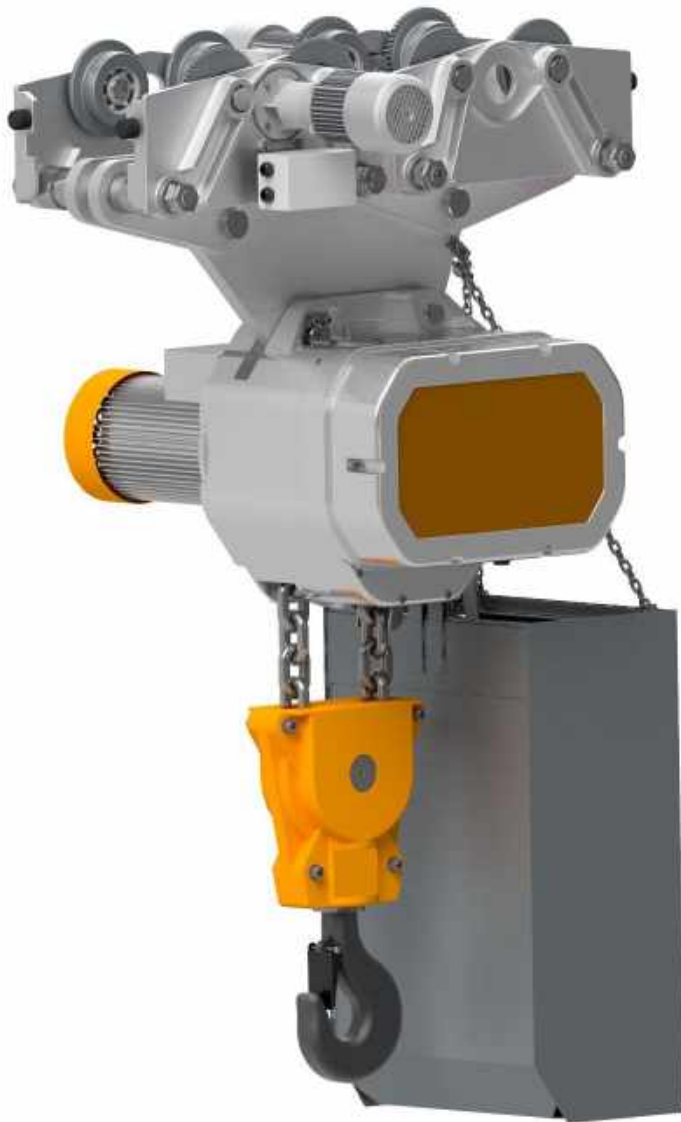


Operating instructions

POWER LIFTKET
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 European Regulations

The following regulations, and all recommendations of this manual serve as basis for assembly, installation, certification and maintenance of electric chain hoists, within Germany and within the area of the European community. For countries other than mentioned, local legislation and directives may apply in addition to the regulations as stated in this manual (German/European). Please pay particular attention to the rules for the prevention of accidents and the statutory regulations.

European Regulations	
2006/42/EC	EC-Machine directive
2014/30/EC	EC-Directive relating to electromagnetic compatibility
2014/35/EC	EC-electrical equipment designed for use within certain voltage limits

BGV accident prevention regulations	
DGUV Vorschrift 1 (BGV A1:2009)	Principles of prevention
DGUV Vorschrift 3 (BGV A3:2005)	Electrical facilities and equipment
DGUV Vorschrift 52 (BGV D6:2000)	BGV accident prevention regulation for use in crane systems
DGUV Vorschrift 54 (BGV D8:1997)	BGV accident prevention regulation for electric winches, lifting and pulling equipment
DGUV Regel 100-500 (BGR 500-2.8:2008)	Hoisting accessories
DGUV Grundsatz 309-001 (BGG 905:2004)	Checking of cranes

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

Standards and technical specifications	
FEM 9.511:1986	Hoist gearing classification
FEM 9.683:1995	Series lifting equipment; Selection of hoisting and travelling motors
FEM 9.751:1998	Series lifting equipment; Power driven series hoist mechanisms; Safety
FEM 9.755:1993	Serial hoist units; Measures for achieving safe working periods

The producers guarantee depends on consideration of these regulations and all of this manual.

Other national regulations are valid for countries outside of the European community.

1.2 Advice for the use of electric chain hoists

Electric chain hoists are designed to lift and to lower the loads vertically and to travel horizontally with those lifted loads (with trolleys). Any other use is not considered to be proper. Manufacturer does not take responsibility for any improper use and the risk is on the operator's responsibility.

For use of the hoist in an aggressive environment – please consult the producer.

To this effect, it may be necessary to make certain components from different materials.

The electric chain hoist can only be operated by personnel, who have complete knowledge of this manual, and have unhindered access to it. Do not operate the electric chain hoist until all operators have thorough knowledge of this manual, and acknowledge that by signing the allocated field on the rear cover of this brochure.

If properly used, the modern design of the electric chain hoists guarantees safety and economic operation.

The safety friction clutch is located between gearbox and brake, which enables stopping the load without putting strain on the clutch.

Before first use make sure, that all electrical wires are connected in accordance with the instructions, that all wires are without damages and that the whole equipment could be switched off by a main switch. It is the responsibility of the operator to make sure that all suspension points of the hoist are designed to safely withstand the dynamic forces caused by the lifting equipment.

The chain hoist can only be used when it is suspended according to specification and the outgoing chain can leave the hoist safely, by its own weight, in the relevant direction. Therefore, the container for the dead end of the chain outside the hoist must be big enough to allow the chain to come out.

If not, the chain can be trapped inside the hoist and can break the casing of the hoist.

Maintenance work on hoisting equipment has to be carried out by **trained and authorised people** only. The main switch has to be switched off and the working area is to be secured beforehand.



Authorised people have to have a theoretical training as well as experience in the field of winches, lifting and pulling equipment or cranes. They have to possess an excellent knowledge of the relevant work safety regulations, directives, and general accepted rules of lifting techniques, which enables them to decide whether the lifting equipment is in a safe working condition or not. IEC 364 or DIN VDE 0105 regulations, for example, prohibit that untrained personnel perform any work on power equipment.

Any maintenance work and inspections are to be entered into the crane inspection book (e.g. brake or clutch adjustments).

This manual will tell you how to operate the hoist and how to handle its suspension or its loads safely. The following safety advices have to be observed. The safety instructions may not be complete for each mode of use. If there are any questions or problems contact the manufacturer or our local representative.

This Operating Instructions should always be in a complete and fully readable condition.

No responsibility is taken for damages and operating troubles due to the following reasons:

- improper use
- unauthorised modification of the drive system
- unworkmanlike work done on the system and with the system
- operating errors
- Failure to use the product as instructed in the manual



1.3 Prohibitions on use

- **Using the hoist to carry people is strictly prohibited!**
- **Inching mode (fast switching on / off of functions)**
- **Permanent run against the rubber buffers of the lowest and highest hook position (ultimate safety limit for emergency only)**
- **Using the hoist with people being underneath the load**
- Moving loads heavier than the nominal load
- Pulling loads which are tilted or dragging loads
- Tearing off loads
- Removing the cover of vessels which are under vacuum
- Moving a trolley by pulling the control pendant or the control cable, even if these are relieved of strain
- Using the lifting chain to sling the loads
- Using a lifting chain, which is longer than the chain box capacity stated under the box
- Starting initial operation before an expert or a trained specialist has inspected the equipment.
- Carrying out repairs without cutting off current supply and without special knowledge
- Using the hoist with higher duty rate as marked on the specification plate
- Using the hoist without having done the regular inspection



1.4 Directions for use

- The load may only be moved if it is slung securely and no person is standing near enough to be at risk.
- The load must be placed vertically under the electric hoist before lifting.
- The motion directions are indicated with symbols on the control buttons.
- Do not turn the chain over edges.
- Do not lower the double fall hook until the chain gets 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 dangerous materials.
- Repair work can be done by specialists only if mains supply is switched off and secured and no load is suspended on the hook.
- After an emergency stop button actuation, the cause of actuation has to be found and all possible failures removed by expert personnel. Reset emergency pushbutton only after this procedure.
- Lifting the load from the ground has to be done with the lowest possible speed. Before doing this slack sling chains or ropes have to be tightened carefully.
- When operating hoist at a height that is reachable by hand, do not touch the hoist, where load chain enters the unit. Proper safety measures have to be established to avoid this risk.



1.5 Spare parts

Only original fixing components, spare parts and accessories, listed in manufacturer's spare parts catalogue, are acceptable for use. The producer's guarantee is given for those spare parts only. The producer cannot be held responsible for any damages due to the use of non-original parts and accessories.

2 Technical overview

2.1 Assembly options

The simple building block system makes it easy to convert an electric chain hoists to different versions. This allows the choice of single or double – fall versions, stationary or mobile with push or electric trolleys, and the installation of greater hoisting and operating heights.

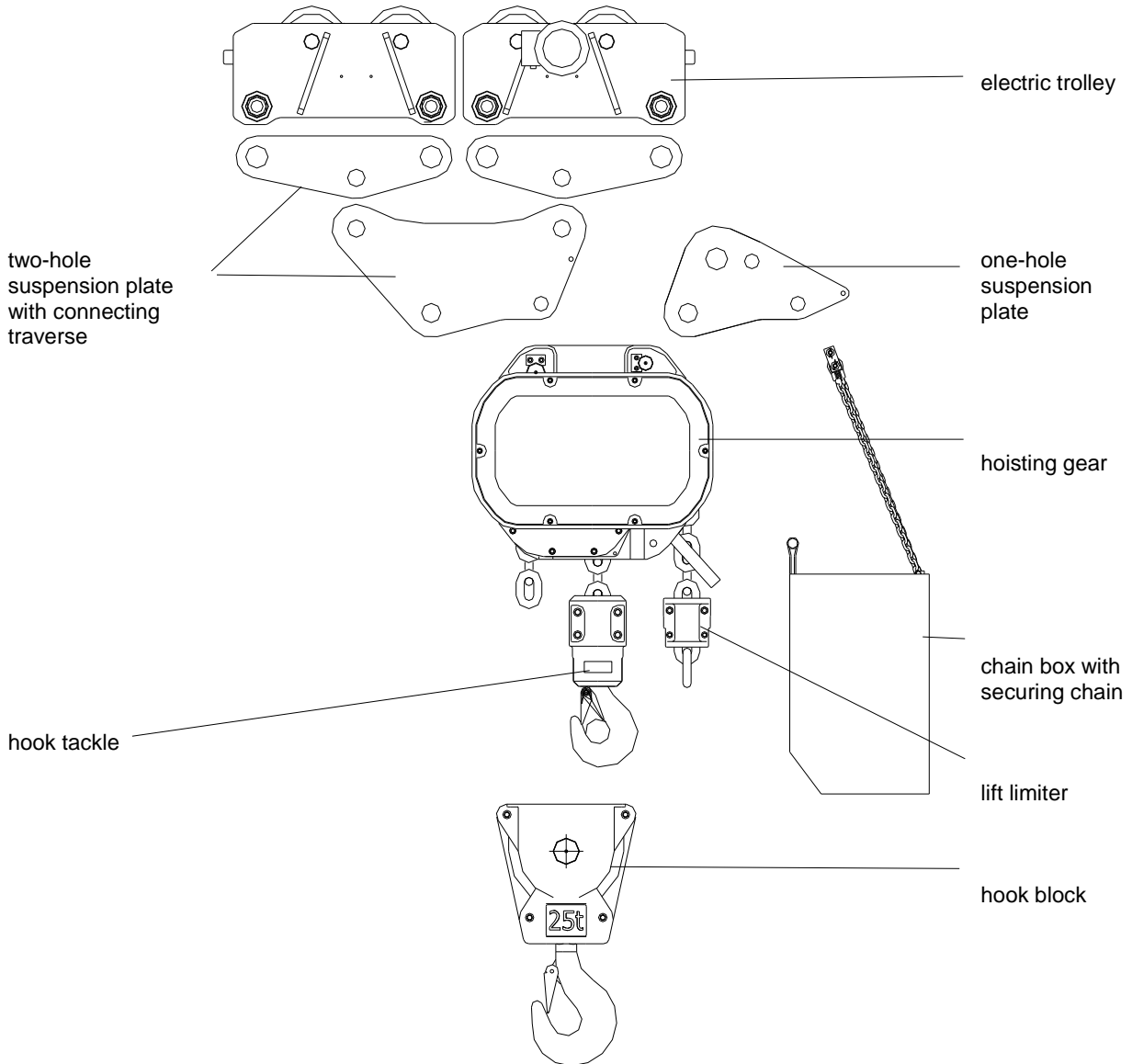
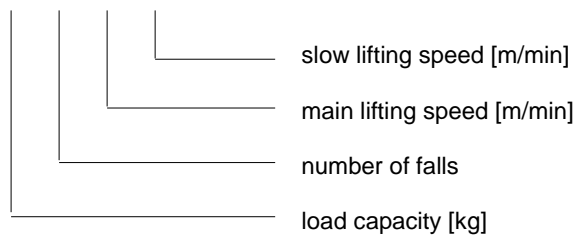


Figure 1: assembly options

2.2 Explanation of type designation

version 235/50

type 25.000 / 2 -3.2 / 0.8



2.3 Sectional view

Fig. no.	Description
1	Hoist body
2	Gear cover
3	Pinion shaft 1
4	Brake unit
5	Cap for auxiliary circuit
6	Clutch unit
7	Lifting motor
8	Sprocket wheel
9	Cap for limit switch

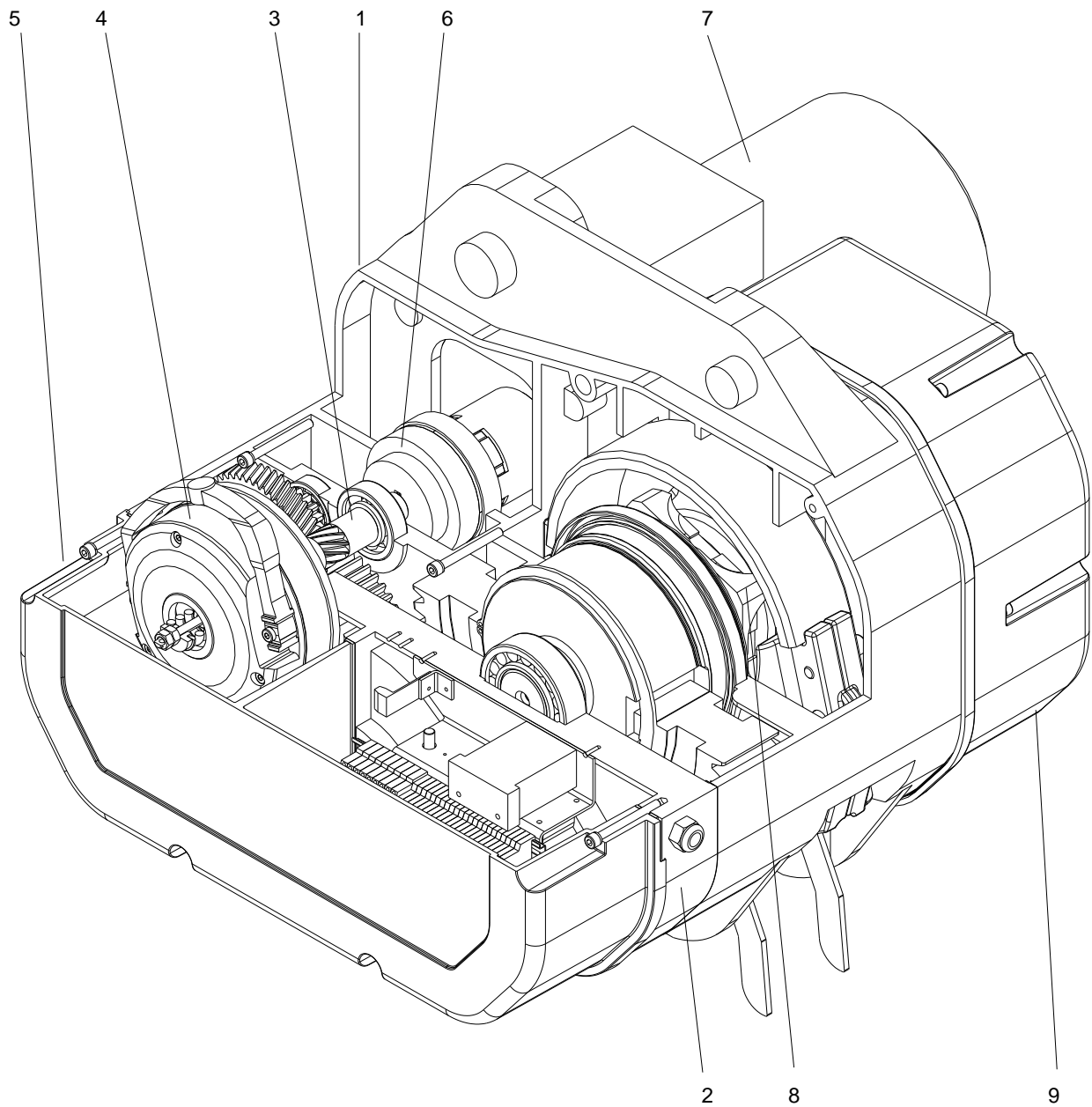


Figure 2: sectional view

2.4 Illustration of the load chain configuration

Use only original chain of the manufacturer! Only these original chains meet the high stress and service life standards required.

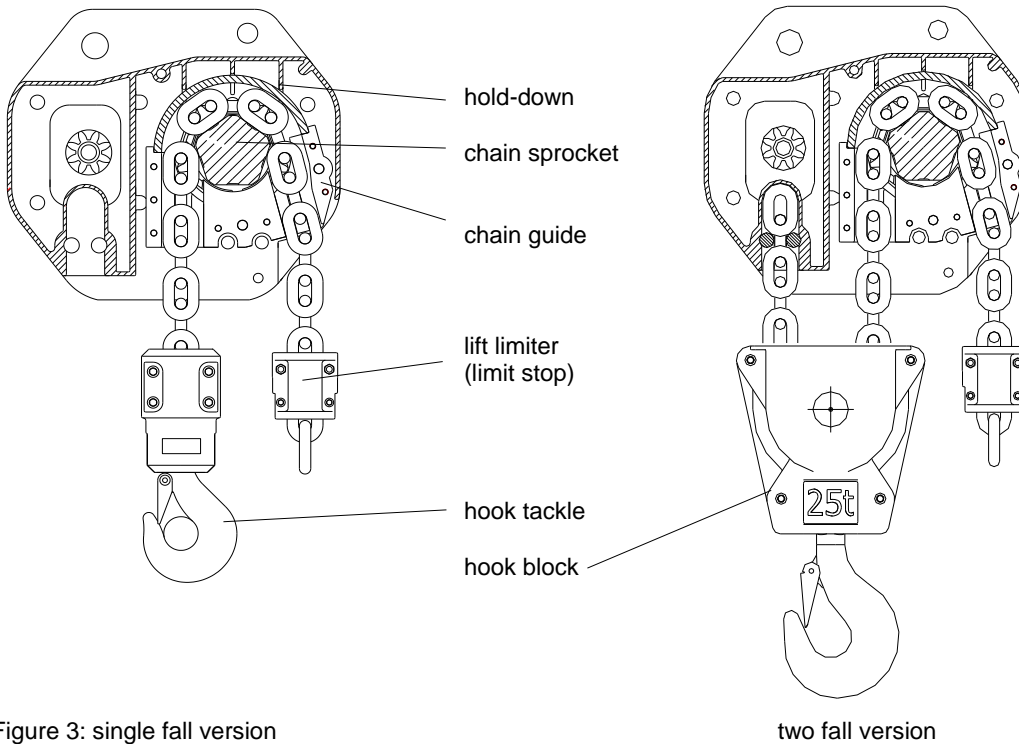


Figure 3: single fall version

two fall version

3 Assembly

Assembly work should only be carried out by trained specialist in accordance with DGUV V54 (BGV D8) §24.

3.1 Mechanical assembly

3.1.1 Hook tackle

The hook tackle is used to attach loads for hoists in single fall version.

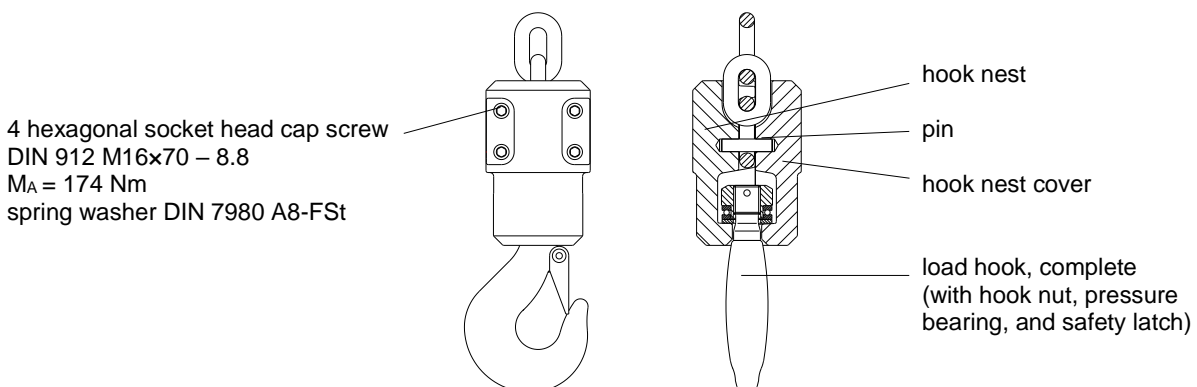


Figure 4: design of the hook tackle

During maintenance, please check the condition of the hook (wear, centre distance), pressure bearing, safety latch and hook nut.

Caution! Hook nut of the hook tackle is secured by a split pin inserted at right angle to the shaft.



3.1.2 Hook block

The hook block is used to attach the load in double fall version.

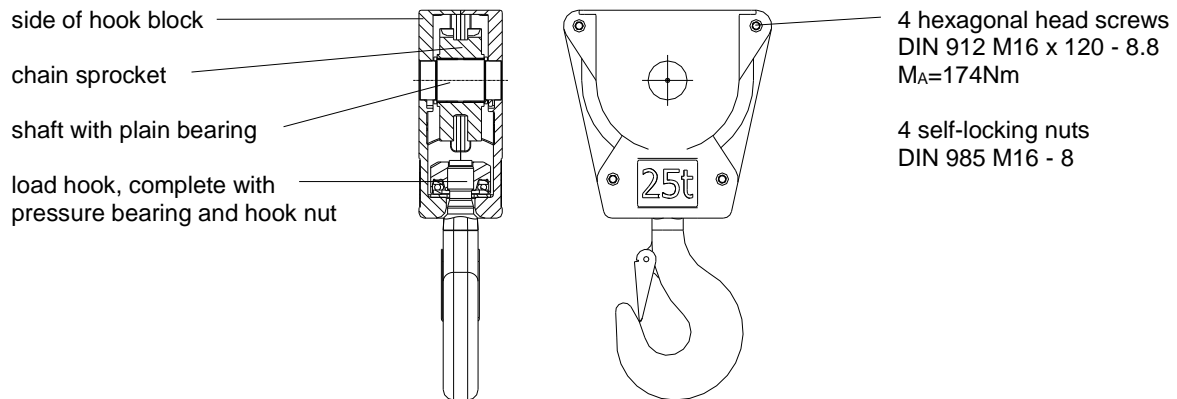


Figure 5: details of the hook block

During maintenance, please check the condition of the hook (wear, centre distance), pressure bearing, safety latch and hook nut.

Caution! Hook nut of the hook block is secured by a securing insert located on the top of the nut.



3.1.3 Stationary electric chain hoists

3.1.3.1 Hoist suspension with suspension plate

Assembly: Place the suspension plate into suspension nest, specially provided on the electric chain hoist body, and pin it in into place by two pins. Fit the securing plates and secure them by socket head cap screws complete with spring washers.

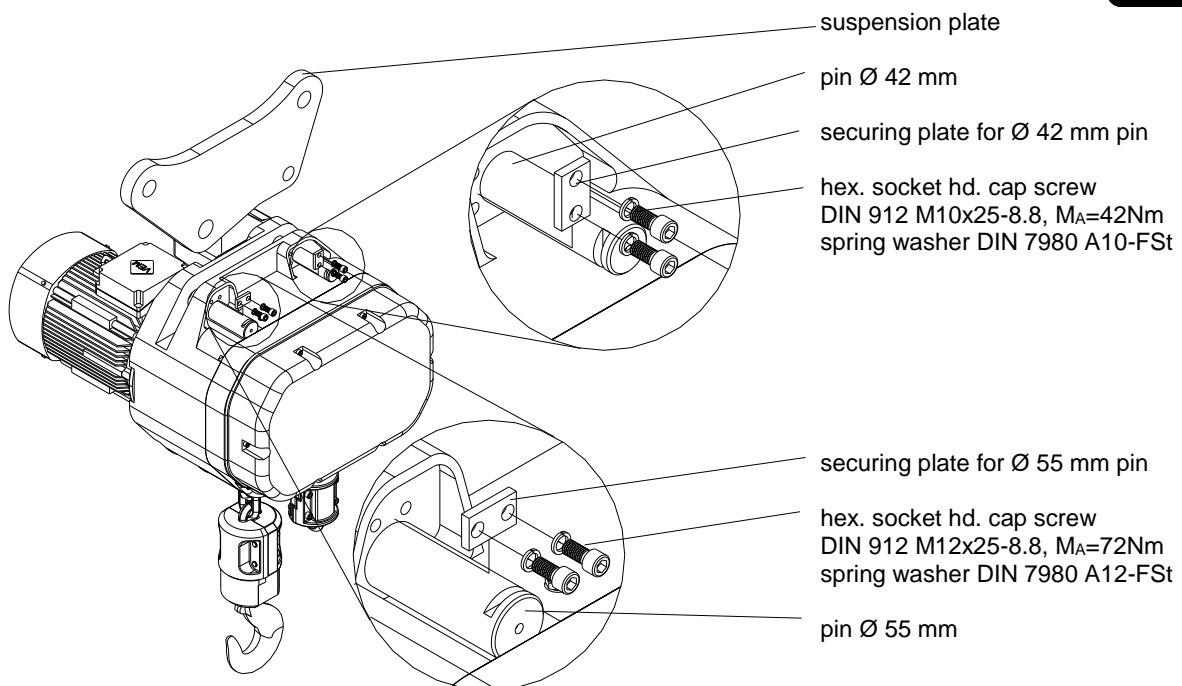


Figure 6: suspension with suspension plate

3.1.3.2 Hoist suspension with single hole suspension plate

Assembly: Place the suspension plate into suspension nest, specially provided on the electric chain hoist body, and pin it in into place by two pins. Fit the securing plates and secure them by socket head cap screws complete with spring washers.

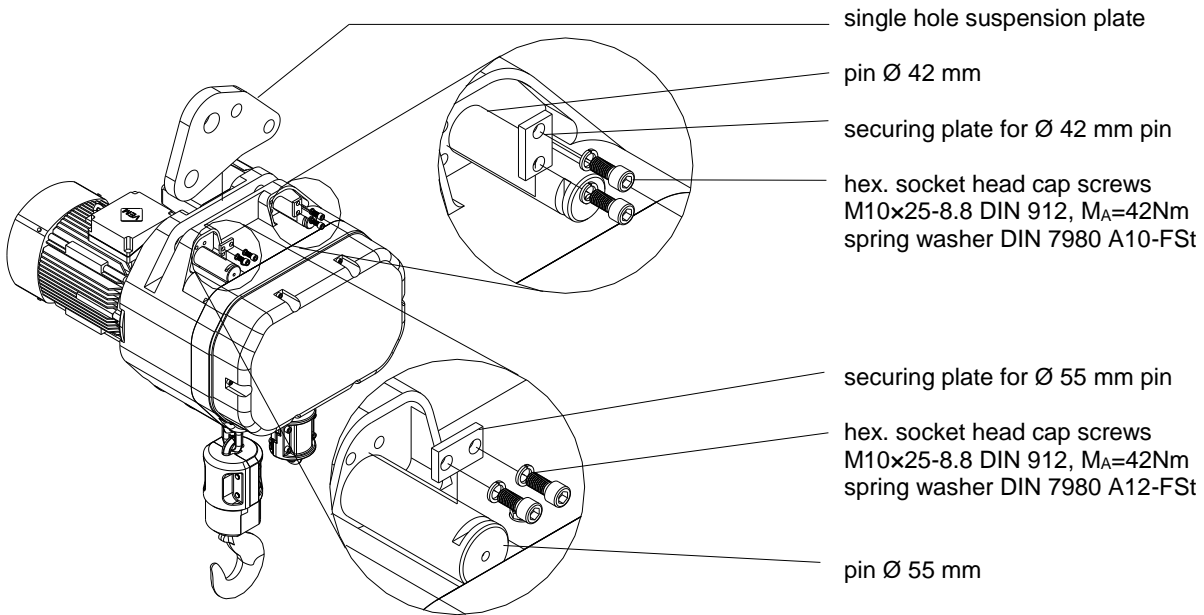


Figure 7: hoist suspension with single hole suspension plate

Caution!

The single hole suspension plate is designed so that centre of suspension hole fall in line with centre of gravity of the load both in case of single and double fall versions. The right fixing hole is marked by a symbol.

When changing the number of chain falls of hoist, which is fitted with a single hole suspension plate, the suspension point has to be selected to fall in line with the centre of gravity of the load.

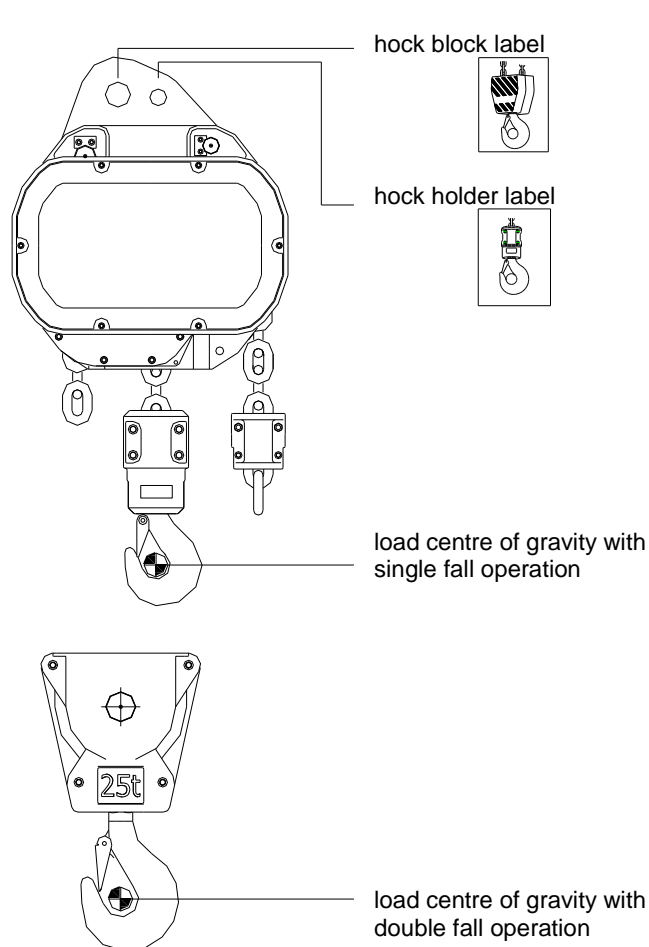


Figure 8: load centre of gravity with single and double fall version

3.1.4 Gear ventilation

After the completion of hoist installation, a special washer has to be placed under the oil filler plug (top side of casing) to avoid oil leakage due to high pressure inside the gearbox. You will find this washer fastened with a piece of self-adhesive tape next to the oil filler plug.

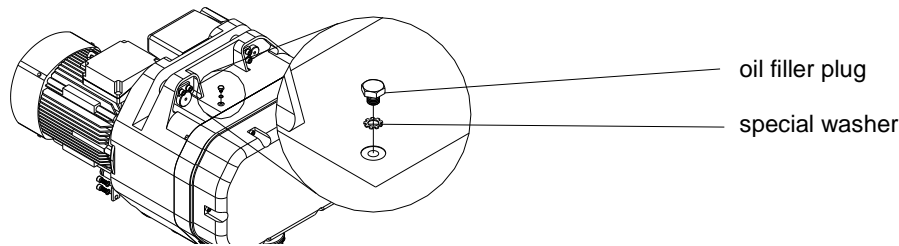


Figure 9: special washer for the oil filler plug

3.1.5 Mounting the chain box

The chain box is held in position by a DIN 931 M20x200-8.8 screw, which is secured by a M20 DIN 985-8 self-locking nut.

To secure chain box into place or adjust its position, fit the securing chains as follows:

- Insert the chain end links of each securing chain (7x22 mm) in between the lugs on chain box and fix them by DIN 931 M8x35-8.8 hex. head screws and M8 DIN 985-8 self-locking nuts.
- The securing chains have to be fixed on suspension eye. The securing chains are connected by shackles and they are fixed on the suspension eye by the lugs and the 12x80 DIN 1433 bolts.
- Make ensure that securing chains are **tight and not twisted** after fitting.

Important! Ensure that the chain box is sufficient large for the **amount of chain you are using**. See the chain dimension and **capacity** markings shown on the side of the chain box. Insert the chain end with lift limiter loosely into the chain box.

After running the entire chain length through the hoist into the chain box, check that the box is not overloaded (see capacity mark at the chain box).

Do not overload the chain box.

Take care that load holding elements do not contact or hit the chain box.

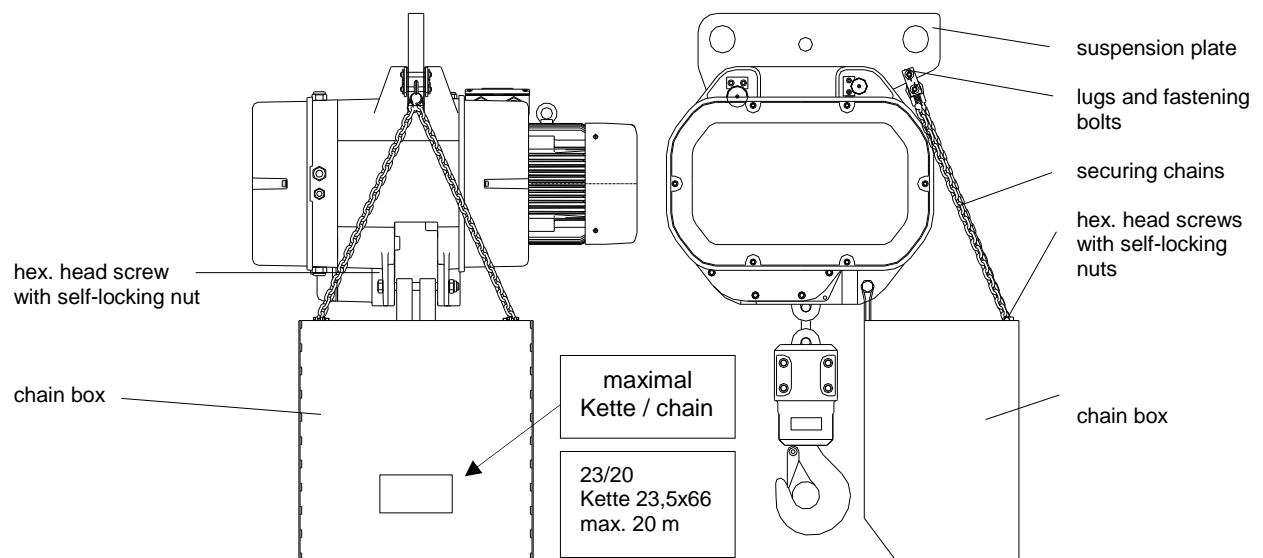


Figure 10: Mounting the chain box

3.1.6 Assembling the load chain - single fall version

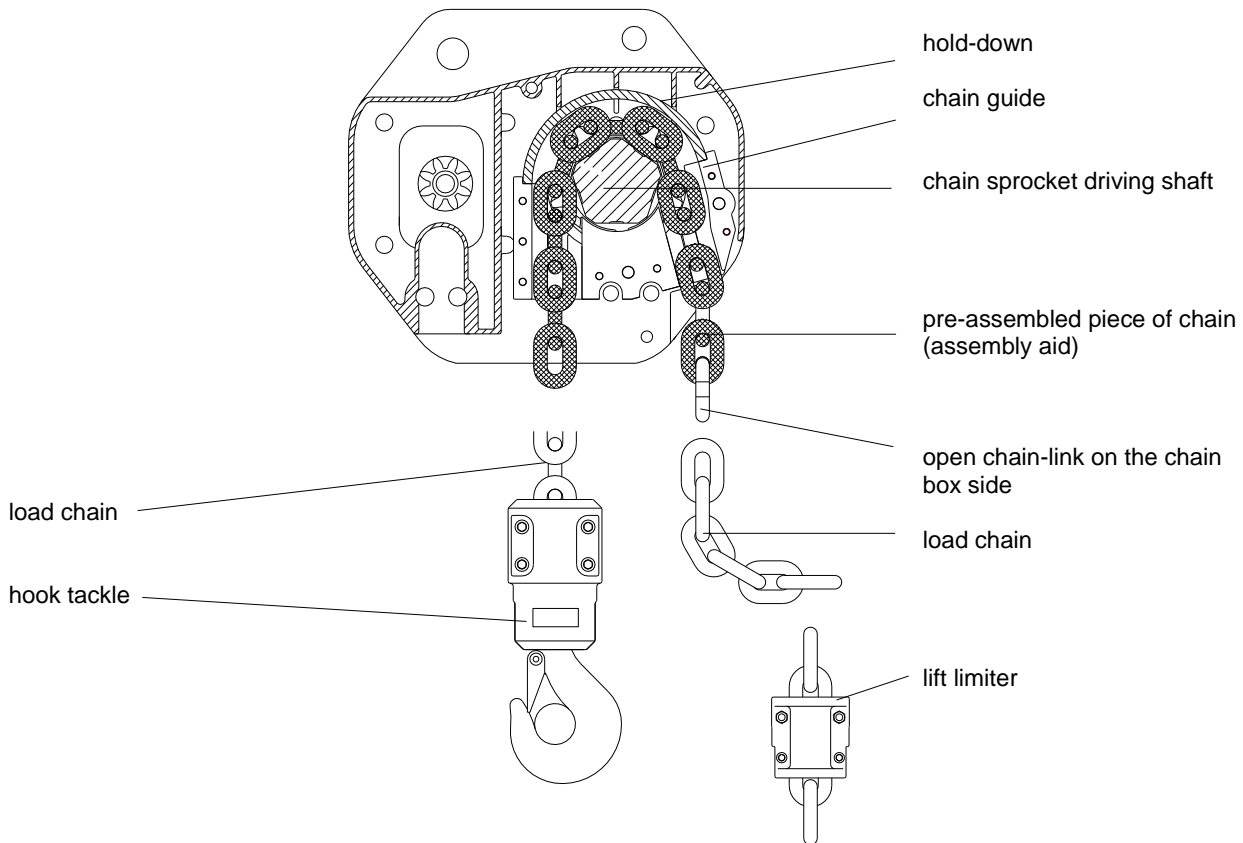


Figure 11: assembling the load chain – single fall version

1. There is a short pre-assembled piece of chain on the chain driving sprocket of new units.
2. Always place the open chain link on the chain box side of the pre-assembled piece of chain and hook on the load chain.
3. Feed in the load chain by actuating control buttons.
4. **Remove the pre-assembled chain piece and the open chain link.**
5. Fit the hook tackle to the end of load chain.
6. Lower the hook to its lowest position.
7. Attach the lift limiter* onto the 3rd link of the dead end.
8. Assemble chain box according to chapter 3.1.5.
9. Allow the chain to run into the chain box and lubricate the entire length of the chain

Caution! When feeding in load chain or changing the number of chain falls, never let the old chain to run completely out of the chain hoist body. Hook on the new load chain or a chain piece on its end by an open link. After feeding in the new load chain, remove open chain link and chain piece (observe instructions specified in chapter 3.1.8!)

Let the dead end of chain run into the chain box by pressing the up button and using the hoist motor (not by hand) to prevent knots inside the chain box. Allow filling of the chain box only by running the chain through the hoist by using the motor.

* Lift limiter

The lift limiter actuates a limit switch, which determines the lowest position of load hook and prevents the dead end of chain running out of the hoist. When the limit switch malfunctions, lift limiter acts as an emergency limiter together with the slipping clutch. This emergency limit stop, however, cannot be used in normal operation.



3.1.7 Assembling the load chain – double fall version

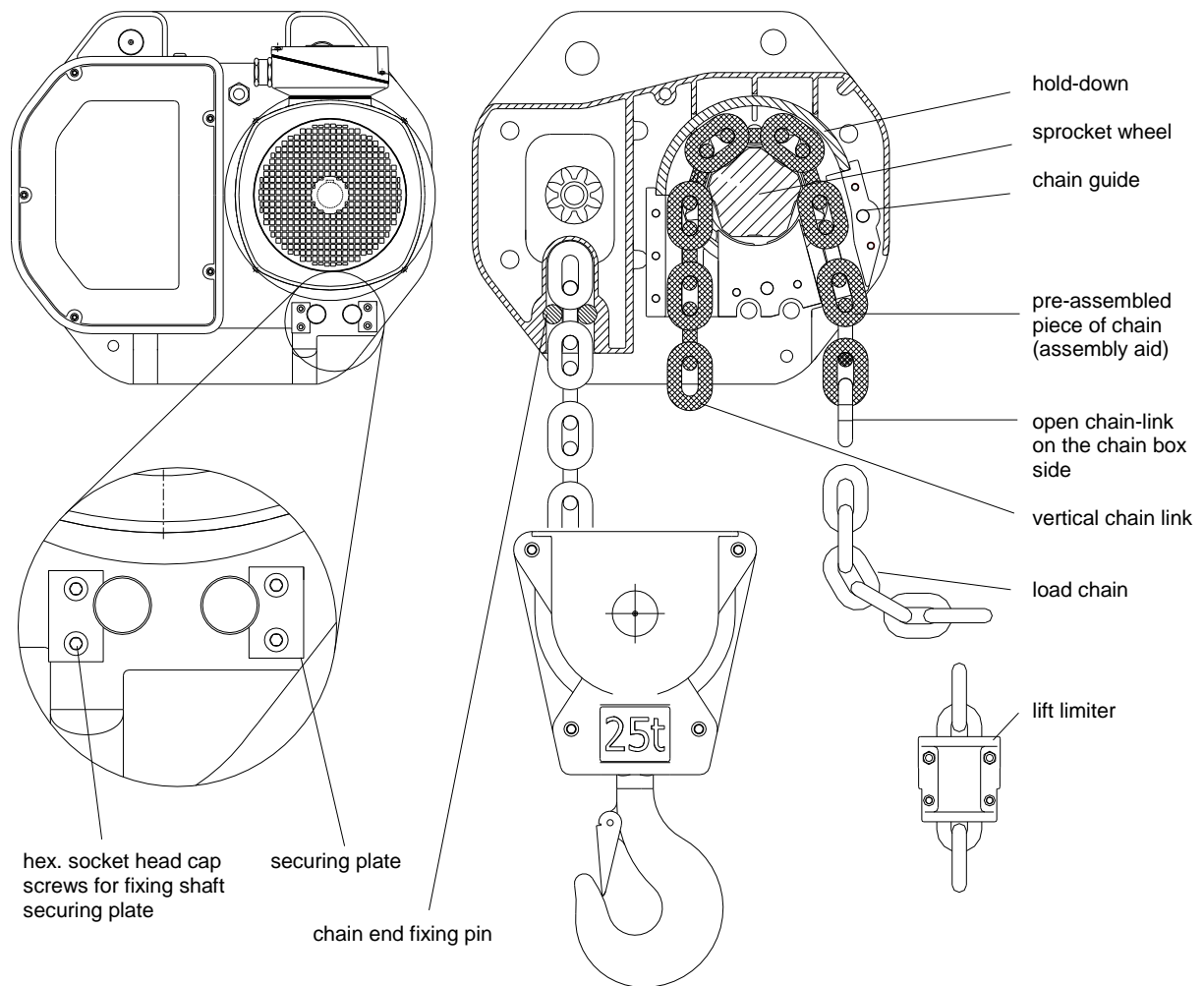


Figure 12: assembling the load chain – double fall version

1. First feed the load chain into the hoist body (as described in chapter 3.1.6).
2. Pull the chain through the hook block using the pull in-wire (special tool).

Caution! Never allow the chain to be twisted between the chain outlet and the hook block! If the assembly, according to Figure 12, is not possible without a twisted chain, one chain link has to be cut and removed to allow correct assembly or installation has to be performed with 2 slotted chain links.



3. **Remove the pre-assembled chain piece and the open chain link.**
4. Unscrew DIN 912 M10x25-8.8 socket head cap screws of the shaft securing plate.
5. Remove both chain fixing pin.
Pull the chain end starting with vertical chain link from the hook block and push it into the cross shaped chain hole, which is on the bottom of hoist casing. Take care not to let the chain get twisted.
6. Reinsert chain end fixing pins.
7. Fit securing plates with DIN 912 M10x25-8.8 ($M_A=42Nm$) socket head cap screws.
8. Recheck that the chain is not twisted.
9. Lower the hook to its lowest position.
10. Attach the lift limiter onto the 3rd link of the dead end.
11. Assemble chain box according to chapter 3.1.5.
12. Allow the chain to run into the chain box and lubricate the entire length of the chain

Caution! Please take into account directions for use described in chapter 1!



3.1.8 Replacing the load chain, chain guide and hold-down

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

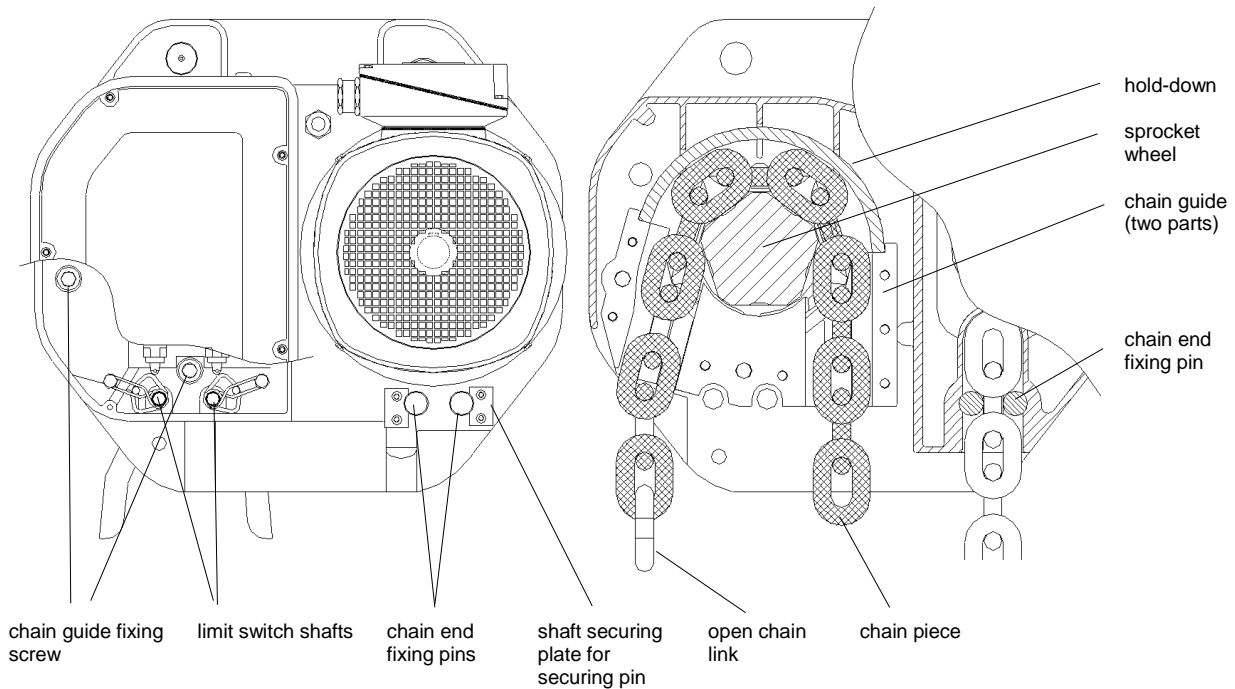


Figure 13: replacing the load chain, chain guide and hold-down

Single fall operation

Removal of worn load chain

1. Dismantle chain box.
2. Remove hook tackle from load chain by unscrewing 4 pcs. of DIN 912 M16x70 socket head cap screws (see section 3.1.1)
3. Dismantle lift limiter from the unloaded chain end by unscrewing 4 pcs. of DIN 912 M12x70 socket head cap screws.
4. Hook the feed-in chain piece to the hook side of load chain using an open chain link.
5. Run the worn load chain out of the unit by actuating up-switch.
6. Run the load chain out of hoist body until pre-assembled chain piece is still remains on the chain sprocket.
7. Unhook worn load chain from pre-assembled chain piece.



Replacing the load chain and hold-down

8. Remove the cover of limit switches by unscrewing 5 pcs. of DIN 912 M8x80-8.8 hex. socket head cap screws.
9. Removal of limit switch shafts in the following order:
 - ⇒ Unscrew DIN 912 M5x35-8.8 hex. socket head cap screws (2-off) of the limit switch shafts.
 - ⇒ Remove retainer rings and spring of rotating fork.
 - ⇒ Pull out the limit switch shafts.
10. Unscrew DIN 912 M20x140-8.8 screws (2-off) of the chain guide located in the limit switch compartment.
11. Remove chain guide (from the bottom of the housing)
12. Press the hold-down out of its position, using a screwdriver.
13. Fit the new hold-down and new chain guide
(Tightening torque of DIN 912 M20x140 mounting screws (2-off) should not exceed 60 Nm.)
14. Refit limit switch shafts (see section 3.2.2)
15. Refit limit switch cover.



Replacing load chain

16. Always place the open chain link on the chain box side of the pre-assembled piece of chain and hook on the new load chain.
17. Feed in the load chain by inching the pendant.
18. **Remove the pre-assembled chain piece and the open chain link.**
19. Fit the hook tackle to the end of load chain.
20. Lower the hook to its lowest position.
21. Attach the lift limiter onto the 3rd link of the dead end.
22. Fit on chain box according to section 3.1.5.
23. Allow the chain to run into the chain box and lubricate the entire length of the chain



Caution! If the chain has completely run out of the hoist housing, loosen the clutch before fitting the new chain and readjust it after the chain has been fitted.



Double fall operation

Removal of worn load chain

1. Dismantle chain box.
2. Unscrew DIN 912 M10x25-8.8 fixing screws (4-off), dismantle shaft holders and remove chain end fixing pins.
3. Dismantle lift limiter from the unloaded chain end by unscrewing DIN 912 M12x70 hex. socket head cap screws (4-off).
4. Hook the feed-in chain piece to the hook side of load chain using an open chain link.
5. Run the worn load chain out of the unit by actuating pendant switches.
6. Run the load chain out of hoist body until pre-assembled chain piece is still remains on the chain sprocket.
7. Unhook worn load chain from pre-assembled chain piece.



Replacing the load chain and hold-down

8. Remove the cover of limit switches after unscrewing 5 pcs. of DIN 912 M8x80-8.8 hex. socket head cap screws.
9. Removal of limit switch shafts in the following order:
 - ⇒ Unscrew DIN 912 M5x35-8.8 socket head cap screws (2-off) of the limit switch shafts.
 - ⇒ Remove retainer rings and spring of rotating fork.
 - ⇒ Pull out the limit switch shafts.
10. Unscrew DIN 912 M20x140-8.8 screws (2-off) of the chain guide, which is located in the limit switch compartment.
11. Remove chain guide (from the bottom of the housing)
12. Press the hold-down out of its position, using a screwdriver.
13. Fit the new hold-down and new chain guide
(Tightening torque of DIN 912 M20x140 mounting screw (2-off) should not exceed 60 Nm.
14. Refit limit switch shafts (see section 3.2.2)
15. Refit limit switch cover.



Replacing load chain

16. Always place the open chain link on the chain box side of the pre-assembled piece of chain and hook on the new load chain, starting with vertical chain link.
17. Feed in the load chain by actuating the pendant switch.
18. **Remove the pre-assembled chain piece and the open chain link.**
19. Pull the chain through the hook block using the pull-in wire (special tool).

Caution! Never allow the chain to be twisted between the chain outlet and the hook block! If the assembly, according to Figure 12, is not possible without a twisted chain, one chain link has to be cut and removed to allow correct assembly.
20. Pull the chain end from the hook block and push it into the cross shaped chain hole, which is on the bottom of hoist casing. Take care not to let the chain get twisted.
21. Reinsert chain end fixing pins.
22. Fit securing plates with DIN 912 M10x25-8.8 (M_A=42Nm) hex. socket head cap screws.
23. Recheck that the chain is not twisted.
24. Lower the hook to its lowest position.
25. Attach the lift limiter onto the 3rd link of the dead end.
26. Fit on the chain box properly.
27. Allow the chain to run into the chain box and lubricate the entire length of the chain



Caution! If the chain has completely run out of the hoist housing, loosen the clutch before fitting the new chain and readjust it after the chain has been fitted.



3.2 Electric connections

Electrical installation must comply with EN 60204-32 or relevant national regulations. After having completed the installation, checks have to be executed in accordance with the European Regulation EN 60204-1, section 20.2 and section 20.3.



Details of the control can be seen in the wiring diagram. The electric installation complies with the currently valid EN 60204 part -32 standard.

3.2.1 Connection to the mains power supply (three phase mains rotating clockwise)

The mains power supply (main incoming line cable) must be able to be disconnected at all poles by means of a mains switch (in accordance with EN 60204-32 section 5.3).

Work on the electric installation may only be carried out by trained specialists and the equipment must first be disconnected from the mains power supply.

Fuses (slowly blowing) at 400 V (-) before main switch should have 63 A rating.

Check if the mains voltage complies with that specified on the type plate.
Connect mains supply lines and control cables in accordance with the wiring diagram.



The L1, L2, L3 and PE terminals for the mains connection are located in the control box. Line 3 + PE cable (minimum cross section 4 mm²) are necessary for the connection. After connection, press the lifting button. If the load moves downwards, swap L1 and L2 supply wires (cut off power supply before swapping)



3.2.1.1 Low voltage control (auxiliary circuit control)

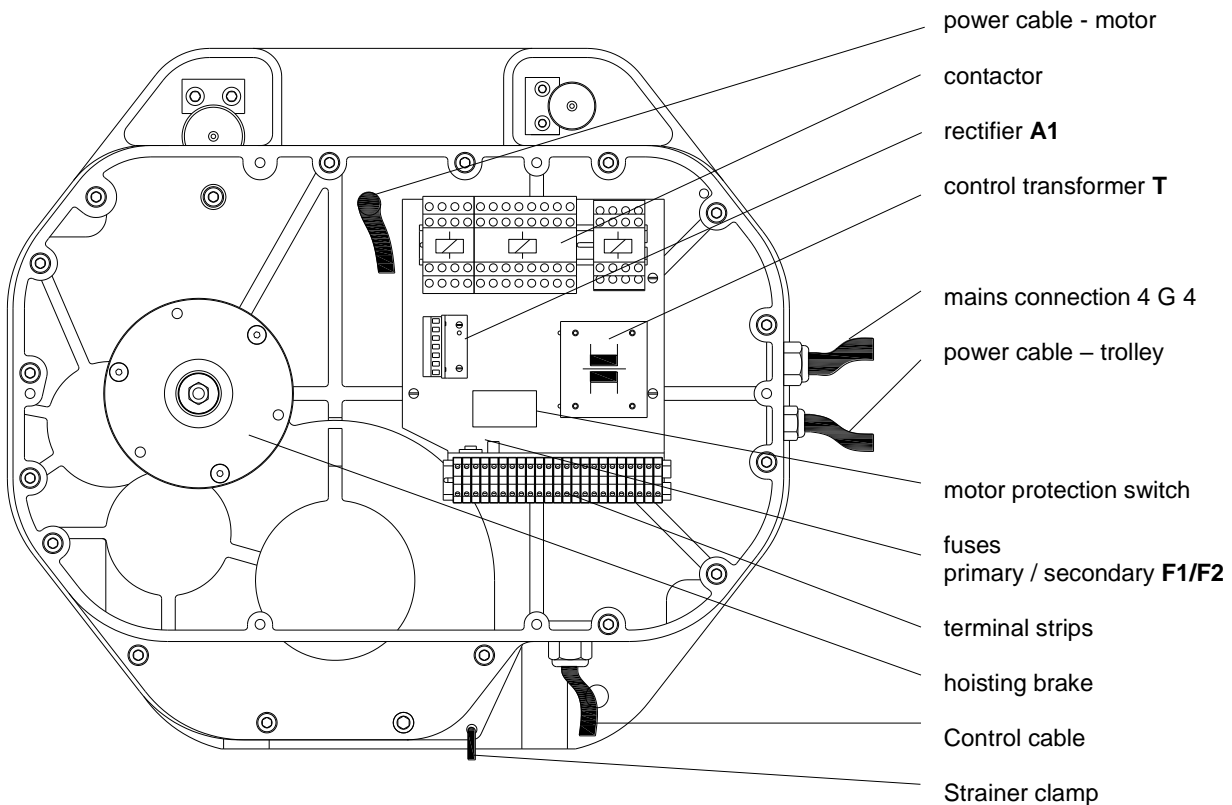


Figure 14: low voltage control

The control transformer T supplies control circuit with 24 V AC control voltage. Other secondary voltages are available on request.

3.2.2 Electric limit switches for lift limitation

The electric chain hoists are equipped with electric limit switches to limit the uppermost and lowest position of the hook. Distance between limit switch cam and limit switch can be adjusted by shifting the switch, and its value should not exceed 1 mm.

When commissioning hoists, make sure that symbols on the switches comply with direction of hook movement.

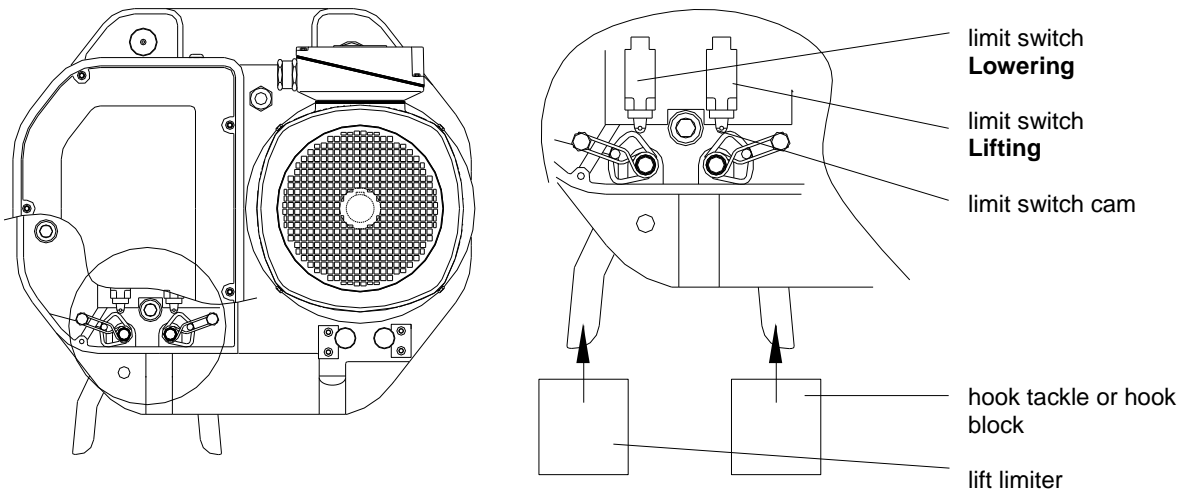


Figure 15: electric limit switches for lift limitation

4 Electric chain hoist with electric trolley

All trolleys are suitable for

- Flanges with small width in accordance with DIN 1025 and European regulations 24-62
- Flanges with medium width in accordance with DIN 1025
- Flanges with large width in accordance with DIN 1025

The trolley can be fitted with an electric cross limit switch at the level with the centre of trolley wheels.

Electric trolley of type 235/... hoist is not suitable for curved tracks!

Additionally load conditions of bottom flange of support beam has to be checked by a structural engineer and has to comply with FEM 9.341.



4.1 Single fall operation

In case of single fall operation (max. 12,5 t), the electric chain hoist is fixed to the electric trolley by a suspension plate.

Electric chain hoists supplied with a 12,5 t capacity trolley can not be converted to two fall operation.

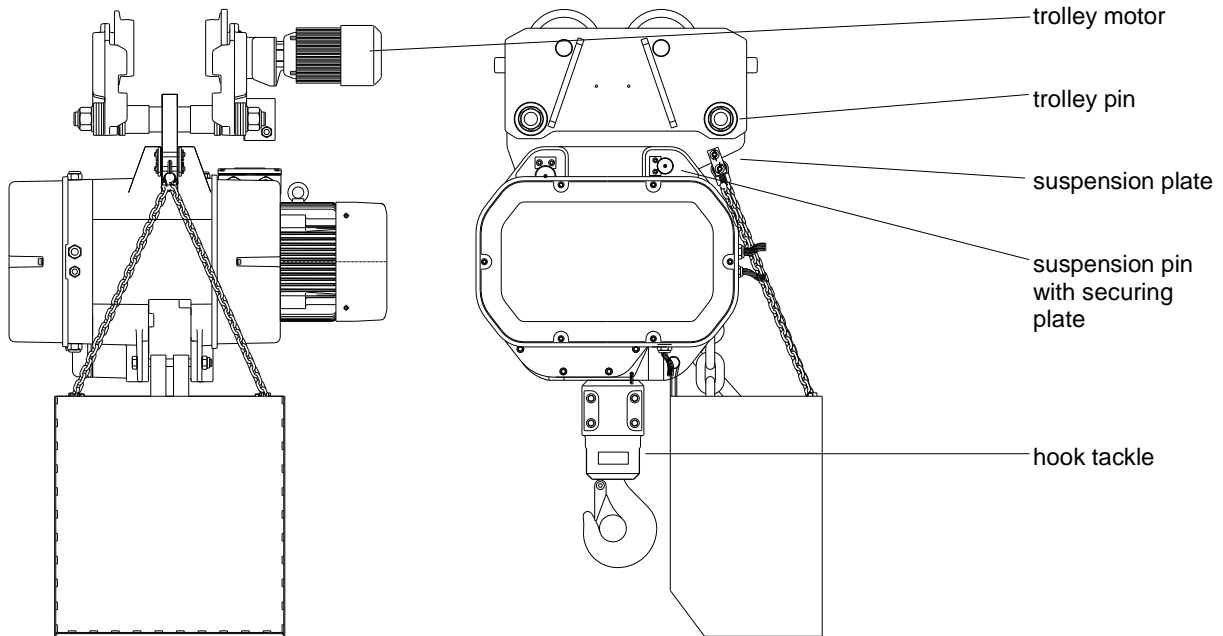


Figure 16: electric chain hoist with electric trolley

4.2 Double fall operation

In case of double fall operation, two 12,5 t capacity electric trolley are used to carry the chain hoist. In this operation mode with maximum 25 ton load capacity, four traverses distribute load evenly on two trolleys.

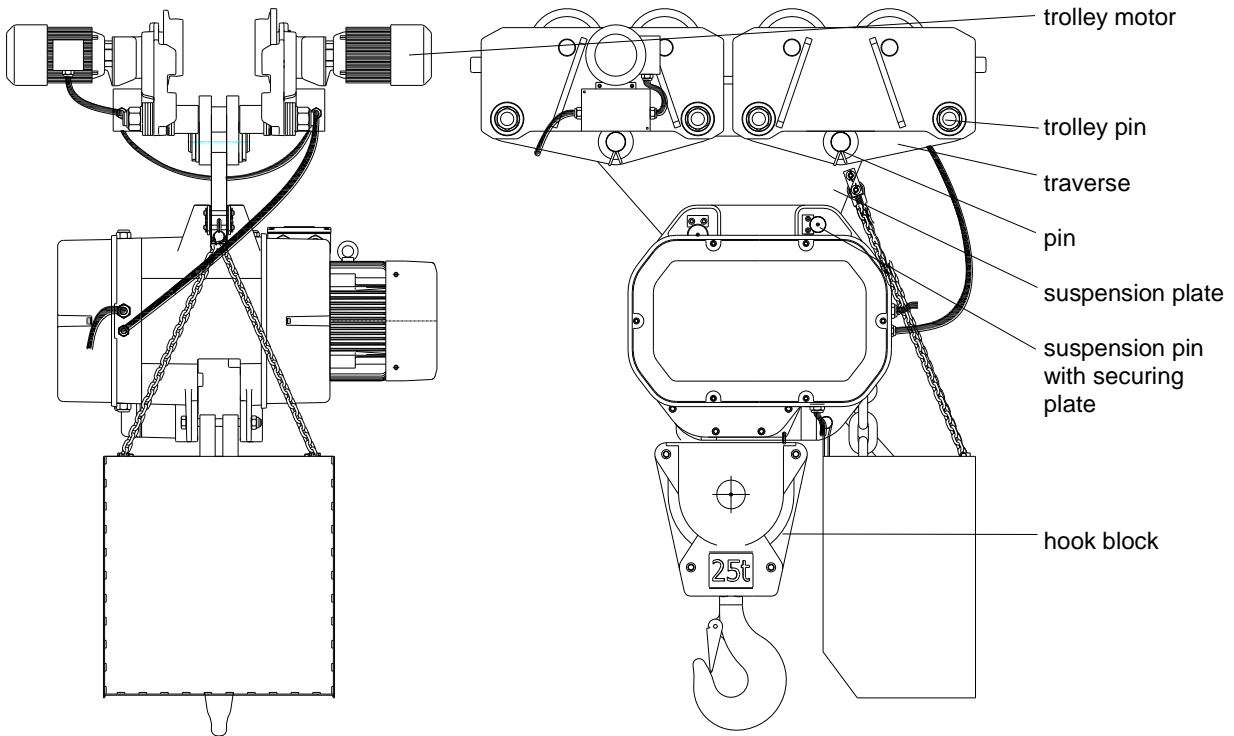


Figure 17: hoisting gear with electric trolley

4.3 Mechanical assembly

The two trolley suspension bolts are to be fixed to the lateral boards so as to allow a clearance of one to two millimetres between the running wheel flange and the girder flange. The width of trolley is adjusted by inserting spacers symmetrically.



In case of **single fall operation**, the suspension plate is mounted between spacing bushes on the trolley connecting pins.

In case of **double fall operation**, traverses have to be placed on trolley suspension pins in between spacer bushes. The suspension plate is fitted between traverses by using pins, which are secured by washers and pegs.

To ensure the right installation position of trolleys, traverses are designed in such a manner that trolleys can be mounted in one way only. Trolleys cannot contact each other in the middle.

Securing nut (M36x1,5) of the trolley pin is to be tightened to 560 Nm torque by a torque wrench.

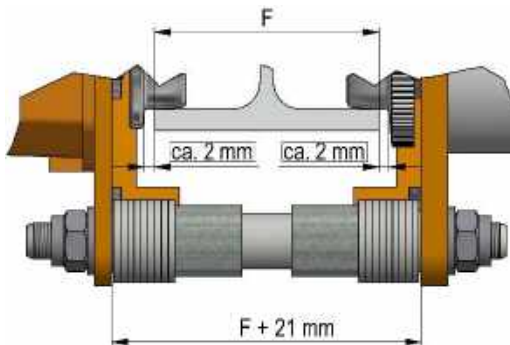


Figure 18: adjusting the width of electric trolley

The suspension plate is fixed to the hoist by two suspension pins $\varnothing 50$ mm and $\varnothing 42$ mm. The suspension pins are secured by securing plates and socket hd. cap screws. Movement, in the directions shown by the arrows, must still be possible between the hoist and the trolley when assembly is complete.

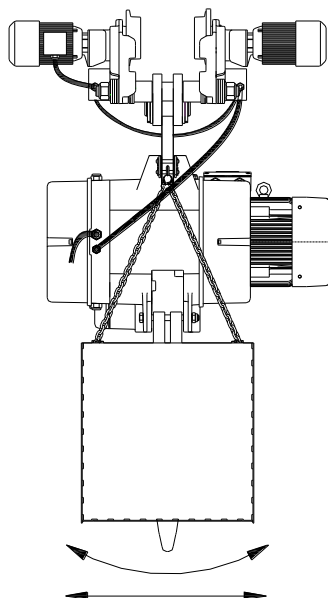


Figure 19: flexibility between chain hoist and trolley

4.4 Electric connection of trolleys

The contactors for controlling the trolley motor are located in a special contactor box. This control box is fixed to the side- plate of trolley (on the motor side) by two DIN 912 M8×10 socket head cap screws.

Connect the leads of the cable protruding from the contactor box to the right terminals in terminal compartment of the electric chain trolley in accordance with the wiring diagram. After electric connection, check that the electric chain hoist and trolley are working correctly.

In case of double chain fall operation, the second trolley is to be connected to the first trolley by a connection cable in accordance to wiring diagram. There is a separate cable screw connector for this purpose in the auxiliary control box of the first trolley.

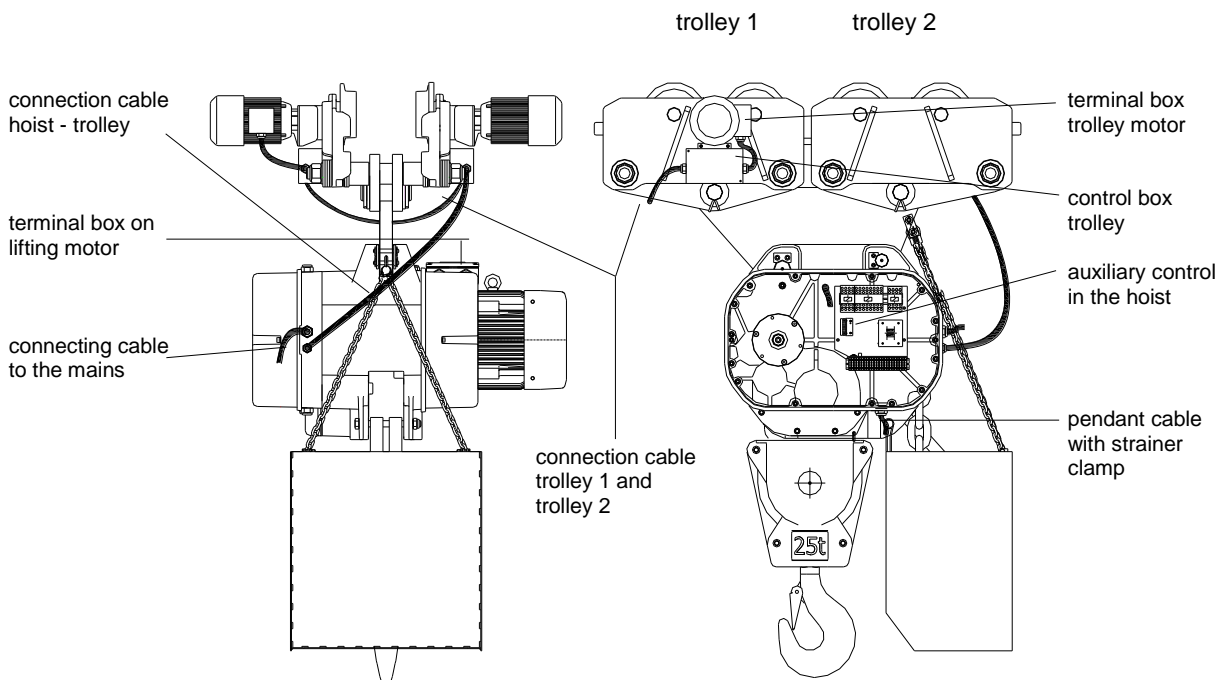
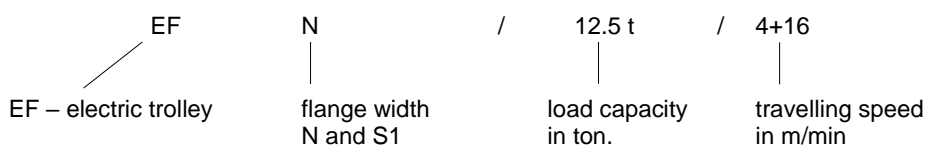


Figure 20: electric connection of trolleys

Explanation of trolley type designation



5 Tests

Use of the electric chain hoist is possible in accordance with:

- Accident prevention regulations for Winches, lifting and pulling equipment DGUV V 54 (BGV D8)
- UVV Cranes DGUV V 52 (BGV D6)

The dynamic and static tests are accomplished acc. to EC Machinery Directive by manufacturer.

5.1 Test when used according to DGUV V 54 (BGV D8 § 23)

A trained specialist must test the equipment before starting operation for the first time and after extensive alterations.

5.2 Test when used according to DGUV V 52 (BGV D6 § 25)

An authorised person must test the cranes before starting operation for the first time and after extensive alterations. The electric chain hoists are type approved.

5.3 Regular tests

- A trained specialist must test the equipment, cranes and supporting structures once a year. It may be necessary to carry out tests more often if the operating conditions are very harsh, that means for example high percentage of use with full load, dusty or aggressive environment, high duty rate, high number of operation cycles. With this inspection, the remaining time of use is to be determined and recorded in accordance with FEM 9.755.
- Only an **authorised person** appointed by the BG - associations and experts from the Technical Control Association (TÜV) are considered qualified to test cranes.
- **Trained specialists** are highly qualified specialist personnel or the manufacturer's after-sales service personnel.

6 Maintenance

- All maintenance work must be carried out by trained specialists.
- The maintenance table (Table 1) lists the parts and functions to be checked and the necessary maintenance work. Malfunctions have to be reported immediately, in writing, to the owner, who initiate repair work to be carried out by a trained specialist.
- All repair work must be carried out on unloaded equipment, after power supply is cut off by main switch.
- Shorten the periods between maintenance works in very harsh operating conditions, e.g. multi-shift operation, high number of switch actuation, poor environmental conditions.



Checking for wear

- Check suspension hook and load hook for possible deformation (measure punch spacing), cracks, corrosion and general condition.
- The chain sprocket in the hook block must be replaced if the running surface is worn by about 1mm.
- Check the wear of the load chain in accordance with chapter 6.4.2.



6.1 Maintenance and checks

Please note points described in chapter 1.2 !

The following regular maintenance periods are for reference, which has to be shortened, if the hoist is working under hard conditions (two or three shifts, high percentage of lifting with nominal load, dusty or high temperature environment).

	Check		
	daily	3 monthly	yearly
Visual check of the whole equipment	•		
Function check of the brake	•		
of the lift limiter		•	
Maintenance and adjustment of the brake	30 operating hours		
Slipping clutch			•
Wear of the load chain (chapter 6.4.2)		•	
Lubrication of the load chain	•		
Lubrication of the hook tackle and hook block in accordance with chapter 10.3, and condition of safety latch		•	
Checking hook nut locking			•
General checks of all screws			•
chain guide / hold-down			•
locking elements			•
Condition and fixing of chain box		•	
Check of control cable, power supply cable and pendant control			•
Check of the trolleys and wheels			•

Table 1: maintenance and checks

The electric chain hoist is designed in accordance with FEM 9.511. If the hoist is used under the conditions of FEM 9.511, including the described frequency of maintenance work, the electric chain hoist must be overhauled after 10 years.



6.2 Construction of DC disc brake

Brake type	Screws DIN 912	Tightening torque [Nm]	Nominal power P [W]	Air gap S_L nominal [mm]	Air gap S_L max. [mm]
BFK 458-16	3xM8	23	55	0,3	0,75
ROBA-stop-M 100	3xM8	22	88	0,3	0,9

Table 2: brake types

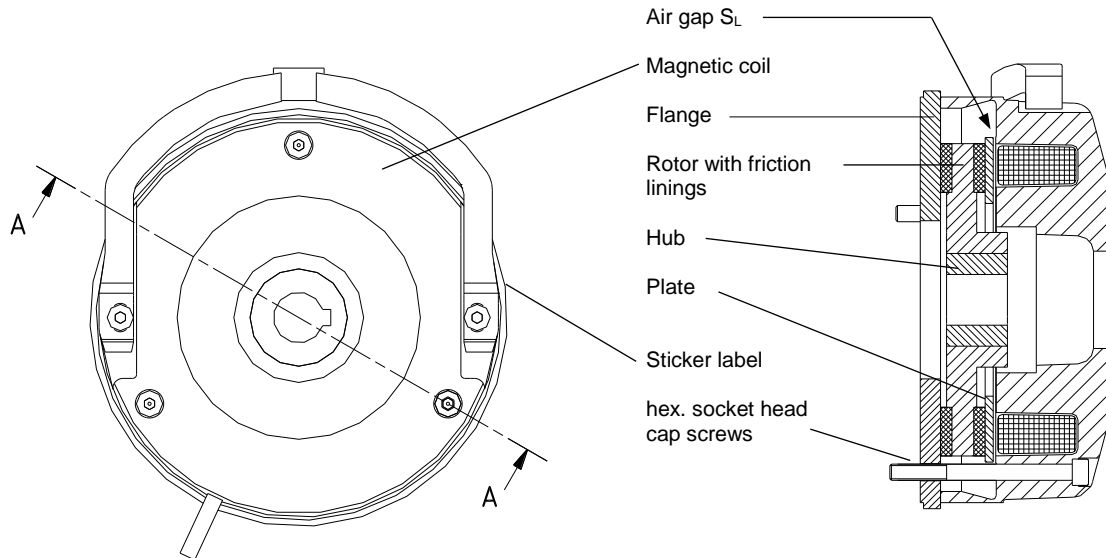


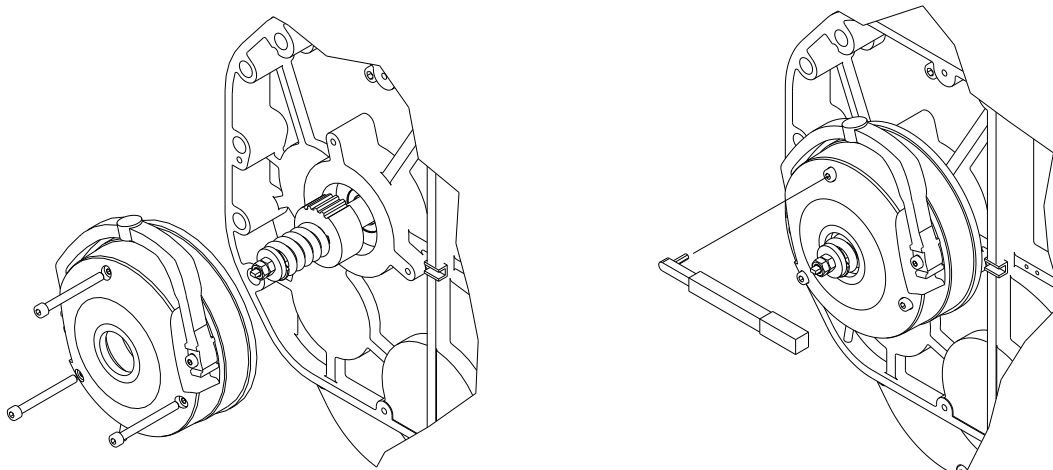
Figure 21: construction of spring operated brake

6.2.1 Installation of the brake

1. Press the hub onto the shaft.
2. Assemble the clutch spring with adjusting nut and locking nut.
3. Assemble brake unit to the hub.
4. Mount the brake on the gear cover by 3 x M8 fixing screws.
5. Tighten the screws uniformly (tightening torque see table 2)



When ordering spare parts, the complete model designation has to be stated.



Mounting the brake onto the gear cover

Tightening with a torque wrench

Figure 22: installation of the brake

Dismantling has to be done in the opposite order!



6.2.2 Electric control of the brake

Principle of operation

The disc brake is supplied through a rectifier circuit. It operates according to the fail-safe principle. If there is a power failure, the brake is applied automatically so that the load is held securely in every position. To shorten the braking time the brake is operated in a DC circuit. The different methods of connection for a particular type of hoist can be seen in the respective wiring diagram.

6.2.3 Faults on brake

Troubleshooting and fault elimination

Faults	Causes	Remedy
Brake does not release; air gap is not zero	Coil has contact to ground or between the windings	Replace the brake
	Wiring wrong or defective	Check connection and correct wiring to drawing
	Rectifier defective or wrong	Compare wiring at rectifier with wiring diagram; especially correct setting of the bridge. Measure DC - voltage between terminals 5 and 6. If differences occur change the rectifier
	Air gap too large	Replace the brake

Table 3: troubleshooting and fault elimination

If rectifier defects occur repeatedly, the brake shall be replaced even if no winding short circuit can be detected. Defect may occur only in warm operating condition.

6.2.4 Checking brake functioning

When breaking the nominal load during the lowering process, the load should be stopped after approx. two chain link lengths of travel, and the brake should not stop the load in a jerking manner.



6.3 Safety clutch

The sliding clutch is located between the lifting motor and main pinion shaft and transmits the torque. As a secondary function, it limits the transmission of torque depending on the setting, hence limits the transmitted power. This way, it prevents overloading hoist and its support components.



A special advantage of the patented safety clutch is, that it is situated right after the motor shaft, before the brake. In case of heavy wear at the clutch lining, one would not see an uncontrolled downward movement of the load, because the load can be held at every point by the brake.

The clutch unit acts as a sliding clutch with asbestos free linings. The clutch is easily adjustable and accessible. The wear resistant lining material doesn't require re-adjustment under normal operational circumstances.

6.3.1 Construction of slipping clutch

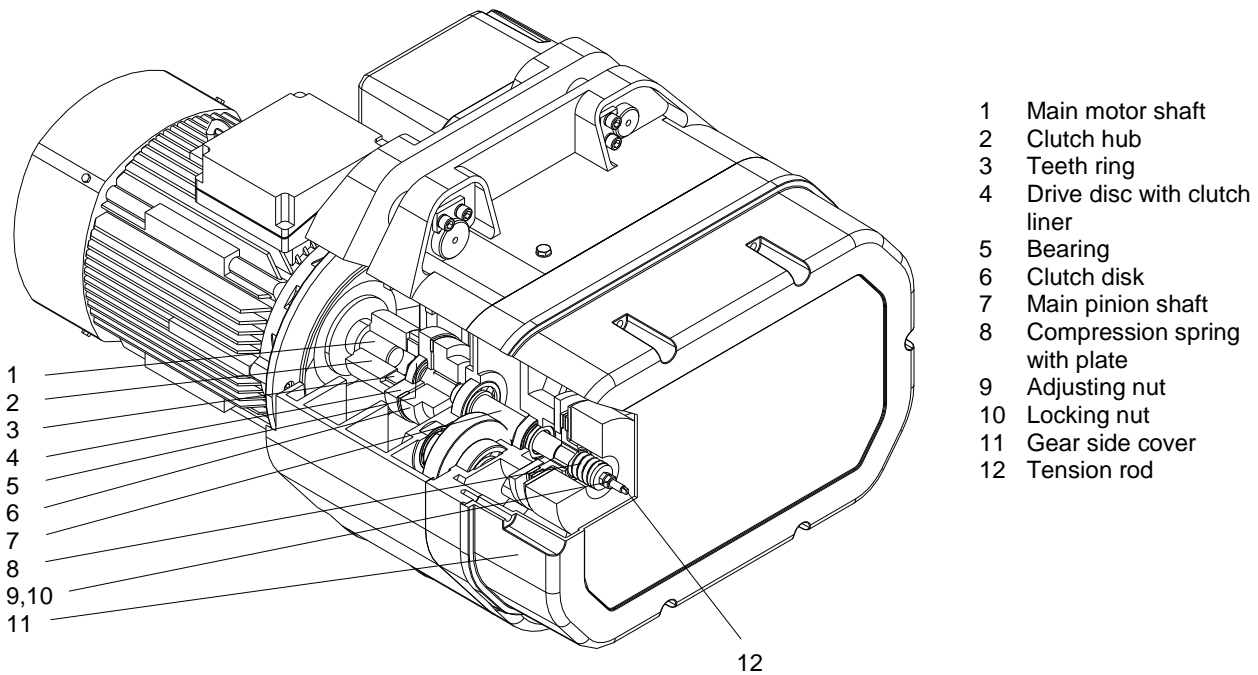


Figure 23: construction of sliding clutch

6.3.2 Adjustment of the sliding clutch

Adjusting the sliding clutch may only be performed by a trained or competent person.

1. Test load = 1.1 times the nominal/rated load, or hook a clutch testing device to the load hook.
2. Switch on the electric chain hoist by pressing the lift button and check that the test load can be lifted or if the clutch testing device shows approximately 1.3 times the nominal load. The accurate value for 1.3 factor depends on lifting speed.
3. Lower the test load to the floor.
4. Decrease or increase clutch torque until the test load is just lifted or the clutch testing device shows a required value.
5. Adjustment of clutch torque:
 - a. Unscrew and remove cover on the gear side (11).
 - b. Loosen the securing nut (10) on the adjustment nut (9).
 - c. Use a spanner or plier to hold the shaft firmly against rotation of tension rod (12).
 - d. Use a second spanner to loosen/tighten the adjusting nut (9) until the hoist just lifts required test load, or the clutch testing device shows the required value.
 - Check the clutch setting by a short starting of the hoisting motor (press lift button shortly). –
 - e. Tighten the securing nut (10) on the adjustment nut (9).
 - f. Completion: Recheck the clutch torque by lifting the test load.
 - g. Refit cover on the gear side (11).

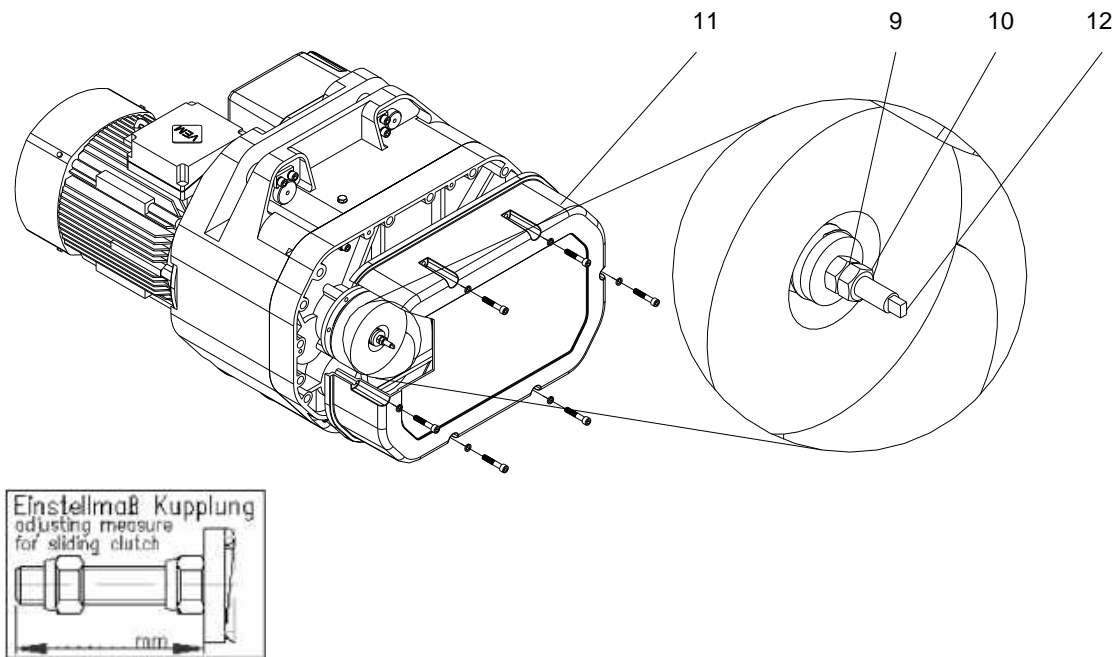


Figure 24: adjustment of the sliding clutch

The sliding clutch is factory set with the test load.

After changing or replacing the lift motor, it is not necessary to reset the clutch. In such a case, checking with nominal load is satisfactory.

The original distance between the end of the tension rod and the pressure plate of the coupling is marked on a tag on the brake coil.

Note: test load = nominal load (during regular inspections)



6.3.3 Checking the release limit of the sliding clutch during regular inspections

The release limit of the sliding clutch has to be checked by a specialist during the yearly work safety inspection in accordance with §26, DGUV V 52 (BGV D6), or §23, DGUV V 54 (BGV D8). It should be checked whether the hoist lifts the nominal load! The hoist must not lift more, than 1,6 x nominal load.

If test loads larger than nominal load are not available, then release limit of slipping clutch can be checked by a clutch testing device. In this case, slipping limit should be approximately 1,3 x nominal load. After checking the release limit, verify again if the hoist lifts the nominal load.

When measuring wrong release value, the sliding clutch has to be readjusted in accordance with chapter 6.3.2, and verification to chapter 6.3.3 has to be repeated. Adjustment value is to be recorded.

6.4 Load chain

Hoist chains are means of carrying loads which require official approval. Therefore, it is important to observe the guidelines issued by the trade association's centre for accident prevention with regard to round steel chains in hoisting operation, the guidelines for general inspection and test specifications in accordance with DIN 685, section 5, the accident prevention regulations in DGUV V 54 (BGV D8) and DGUV V 52 (BGV D6).

6.4.1 Lubricating the load chain before starting and during operation

The links along the entire length of the load chain must be lubricated with 1:1 mixture of penetrating gear lubricant oil and molybdenum grease - before starting operation for the first time and during operation with no load. Subsequent lubrication, after cleaning the links first, depends on the frequency of use and the operating conditions.



A dry-film lubricant, e.g. lubricating varnish, graphite powder, should be used when ambient influences are conducive to wear (sand, emery).

6.4.2 Checking the wear of the load chain

The continuous monitoring of the load chain is compulsory according to DIN 685 section 5 and the accident prevention regulations in DGUV V 54 (BGR D8) § 27. The load chain must be checked before starting operation and regularly after every 70 operating hours or 3500 lifting/lowering cycles - under normal conditions, or more often under harsh and severe conditions.



Checking must cover checking links, particularly at their points of contact, for wear, cracks, deformation and other damages.

The chain must be replaced:

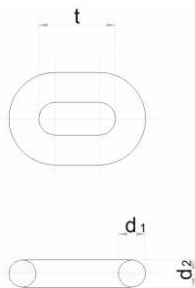
- if the nominal thickness at the points of contact is reduced by 10%,
- if the chain or a link is elongated by 5 %, or measured over eleven links, the chain is elongated by 2%
- if the links are rigid

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

Caution! For replacement, use only original chains supplied by the manufacturer.



6.4.3 Measuring wear and replacing chain



Chain dimensions 23.5 × 66 mm

t dimension = max. 69.3 mm

measured over one link

t dimension = max. 740.5 mm

measured over 11 link

d_m dimension = max. 21.15 mm

Formula:

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

Figure 25: measuring wear and replacing chain

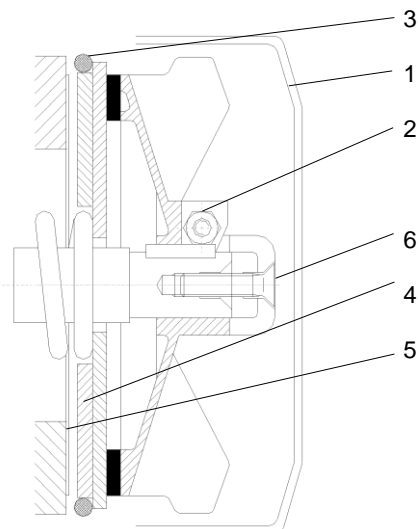
6.5 Maintenance work on trolley

The checks and maintenance work on the electric trolley have to be done in accordance with instructions specified for trolleys in Table 1. (Maintenance and checks).



6.5.1 Air gap adjustment of trolley brake

If the brake linings are worn, so that air gap reaches the max. allowed 0.9 mm, then it is necessary to adjust the gap.



1. Dismantle the cover (1).
2. Loosen the fan fixing screws (2).
3. Remove the O-ring (3) and put a thickness gauge 0.25 mm between plate (4) and sticking plate (5).
4. Tighten the screw (6) so far that you can remove the thickness gauge easily. Check the air gap at several places along the circumference.
5. Tighten the fan screws (2) uniformly. Tighten first the screws opposite the key (tightening torque 4-5.5 Nm).
6. Tighten the screw (6) again.
7. Remove the thickness gauge.
8. Replace the fan cover (1).
9. Carry out test run to verify the brake operation.

Figure 26: construction of the electric trolley brake

7 Duty rate of an electric chain hoist

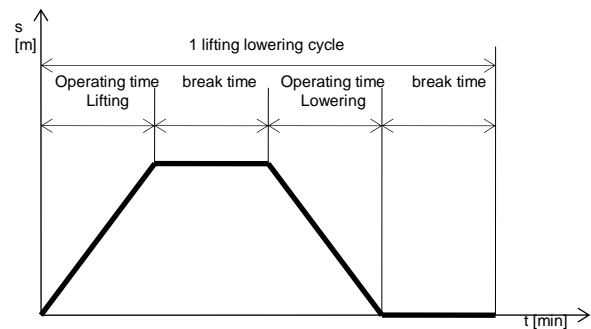
The duty rate and the number of operating cycles for one hour must not be exceeded (see FEM 9 682). The allowed duty rate is shown on the data plate of the electric chain hoist.

The duty rate, expressed as the cyclic duration factor (c.d.f.) is the ratio of

running time to running time + period of rest

Formula:

$$ED \% = \frac{\text{total running time} \times 100\%}{\text{total running time} + \text{total rest time}}$$



The duty rate is limited by the permissible temperature of the windings in the lifting motor. The running time is depending on the lifting height, lifting speed of the electric chain hoist and the number of lifting motions required for a particular transport procedure (unloading trucks, feeding machines). It is difficult in practice to take note of the duty rate during the lifting operation. We, therefore, give the following practical guidelines:

7.1 Short-time duty

Permissible operating period without cooling interval after motor starts and with an initial motor temperature of about 20°C.

Duty group FEM 9 511	Duty group ISO 4301	Duty rate (ED %)	Short-time duty to FEM 9.683 (t _B in min)
1 Bm	M3	25 %	15

Table 4: duty rate in short-time duty

This duty type is not permissible for the slow speed of hoisting motors. After having reached the maximum running time, a break is required, and the hoist can be further used in intermittent mode.

7.2 Intermittent duty

Duty rate (ED %)	Break (min)
25 %	3 times running time

Table 5: necessary breaks depending on duty rate

7.3 Example

The electric chain hoist type 12500/1-6,3/1,6 is used to lift loads of 12,500 kg to a height of 3 m.

Performance data:	Load	12500 kg		
	Lifting speed	6.3 m/min	- main lifting speed	1.6 m/min - slow lifting speed
	Duty rate	25 %	- main lifting speed	10 % - slow lifting speed

At the beginning of the lifting operation the electric chain hoist has a temperature of approx. 20 °C.

$$c.d.f. = \frac{3 \text{ m (lifting)} + 3 \text{ m (lowering)}}{6.3 \text{ m/min}} = 0.95 \text{ min}$$

The hoist can be operated for approximately 20 min. without a break. This means

$$21 \text{ lifting/lowering cycles} \times 12500 \text{ kg load} = \underline{262500 \text{ kg}} \text{ transported load.}$$

After 20 minutes of operating time, 3 minutes break for each minute of operating time must be taken (i.e. 3 times the operating time). This break is usually necessary for slinging and taking off loads.

Important! Low lifting speed should only be used for precise lowering and lifting.
Low lifting speed is not suitable when greater lifting heights should be achieved.



8 Duty rate of the electric trolleys

If the hoist is equipped with an electric trolley the operators have to take care of the duty rating of the trolley as well. This especially applies in case of very long tracks.

Electric trolley type	Duty rate (%)	Short running time (min)
EF 4+16 m/min	40/20	30*

* The ratings are relevant for the fast travelling speed.

Table 6: Duty rate for electric trolley

9 Strainer clamp for the control cable

The strainer clamp must be fixed in such a way as to prevent any tensile forces affecting the control cable. Pulling the chain hoist at the control pendant by means of the strainer clamp is not permitted.

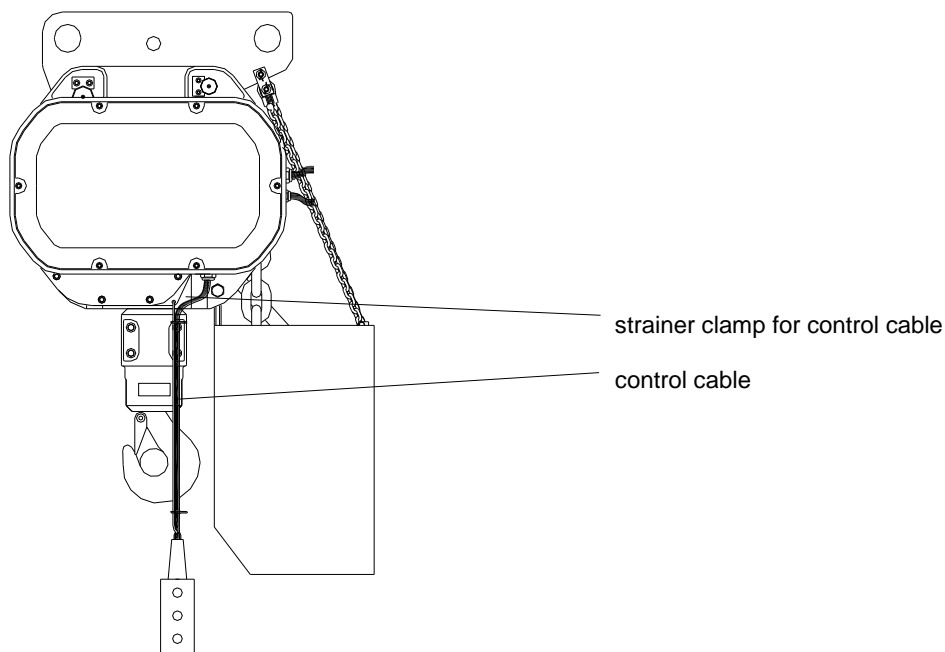


Figure 27: assembly of the strainer clamp

10 Lubrication

10.1 Lubrication of the gear

The gear is factory filled with 7.8 litre of gear oil. When the hoist is overhauled, the oil must be changed. The oil has to be disposed in accordance with the law of environmental protection.

Use 220 mm²/s viscosity oil, if temperature ranges from – 20 °C to +40°C.

Alternative oils are:

Supplier's	oil designation
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

Table 7: Alternative oils

10.2 Lubrication of the chain

1:1 mixture of penetrating gear lubricant oil and molybdenum grease

The following lubricants are recommended for lubrication of chain depending on operating conditions:

Supplier's	lubricant designation
Fuchs ©	Stabylan 2001
Klüber ©	Klüberoil 4UH 1-1500
Fuchs ©	Ceplattyn 300
Castrol ©	Optimol Viscogen KL300
Fuchs ©	Stabylan 5006
Klüber ©	Klüberoil CA 1-460
Fuchs ©	CTP D 350
Fuchs ©	RENOLIT SO-GFB
Klüber ©	Microlube GB 00
Exxon Mobil ©	Mobilux EP2

Table 8: Alternative lubricants for chain

10.3 Lubrication of the hook block and hook tackle

Lubricate the anti-friction bearings on the hook and the chain sprocket after approx. 20,000 lifting cycles or once a year. If in heavy use, shorten the interval, and use a special anti-friction bearing grease.



Lubricants recommended for lubrication of bearings:

Supplier's	lubricant designation
Fuchs ©	Renolith Duraplex EP3; NLGI - class 3
Fuchs ©	Lagermeister LX EP2

Table 9: Alternative lubricant for bearing

10.4 Lubrication of the trolleys

The exterior gearing of the electric trolley must be lubricated with grease by the customer prior to initial operation, under normal conditions at least once a year, or after 10,000 driving cycles. If in heavy use, the lubrication intervals must be shortened.



Lubricants recommended for lubrication of gearing:

Supplier's	lubricant designation
Fuchs ©	Renolith Duraplex EP3; NLGI - class 3

Table 10: Alternative lubricant for gearing of the trolley

10.5 Auxiliary materials

The following locking pastes are recommended for the locking of the fastening screws of chain guides:

Producer	Designation	Characteristics
Weicon ©	Weiconlock AN 302-42	locking paste, appropriate to connections up to M36, breakaway dismantle torque min. 14 -18 Nm
Henkel ©	Loctite 243	locking paste, appropriate to connections up to M20, breakaway dismantle torque min. 20 Nm

Table 11: Locking paste

11 Measures to be taken at the end of the S.W.P.

After the hoist or its components have reached the end of the S.W.P. the hoist or its components have to be overhauled or to be taken finally out of operation.

The parts have to be disposed in accordance to the laws of environmental protection. Metals, rubber, plastics have to be disposed or recycled separately.