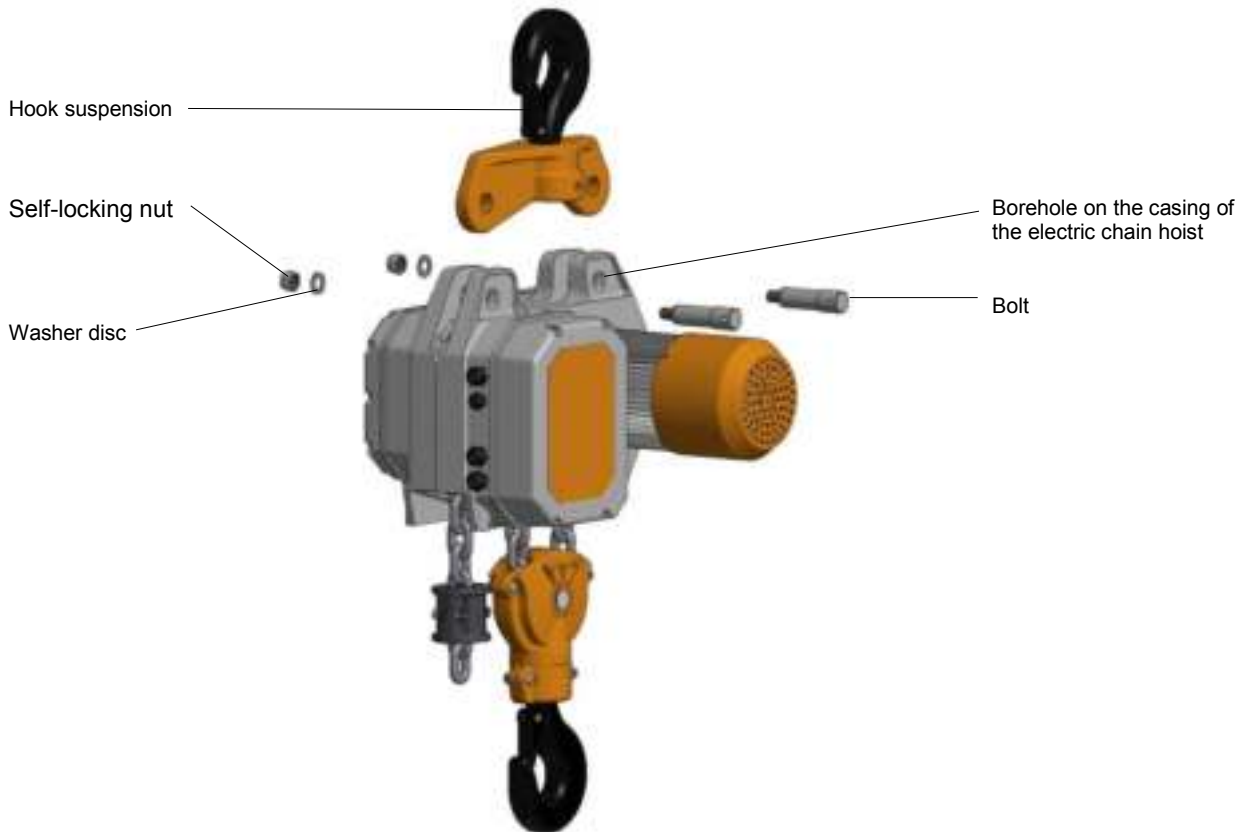




Diagram No 10: Hook suspension for the chain hoist

NOTE If desired, the hook suspension can also be delivered in a non-rotating version (option). 

The suspension hook is to be rotated when changing the number of chain falls.

Assemble the suspension hook to ensure that the centre point of the load hook of the suspension hook falls in line with the centre of gravity of the load in case of both single and double fall versions.

CAUTION Of the symbols referring to the single fall or double fall versions (hook tackle and hook box) the marking corresponding to the actual hoist version must be on the side of the chain box. 

When changing the number of falls for a hoist fitted with a suspension hook the suspension eye is to be disassembled from the hoist casing. After this the suspension hook is to be rotated at an angle of 180° and re-assembled in the boreholes of the hoist configured for this purpose.

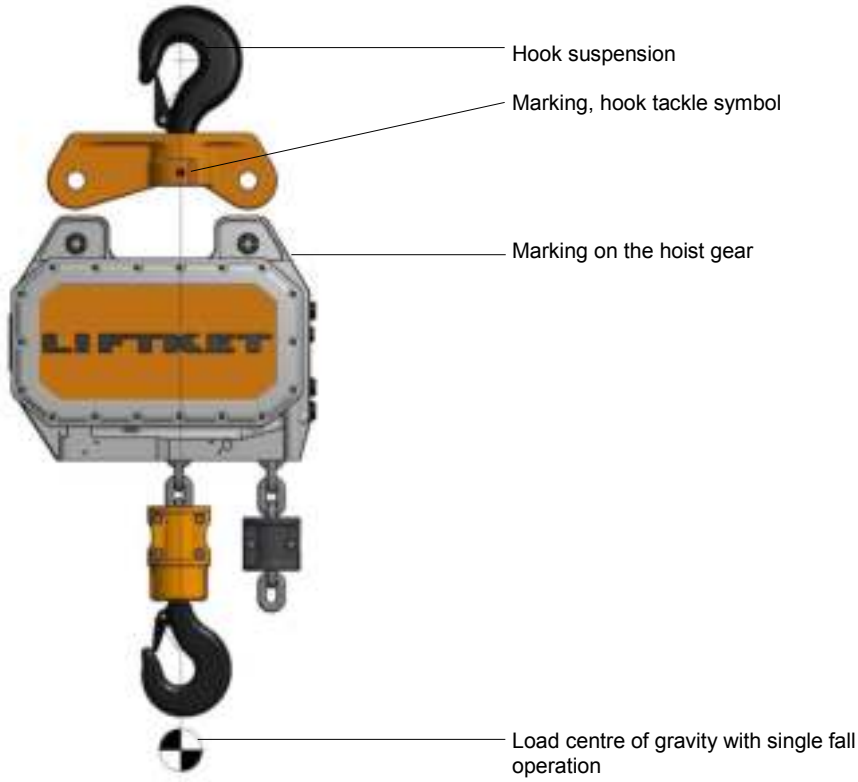


Diagram No 11: Position of hook suspension with single fall operation

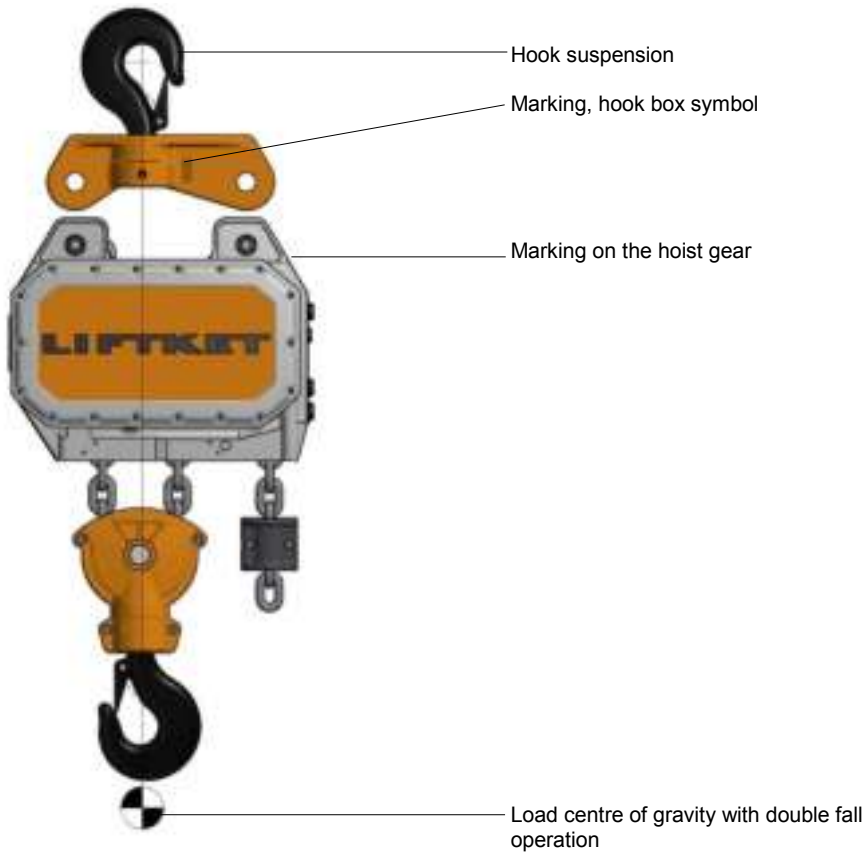




Diagram No 12: Position of hook suspension with double fall operation

4.1.4 Hoisting gear with electric trolley

NOTE	<p>All trolleys are suitable for</p> <ul style="list-style-type: none"> • Thin beams in accordance with DIN 1025 and Euronorm 24-62; • Medium I-beams in accordance with DIN 1025; • Wide I-beams in accordance with DIN 1025. 	
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CAUTION	<p>At the height of the centre of the bumpers install girder limit stops at the ends of the girder. Additionally, as an option, a version with an electric travel end position switch can also be ordered. It is the responsibility of the client to configure the switch pins necessary for this.</p> <p>The electric trolley of type B13 and B15 hoists is not suitable for girder bends!</p>	
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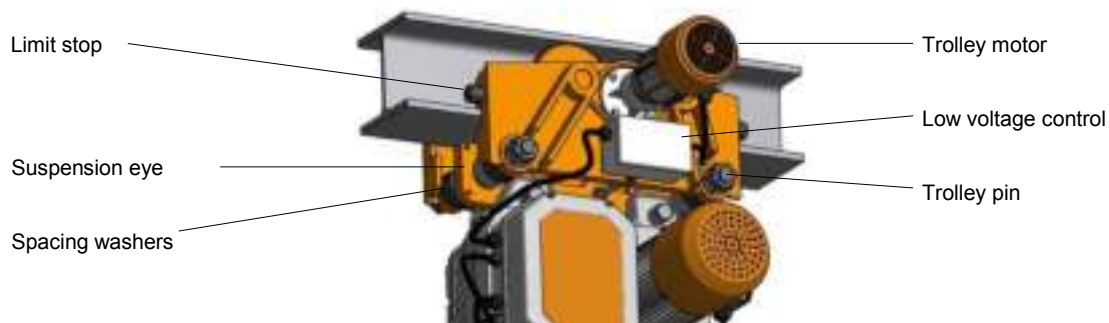



Diagram No 13: Hoisting gear with electric trolley

Explanation of trolley type designation:

Type example: EF N / 12500 4+16

EF – Electric trolley N, S1 flange width Capacity in kg Electric trolley travel speed

4.1.4.1 Mechanical assembly

NOTE	<p>The two suspension bolts are to be fastened to the lateral board of the trolley so as to allow a clearance of about two millimetres between the running wheel flange and the girder flange. The width of the trolley is adjusted by inserting spacing washers symmetrically.</p>	
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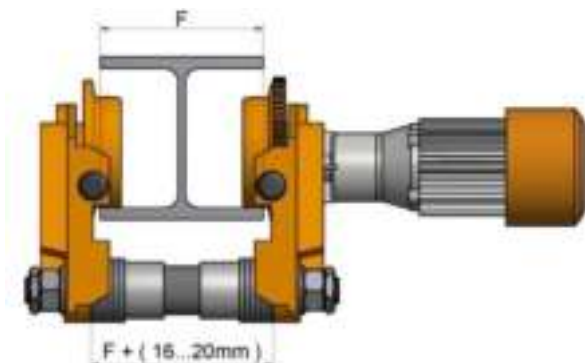


Diagram No. 14: Adjusting the width of electric trolley

The suspension eye is mounted between the safety bushes on the trolley connecting bolts. There is a safety pin on one of the lateral boards to ensure that the trolley can be mounted in the right position. The M36x1.5 nut of the trolley bolt is to be tightened with a torque spanner using a torque of 250 Nm. For the mounting of the hoist there are two suspension bolts with diameters of $\varnothing 36$. The suspension bolts are secured by M22x1.5 DIN 985 self-locking nuts.

NOTE

After assembly, there must still be freedom of movement between the hoist and the trolley in the direction of the arrows shown on the diagram.



Diagram No. 15: Freedom of movement between the hoist and the trolley

4.1.4.2 Electric connection of trolleys

The contactors of the low voltage control are located in the control box of the trolley motor. This box is attached to the side plate of the trolley on the motor side using two M8x16 DIN 933 hexagonal bolts. It is the responsibility of the Client to connect the connecting cable between the trolley control box and the trolley motor in accordance with the circuit diagram.

The connecting cable leading from the trolley control box is to be connected within the electric connection space of the electric chain hoist in accordance with the circuit diagram. After electric connection check that all functions of the hoist and of the trolley are operating correctly.

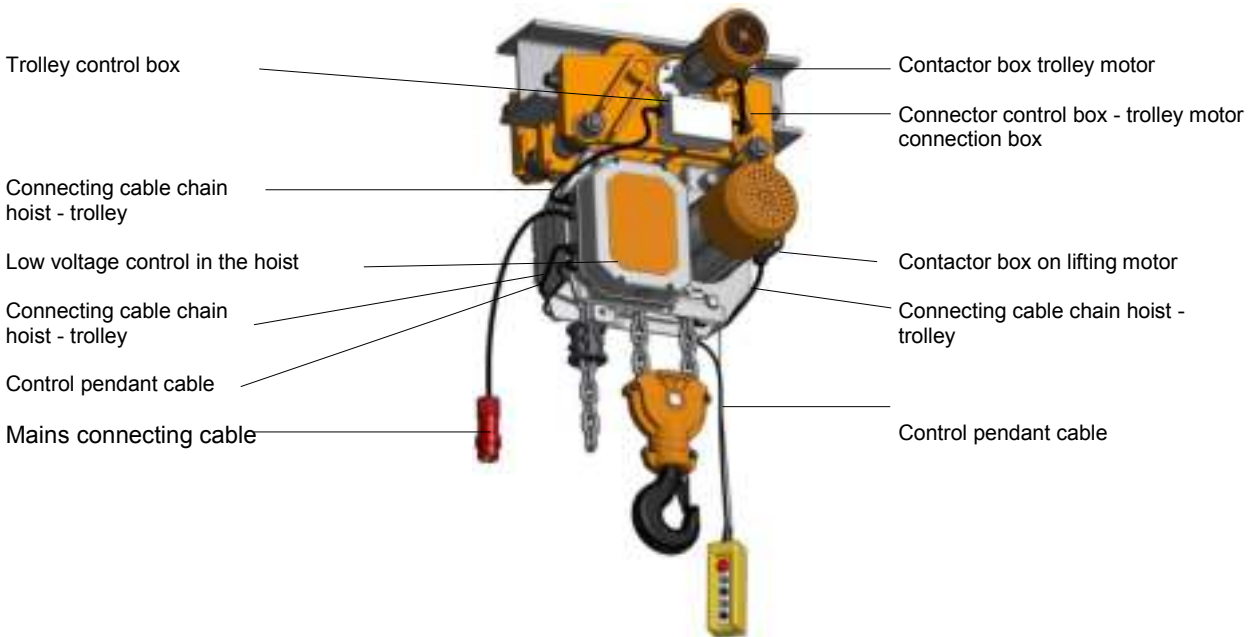


Diagram No 16: Electric connection of trolleys

4.1.4.3 Electric control of the brake

The brake is fed by a rectifier circuit. The brake operates on the quiescent current principle. Upon a cessation of voltage, the brake acts automatically and the travelling motion is stopped.

4.1.5 Chain box

4.1.5.1 Mounting the chain box

There is a bracket fastened with two M12x55 DIN 912 allen screws on the bottom of the electric chain hoist casing used to fasten the chain box. Hang the chain box into its place using the M20x180 DIN 931 screw and secure it by screwing on the self-locking nut.

To secure the chain box into place and to adjust its position, mount the securing chain as follows:

- Insert the upper end of the securing chain into the chain pocket configured on the hoist casing for this purpose and secure it with the M8x30 DIN 933 hexagonal bolt and washer.
- Fit the last chain link of the lower end of the securing chain (7x22) into the opening configured for this purpose on the chain box and fasten it with the M8x35 DIN 931 hexagonal bolt and self-locking nut.
- Ensure that the securing chain is **tight and not twisted** after assembly.

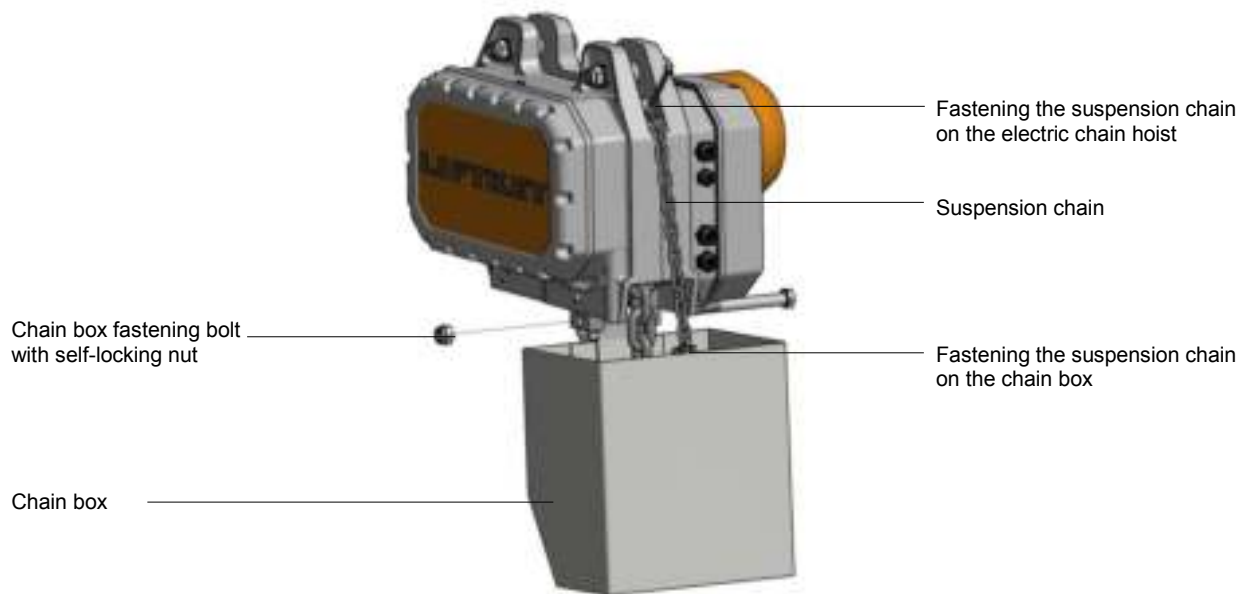


Diagram No. 17: Mounting the chain box

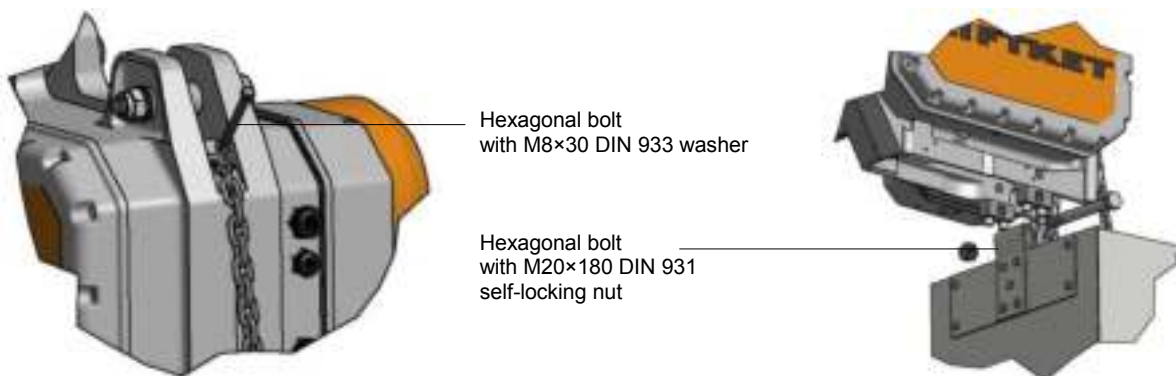





Diagram No 18: Detail drawings for mounting

ATTENTION	<p>Ensure that the available chain box is sufficient for the given chain length (see the chain size and maximum capacity marking indicated on the chain box). Insert the chain end with lift limiter loosely into the chain box.</p> <p>Do not exceed the specified maximum chain length!</p>	
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NOTE	<p>Take care for load holding elements not to be in contact with or not to hit the chain box.</p>	
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4.1.5.2 Oversize chain box

In case of oversize chain boxes (with chain lengths > 40m) the chain box must be relieved of strain.

NOTE	With fixed applications using a suspension hook or a single hole suspension eye the operator must fashion a suspension point to fasten the suspension chain.	
	The length of the suspension chain is to be adjusted to the local circumstances when mounting the electric chain hoist. Meanwhile please take care for the chain box to be suspended approximately vertically and not to reach into the path of the hook.	

If the electric chain hoist is mounted on a trolley, then the chain box must be relieved of its strain using an additional tandem trolley.

Electric chain hoist with suspension hook




Electric chain hoist with electric trolley and tandem trolley



Diagram No 19: Mounting of an oversized chain box

4.1.6 Lift limiter

The lift limiter actuates the limit switch that limits the lowest position of the load hook and prevents the dead end of the chain from running out of the hoist. If the operational limit switch develops a fault, then the lift limiter together with the slipping clutch functions as an emergency end-position limiter.

CAUTION	Do not allow the lift limiter to touch the casing in operation!	
	Thus do not operate without a functioning limit switch.	

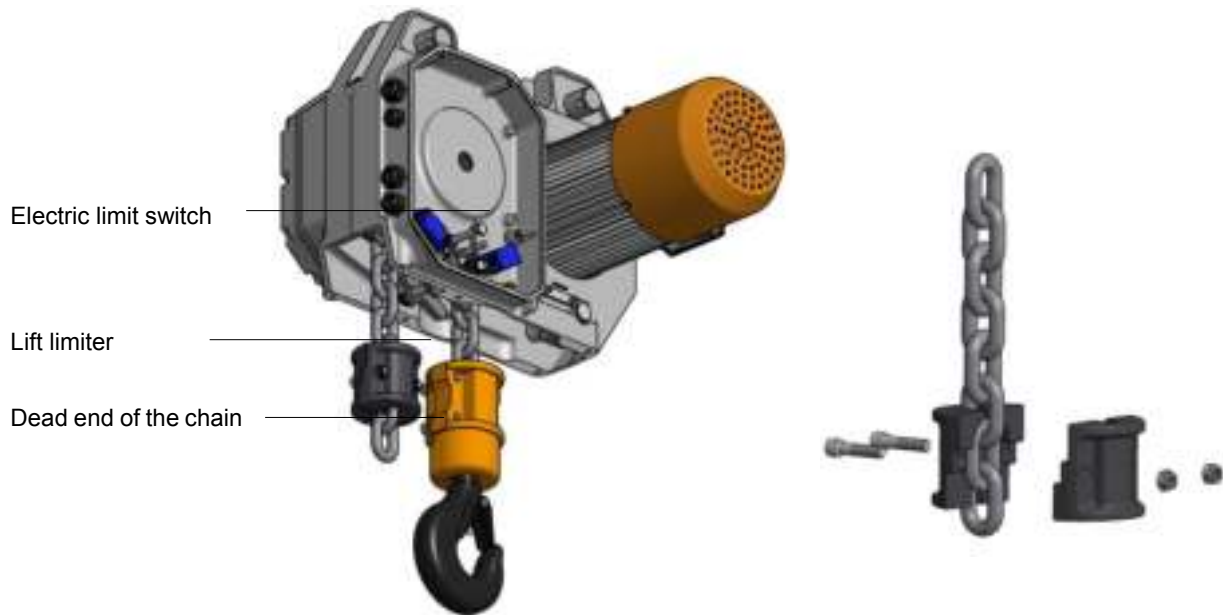



Diagram No 20: Assembly of the lift limiter

4.1.7 Gear ventilation

Having completed the assembly of the hoist, don't forget to position the special tooth-lock washer provided with the hoist, under the oil filler plug located on the top of the casing, in order to avoid the development of overpressure or vacuum in the gearbox. Upon delivery you will find this tooth-lock washer fastened with a piece of self-adhesive tape to the casing next to the oil filler plug.

NOTE	For outdoor use in case of high air humidity and high temperature variations the use of the split washer is not recommended.	

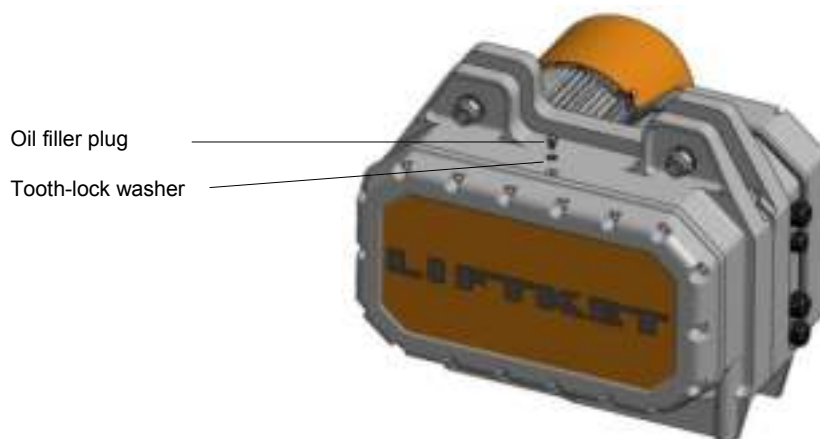


Diagram No 21: Tooth-lock washer for the ventilation of the gear

4.1.8 Schematic sketch of the load chain configuration - single fall version

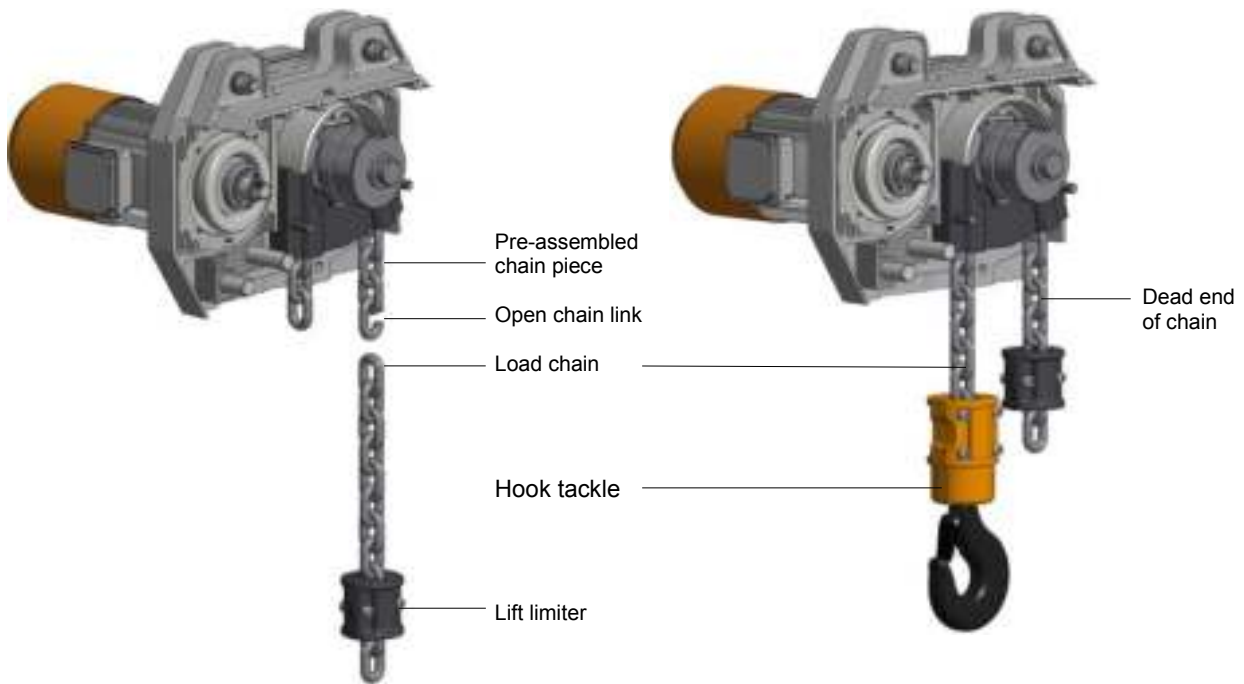


Diagram No 22: Schematic sketch of the load chain configuration - single fall version

1. Upon delivery there is a short pre-assembled chain piece on the chain driving sprocket.
2. Always hang the provided slotted connecting chain link onto the pre-assembled chain piece on the side of the chain box and hook on the load chain that you intend to run in.
3. Run in the load chain by actuating the pendant switch.
4. **Remove the pre-assembled chain piece and the slotted connecting chain link.**
5. Fit the hook tackle to the end of the loaded chain side.
6. Lower the load hook to its lowest position.
7. Fasten the lift limiter on the dead end of the chain.
8. Mount the chain box.
9. Run the chain into the chain box while lubricating the entire length of the chain.

NOTE

When feeding the load chain or changing the number of chain falls, never let the old chain to run out entirely from the hoist casing, but immediately hook on the new load chain or the pre-assembled chain piece using the slotted connecting chain link.

After feeding in the new load chain, remove the pre-assembled chain piece with the slotted connecting chain link.



CAUTION

In order for the chain to have an orderly position within the chain box, the dead end of the chain should be allowed to run into the chain box by itself while the hoist is in lifting mode, and should **not** be placed in manually afterwards.



4.1.9 Schematic sketch of the load chain configuration - double fall version

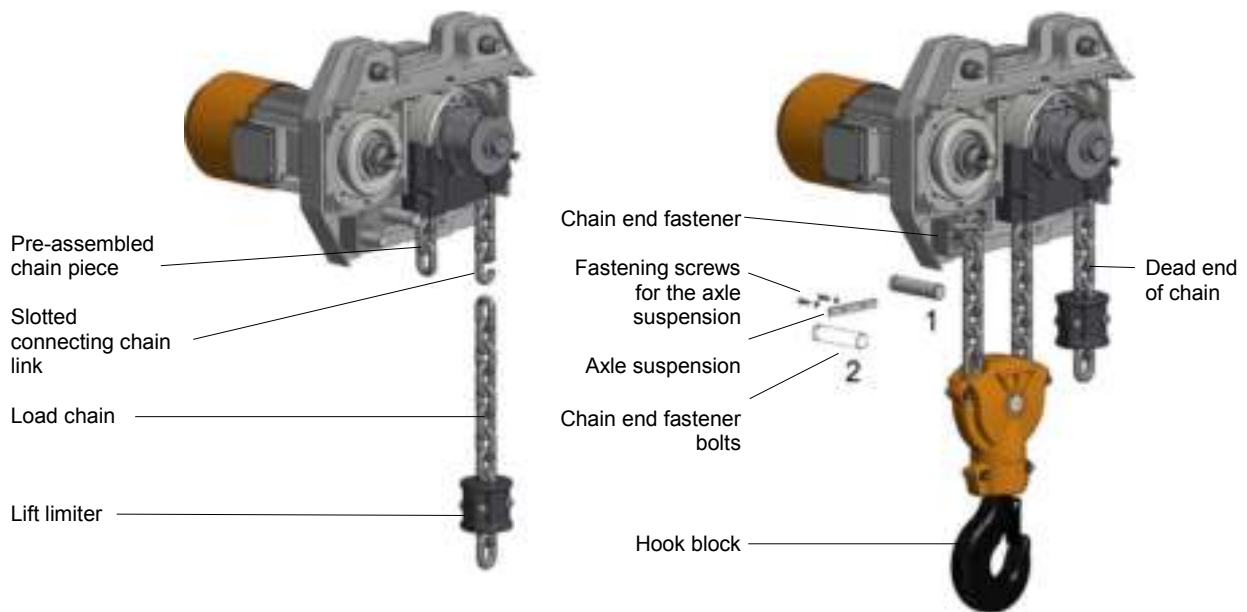


Diagram No. 23: Schematic sketch of the load chain configuration with a double fall version

1. First allow run in the load chain into the casing of the electric chain hoist-
2. **Remove the pre-assembled chain piece and the slotted connecting chain link.**
3. Pull the chain through the hook block using a wire.


CAUTION	Do not allow the chain under any circumstances to twist between the hook block and the outlet opening of the electric chain hoist casing. If the assembly according to Diagram No. 24 is not possible, then cut and remove one link from the chain.	
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4. Release the screws that fasten the axle suspension and remove the axle suspension.
5. Release chain end fastener bolt No. 1.
6. Turn out the chain end fastener.
7. Lay the last link of the chain end pulled from the hook block into the chain end fastening dent.
8. Turn the chain end fastener back into the casing.
9. Secure the chain end fastener with bolt No. 1.
10. Secure the axle suspension with the allen screws.
11. Recheck once more that the chain is not twisted.
12. Lower the load hook to its lowest position.
13. Fasten the lift limiter on the dead end of the chain.
14. Mount the chain box.
15. Run in the chain into the chain box while lubricating the entire length of the chain.

CAUTION	When feeding the load chain or changing the number of chain falls, never let the old chain to run out entirely from the hoist casing, but immediately hook on the new load chain or the pre-assembled chain piece using the slotted connecting chain link.	
	After feeding in the new load chain, remove the pre-assembled chain piece with the slotted connecting chain link.	

CAUTION	In order for the chain to have an orderly position within the chain box, the dead end of the chain should be allowed to run into the chain box by itself while the hoist is in lifting mode, and should not be placed in manually afterwards.	
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4.1.10 Replacing the load chain, the chain guide and the chain hold-down

NOTE	When replacing the load chain, the chain guide and the hold-down must also be replaced.	
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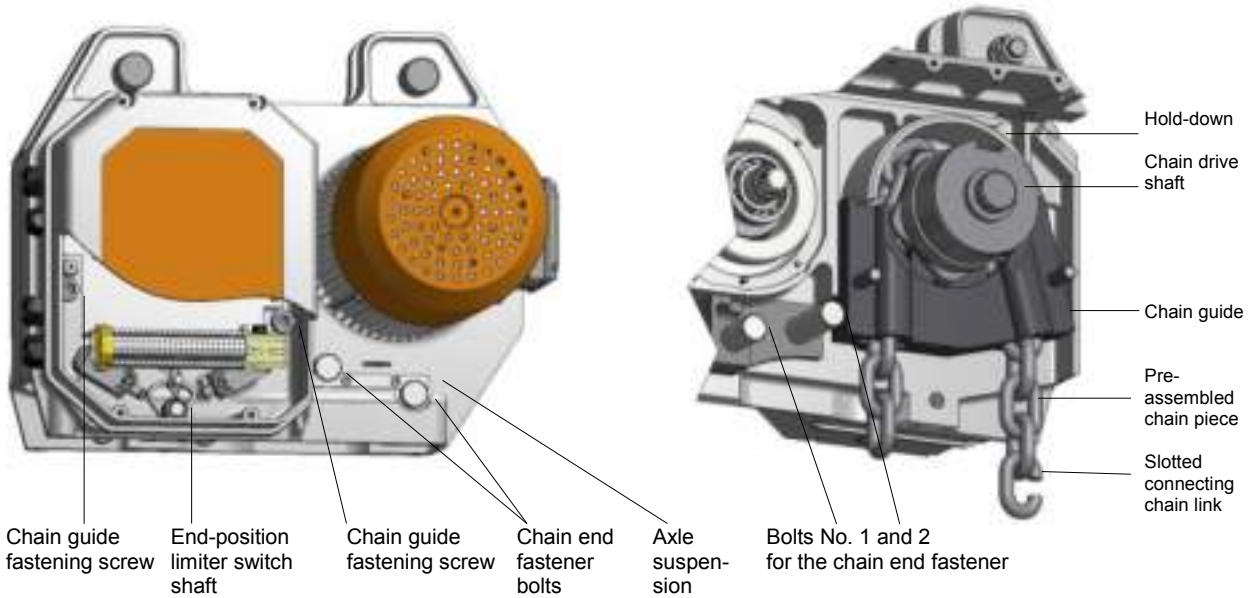


Diagram No 24: Replacing the load chain, the chain guide and the chain hold-down



4.1.10.1 Single fall operation

Removal of a worn load chain

1. Dismantle the chain box.
2. Dismantle the hook tackle from the load chain by unscrewing the four M12x60 DIN 912 allen screws.
3. Dismantle the lift limiter from the dead end of the chain by unscrewing the two M12x60 DIN 912 allen screws.
4. Hook the pre-assembled chain piece to the hook side of the load chain using the slotted connecting chain link.
5. Operate the pushbutton of the pendant to allow the chain to run out so that only the pre-assembled piece of chain with the slotted connecting chain link remains on the chain sprocket.
6. Unhook the worn load chain.

Replacing the load chain and hold-down

7. Dismantle the cover of the low voltage control by unscrewing the four M6x75 DIN 912 allen screws.
8. Disassemble the limit switch shaft of the lift limiter.
9. Unscrew the two M16x120 DIN 912 fastener screws of the chain guide in the switch-box of the hoist control.


NOTE	 <p>In the case of the B15 model in addition to the above chain end fastener bolt No. 1 must also be removed in order to replace the chain guide.</p>	
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10. Take out the chain guide on the bottom side of the casing.
11. Use a screwdriver to push out the chain hold-down from the chain passage.

12. Insert the new chain hold-down and the new chain guide and fasten the fastening screws.
The maximum tightening torque of the two M16x120 DIN 912 fastening bolts is 60 Nm.
Place new gasket rings under the screws!
13. Assemble the shaft of the lift limiter limit switch.
14. Mount the cover of the low voltage control.

Replacing the load chain

15. Always hang the provided slotted connecting chain link onto the pre-assembled chain piece on the side of the chain box and hook on the new load chain.
16. Run in the new load chain by actuating the control button.
17. **Remove the pre-assembled chain piece and the slotted connecting chain link.**
18. Fit the hook tackle to the end of the loaded chain side.
19. Lower the load hook to its lowest position.
20. Fasten the lift limiter on the dead end of the chain.
21. Mount the chain box.
22. Run in the chain into the chain box while lubricating the entire length of the load chain.

CAUTION	<p>If despite all the chain was completely removed from the hoist, then proceed as follows:</p> <ul style="list-style-type: none"> • Release the clutch setting to a minimum value; • Push in a wire through the chain guide cross until it reaches out on the other side; • Starting with a plane chain link use the wire to pull the chain into the seat of the sprocket and operate the slow lifting speed to carefully pull in the chain. 	
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4.1.10.2 Double fall operation

Removal of a worn load chain

1. Dismantle the chain box.
2. Release the two M6x20 DIN 912 screws that secure the axle suspension and remove the axle suspension.
3. Release chain end fastener bolt No. 1, turn out the chain end fastener, and remove the end of the chain from the chain end fastener.
4. Dismantle the hook block.
5. Dismantle the lift limiter from the dead end of the chain by unscrewing the two M12x60 DIN 912 allen screws.
6. Hook the pre-assembled chain piece to the hook side of the load chain using the slotted connecting chain link.
7. Operate the pushbutton of the pendant to allow the chain to run out so that only the pre-assembled piece of chain with the slotted connecting chain link remains on the chain sprocket.
8. Unhook the worn load chain.

Replacing the load chain and hold-down


9. Dismantle the cover of the low voltage control by unscrewing the four M6x75 DIN 912 allen screws.
10. Disassemble the limit switch shaft of the lift limiter.
11. Unscrew the two M16x120 DIN 912 fastener screws of the chain guide in the switch-box of the hoist control.

NOTE		<p>In the case of the B15 model in addition to the above chain end fastener bolt No. 1 must also be removed in order to replace the chain guide.</p>	
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12. Take out the chain guide on the bottom side of the casing.
13. Use a screwdriver to push out the chain hold-down from the chain passage.
14. Insert the new chain hold-down and the new chain guide and fasten the fastening screws.
The maximum tightening torque of the two M16x120 DIN 912 fastening bolts is 60 Nm.
Place new gasket rings under the screws!
15. Assemble the shaft of the lift limiter limit switch.
16. Mount the cover of the low voltage control.

Replacing the load chain


17. Always hang the provided slotted connecting chain link onto the pre-assembled chain piece on the side of the chain box and hook on the load chain that you intend to feed.
18. Run in the new load chain by actuating the control button.
19. **Remove the pre-assembled chain piece and the slotted connecting chain link.**
20. Pull the chain through the hook block using a wire.

CAUTION	Do not allow the chain under any circumstances to twist between the hook block and the outlet opening of the electric chain hoist casing. If the assembly according to Diagram No. 24 is not possible, then cut and remove one link from the chain.	
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20. Lay the last link of the chain end pulled out from the hook block into the chain end fastening dent.
21. Turn back the chain fastener into the hoist casing and fasten it using bolt No. 1.
22. Recheck once more that the chain is not twisted.
23. Secure the axle suspension with the allen screws.
24. Lower the load hook to its lowest position.
25. Fasten the lift limiter on the dead end of the chain.
26. Mount the chain box.
27. Run in the chain into the chain box while lubricating the entire length of the chain.

CAUTION	<p>If despite all the chain was completely removed from the hoist, then proceed as follows:</p> <ul style="list-style-type: none"> • Release the clutch setting to a minimum value; • Push in a wire through the chain guide cross until it reaches out on the other side; • Starting with a plane chain link use the wire to pull the chain into the seat of the sprocket and operate the slow lifting speed to carefully pull in the chain. 	
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4.2 Electric connections


NOTE	Electrical installations must be configured in compliance with the effective provisions. After having completed the installation, carry out the checks according to EN 60204-32. The detailed design of the control is contained in the circuit diagram. The electric installation complies with standard EN 60204-32.	
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4.2.1 Mains connection

All poles of the mains connector cable must be detachable in accordance with standard EN 60204-32.

Only trained specialists may perform works on electric installations. Prior to the commencement of repair works the installation must be disconnected from the current. In order to ensure proper operation, the electric field of the network must rotate clockwise (to the right). When correctly connected, the hoist will move in the direction of lifting when the lift push-button is actuated.

NOTE	Fuses (slowly blowing) at 400 V (3 phase alternating current) in front of the mains switch: 32 A.	
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NOTE	Check if the mains voltage corresponds to the value shown on the type plate. Connect the mains and the control cables in accordance with the circuit diagram. The L1, L2, L3 and PE terminals for the mains connection are located under the cover of the low voltage control. Connection requires a 3+PE cable (with a minimum cross section of 2.5 mm ²).	
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CAUTION	After connecting press the button for lift. If at this point the load moves downwards, switch over cable cores L1 and L2. Disconnect the installation from the current beforehand.	
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4.2.2 Low voltage control

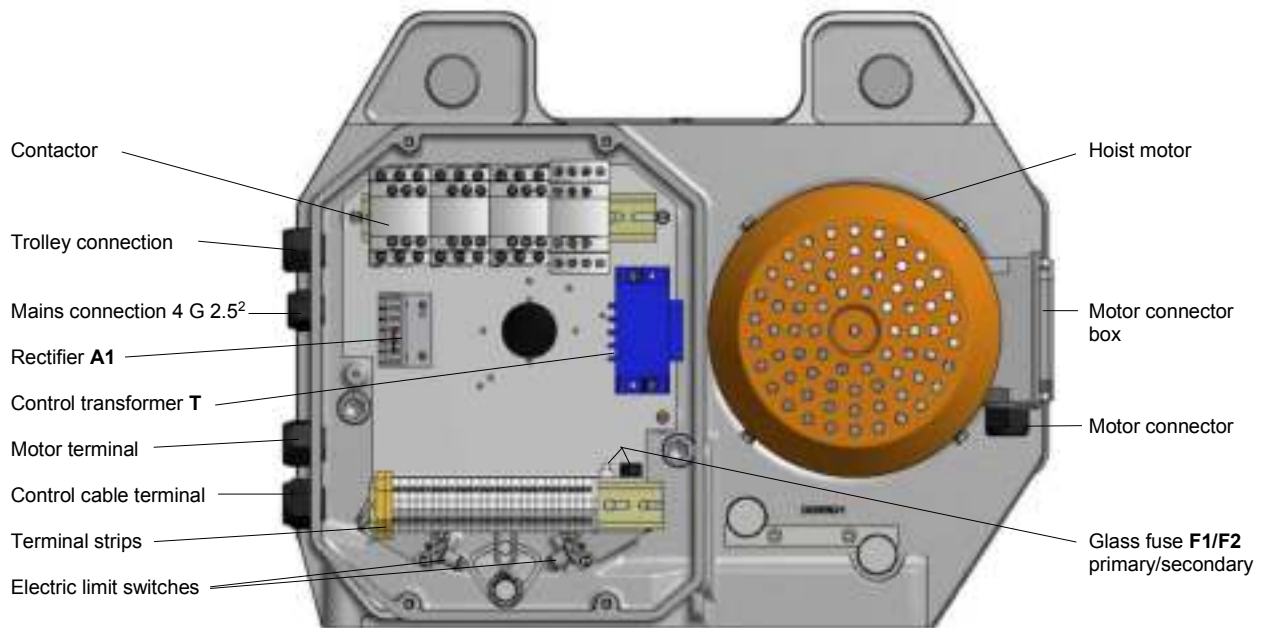


Diagram No. 25: Low voltage control

The control occurs in the control circuit, which is supplied with a voltage of 24 Volts by a transformer. Other control voltages are available as an option.

The hoist motor can be protected against overheating using thermal overload protection (option). Thermal overload protection detaches the device upon reaching the threshold temperature. Further operation is possible only once the motor has cooled to a temperature below the threshold temperature (safe operating temperature).

4.2.3 Electric control of the hoist brake

The brake is fed by a rectifier circuit. The brake operates on the quiescent current principle. Upon a cessation of voltage the brake acts automatically and thereby safely holds the load regardless of the position of the hoist. In order to reduce the braking distance the brake is operated by direct current.

4.2.4 Electric limit switch

Electric chain hoists are always fitted in the manufacturing plant with low voltage controls and electric limit switches to limit the upper and lower lifting end-positions.

4.2.4.1 Location of electric limit switches

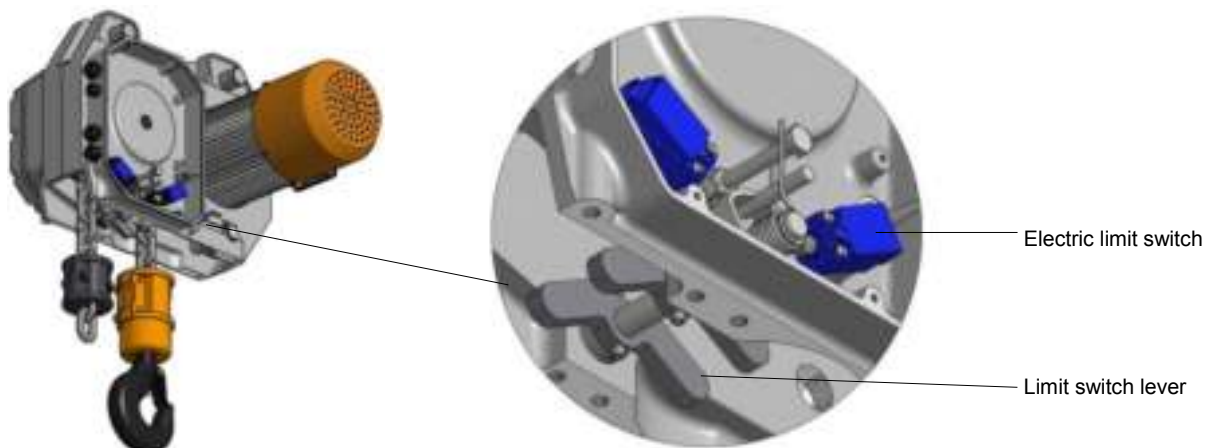


Diagram No. 26: Location of electric limit switches

4.2.4.2 Disassembling and assembling the limit switch shaft

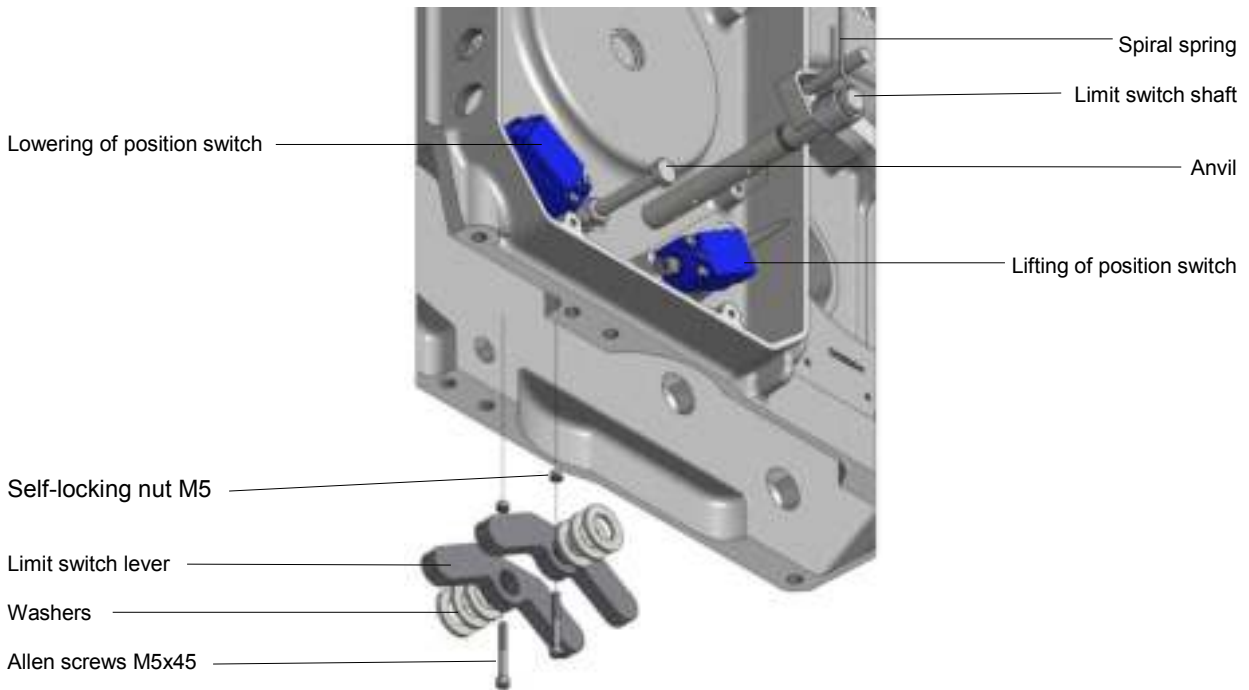


Diagram No 27: Disassembling and assembling the limit switch shaft

Disassembling the limit switch shaft

1. Release the two M5x45 screws of the limit switch lever.
2. Pull the complete limit switch shaft together with the spiral spring through the head of the anvil.
3. Remove the limit switch shaft together with the spiral spring, while catching the limit switch levers and washers that fall out.

Assembling the limit switch shaft

1. Assemble in the reverse order.
2. Following the assembly of the limit switch shaft the distance between the position switch and the limit switch cam must be between 0.5 mm and 1.0 mm.

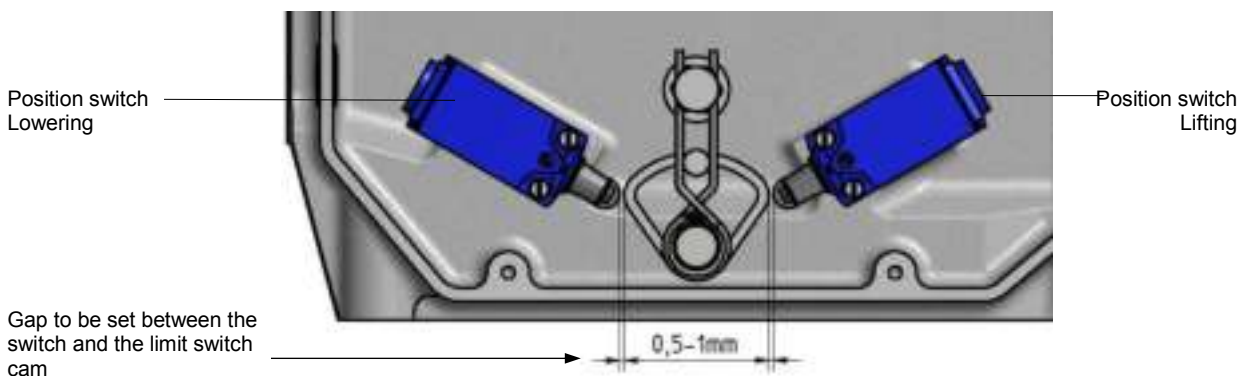


Diagram No. 28: Setting the electric limit switches


CAUTION

Upon first use do not forget to cross-check the symbols shown on the control pendant with the direction of hook travel, and check whether or not the lifting motion is safely stopped by the corresponding limit switch.



5 Operation

5.1 Control pendant

NOTE	Hoists may only be operated by persons who have been assigned this task by the operator. The Operating instructions must always be located next to the hoist and accessible to the operating personnel.	
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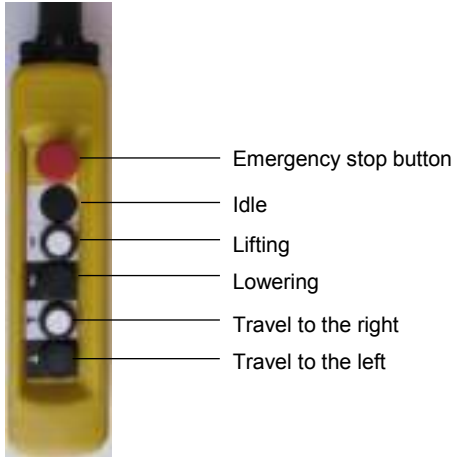


Diagram No 29: Pendant control (example)

Push-button		Function
Mushroom-shaped push-button - emergency stop	Push the button or hit it Turn clockwise	Off Unlock
Direction push-button single speed	Push the button	Movement in a direction
Direction push-button two speeds	Push the 1 st stage of the button Push the 2 st stage of the button	Movement in the chosen direction at slow speed Movement in the chosen direction at fast speed
Pre-selector switch	Dial switch Left - middle - right position	According to the pre-selection option

Table No. 3: Push-button functions

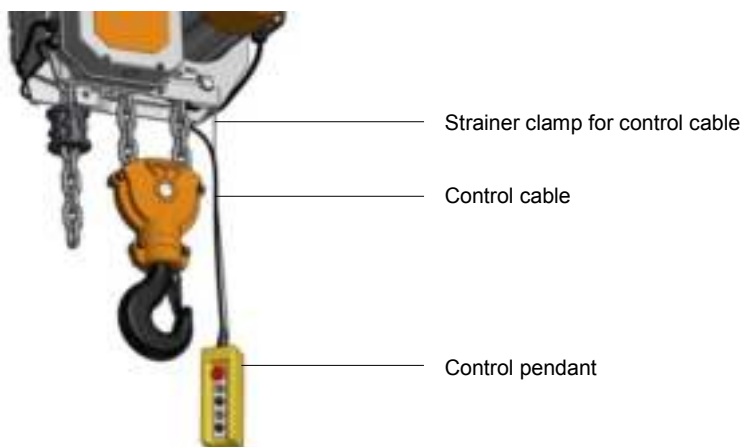




Diagram No 30: Fastening the strainer clamp

CAUTION	The strainer clamp must be fastened in way not to allow any tensile forces to act on the control cable. Do not pull the hoist by holding the pendant control or the control cable.	
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5.2 Radio remote control

NOTE	Please find enclosed the original Operating instructions from the manufacturer of the radio remote control.	
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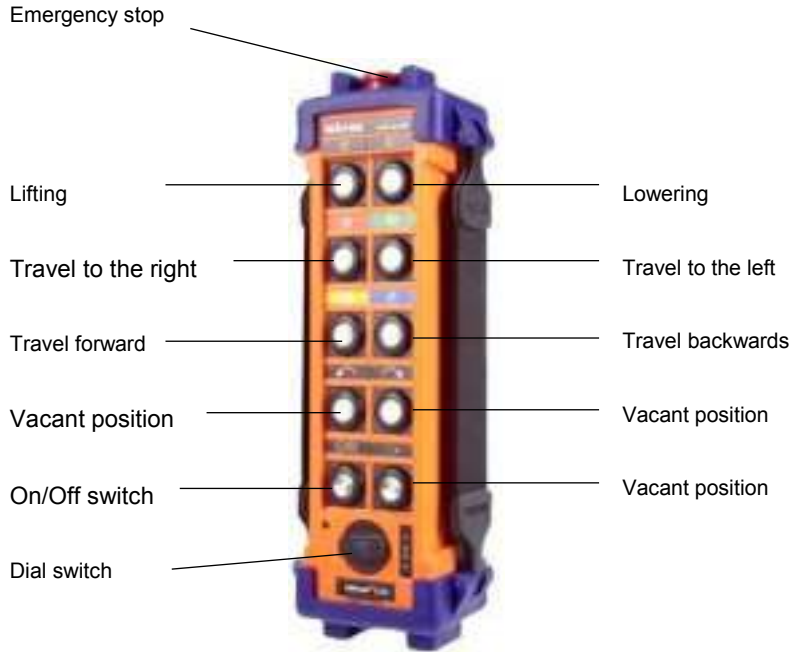




Diagram No 31: Radio remote control (example)


5.3 Load slinging

NOTE	The slinging of loads must be performed in compliance with DGUV 209-13 Information - Slinger (BGI 556).	
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In connection with the load taken by the hoist please consider the following points:

- The hoist must always be positioned vertically above the load.
- Only the hook may bear the load.
- If necessary, use hangers for picking up the load.
- The load must be hooked properly.
- The safety latch must be locked.
- Before lifting the load, verify whether or not the chain is twisted.
- Before commencing the lifting operation tighten the chain.
- Do not lift the load with a loose chain and at full speed.

NOTE	Do not turn the load chain over edges. Do not use the load chain to tie loads.	
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NOTE	The operator or a second person must always maintain eye contact with the load during the lifting operation and during travel.	
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6 First use

6.1 General conditions and prerequisites

The first use must be performed by an authorised person (expert) in accordance with DGUV specification 52 (BGV D6) or by a person (specialist) trained in accordance with DGUV specification 54 (BGV D8). It is the responsibility of the operator to initiate the inspection prior to the first use. The preparations for the first use must be performed by a specialist.


The inspection must be performed in compliance with the DGUV 309-001 principle (BGG 905) and with the valid national standards and regulations.

6.2 Inspection before first use


	The hoist must be mounted in a workmanlike fashion and in accordance with the Operating instructions.	
ATTENTION	Upon the first use of the hoist its safe operation is not yet secured.	
	It is life-threatening if the first use of the hoist takes place without a prior inspection.	

The inspection prior to the first use may only be performed by specialist personnel (qualified person / specialist or expert). Qualified specialist personnel includes the maintenance mechanics of the manufacturer. Nevertheless, the operator may also engage its own adequately trained specialist personnel to perform the inspection prior to the first use.

Prior to the first use consider the following points:

	The operator of the hoist must wear protective equipment. Close down and secure the work area and the danger zone. There should be enough space to perform the assembly works. Verify if the mains voltage and frequency correspond to the specifications on the type plate. Verify if the device was mounted in a professional way and the functioning of the safety devices. Move the trolleys manually and verify if they can run easily along the entire route of travel without obstructions and without posing a hazard to people or objects. Check the limit stops of the girder.	
NOTE		

6.3 Inspection at first use

ATTENTION	The first use of the hoist may take place only if it complies with the health and safety provisions and with the international standards.	
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By performing the inspection for the first use the operator provides for the unrestricted and safe operation of load bearing installations and hoists. In the course of the inspection the static and dynamic properties of the hoist must be considered.

The declaration of conformity for the hoist or the crane must be available.

6.3.1 Inspection contents

- Identification of the crane and the hoist, including the type plate and the crane inspection log, as well as the documentation of the load chain and the load hook. Record all of the actual dimensions of the load hook into the crane inspection log.
- Condition and load bearing capacity of the supporting structure.
- Condition and load bearing capacity of the hoist.
- Completeness and effectiveness of the safety installations.
- Observance of safety distances and free dimensions.
- Testing of the emergency stop device by pressing the emergency stop push-button.

6.3.2 Conducting the investigation

The inspection must be performed in compliance with the DGUV 309-001 principle (BGG 905) and with the valid national standards and regulations. At least the following must be inspected:

- Testing of all functions without a load.
- Inspection of all safety devices.
- Load test with a test load = 1.25 x nominal load.
In essence this test serves to test the supporting structure and the brake.

CAUTION

Proceed with the greatest caution when performing the test. Keep the load always near to the ground, and commence the following operation only if the swings from the previous operation have subsided. Document any deformations and swings.



- Load test with a test load = 1.1 x nominal load (dynamic load)
Test all possibilities for proper operation as intended. Perform the dynamic test with the overlap of the possible operational movements, with the maximum working speed. The hoist must be capable of lifting 1.1 times the nominal load without a change to the setting of the slipping clutch.
- Examine the behaviour of the hoist / crane if used incorrectly.
- Test all functions at 1.1 x the nominal load.
- Actuate all safety devices.
- Document the completion of the first use in the crane testing log.
- Record the date of the 1st repeated inspection with an inspection sticker and/or with an entry to the crane inspection log.

NOTE


After the completion of the first use the hoist or the crane can be used properly as intended.



7 Operation

7.1 Proper operation

The proper operational purpose of the hoist is to lift and lower loads. In the case of hoists with trolleys proper operation includes lifting, lowering, and the horizontal movement of the lifted load.

CAUTION	Improper operation may cause severe bodily injury and/or property damage.	
	The carrying of people, the dragging, drawing, skewed drawing of loads and the lifting of stuck loads does not constitute proper operation and are therefore prohibited.	
	Please consider the following prohibitions for use!	


All modes of operation that deviate from proper operation may involve a health hazard and may cause severe bodily injury and/or property damage. The hoist may only be operated by trained and authorized personnel. It is the responsibility of the operator to initiate the training and the teaching of the operating personnel.

Please consider and observe all health and safety provisions and national provisions for the use of hoisting devices.

7.2 Residual risks


7.2.1 Pinch hazard

Due to their design hoisting devices pose a risk of body parts being pinched and of clothing items or hair being pulled in by the load chain or by the load hook.

CAUTION	Don't touch the moving chain.	
	Don't reach into the chain guide.	
	Don't reach between the bottom of the hook opening and the suspended load, wear protective gloves.	
	With low crane girders don't touch the running surface of the girder and don't lean on it.	


7.2.2 Burning hazard

With intensive operation the casing of the hoist and parts of the motor may reach high temperatures.

CAUTION	During the operation of the hoist there is a burning hazard. Do not touch the hoist while it is in operation.	
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7.2.3 Hanging load / falling objects


During the operation of the hoist the hanging loads or parts thereof may fall down.

CAUTION	It is prohibited for people to stay below a hanging load.	
	It is prohibited to lift and move loads above people.	
	The danger zones of the hoist must be marked.	
	The personnel must be adequately trained and they must wear protective gear.	

7.3 Working with the hoist


7.3.1 Start of work

Inspection before the start of work


CAUTION	Before the start of work the operator must verify that the hoist is in a regular and reliable condition. The hoist must be stopped immediately if there is a safety-relevant shortcoming or defect in the hoist, or in any of its related components.	
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Safety-relevant shortcomings or defects may include the following:

- Damage to some load bearing element, such as the chain, the hook, the suspension, the support structure, etc.;
- A load chain mounted in a twisted condition or a hook block that has turned over;
- Damages to electric installations, cables and insulations;
- Inoperability or delayed operation of the brake, of the limit switches, or of the safety devices;
- Portions of the casing, covers or rubber bumpers missing.

NOTE	Please wear protective gear while working with the hoist. Before switching on the hoist always make sure that there are no people staying in the danger zone of the hoist.	
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Testing the brake function

CAUTION	Before the start of work the operator must verify the operability of the brake. The braking distance of the hoist should be about 2 chain links in length.	
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For this perform the following operations:

- Perform a lifting without a load and stop the hoist.
- Perform a lowering without a load and stop the hoist.
Both operations must stop without a problem.
- Position the hoist vertically above the load.
- Sling on the load.
- Perform a lifting with the load and after a short lifting distance stop the hoist.
The lifting motion must stop without a problem. The load may not slide down.
- Perform a lowering with the load and after a short lowering distance stop the hoist.
The lowering motion must stop without a problem. The braking distance should be about 2 chain links in length.
For hoists with lifting speeds greater than 8 m/min the braking distance may not exceed 1/60th of the lifting speed (in mm).

Verifying the functioning of limit switches


If the hoist was fitted with limit switches, then the functioning of those must be verified before the start of work:

- Visual check for mechanical damage, easy running, corrosion
- Verifying the functioning of the lifting emergency limit switch:
Operate the lifting function until the lifting limit switch releases. The motion must stop.
- Verifying the functioning of the lowering emergency limit switch:
Operate the lowering function until the lowering limit switch releases. The motion must stop.


Further tests

- For hoists equipped with trolleys check the entire girder for obstructions.
- Verify the existence of girder limit stops.
- Verify the existence of girder limit bumpers on the trolley.
- Verify the marking of the crane master switch and its accessibility.

7.3.2 Operating instructions

CAUTION	<p>The operator must immediately stop the work performed with the hoist if there are people staying in the danger zone of the hoist. The work may continue only after such persons have left the danger zone.</p> <p>Any person who detects a threat to other persons or a safety-relevant defect or shortcoming of the hoist, must immediately switch off the hoist.</p>	
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If the hoist was switched off due to a safety-relevant defect, then it must be secured against unauthorized use. A specialist must examine whether or not the cause of the hazard was eliminated and whether or not operation can continue without a hazard.

CAUTION	<p>In an emergency situation, all motion can be stopped by actuating the red emergency stop push-button.</p> <p>After this the hoist is not detached from voltage!</p> <p>In order to lock the emergency stop push-button turn it clockwise.</p>	
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General instructions

- Consider the prohibitions and directions for use contained in these Operating instructions.
- The operational use of limit stops (such as the slipping clutch, the lift limiter, the limit stops) is prohibited.
- Do not disable the safety devices and the related elements of the hoist.
- Do not leave a suspended load without supervision.

Instructions for load slinging

- The load must be positioned under the hoist vertically.
- The load must always be hanged to the bottom of the hook opening.
- Do not tip load the hook.
- The safety latch / locking latch must be locked.
- Do not remove the safety latch / locking latch and do not perform work with an open safety latch / locking latch.
- Do not turn the load chain over edges and do not use it as a load hook.

Instructions for the lifting and lowering of loads

- Before performing work with the hoist position yourself to have an overview of the entire workspace. If this is not possible, then involve also another person who has a view of the workspace.
- Actuate the lifting operation by pressing the appropriate push-button on the pendant control.
- When lifting a load from the floor always use the lowest possible lifting speed.
- The load chain may not be loose when lifting a load from the floor. First it has to be tightened using the lowest possible lifting speed.
- Use the low lifting speed for short lifting distances only.
- Do not operate the push-button in inching mode.
- Consider the maximum permitted switched on duration of the hoist.

Instructions for the horizontal movement of loads

- In the case of an electric trolley the horizontal movement of the load takes place via the operation of the pendant control.
- For manually propelled trolleys push only the hoist or the suspended load to move the load sideways.
- The load must be guided and may not be swung.
- Do not pull using the pendant control.

7.3.3 Decommissioning

Decommissioning due to a defect

The hoist must be switched off immediately:

- If controls, such as the pendant control or the radio remote control have been damaged or malfunction;
- If there are damages to the electric installations, cables and insulations;
- If the brakes and the safety devices malfunction.

Decommissioning due to the completion of work

When leaving the workplace or when the work is completed the operator must take safety measures:

- Stop the hoist in a condition without a load.
- The operator must position the hoist in the parking position outside of the communication area.
- Operate the emergency stop switch (if any).
- Switch off the hoist with the mains master switch or with the disconnection switch.


Decommissioning due to maintenance

Maintenance works must be carried out by a trained specialist.

- The mains master switch or the disconnection switch of the hoist must be switched off for the maintenance works and must be secured against switching on by an unauthorised person or accidentally.
- Maintenance works may be performed on unloaded hoists only.
- Moving parts must be secured against falling or they have to be removed from the hoist.
- During the maintenance of hoists the relevant DGUV (German Statutory Accident Insurance) provisions, the official regulations, and the instructions for proper use must all be observed.
- Only specialists may perform maintenance works on electric installations. Standards EN 60204-1 and EN 60204-32 must be observed.

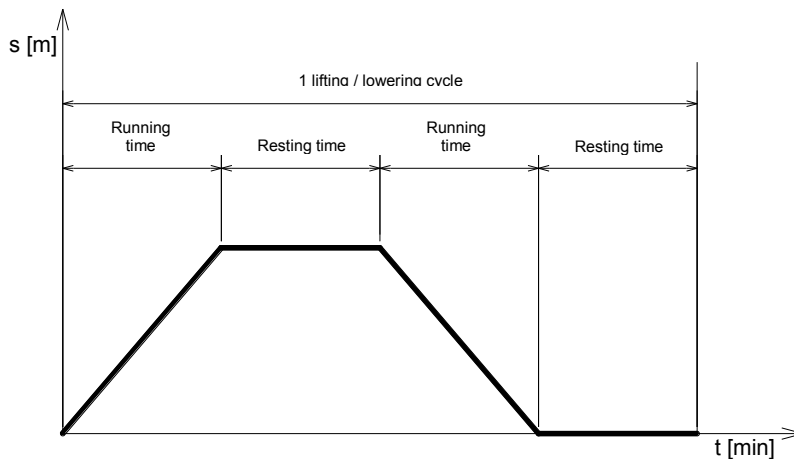
8 Duty rate

8.1 Duty rate of an electric chain hoist

CAUTION	The permitted number of operating cycles and the duty rate (ED) may not be exceeded (see FEM 9 683). The permitted duty rate is indicated on the type plate of the electric chain hoist.	
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The duty rate is a ratio between the **running time and the running time + resting time**.

Formula:
$$ED\% = \frac{\text{Total running time} \times 100\%}{\text{Total running time} + \text{Total resting time}}$$



The duty rate is limited by the permissible warming of the lifting motor.


The running time is dependent on the lifting height, the lifting speed of the electric chain hoist and the number of lifting motions required for a particular transport procedure (unloading of a truck, feeding of machines).

8.1.1 Short-time duty

Permissible running time without a resting time after start of work and with an initial motor temperature of about 20°C.

Duty group FEM 9.683	Duty group ISO 4301	Duty rate (ED%)	Short-time duty* according to FEM 9.683 (t _B in minutes)
1 Bm	M 3	25	15

Table No. 4: Duty rate in short-time duty

NOTE	The t _B running time of the hoist is higher than required by FEM 9.683.	
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This duty type is not permissible for the slow lifting speed of the hoisting motor. After having reached the maximum running time a rest is required and the hoist must be continued in intermittent duty.

8.1.2 Intermittent duty

Depending on the duty rate the following resting time must be observed:

Duty rate (ED%)	Rest (minutes)
25%	3 times the running time

Table No. 5: Duty rate in intermittent duty

8.1.3 Example

The electric chain hoist type 6300/1-5.6/1.4 is used to lift a load of 6300 kg to a height of 3 m.


Performance data:	Load capacity	6300 kg			
	Lifting speed	5.6 m/min	- Main lifting speed	1.4 m/min	- Slow lifting speed
	Duty rate	25 %ED	- Main lifting speed	10 %ED	- Slow lifting speed
	Hoist duty group	1 Bm			


At the beginning of the lifting operation the electric chain hoist is cold, i.e., it has a temperature of approximately 20 °C.

$$\text{Running time} = \frac{3 \text{ m lifting} + 3 \text{ m lowering}}{5.6 \text{ m/min (lifting speed)}} = 1 \text{ minute, 4 seconds per lifting cycle}$$

In case of operation without a rest (short-time duty = maximum 15 minutes without a rest according to FEM 9.683) a maximum of 14 lifting cycles can be performed.

After reaching 15 minutes of running time a resting time of 3 minutes must be inserted for each 1 minute of running (i.e., 3 times the operating time). This rest is usually necessary for the slinging and un-hooking of loads.

CAUTION	For great lifting heights (above 10 metres) in intermittent duty rests for cooling must be inserted.	
	A low lifting speed should only be used for the cautious lowering and lifting of the load. The low lifting speed is not suitable for travelling through greater lifting heights.	


NOTE	To protect the motor against overheating, if desired a temperature sensor can be incorporated.	
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8.2 Duty rate of the electric trolley


If the electric chain hoist is equipped with an electric trolley, then the operator must also consider the cycle rate and the duty rate of the trolley. This applies in particular for long crane girders.

Trolley type	Intermittent duty (ED%)	Short time duty (min)
EF 16+4 m/min	40/20	30


Table No. 6: Duty rate for trolleys

NOTE	The indicated permitted running time applies for the fast travelling speed. Do not make the trolley travel longer girder sections at low speed.	
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9 Inspections

NOTE	All inspections and the maintenance works performed must be documented in the crane inspection log (such as the adjustment of the brake or of the clutch).	
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9.1 Inspection when used in compliance with DGUV Regulation 54 (BGV D8 Article 23)

NOTE	Prior to first use and following essential changes the electric chain hoist must be examined by a qualified person / specialist.	
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9.2 Inspection when used in compliance with DGUV Regulation 52 (BGV D6 Article 25)


NOTE	Prior to first use and following essential changes cranes must be examined by a person with an acknowledged qualification / expert. Electric chain hoists are type approved.	
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9.3 Regular inspections

NOTE	Once every year electric chain hoist, cranes and supporting structures must be examined by a qualified person (specialist). Under harsh operating conditions, such as if frequently operated at full load, in dusty or aggressive environments, with a high number of operating cycles or a long duty rate the frequency of the inspections must be increased.	
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- For the purposes of crane inspections, in addition to the TÜV experts, **persons / specialists with an acknowledged qualification** include only the specialists authorised by the Trade Association for this purpose.
- An **authorised person / expert** is a person whose professional qualifications and experience provide him with adequate knowledge of winches, hoisting and dragging devices or cranes, and who is familiar with the relevant work and health and safety regulations, directives, and the generally accepted rules of engineering to a level that enable him to assess the suitability of winches, hoisting and dragging devices or cranes for safe work.


10 Maintenance

NOTE	All maintenance works can be carried out by trained specialists only. Defects must be reported immediately to the operator in writing. The operator must initiate the elimination of such defects by a specialist.	
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CAUTION	All maintenance works must be carried out on unloaded and disconnected electric chain hoists exclusively. Switch off the mains master switch and secure it against unauthorised re-connection.	
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The maintenance table contains the parts and functions to be verified, and the maintenance works.

10.1 Inspection and maintenance works

NOTE	The following inspection intervals are guidance values that should be shortened under harsh operating conditions, such as in multi-shift operation, at constant nominal load, in dust, aggressive environmental loads, extreme temperatures and environmental effects.	
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		Inspection		
		Daily	Every 3 months	Yearly
Visual check	General condition	•		
	Load chain (twisting, rust, damage)	•		
	Screw joints			•
	Chain hold-down and chain guide			•
	Safety elements	•		
	Load hook and suspension hook for cracks and rust			•
	Chain box and the fastening of the chain box		•	
	Pendant control, control cable, mains connector cable	•		
	Trolley bumper		•	
	Trolleys and running wheels			•
	Availability and legibility of the Operating instructions			•
	Complete availability and legibility of warning inscriptions			•
	Functional testing	Brake	•	
Slipping clutch				•
End position limiter			•	
Checking for wear	Load chain		•	
	Chain sprocket	replacement if the bearing surface is worn by about 1 mm		•
	Load hook	centre punch spacing measurement checking of the securing of the hook nut		•
	Suspension hook	centre punch spacing measurement checking of the securing of the hook nut		•
Maintenance	Load chain lubrication		•	
	Hook tackle, hook block, suspension hook lubrication			•
	Brake setting or replacement (checking of the air-gap)			•
	Clutch setting (release limit)			•

Table No. 7: Inspection and maintenance works

NOTE	The electric chain hoist was dimensioned in compliance with Standard FEM 9.511. According to FEM 9.755 the residual safe working period must be established and documented every year . If the residual safe working period calculations are fully available, then the electric chain hoist must be subjected to a general overhaul when the theoretical safe working period (maximum safe working period) has been reached. If the usage of the electric chain hoist is not certified, then pursuant to FEM 9.755 the general overhaul must be carried out not later than after 10 years.	
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10.2 Brakes

NOTE Electromagnetically opened spring loaded D.C. disk brakes require little maintenance.



10.2.1 Hoist brake

10.2.1.1 Functional description

Electromagnetically opened spring loaded D.C. disk brakes require little maintenance.

The brake torque is generated by spring force. The pressure springs of the brake press the brake disc, which is connected to the motor shaft in a form-locking fashion, to the motor flange via the axially moving anchor plate. At this point the brake torque is created.

When applying direct current to the field winding of the brake magnet it exerts a magnetic force. This magnetic force attracts the anchor plate to the brake magnet. The brake opens.

As an option the brake can also be opened manually, mechanically. When actuating the manual opening lever the anchor plate leans up against the brake magnet. The brake opens.

10.2.1.2 Sectional view

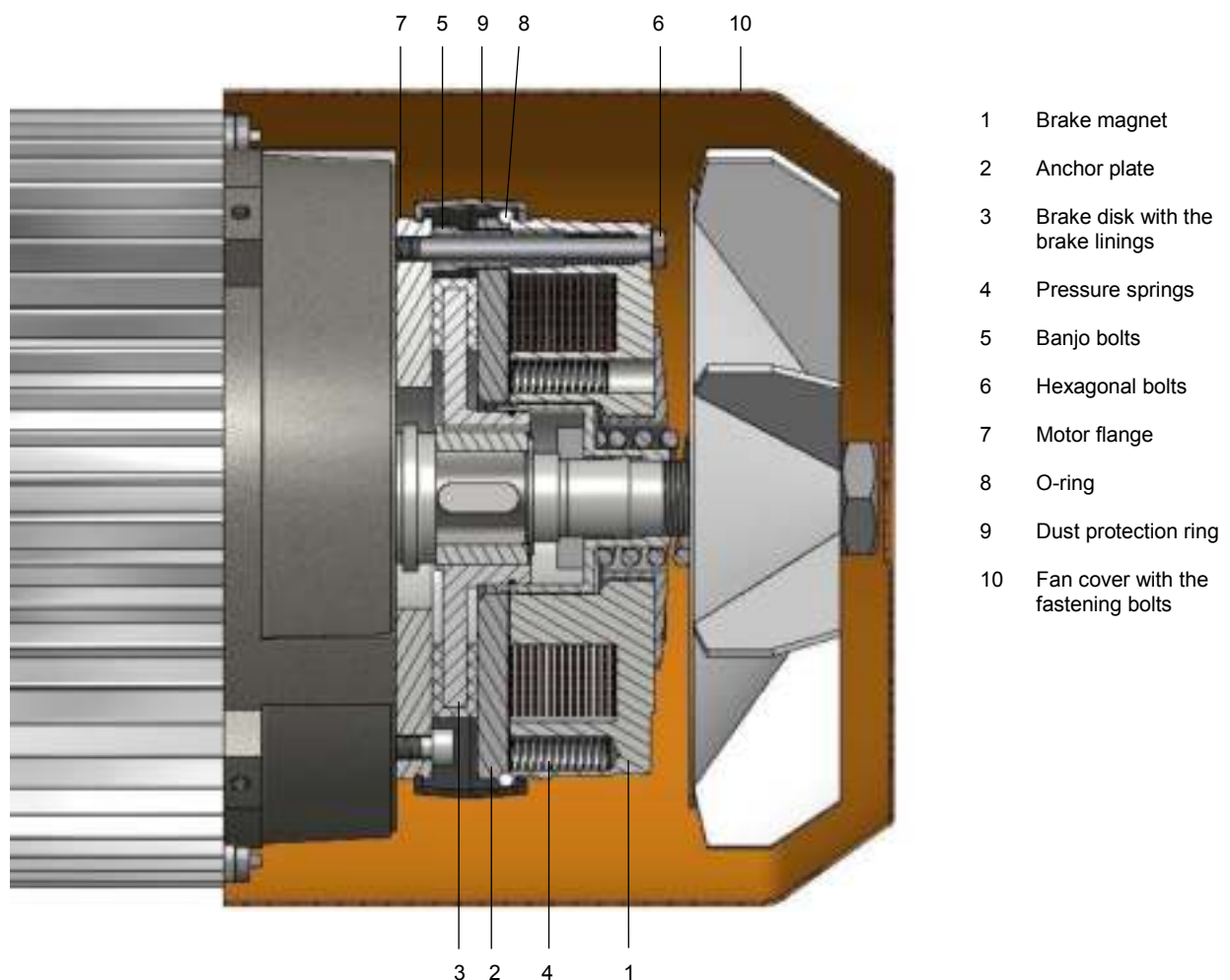




Diagram No. 32: Brake sectional view


10.2.1.3 Adjustment of the hoist brake

NOTE	The operating air-gap is measured in a current-free state between the anchor plate (2) and the brake magnet (1). The air-gap was set to 0.3 mm in the manufacturing plant.	
	The air-gap will increase due to wear and tear. If the brake linings are worn so that the air gap of the brake reaches the maximum permitted value of 0.9 mm, then the brake must be adjusted as follows:	


1. Disconnect the gear from the current.
2. Remove the fan cover (10) after unscrewing the screws.
3. Pull out the dust protection ring (9) from the groove of the brake magnet (1) and pull it over the brake magnet.
4. Use compressed air to blow out the dust generated by the wear and tear.
5. Pull out the O-ring (8) from the groove and push it onto the brake magnet (1) to reveal the air-gap.
Use compressed air again to blow out the dust generated by the wear and tear.
6. Check the combined thickness of the brake disc (3) and the vulcanised brake linings.


NOTE	If the combined thickness of the brake disc together with the linings does not reach a value of 9.5 mm, then it has to be replaced.	
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7. Release the hexagonal head screws (6) with a half turn. Not later than after every 2nd adjustment the hexagonal head screws must be replaced.
8. Screw in the hollow screws (5) into the brake magnet (1) by about 1 mm.
9. Tighten the hexagonal head screws (6) to set the air-gap between the anchor plate (2) and the brake magnet (1) to 0.3 mm as measured with a clearance gage.
10. Unscrew the hollow screws (5) from the brake magnet (1) until they are leaning up against the motor flange (7).
11. Tighten the hexagonal head screws (6) evenly.
12. Check the size and the evenness of the air-gap using a clearance gage.

NOTE	The air-gap must be the same everywhere, so carry out the check at several perimeter points.	
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13. If necessary correct the air-gap as described under points 6-11.
14. Use a torque of 10 Nm to tighten the hexagonal head screws (6). Use a torque wrench.
15. Position the O-ring (8) into the groove between the anchor plate (2) and the brake magnet (1).
16. Push back the dust protection ring (9) and push it into the groove of the brake magnet (1).
17. Connect the flat cable connector.
18. Replace the fan cover and fasten it with the screws.
19. Connect the drive gear.
20. Perform a functional test.

CAUTION	When braking a load corresponding to the nominal load capacity in lowering mode the braking distance should not exceed the length of two chain links, and the brake should not hold the load with a sudden jerk.	
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CAUTION	Perform operations 1 – 5, 15 and 16, and 18 – 20 at least once every year, or once every 50 hours of operation.	
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10.2.2 Trolley brake

10.2.2.1 EFB brake

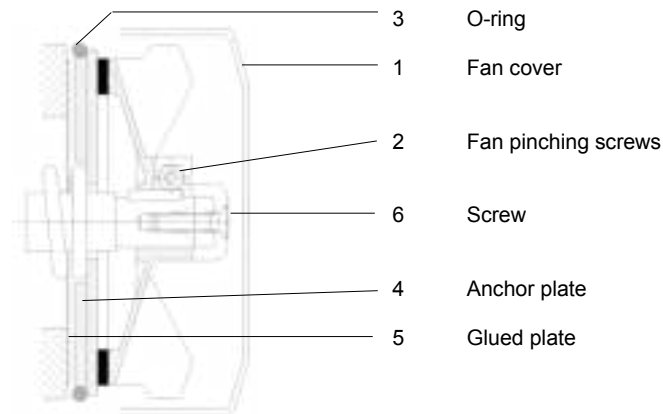


Diagram No 33: EFB brake sectional view

NOTE	The operating air-gap is measured in a current-free state between the anchor plate (2) and the glued plate (5). The air-gap was set to 0.25 mm in the manufacturing plant.	
	The air-gap will increase due to wear and tear. If the brake linings are worn so that the air gap of the brake reaches the maximum permitted value of 0.9 mm, then the brake must be adjusted as follows:	

1. Dismantle the fan cover (1).
2. Loosen the fan screws (2).
3. Remove the O-ring (3) and place a clearance gage of 0.25 mm between the base plate (4) and the glued plate (5).
4. Tighten the screw (6) so far that you can just remove the clearance gage. Check the air-gap at several perimeter points.
5. Tighten the fan pinch screws (2) evenly. First tighten the screw opposite the bolt (tightening torque of 4-5.5 Nm).
6. Tighten the screw (6) again.
7. Remove the clearance gage.
8. Replace the fan cover (1).
9. Carry out a test run to check the brake.

10.2.2.2 ZFB brake

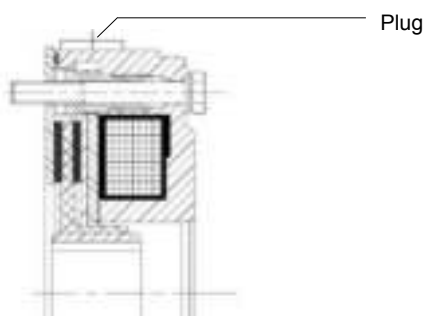



Diagram No 34: ZFB brake sectional view

NOTE	The operating air-gap is measured in a current-free state. The brake gap can be checked with the removal of the plug. The air-gap was set to 0.3 mm in the manufacturing plant.	
	The air-gap will increase due to wear and tear. If the brake linings are worn so that the air gap of the brake reaches the maximum permitted value of 0.8 mm, then the brake must be replaced again.	

10.3 Slipping clutch

10.3.1 Brake operation

The patented safety slipping clutch is located between the drive gear and the brake. The brake acts directly on the load via the gearbox with a form-locking connection, without loading the clutch. Even with heavier wear of the clutch the load cannot lower in an uncontrolled way, because the brake holds the load whatever its position. The slipping clutch acts as a dry clutch, using asbestos free linings.

CAUTION	The slipping clutch is a directly acting lifting force limitation that cannot be used operationally.	
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10.3.2 Sectional view

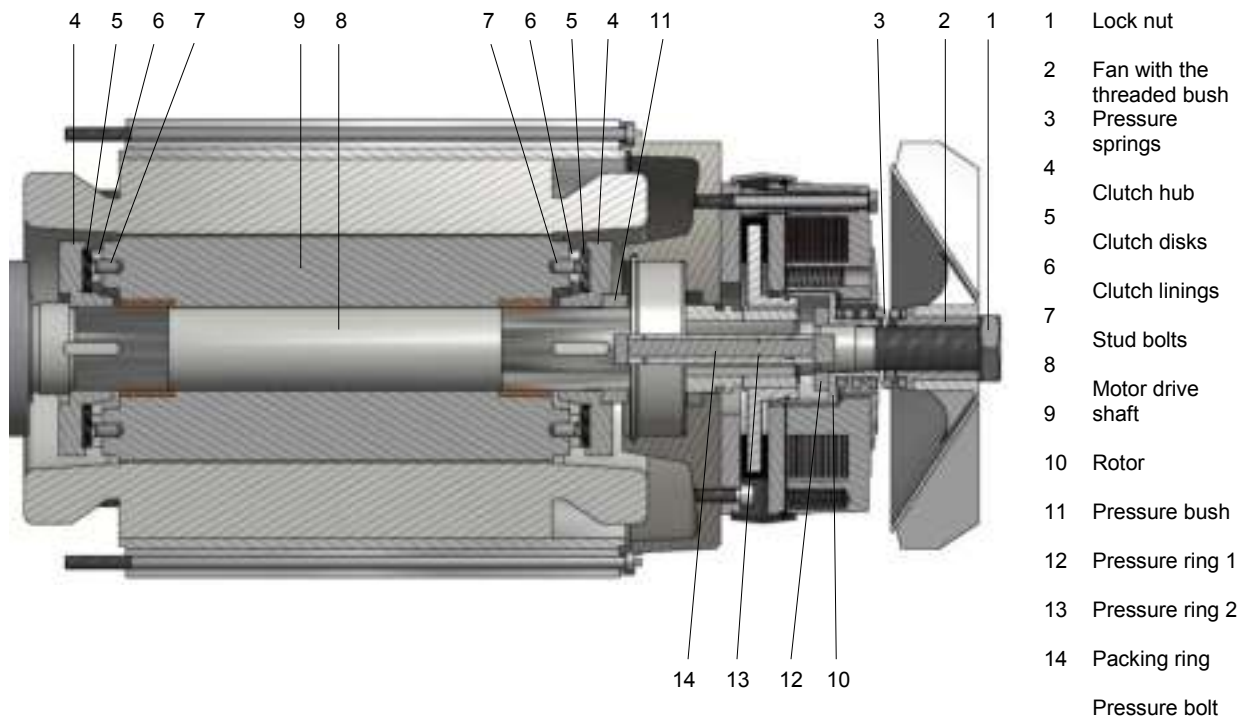



Diagram No 35: Sliding clutch sectional view

The parts of the slipping clutch: two clutch hubs (4), located on both sides of the motor rotor (9) that are connected to the motor drive shaft (8) in a form-locking fashion, the clutch linings (6), the clutch discs (5) that are bolted with the rotor (9). The motor shaft (8) carries the pressure ring 1 (11), the internal pressure bolt (14) with the packing ring (13), the pressure ring 2 (12), the pressure bush (10) the pressure spring (3), the fan with the threaded bush (2) and with the lock nut (1).

10.3.3 Slipping clutch adjustment

NOTE	If the load is measured with a crane scale or an adjustment device against a fixed fixation point, then the load value being read with a slipping clutch is 30% higher than the nominal value setting. The slipping time of the clutch may not exceed 2-3 seconds.	
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1. Unscrew the lock nut (1).
2. With feeling tighten the pressure spring (3) by turning the fan with the threaded bush (2) so that the hoist just about lifts the load.
Turning the fan with the threaded bush (2) to the right the torque of the clutch will increase.
Turning the fan with the threaded bush (2) to the left the torque of the clutch will reduce.
3. Fix the setting of the fan with the threaded bush using the lock nut (1).
4. Verify again the setting of the clutch by lifting the nominal load until the upper hook position.

10.3.4 Checking the release limit of the slipping clutch during regular inspections

The release limit of the slipping clutch has to be checked by a specialist during the regular inspection in accordance with DGUV Regulation 52 (BGV D6 Article 26) and DGUV 54 (BGV D8 Article 23). At this point in time it should be checked whether or not the hoist lifts the nominal load! The hoist may not lift a load that is greater than 1.6 times the nominal load.


In case if test loads heavier than the nominal load are not available for the regular inspection, then the release limit of the slipping clutch can also be checked using a suitable clutch testing device. In this case the release limit should be 1.3 x the nominal load. After checking the release limit, verify again whether or not the hoist lifts the nominal load.

In case of a defect the slipping clutch must be adjusted again, and the clutch release limit must be re-checked. The set value is to be recorded in a protocol.


10.4 Load chain

Hoist chains are load bearing elements subject to mandatory inspections. Therefore, it is important to observe the guidelines issued by the trade association's centre for accident prevention regarding to round steel chains in hoisting operation, the guidelines for general inspection and test specifications in accordance with DIN 685 section 5 of November 1981, and DGUV Regulation 54 (BGV D8), DGUV Regulation 52 (BGV D6) and EN 818-7 of September 2002.

10.4.1 Lubricating the load chain upon first use and while in use

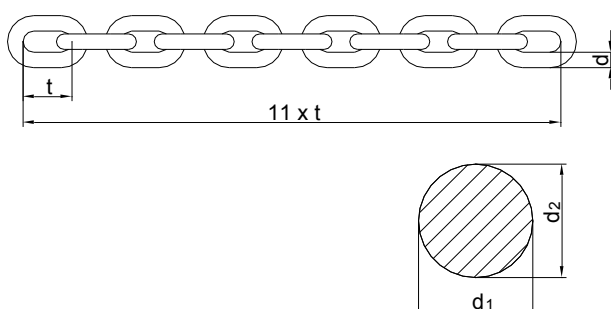
NOTE	<p>The links along the entire length of the load chain must be lubricated in an unloaded state with penetrating gear lubricant oil prior to the first use and regularly while it is in use. As a function of use and operating circumstances the links must be re-lubricated after cleaning.</p> <p>In environments conducive to wear and tear (sand, emery) use a dry lubricant to lubricate the chain (e.g. lubricating varnish, graphite powder).</p>	
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10.4.2 Checking wear and tear and replacing the chain

CAUTION	<p>The continuous monitoring of the load chain is a mandatory provision pursuant to DIN 685 Part 5 and DGUV Regulation 54 (BGV D8 Article 27).</p> <p>The load chain must be checked prior to first use and regularly once every 200 operating hours or every 10,000 lifting/lowering cycles under normal conditions, or more often under harsh operating conditions.</p> <p>Pay particular attention to check the chain links at their points of contact, for wear, cracks, deformation and other damages.</p>	
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The chain must be replaced:

- If the nominal thickness at the points of contact has reduced by 10%;
- If a link has elongated by 5 %, or if the chain, measured on 11 chain links, has elongated by 2%;
- If the links have become rigid.




t = nominal length of a single chain link
 d = nominal diameter of a single chain link
 d_1, d_2 = actual diameter

$$d_m = \frac{d_1 + d_2}{2}$$


Diagram No 36: Chain dimensions

Chain dimensions	mm x mm	16 x 45	17.3 x 48
Nominal diameter of a single chain link	d in mm	16	17.3
Diameter wear threshold	d_m in mm	14.4	15.6
Length measured on a single chain link	t in mm	45	48
Wear threshold for the length of a single chain link (max)	t_{max} in mm	47.25	50.4
Length measured over 11 chain links	11 x t in mm	495	528
Wear threshold for the length of 11 chain links (max)	$(11 \times t)_{max}$ in mm	504.9	538.5

Table No. 8: Chain dimensions

NOTE	As a replacement chain use only an original load chain supplied by the manufacturer of the hoist.	
	When replacing the load chain, the chain guide and the chain hold-down must also be replaced.	

10.5 Measuring the wear of the load hook and replacing the load hook

NOTE	According to Part 1 of the DIN 15405 standards the load hook must be replaced if its opening has expanded by more than 10% or if the height of the hook bottom has decreased by more than 5%.	
	The base dimensions of the hook are contained in the hook certificate located in the crane inspection log.	
	There may be no sharp dents or cracks on the hook bottom.	


11 Lubrication

11.1 Drive gear

The drive gear has been filled with gear oil in the manufacturing plant. The lubrication of the drive gear is meant for its entire lifetime.

An oil change is needed:

- If the electric chain hoist was subjected to a general overhaul;
- If there is visible leakage;
- If the air-bleed valve is blowing off strongly;
- After each time the drive gear has been opened.

NOTE	Make sure to always have a sufficient quantity of oil in the drive-box.	
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Oil change:

There is one screw on the bottom of the drive-box for bleeding the oil and one on top for filling oil into the drive gear.

Gear lubricant oil used: Mineral oil; viscosity of 220 mm²/s at a temperature of 40°C.

The following table contains the quantity of oil to be filled:


Model	Quantity in ml
B13/...X	3000
B15/...Y	3000

Table No. 9: Oil quantities


The following types of oils can be used:

Supplier	Designation	Notes
Fuchs®	Renolin CLP 220	
Castrol®	Alpha Zn 200	
ESSO®	EP 220	
Mobil®	Mobil gear 630	
Shell®	Omala 220	
ELF®	Reductelf SP 220	
BP®	XP 220 BP Energol GR	
Exxon Mobil®	Mobilux EP2	
Fuchs®	Geralin SF 220	Food industry

Table No. 10: Oil types

NOTE	Neutralise any spent oil in compliance with the statutory provisions.	
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11.2 Chain

NOTE	Prior to the first use and regularly while the electric chain hoist is in operation the chain links must be lubricated in the entire length of the load chain using penetrable drive gear lubricant oil.	
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Lubrication of the chain:

- Lubricate the chain in an unloaded condition.
- Apply lubricant to the shaded areas of the chain link.
- The chain located in the chain box must also be lubricated.
- Prior to repeated lubrication the chain must be cleaned.
- You may vary the quantity of the lubricant and the frequency of lubrication as a function of the operating conditions.
- Lubricate the chain at least once every 3 months.
- If necessary / depending on the operating conditions the lubrication intervals must be shortened.
- Use a dry lubricant if the operating conditions are conducive to heavy wear and tear (sand, emery, etc.).

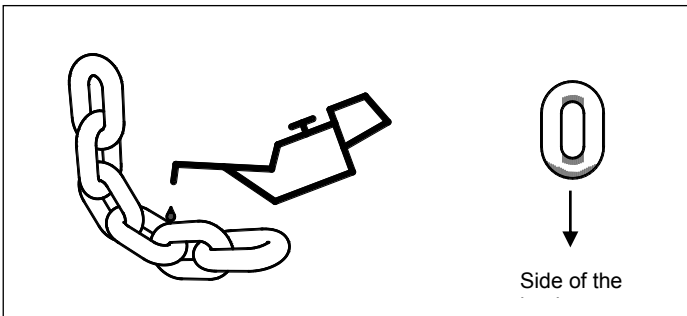


Diagram No 37: Lubrication chain

As a function of the operating conditions we recommend the following lubricants for the lubrication of the chain:

Manufacturer	Designation	Notes
Fuchs®	Stabylan 2001	
Klüber®	Klüberoil 4UH 1-1500	Food industry
Fuchs®	Ceplattyn 300	Dry lubricant
Castrol®	Optimol Viscogen KL300	
Fuchs®	Stabylan 5006	
Klüber®	Klüberoil CA 1-460	
Fuchs®	CTP D 350	
Fuchs®	RENOLIT SO-GFB	
Klüber®	Microlube GB 00	

Table No. 11: Chain lubricants

11.3 Hook tackle and hook block


NOTE	Under normal operating conditions the roller bearings of the hook and of the chain sprocket require lubrication once around every 20,000 lifting cycles or once a year, or more frequently under harsh operating conditions.	
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Lubricants recommended for lubricating the bearings:

Manufacturer	Designation
Fuchs®	Renolit Duraplex EP3
Fuchs®	Lagermeister LX EP2

Table No. 12: Bearing lubricants

11.4 Trolley


NOTE	The small drive cog-wheel and the cogs of the cogged running wheels must be lubricated using bearing grease at the first use and approximately once every 10,000 back and forth travels under normal operating conditions, and more frequently under harsh operating conditions.	
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Lubricants recommended for the lubrication of the cogging:

Manufacturer	Designation
Fuchs®	Renolit Duraplex EP3
Fuchs®	Lagermeister LX EP2

Table No. 13: Cogging lubricants

12 Malfunctions

ATTENTION	Inspection and maintenance works must be carried out by trained specialists exclusively.	
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ATTENTION	<p>There are dangerous voltages generated on the electric chain hoist and on the cables connecting the individual components.</p> <p>Performing work on the closed circuit may cause fatal or severe injuries (invalidity).</p> <p>Prior to performing any maintenance work on the device switch off the power supply and detach the power supply of the device. The master switch must be locked in the Off position and must be marked.</p>	
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Defect	Cause	Elimination
The electric chain hoist is not functioning	The power supply has been interrupted	Check all three phases of the mains connection / cable on the master switch, on the switches, the fuses, and on the connecting cables.
	Different voltage or frequency	Verify if the mains voltage and frequency correspond to the specifications on the type plate of the electric chain hoist.
	The electric chain hoist is overloaded	Reduce the load to the nominal load.
	The motor has overheated and the thermal overload protection switch has released	See the defect "The motor or the brake has overheated".
	Unworkmanlike cabling, loose or torn cables in the electric system of the electric chain hoist.	Disconnect the power supply, check the cable connections of the electric chain hoist control and of its pendant control.
	The brake does not open	<p>Check the resistance of the brake coil. Replace the brake if necessary.</p> <p>Check the input and output voltages of the rectifier. Replace the rectifier if necessary.</p>
The electric chain hoist is (still) not functioning	Defective contactor	Check the coil for tear or for a short circuit. Check the connections of the control. Check the leakage of the contacts of the contactor. Replace the contactor if necessary.
	The emergency stop button was pushed on the pendant control	Turn to emergency stop button clockwise in order to lock the control and to enable the operation of the electric chain hoist once the defect has been eliminated.
	Defect in the control transformer	Check the control transformer for overheating. Disconnect the control transformer and check the coil for potential tears.
	The motor has burnt down	Replace the stator, the rotor / shaft and the other defective parts.
The load moves in the opposite direction.	The power supply was connected in the wrong sequence.	Switch two of the three phase leads of the power supply. (See the chapter on mains connection.)
	Unworkmanlike electric cabling.	Check against the circuit diagram and check all of the connections.
The motor or the brake has overheated	Different voltage or frequency	Verify if the mains voltage and frequency correspond to the specifications on the type plate of the electric chain hoist.
	Extreme external thermal effect	At temperatures above 40°C the duty rate and the frequency of use must be reduced to avoid the thermal loading of the motor. Take special preventive measures for the ventilation of the electric chain hoist or for its protection against heat.

Defect	Cause	Elimination
The electric chain hoist lifts, but does not lower	The lowering circuit is interrupted	Check the circuit for disconnected contacts. Check the lowering function of the limit switch.
	Cable or core tear in the control cable	Check all of the cable cores for tear. If even one core is torn, replace the entire cable.
	Defective contactor	Check the coil for tear or for a short circuit. Check the connections of the control. Check the leakage of the contacts of the contactor. Replace the contactor if necessary.
	Defective switch inset in the pendant control	Check the electric leakage. Check the electrical bonding. Replace or repair if necessary.
	The chain is stuck	Check if the chain can run into the chain box without friction. Check if the chain has a knot and untie it. If there are visible defects replace the chain and the chain guide.
The electric chain hoist lowers, but does not lift	The electric chain hoist is overloaded	Reduce the load to the nominal load.
	Low voltage in the power supply of the electric chain hoist	Establish the cause of the low voltage and bring the voltage to within 10% above or below the value specified on the type plate. Measure the voltage on the input terminals of the electric chain hoist.
	The lifting circuit is interrupted	Check the circuit for disconnected contacts. Check the lifting function of the limit switch.
	Cable or core tear in the control cable of the pendant control	Check all of the cable cores for tear. If even one core is torn, replace the entire cable.
	Defective contactor	Check the coil for tear or for a short circuit. Check the connections of the control. Check the leakage of the contacts of the contactor. Replace the contactor if necessary.
	Defective slipping clutch	Check the clutch setting or replace it.
	The chain is stuck	Check if the chain can run into the chain box without friction. Check if the chain has a knot and untie it. If there are visible defects replace the chain and the chain guide.
The electric chain hoist does not lift the nominal load, or not with an adequate speed	The electric chain hoist is overloaded	Reduce the load to the nominal load.
	Low voltage in the power supply of the electric chain hoist	Establish the cause of the low voltage and bring the voltage to within 10% above or below the value specified on the type plate. Measure the voltage on the input terminals of the electric chain hoist.
	Defective slipping clutch	Check the clutch setting or replace it.
	The chain is stuck	Check if the chain can run into the chain box without friction. Check if the chain has a knot and untie it. If there are visible defects replace the chain and the chain guide.
Too much caster when braking	The brake does not hold	Check the brake for the correct air-gap. Replace the brake if necessary.
	Load too great	Reduce the load to the nominal load.
	Duty rate too high	Reduce the number of operating cycles.
The electric chain hoist operates in a twitching motion, or leaves out	The contacts do not touch (they draw an arc)	Check the contactors for burnt contacts. Replace if necessary.
	Uncertain contact in the circuit	Check all of the cable and terminal connections for bad contact. Replace if necessary.
	Cable or core tear in the control cable of the pendant control	Check all of the leads of the pendant control for tear or defects. Replace the entire pendant control if you cannot eliminate the tear.

13 Measures to be taken at the end of the theoretical safe working period

13.1 Calculation of the theoretical safe working period

Establishing the kmi total load factor

	5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %
Full load	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
¾ load	0.021	0.042	0.063	0.084	0.105	0.127	0.148	0.169	0.190	0.211
½ load	0.0063	0.0125	0.0188	0.0250	0.0313	0.0375	0.0438	0.0500	0.0563	0.0625
¼ load	0.0008	0.0016	0.0023	0.0031	0.0039	0.0047	0.0055	0.0063	0.0070	0.0078

Calculation of the kmi:

Load	Time proportion (%)	kmi
Full load		
¾ load		
½ load		
¼ load		
Total kmi		

Establishing the portion of the theoretical safe working period consumed in the specific period:

Actual use:

$$S_i = kmi \times T^* \times \text{workdays} \times \text{multiplier}$$

$$S_i = \dots \times \dots \times \dots \times \dots \times \dots$$

$$S_i = \underline{\hspace{2cm}} \text{ h} - \text{number of hours at full load}$$

Multiplier	
1.1	With a meter for operating hours
1.2	Without a meter for operating hours
1.5	Unknown mode; out of use
T*	Effective safe working period, daily in hours

Establishing the total consumed portion of the theoretical safe working period:

$$S = S_i (\text{specific period}) + \sum S_i (\text{all previous periods})$$

$$S = \dots + \dots$$

$$S = \underline{\hspace{2cm}} \text{ h}$$


Establishing the theoretical safe working period in accordance with FEM 9755:

	1Bm	1Am	2m	3m
D	400 hours	800 hours	1600 hours	3200 hours

The ratio of the actual and the theoretical safe working period must be ≤ 1 .

$$\frac{S}{D} = \frac{\text{actual safe working period}}{\text{theoretical safe working period}} = \underline{\hspace{2cm}} = \leq 1$$

Residual safe working period: $D - S = \dots - \dots = \underline{\hspace{2cm}} \text{ h}$

NOTE	Upon reaching the theoretical safe working period the machine or its components must be subjected to a general overhaul, or must be disposed of as waste in an environmentally sound manner.	
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13.2 Disposal

Lubricants such as oils and greases must be disposed of in compliance with the effective Act on waste. Metals, rubber, and plastics must be forwarded for recycling separately.