



Explosion-protected chain hoists_ ↘ EN

Operating and maintenance instructions

 II 2 G (ATEX) - Zone 1

 II 2 D (ATEX) - Zone 21

Fundamental information

You have purchased a product manufactured by STAHL CraneSystems GmbH. This chain hoist has been constructed in compliance with the applicable standards and regulations.

Inspect hoist for damage caused in transit immediately upon delivery.

Report damage caused in transit and after consulting the manufacturer/supplier repair or have repaired before installation and commissioning. Do not install or commission a damaged hoist!

- **Assembly**
- **installation**
- **commissioning**
- **tests**
- **maintenance and elimination of faults**

may only be carried out by a qualified person

Terms employed

User

Whoever uses and employs the chain hoist or has it operated by suitable trained personnel is considered to be the user (employer/company).

Trained personnel

Trained personnel are persons who have been instructed and trained in the duties with which they are entrusted and the risks which may arise from incorrect behaviour, have been advised on the necessary protective devices, precautions, applicable regulations, accident prevention regulations and prevailing conditions and have proven their ability.

Skilled electrician

A skilled electrician possesses knowledge and experience on electrical equipment arising from specialist training and, with knowledge of the applicable standards and regulations, is able to assess the work with which he is entrusted and detect and avoid possible risks.

Definition of a qualified person:

A qualified person is one with the necessary qualification, based on theoretical and practical knowledge of hoists, in particular with regard to explosion protection, for the required activities as listed in the operating instructions.

The person must be in a position to assess the safety of the installation in conjunction with the application.

Persons with the authority to undertake certain maintenance work on our explosion-protected products include service engineers of manufacturer and trained fitters with the corresponding certification.

Seminars:

Comprehensive understanding of material handling products is a prerequisite for the correct use of equipment. Competent and practically oriented, we impart the specialist knowledge required for the correct use, monitoring and care of your installation. Please ask for our seminar programme.

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1.1 Symbols



Explosion protection

The explosion-protected chain hoist complies with EC directive 94/9/EC (ATEX 100a) and is constructed according to the corresponding European standards. The components are certified by a designated institute (PTB). Mechanical explosion protection is designed and manufactured in accordance with the EN standards 13 463 presently in preparation. The documents are filed in a designated place. Certification has been ensured by means of a quality management system.

Components bearing this symbol are explosion-protected (protection class Ex, e: e.g. connection boxes and Ex, d: e.g. panel boxes for electrical equipment, motors and brakes). Work on these components may only be carried out by skilled personnel that has been especially trained on explosion protection.



Safety at work

This symbol marks all information on safety at work where risks to life and limb are entailed.



Warning of electrical voltage

Covers such as hoods and caps which are marked with this symbol may only be opened by "qualified persons or suitably instructed personnel".



Warning of suspended load

It is forbidden for persons to stand under suspended loads. This entails risks to life and limb!



Safety in operation

Information marked with this symbol must be observed to avoid damage to the chain hoist or the goods transported.

In these operating instructions, these symbols mark particularly important information on risks and safety in operation.

1.2 Mechanical components

"Mechanical explosion protection" refers to all mechanical sub-assemblies (non-electrical sub-assemblies).

These include for example

- 1) Chain drive and load suspension equipment
- 2) Gear
- 3) Trolley and crane wheels

These sub-assemblies have been manufactured in such a way, relating to the specific order, that they do not present any risks when used for the intended purpose. To ensure lifetime safety, these sub-assemblies must be inspected and serviced carefully in accordance with these operating instructions.

1.3 Operating instructions

Follow the operating instructions. The operating instructions are required by the EC Machinery Directive and EC Directive 94/9. The operator is legally required inter alia by EC Directive 99/92 to observe them.

1.4 Use for intended purpose



- Chain hoists are intended for lifting freely movable and guided loads that cannot tilt. Depending on their design, they are for stationary or mobile use. If loads are to be towed horizontally, or in the case of guided loads, automatic operation, continuous deadweight or constantly repeated hoisting motions, the individual application must be assessed. Contact the manufacturer in case of doubt.
- If the hoist forms "part of a machine," the person placing it on the market must ensure that the hoist meets the specific regulations of the application.
- Runways, suspensions and endstops must be of suitable dimensions.
- Do not carry out any alterations or modifications. Additional fitments must be authorised by the manufacturer. The declaration of conformity may be invalidated.

Not permitted:

- Exceeding the safe working load
- Transporting persons
- Pulling loads at an angle
- Pulling loads loose, dragging or towing loads
- Manipulating the slipping clutch
- Operating the hoist with slack chain
- Touching the chain during the hoisting motion
- Operating a damaged hoist
- Operating the hoist with the chain twisted
- Approaching the emergency limit switch in normal operation
- Approaching top and bottom hook position (slipping clutch) in normal operation

1.5 Safety-conscious operation



The ST ex chain hoists are constructed according to the state of the art and equipped with a slipping clutch as overload protection. In spite of this, dangers may arise from incorrect use or use for an unintended purpose.

- The operator is responsible for ensuring that work is carried out with safety in mind and avoiding risks.
- Read the operating instructions before starting to work with the chain hoist.
- Observe the "Duties of crane operator", see page 16.
- Before starting work, find out where the EMERGENCY STOP button is (usually in the control pendant).
- **Do not** place your hand between edges which may pinch or cut. See sketch
- Do not use the emergency limit switch (ultimate limit switch for highest and lowest hook position) as an operational limit switch.
- Report damage and defects to the chain hoist (abnormal noises, impaired braking function, deformations, ...) to the person responsible immediately. Do not use the chain hoist until the faults have been eliminated.
- Do not remove information plates from the chain hoist. Replace illegible or damaged plates.
- Have hoist inspected by the relevant authority before commissioning.

1.6 Organisational safety precautions



- Only direct persons to operate the hoist if they have been trained or instructed in its use. Observe the legal minimum age!
- At regular intervals, check that work is being carried out in a safety-conscious manner.
- Observe the intervals specified for periodic tests. File the test reports in the test logbook.
- Store the operating instructions within easy reach where the chain hoist is operated.

1.7 General regulations

- Safety and accident prevention regulations



1.8 Installation, commissioning, maintenance and repairs

- National regulations
- Statutory regulations relating to EC Directive 99/92 (ATEX 137).

- **Installation, commissioning, maintenance and repairs may be carried out by qualified persons only**, see page 2.
- We recommend having installation carried out by trained personnel commissioned by the manufacturer.
- Use only **original spare parts** for repairs, otherwise the warranty will become invalid.
- Do not carry out any alterations or modifications.
- Additional fitments must be approved by the manufacturer.

If the chain hoist is constantly operated out of doors and exposed to the elements without protection, we recommend fitting a small roof or at least "parking" the hoist under a roof.

1.9 Warranty

- The warranty will become invalid if these operating instructions are not observed for installation, operation, inspection and maintenance.
- Repairs and elimination of faults within the scope of the warranty may only be performed by qualified personnel (see page 2) after the manufacturer/supplier has been consulted and has given his approval.
The warranty will become invalid if the hoist is modified or original spare parts not used.

1.10 Periodic tests



Hoists and cranes must be inspected by a **qualified person**, see page 2, at least once a year. The results of the test must be recorded and filed in the test log book. The remaining service life of the hoist acc. to FEM 9.755 must also be established during this inspection. The periodic tests must be adapted to the hoist's use. Intensive use entails shorter maintenance intervals.

All tests must be initiated by the user, see page 2.

The components ensuring explosion protection must be checked every 3 years at the latest. As a rule, some of these are checked during the annual inspection (e.g. installation, attachment...) If the ambient conditions are severe, the intervals between the periodic tests must be shortened as necessary.

1.11 After sales service

With the purchase of this chain hoist, you have decided on a high-quality piece of lifting equipment. Our after sales service will give you advice on its correct use.

In order to maintain the safety and constant availability of your chain hoist, we recommend concluding a maintenance agreement on the basis of which we will undertake the "periodic tests" on your behalf.

Repairs will be carried out competently and economically by our trained personnel.

The modular concept of our series of explosion-protected chain hoists permits a



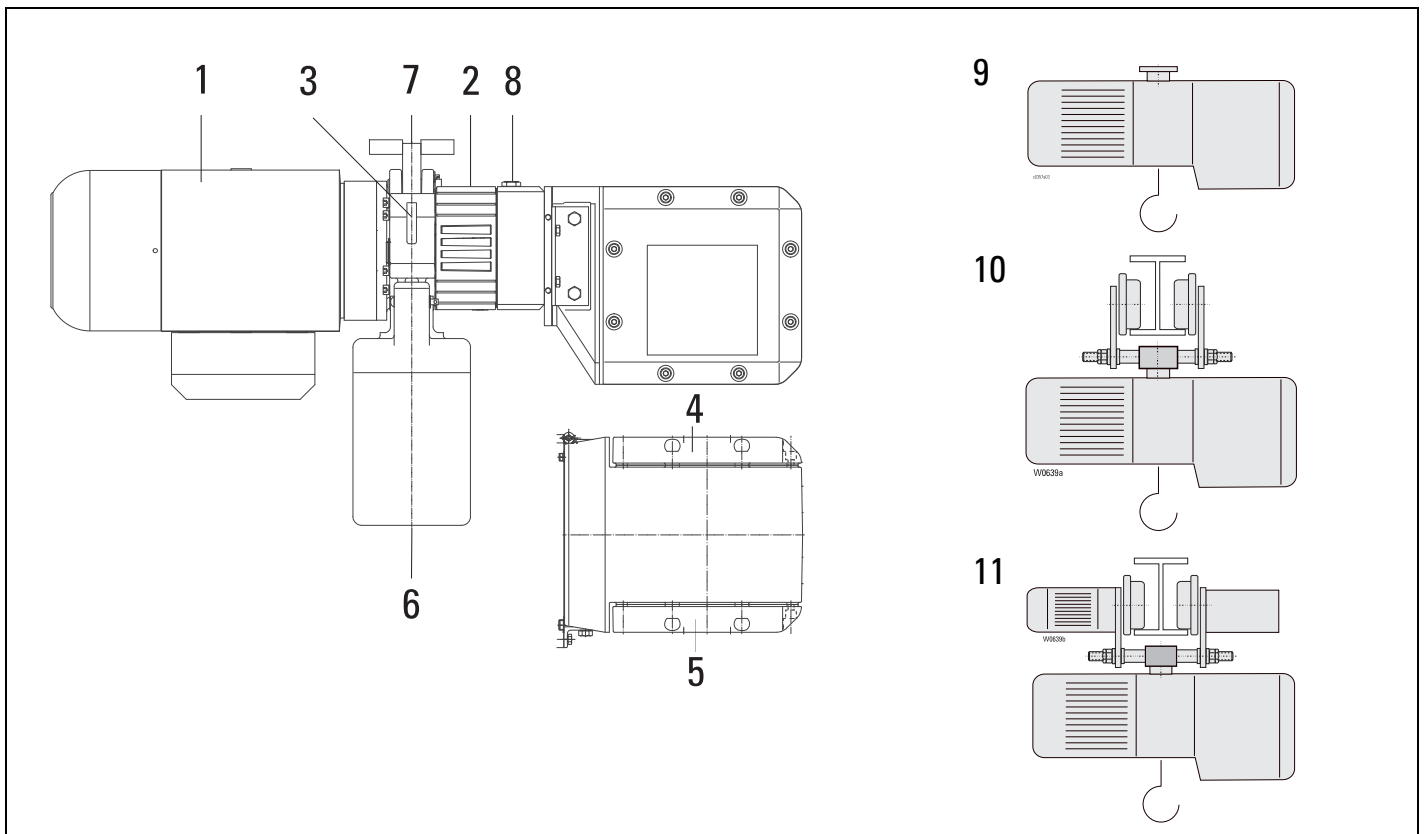
multitude of variations on the basis of series components.

Our certified quality assurance system to DIN ISO 9001/EN 29001 and our special in-house process inspection to EC directive 94/9/EC guarantee consistently high quality.

Chain hoist STex/Zone 1 is intended for use in Zone 1 in accordance with EC directive 99/92/EG The equipment category in accordance with 94/9/EG is ⊕ II 2 G.

Chain hoist STex/Zone 21 is intended for use in Zone 1 in accordance with EC directive 99/92/EG The equipment category in accordance with 94/9/EG is ⊕ II 2 D.

If you have any questions, for example on hoists modified to customers' specific applications, please contact one of our branches or subsidiaries. We will be pleased to advise you!

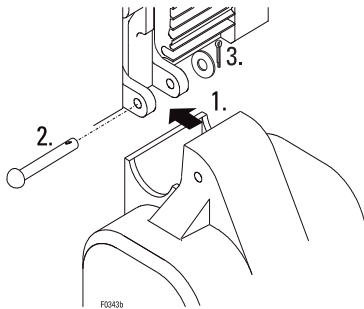


- 1 Ex motor
- 2 Gear
- 3 Chain guide
- 4 Ex connection box in increased safety (EEx e) or flameproof enclosed (EEx d)
- 5 Flameproof enclosed panel box
- 6 Chain box
- 7 Suspension
- 8 Air vent screw with oil dipstick
- 9 Stationary Ex chain hoist
- 10 Ex chain hoist with push trolley
- 11 Ex chain hoist with standard headroom electric trolley

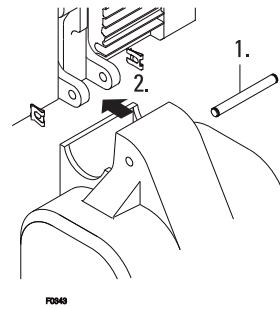
3.1 Mechanical installation

3.1.1 Fitting and securing chain box

ST20



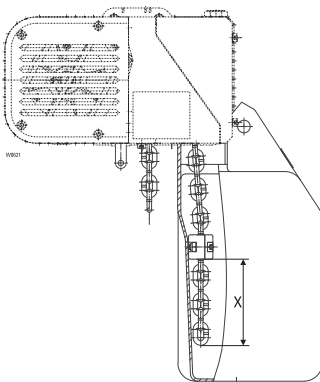
ST50



**Lubricate chain with chain grease supplied!
Chain box must be able to move freely.
Max. chain length see sticker on chain box.**

3.1.2 Fitting chain stopper

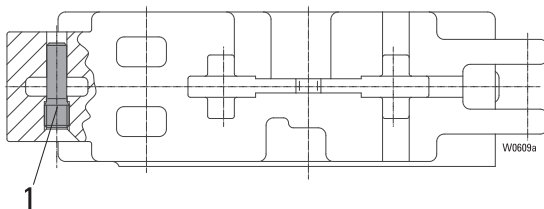
Min. projecting chain length X



| | |
|------|------------|
| ST20 | X = 100 mm |
| ST50 | X = 150 mm |

3.1.3 Fitting chain anchorage

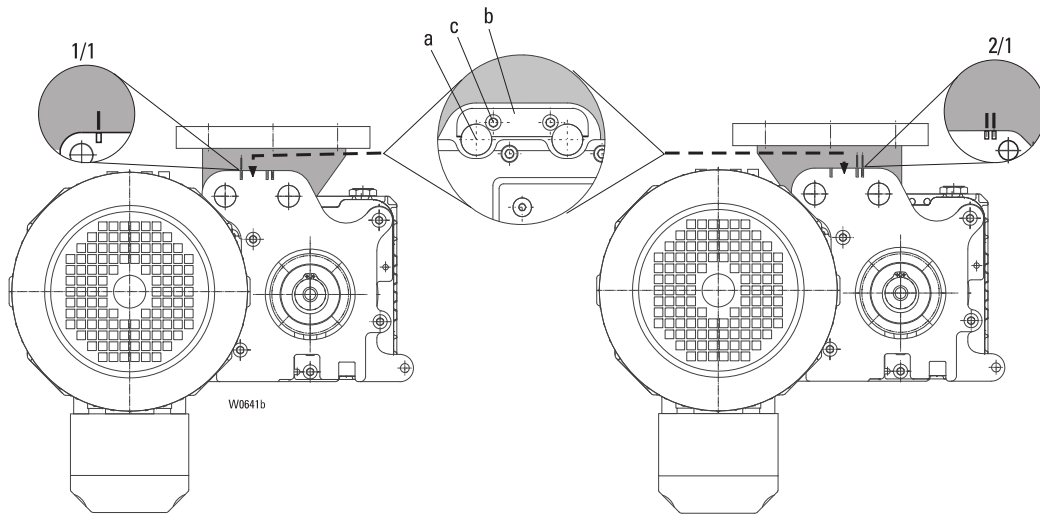
ST20



Screw in chain suspension bolt (1)

3.2 Installing stationary chain hoist

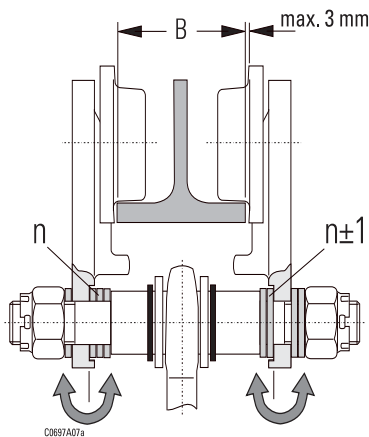
Mount suspension plate with suspension bolt (a) on chain hoist. Note installation position of suspension plate for 1/1 and 2/1 reeving! Lock bolt (a) with washer (b) and cheese-head screw (c), see sketch



3.3 Installing trolley

3.3.1 Adjusting trolley to runway flange

1. Running surfaces of runway and trolley wheels must be free of dirt, oil and paint.
2. Adjust play of wheel flanges, see sketch and table
3. Tighten nut with specified torque, see page 11
4. Fit screw retentions.



Suspend the chain hoist in the centre of the trolley.
Grease wheel gearing.



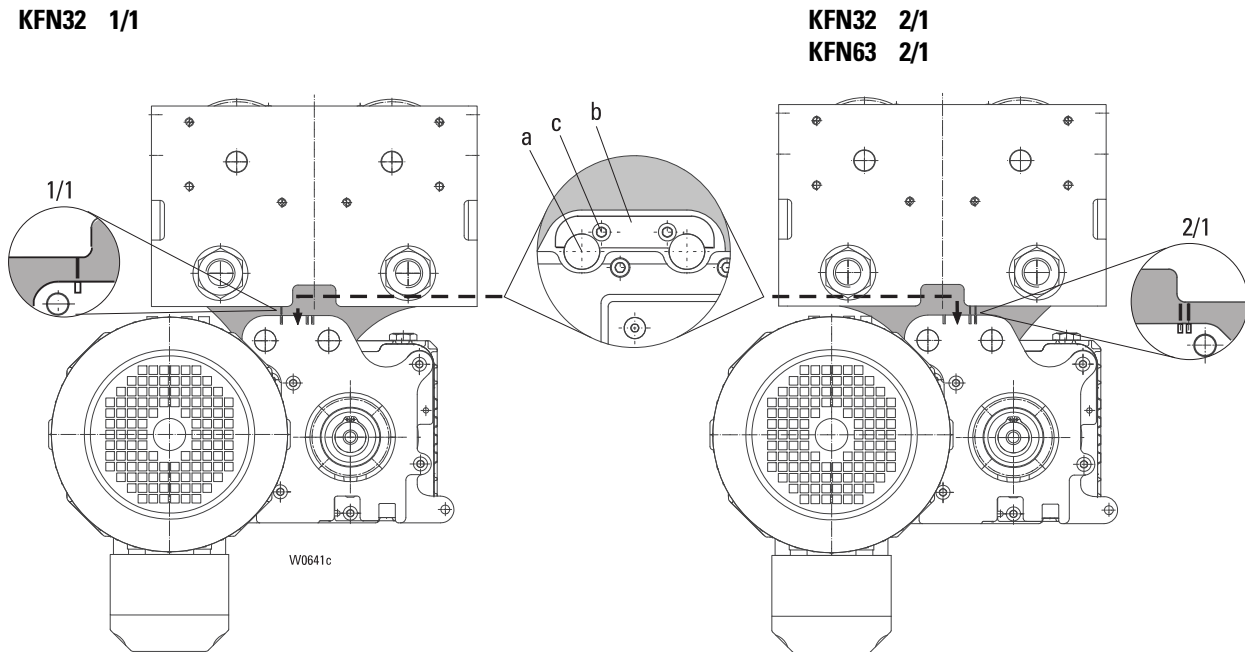
Ensure that the trolley runs smoothly over the whole runway without jamming or increased friction at the wheel flanges. Increased friction at the flanges due to poor beam quality or incorrect trolley adjustment may lead to temperature rise and increased wear. This must be avoided at all costs

Use only original parts for modifying flange width.

3.3 Installing trolley (continued)

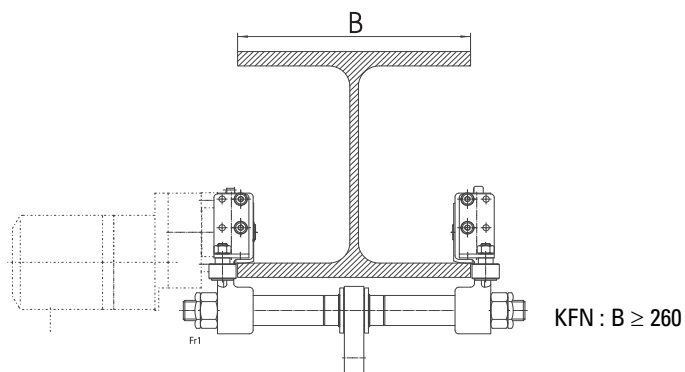
1. KFN32 with ST20; ST50 1/1 KFN63 with ST50 2/1

Fit suspension piece with suspension bolt (a) to chain hoist. Note installation position of suspension piece for 1/1 and 2/1 reeving! Lock bolt (a) with washer (b) and cheese-head screw (c). See sketch



2. Slide trolley onto runway or push on from below after swivelling the side cheeks up.
3. Check that screws and nuts are tightened with specified torque, see page 11.
4. The screw retentions must be fitted!

3.3.2 Fitting guide rollers

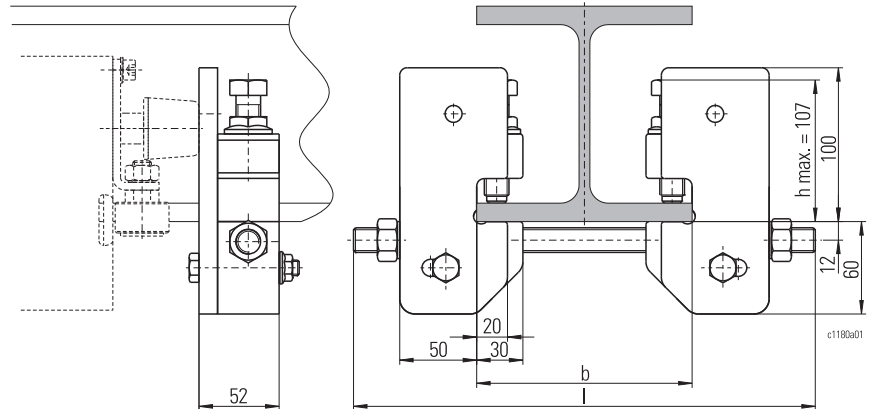


N.B.: Always fit guide rollers to electric trolleys!

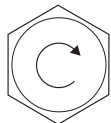
3.3.3 Endstops for monorail trolley

- Fit endstops to end of runway.

| b | l | Order No. |
|--------|-----|-----------|
| [mm] | | |
| ...110 | 185 | |
| ...155 | 230 | |
| ...195 | 270 | |
| ...240 | 315 | |
| ...300 | 375 | |
| ...400 | 475 | |



3.4 Tightening torques for screws



Tighten all screws using a torque spanner. See table for torques universally applicable for screw grade 8.8.

- Chain guide attachment
- Distance bolt on trolley
- Trolley suspension

| M | Screw grade |
|-----|-------------|
| | 8.8 |
| | [Nm] |
| M5 | 6 |
| M6 | 10 |
| M8 | 24 |
| M10 | 48 |
| M12 | 83 |
| M16 | 120 |
| M24 | 320 |
| M30 | 640 |
| M36 | 1100 |

3.5 Electrical equipment



For the sake of safety, have the chain hoist connected up by a skilled electrician. Observe the relevant safety and accident prevention regulations! The skilled electrician must be acquainted with permissible clearances in air and creepage paths, and with cable glands in hazardous areas. Only electrical equipment approved for use in the relevant Ex Zone may be used! (Equipment category II 2 G for Zone 1, II 2 D for Zone 21)



In addition for Zone 21:

EN 50281-1-2 must be observed for installation.

3.5.1 Supply cable

- As fixed installed cables:
 NYY, NYM
- As flexible cables:
 H07RN-F or NGFLGöu or equivalent cables.
 See page 34 for minimum cross-section and max. length of supply cable.

3.5.2 Fusing

- NEOZED, DIAZED or NH fuses in operating class gL/gG, see page 34.
- Observe the correct fuse sizes so that the crane switch contacts do not weld if there is a short circuit and overload protection of lead is ensured!

3.5.3 EMERGENCY STOP

It must be possible to disconnect the system electrically from the operating position. This function can be provided by:

- EMERGENCY STOP button in the control pendant in conjunction with the crane switch contactor,
- main isolator, if this is directly accessible and positioned close to the operating position.

3.5.4 Main isolator

A main isolator is specified for explosion-protected chain hoists and can be supplied on order. It must be possible to disconnect the main supply cable on all poles.

- Install the main isolator in a freely accessible position within easy reach of the hoist installation.

3.5.5 Temperature control

The tripping device for the motor temperature control is installed in the panel box.

3.5.6 Disconnecting switch

- is necessary if more than one floor-operated hoist is supplied with power,
- must be lockable in OFF position.

3.5.7 Test before first commissioning

- obliges the operator to have the installed, modified or repaired electrical equipment, or electrical equipment combined into systems, tested in accordance with a special test in order to establish its proper condition as regards erection, installation and operation.

A comprehensive functional test and safety inspection must be performed after installation to ensure safety in operation.

This test is often subject to specific national regulations. After completion, the test must be recorded in the test logbook.

- Faults must be eliminated before commissioning.
- We recommend having this test performed by the manufacturer.



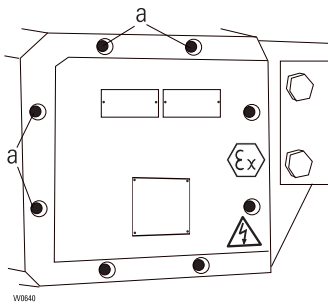
3.5.8 Mains connection

Before a connection box or panel box is opened, the apparatus must be disconnected.

Caution! Pay attention to the explosion hazard. If necessary call in site safety representative!

Opening and closing connection box

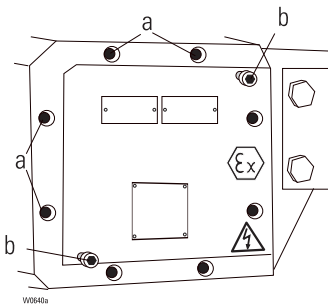
Ex e connection box



Ex e enclosures

- Remove cheese-head screws (a).
 - Lift off cover with gasket.
 - Insert cover into joint. (Do not forget gasket !).
- Tighten all screws.

Ex d connection box



Ex d enclosures

- Remove cheese-head screws (a), if necessary press cover off in position (b) using screws, avoid canting.
 - Clean Ex joints only with a rag or with detergent. If any damage is ascertained, they must be checked by the manufacturer. Do not commission equipment.
 - Insert cover into joint.
- Tighten all screws.

All socket head cap screws must be grade 8.8.

3.5.9 Cable glands

Cable glands are an important constituent of the explosion protection and must therefore be fitted and maintained by qualified personnel.

In accordance with EN 60079-0 (and EN 60079-1 in the case of flameproof enclosed connection boxes), tested and certified cable glands must be used for the entry of flexibly installed cables in explosion-protected connection boxes. To avoid kinking, the cable glands must be specially shaped and provide effective strain relief (clip). Corresponding Ex tested and Ex certified cable glands must be used for fixed installed cables. The cables must be fastened down immediately in front of the gland, e.g. by means of a clip.

Cable glands for cables moved frequently must be secured with Loctite 275. The power supply (supply cable) may be round or flat cable. In both cases the glands must meet the above requirements.

3.5.10 Connecting to mains

- Compare existing mains voltage and frequency with the information on the rating plate.
- Route cables into the hoist connection box through the Ex cable glands.
- Connect according to the circuit diagrams supplied.
- Do not connect any live lead to the temperature sensors! Damaged temperature sensors cannot protect the motor.
- Check that the direction of rotation of the chain sprocket corresponds to the symbols on the control pendant.

If the movement of the hook does not correspond to the symbols on the control pendant, interchange two phase conductors of the supply cable.

Measure control voltage. The control voltage must not deviate from the rated control voltage by more than -5% and +10%.

Caution! Risk of accident! If this is not observed, serious accidents or damage to the hoist may occur!



Controls by others (option)

(Only after consulting the manufacturer)

- If the controls are supplied by others, all electrical components must be wired according to our connection diagrams.
- Control components installed on our hoists in hazardous areas by the operator or a control engineer engaged by the operator are the responsibility of the operator or control engineer. STAHL CraneSystems accepts no liability for these.
- Work on controls (**explosion-protected electrical equipment**) beyond the mere connection of cables may only be performed by companies with a certified quality assurance system (EC Directive 94/9/EC), We recommend purchasing the complete control from manufacturer.
- The declaration of conformity is valid only for the scope supplied by the manufacturer.

The EC declaration of conformity is only valid if the hoist as a whole meets the following regulations:

- EC directive for explosion protection 94/9/EC (ATEX)
- EC machinery directive 98/37/EC
- EC EMC directives 2004/108/EC

3.6 Dismantling

1. Disconnect chain hoist from mains at main isolator
2. Disconnect electrical connections
3. Remove chain hoist
4. Clean chain hoist and preserve

4.1 Commissioning



The chain hoist has been subjected to a final inspection by the manufacturer in accordance with the EC Machinery Directive.

The **test before first commissioning** must be carried out by a **qualified person**, see page 2.

This applies for all chain hoists with electric trolley.

An exception is made for chain hoists with an S.W.L. <1000 kg with push trolley or in stationary design.* (Monorail with push trolley, or stationary attachment.)

The following test steps must also be performed when recommissioning after a period in storage or stoppage.



Test steps

- The Ex symbol must be attached to the hoist in a clearly visible position.
- Check that the chain hoist is completed with the original accessories as supplied.
- Check correct selection and installation of all electrical equipment, see page 13.
- Electrical connection.
- Check that the seating of fixing screws is firm, see page 11, table.
- Check trolley.
- Running surfaces and wheel flanges must be free of dirt, oil and paint.
- Wheel gearing must be greased.
- Buffers and end stops must be mounted and undamaged.
- Check oil level in gear.
- Oil must be visible over approx. 2-5 mm of the oil dipstick.
- Check load chain.
- The load chain must be clean and lubricated.
- Check chain anchorage.
- The chain stopper must be screwed down tightly. On chain hoists without chain box, the end of the chain must be inserted in the chain fixing bolt and secured.
- Check slipping clutch. Run bottom hook block carefully at slow speed without load to the top final position. Only allow the clutch to slip for a few seconds (maximum of 3). The chain must not move, the motor must rotate (can be seen on fanwheel).
- Check brake. Attach rated load. Lift load approx. 20 cm and stop chain hoist. The load must not move downwards. Then lower load briefly and stop by releasing the rocker. Slowing down paths of 3-7 cm are normal.
- Confirm correct commissioning in test logbook in section "Confirmation of commissioning".
- Chain hoists used in conjunction with a crane installation are subjected to a test load before commissioning.



Any fundamental alterations and modifications to the chain hoist, such as e.g welding on load-bearing components, structural alterations to load-bearing components, alteration of drives, alteration of speeds and motor outputs, replacing trolleys, etc. must be authorised by the manufacturer otherwise the warranty will expire. Also any work on or additions to the control must be authorised by the manufacturer. The manufacturer cannot accept any liability for malfunctioning after unauthorised work on the control.

Our qualified personnel is available to perform a reacceptance test after authorised modifications.

* The above exceptions do not apply if the chain hoist is used on a crane.

5.1 Duties of crane operator

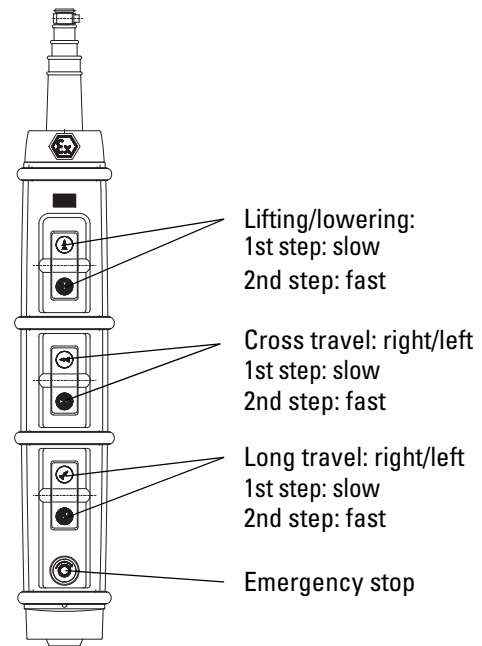


When working with chain hoists, the following points must be observed:

- Every day before starting work, check brakes and limit switches and inspect the system for any visible defects.
- Stop working with the crane if there are any defects which might prejudice its safety in operation.
- Do not move loads above people.
- Before starting work, ensure sufficient working space.
- Do not leave suspended loads unattended.
- The control pendant must be within easy reach.
- Do not use emergency limit switch during normal operation. (The slipping clutch is the emergency limit switch.)
- Do not load above rated capacity.
- Pulling loads at angles, dragging loads, or towing vehicles with the load or load suspension equipment is forbidden!
- Do not heave up any loads which are jammed.
- **Do not** place your hands between edges which may pinch or cut.
- Approach final positions for hoisting, lowering and travel in normal operation only if an operational limit switch is fitted.
- Inching operation (repeated brief activation of the motor to achieve small movements) is not permissible. Motors and brakes could be subjected to an impermissible temperature rise. This would lead to the temperature control disconnecting and the load could then not be set down for some time. Switchgear and motors could be damaged.
- Do not move in the opposite direction until the hoist has come to a stop.
- Observe the safety instructions, see pages 4-6.
- Do not allow load and bottom hook block to hit machines or structural steelwork. In adverse conditions (rust, aluminium, high impact speed) there is a risk of sparking.
- Avoid trolley and crane wheels' slipping due to swinging of load or spinning of drive wheels. There is a risk of sparking and increased temperature rise.

5.2 Operating from control pendant

Standard design
2-step



Safety note

If the rocker switch is no longer depressed by the operator, it returns to the 0 position, the hoist motion is automatically stopped (dead man's control).
 If the hoist malfunctions, e.g. the actual motion does not correspond to the motion intended in activating the rocker switch, release the rocker switch immediately. If the motion continues, press the emergency stop button.

5.3 Emergency stop

Every hoist must have a means of disconnecting the power supply to all drives under load from the ground.

After an emergency stop, the operator must not restart the hoist /crane system until a qualified person has determined that the fault which led to this function being activated has been eliminated and no danger can arise from the continued operation of the system.



- The emergency stop button is on the control pendant.
- Press emergency stop, the system comes to a halt.
- To release the emergency stop: turn the button in the direction shown.

This section deals with operational reliability, availability, and maintaining the value of your chain hoist.

Although this chain hoist is practically maintenance-free, the components subject to wear (e.g. chain, brake) and components important for ensuring explosion protection must be inspected regularly.

Inspection and maintenance may only be carried out by qualified persons who have received special training on explosion protection, see page 2.

Maintenance work beyond that described in this section may only be performed by the manufacturer or trained service personnel.

Use only original spare parts for repairs.

The operator is responsible for the inspection and maintenance of the hoists (§3 clause 1 of the Betr.Sich.V. (decree on safety in operation) or EC directive 99/92/EC - ATEX 137). We recommend consulting the manufacturer when determining on maintenance and concluding a maintenance agreement.



General information on inspection and maintenance

- Maintenance and repair work may only be carried out when the chain hoist is unloaded.
- Before starting, switch off and padlock main isolator.



It is not permissible to work on live parts in areas exposed to explosion hazards!

In addition for Zone 21:

- **Dust deposits over 5 mm thick are not permissible.**

If any dust is deposited, it must be removed from indentations, corners and surfaces in good time.

The electrical components (motor, control) and mechanical components (e.g. gear) have a surface temperature of max. 120°C during normal operation at an ambient temperature of 50°C.

A dust deposit of above 5 mm prevents the heat being dispersed sufficiently (insulation) and an impermissible temperature rise will occur on the surfaces and in the adjoining layer of dust.

The operator is obliged to prevent a 5 mm layer of dust by observing the hoist and cleaning operations at suitable intervals.

- **Remove any dust which may be present before carrying out maintenance work!**
The dust must be removed to prevent it entering any open enclosures of the components during maintenance.

- Observe the requirements of the accident prevention regulations.
- A general overhaul must be carried out after the useful life of the hoist has expired.
- The inspection intervals given in the table apply for use in mechanism group 1 Am or 2 m with reference to FEM 9.511 (mechanism), see page 19. If the hoist is operated in mechanism group 2 m or 3 m, the maintenance intervals must be reduced accordingly. Lubricants and lubrication points, see page 37.

6.1 Maintenance intervals

The maintenance intervals given apply for a chain hoist operated in mechanism group 1 Am.

If the hoist is operated in a different mechanism group in accordance with FEM 9.511, the intervals specified must be adapted on the basis of the following correction factors.

| 1Bm | 1Am | 2m | 4m | Mechanism group (operation) |
|-----|-----|----|----|-----------------------------|
| 1 | 1 | 2 | 4 | Correction factor |

Example:

Check hook attachment

Mechanism group 1 Am: 1 x per quarter

Mechanism group 2 m: 2 x per quarter (every 6 weeks)

6.1.1 Every day

- Check functioning of brake(s)
- Check load hook (visual inspection)
 - clean, lubricated and not twisted
- check bottom hook block (visual inspection), in the case of bronze-coated parts, ensure that the bronze coating is undamaged.

6.1.2 Every month

- Check suspension of control pendant (cable and strain relief wire must be fitted correctly).
- Check load chain for wear

6.1.3 Every three months

- Check hook for wear, see page 21
- Check hook attachment
- Grease output pinion and open step of gearing on electric trolley
- Check attachment of rigid suspension or trolley suspension
- Clean and lubricate hoist
- Check chain anchorage

The chain stopper is screwed tight. On chain hoists without chain box, the end of the chain is attached to the chain fixing bolt and locked. On two-fall operation, the chain fixing bolt at the chain anchorage is locked and shows no sign of wear.
- Bottom hook block

Check load hook, casing and chain sheave for wear, damage, deformation. See page 21 for permissible hook jaw width.

6.1.4 Every year

- Check screw connections (tightening torques, corrosion)
- Check brake and adjustment displacement if necessary.
- Adjust slipping clutch; function of limit switch is also tested when allowing clutch to slip under overload
- Calculate service life expired. Read operating hours counter if any.
- Check chain stopper (visual inspection)
- Check oil level, see gear

Oil must be visible over 2-5 mm of the oil dipstick. If no oil is visible, it must be topped up. If an excessive amount of oil needs to be added, the chain hoist should be checked for leakage.

6.1.5 Check screw connections

- See "Tightening torques", page 11

6.1 Maintenance intervals (continued)

6.1.6 Check trolley

- Running surfaces and wheel flanges are free of dirt, oil and paint. Buffers and end-stops are undamaged.

6.1.7 Wheel gearing

- Grease

6.1.8 Measure brake displacement

- See "Adjusting brake"

6.1.9 Every 3 years

- The explosion protection must be checked every 3 years at the latest. Checking must be performed by skilled personnel trained on explosion protection. The check includes opening all Ex enclosures of controls and assessing the condition of components ensuring explosion protection. Cleaning and preserving is necessary. Temperature control apparatus must be checked. Cables and leads, and cable glands must be checked.

Check that information plates are intact.

Mechanical components are to be checked.

An inspection report must be filed in the crane test logbook or the hoist documents.

6.1.10 Every 5 years

- Gear oil

Change oil, see Oil change, page 28.

Clean chain hoist and plastic chain box only with a damp rag (do not use solvents).

6.1.11 Safety note

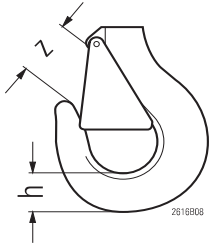
Periodic inspections including maintenance every 12 months, possibly earlier if so prescribed by national regulations, to be performed by a fitter engaged by the manufacturer. Similarly, heavy-duty applications (e.g. multi-shift operation..) or adverse conditions (dirt, solvents) necessitate shortening the inspection and maintenance intervals

6.1.12 Maintenance work

Regular maintenance increases safety and extends the service life of the chain hoist.



6.2 Checking hook for wear



- DIN 15405 Part 1

Check hook or suspension hook for wear. The hook dimensions must not exceed the dimensions given in the table below.

| | | ST20 | | ST50 | |
|-----------------|--------|------|------|------|------|
| | | 1/1 | 2/1 | 1/1 | 2/1 |
| | | [mm] | | [mm] | |
| Load hook | h | 24 | 31 | 37 | 48 |
| | h min. | 22,8 | 29,5 | 35,2 | 45,6 |
| | z | 29,5 | 30 | 33 | 41 |
| | z max. | 32,5 | 33 | 36,5 | 45,1 |
| Suspension hook | h | 37 | 37 | 39,5 | 39,5 |
| | h min. | 35,1 | 35,1 | 37,5 | 37,5 |
| | z | 41 | 41 | 42 | 42 |
| | z max. | 45,1 | 45,1 | 46,2 | 46,2 |

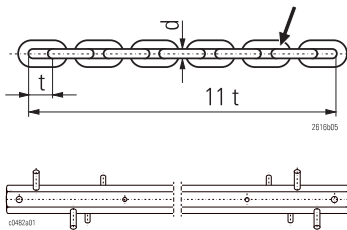
- Load hook or suspension hook must be replaced if they display distortion, breakage, cracks or corrosion.



N.B.

Hook latch must close completely, replace if necessary.

6.3 Checking and lubricating load chain



Chain gauge (part no. 14 320 00 65 0)

- DIN 685 Part 5

- Operate chain hoist under load. If any loud cracking sounds can be heard, check chain, chain sprocket and return sheaves for lubrication and wear.
- Check chain dimensions, measure chain length over 11 links. The chain dimensions must not exceed the values given in the table below.

| | ST20 | ST50 |
|----------|--------|--------|
| | [mm] | [mm] |
| dxt | 7x21,9 | 11x31 |
| d min | 6,3 | 10,2 |
| t max | 23 | 32,5 |
| 11 t max | 245,92 | 350,37 |

- The load chain must be replaced immediately, see page 30, if it displays any distortion, breakage, cracks or corrosion.

N.B.:

Lubricate the load chain above all at the joints.

- Check chain guide, chain sprocket and idler sheave on bottom hook block and replace if necessary, see page 31.
- Check chain anchorage, replace if necessary.

N.B.: Do not turn and reassemble a used chain suspension bolt!



6.4 Gear



The gearing of STex hoists is hardened, hard-machined and has a high safety factor. With their minimum classification of 1 Am or 2 m to FEM 9.511 the gears have a long service life. All bearing points have roller bearings. The gears are protected against internal overpressure by an air vent screw.

- Check whether any oil has leaked (puddle of oil underneath the gear, drops of oil on the gearbox). If any loss of oil is ascertained, check the oil level with an oil dipstick and fill up with oil if necessary.
- Note any gear noises from the hoist when under load and without load. Rough, noisy running, knocking sounds indicate possible faults. (See "Noise level" for information on normal noise level, see page 36.)
- If any faults are detected, repairs must be scheduled. If there is any uncertainty, a fresh diagnosis can be made after consulting other experts, e.g. from the manufacturer.

6.5 Slipping clutch

The slipping clutch installed in the gear is protected against explosion hazard by the high oil level which completely covers the coupling parts. Sparks cannot occur and the heat is dissipated by the oil.

It is thus important for the required oil level to be maintained. An oil dipstick is integrated to permit checking. If no oil can be ascertained on the dipstick, top up with oil. The dipstick must be wetted. To raise the oil level by 5 mm, 50 ml is required on the ST20 ex and 100 ml oil on the ST50 ex.

6.6 Bottom hook block



The bottom hook block must be checked for damage. Distortion, cracks and cuts caused by impact must be assessed.

The damage can only be assessed by trained maintenance personnel.

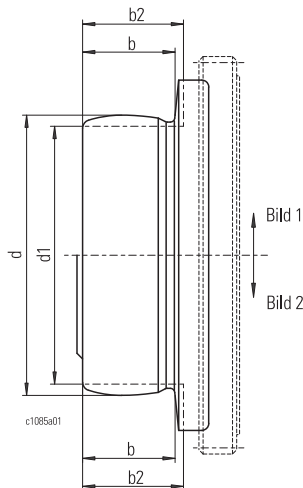
The causes of damage indicating impact and friction stresses must be ascertained. If this type of stress is to be expected during normal operation of the hoist, measures must be taken to eliminate this source of danger. Retrofitting the bottom hook block with a low-sparking metal coating should be considered.

There is a risk of impact sparks if bottom hook blocks swing and hit structural steelwork. Rusty steelwork and/or light metal increases the risk.

In addition for Zone 21:

There is a danger of dust collecting inside the covers of bottom hook blocks and the roller bearings of the chain sheaves. This can lead to a temperature rise in the bearing. Dust deposits in bottom hook blocks must therefore be removed. Replace any bearings which no longer run easily due to dirt.

6.7 Trolley



Wheels, wheel drive and runway

- Visual inspection of wheels for wear. See table for limits for wear.
- Visual inspection of runway girder for wear.
- Inspection of wheel flanges for wear.

A high degree of wear on the flanges indicates that the trolley cants or is running with its weight heavily on one side. The causes of this must be ascertained and eliminated. The running characteristics can be improved by using a guide system. This avoids abrasion and the play of the track gauge can be reduced.

Limits for wear

| d [mm] | Fig. | d1 [mm] | b [mm] | b2 [mm] |
|-----------|------|------------|-----------|-------------|
| 80 | 1 | 76 | 27.5 | 29.5 |
| 125 | 1 | 119 | 38 | 40 |

If any one of the specified limits for wear b2, d1 is reached, the part must be replaced.

- Inspection of lower flange on cranes with sectional girder
The running surface of the trolley wheels must be checked for uneven wear and the causes of any such wear ascertained. Driven wheels must not display any slippage to the running surface which would cause increased abrasion and temperature rise.
- Inspection of rails on cranes and crane runways
The rails must be laid parallel within the permissible tolerances to prevent the crab or crane jamming. Rail joints must provide a smooth surface to avoid impact and deformation.
- Inspection of buffer and buffer stop.
Ensure that the buffer impact is taken up by the centre of the stop elements provided and that the materials exhibit no detrimental characteristics.

6.8 Checking function of slipping clutch - without load!

1. Without load, run bottom hook block to top or bottom hook position.
2. Allow slipping clutch to slip in top or bottom hook position for a maximum of 3 sec. The chain must not move, the motor must rotate.

N.B.

Slipping clutches and brakes may only be adjusted by a qualified person. When starting to adjust the slipping clutch, the chain drive must be off-loaded! The motor must be at a standstill during all work on the slipping clutch! There is a risk of accidents, we recommend contacting our after-sales service.

Before adjustment, the function of the slipping clutch must be checked (see 6.8).

6.9 Adjusting slipping clutch - without load

The slipping clutch can be tested easily with the FMD1 slipping clutch testing device, and adjusted if required without any danger to the structural steelwork. 125% of nominal capacity is the specified value for the slipping clutch. The function of the chain hoist must be tested with nominal load at least once a year. Adjusting the slipping clutch with this testing device does not replace this test!



Warning!

The FMD1 slipping clutch device is not certified for use in explosive environments. Do not use it in explosive environments.

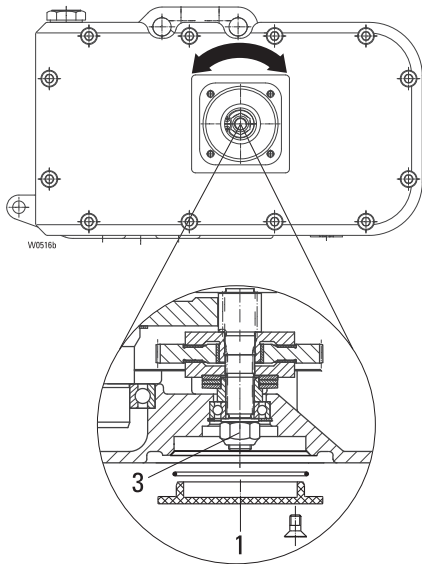
6.10 Adjusting slipping clutch with test load

Adjusting the slipping clutch with a test load may only be performed by a qualified person. Before starting, it must be ensured that the entire suspension structure (such as crane, crane runway, crane runway suspensions right up to the roof of the building, etc.) can support the increased load on the chain hoist. Due to the polygon effect, oscillations and tolerances of the friction linings, in accordance with FEM adjustment values between min. 110% and max. 160% of nominal load are permissible for chain hoists. If necessary, take the chain hoist down and carry out adjustment on a test stand. The slipping clutch is factory set to 125% nominal load.

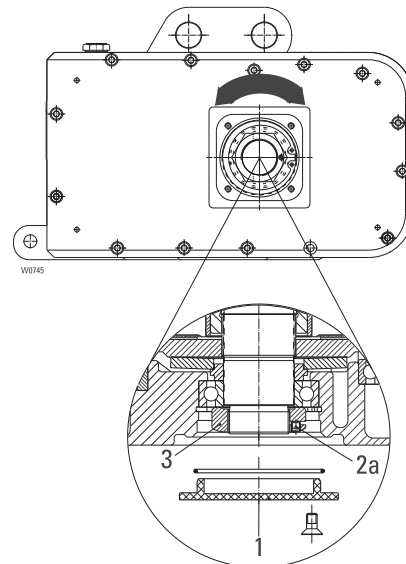
Before adjustment, the function of the slipping clutch must be checked. It is forbidden to hoist test load to top hook position and activate the slipping clutch. The test load may be lifted by a maximum of 300 mm.

- In bottom hook position attach 1.25 x rated load (test load).
 - Remove cover (1).
 - A small amount of gear oil may escape when the cover is removed
 - Release slipping clutch setting with clamping screw (2a) (ST50)
 - Adjust slipping clutch by turning the adjusting screw or nut (3).
 - Turning to the right → the reaction force increases
 - Turning to the left → the reaction force decreases
- If the reaction force is too high, the adjusting screw or nut must be loosened by one turn.
- Adjust slipping clutch so that the test load is just lifted. The rated load must be held firmly in every position.
 - Lock slipping clutch setting with clamping screw (2a) (ST50)
- Replace cover (1) and gasket.

ST20



ST50

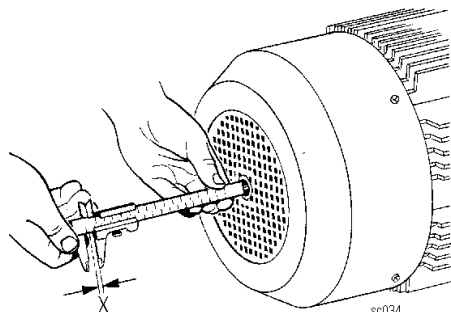


6.10 Hoist brake

Check brake at regular intervals. The intervals must be adapted to suit the operation of the hoist. Too great a brake displacement will cause a temperature rise in the motor and mechanical damage.

Carry out work on the hoist brake only when the hoist is unloaded and the bottom hook block has been set down.

6.10.1 Checking brake

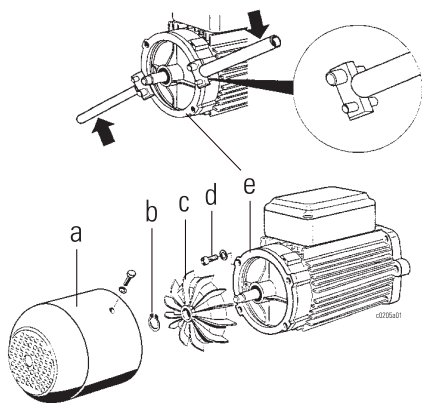


- Measure displacement of motor shaft, switching motor on briefly, see sketch.

The displacement of the motor shaft is the difference between the dimension fan cover → motor shaft when running (L1) and fan cover → motor shaft when standing still. (L2) ($X = L1 - L2$). The dimensions L1, L2 differ for different motors. The minimum displacement must not be less than X min. to prevent the brake disc touching during normal operation. The max. displacement must not exceed X max. .

| | Hoist motor | | |
|-------|-------------|------|------|
| | A05ex | A1ex | A2ex |
| X min | 0,7 | 0,7 | 0,7 |
| X max | 2,5 | 2,5 | 2,5 |

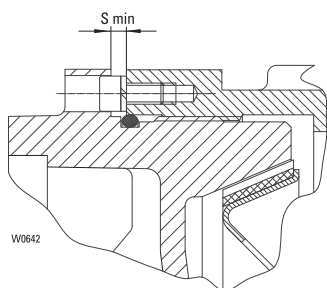
6.10.2 Adjusting brake



7. Measure displacement of motor shaft.
8. Remove fan cover (a), fanwheel (c) and unscrew screws (d).
9. Rotate motor cover (e) clockwise, keeping the holes aligned, until the minimum permissible brake displacement has been reached. One rotation of the motor cover reduces the brake displacement by 2 mm.
- Do not use force when rotating the cover. The Ex joints could be damaged!**
10. Replace motor cover with screws (d).
11. Push fanwheel (c) onto motor shaft and lock with lock washer (b).
12. Replace fan cover (a)

- We recommend using our special tool for rotating the motor cover. see sketch

- If dimension S min. has been reached, replace brake disc.



| | Hoist motor | | |
|-------|-------------|-------|-------|
| | A05 ex | A1 ex | A2 ex |
| S min | 0.8 | 0.8 | 3.2 |

All socket head cap screws must be grade 8.8.

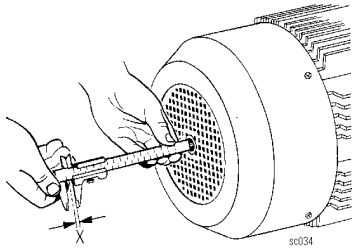
6.11 Trolley brake

Check brake at regular intervals. The intervals must be adapted to suit the operation of the hoist. Too great a brake displacement will cause a temperature rise in the motor and mechanical damage.

- If the braking effect deteriorates noticeably, check the brake.

6.11.1 Testing brake

- Measure displacement of motor shaft, switching motor on briefly, see sketch



The displacement of the motor shaft is the difference between the dimension fan cover → motor shaft when running (L1) and fan cover → motor shaft when standing still. (L2) ($X = L1 - L2$). The dimensions L1, L2 differ for different motors. The minimum displacement must not be less than X min. to prevent the brake disc touching during normal operation. The max. displacement must not exceed X max. .

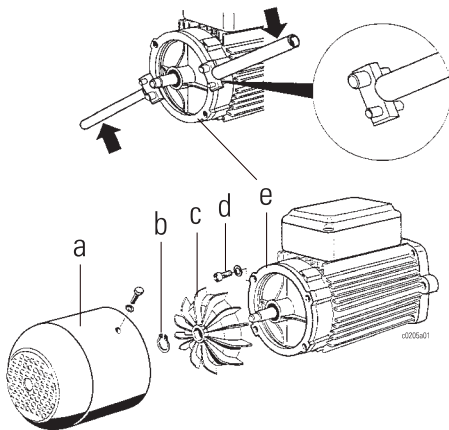
| | Travel motor |
|-------|--------------|
| | A05 |
| X min | 0.7 |
| X max | 2.5 |

6.11.2 Adjusting brake

1. Measure displacement of motor shaft.
2. Remove fan cover (a), fanwheel (c) and unscrew screws (d).
3. Rotate motor cover (e) clockwise, keeping the holes aligned, until the minimum permissible brake displacement has been reached. One rotation of the motor cover reduces the brake displacement by 2 mm.

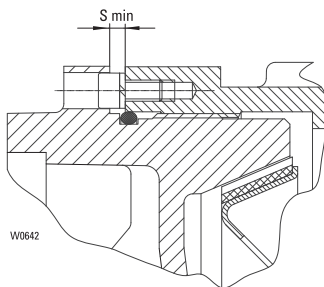
Do not use force when rotating the cover. The Ex joints could be damaged!

4. Replace motor cover with screws (d).
5. Push fanwheel (c) onto motor shaft and lock with lock washer (b).
6. Replace fan cover (a).



- We recommend using our special tool for rotating the motor cover. see sketch

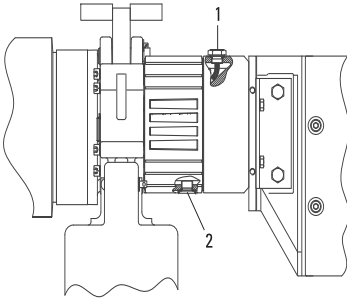
- If dimension S min. has been reached, replace brake disc.



| | Travel motor |
|-------|--------------|
| | A05 ex |
| S min | 0.8 |

All socket head cap screws must be grade 8.8.

6.11 Oil change



Dispose of used oil in accordance with environmental regulations.

- Change oil while warm if possible.
- Top up with fresh oil until the oil dipstick (1) is wetted (the chain hoist must be horizontal while doing so)
- See "Technical data" for suitable types and quantity.
- Replace copper gaskets.
- Screw down oil drain plug (2) and oil filling plug (1) (10 Nm).

6.12 General overhaul

| FEM9.511 | 1Bm | 1Am | 2m | 3m | 4m |
|----------|-----|-----|------|------|------|
| D [h] | 400 | 800 | 1600 | 3200 | 6400 |

The drive mechanism (motor and gear; does not apply to wearing parts) of the ST chain hoist is classified in accordance with FEM 9.511. The theoretical full load lifetime in hours shown opposite (D) is applicable for normal hoist applications.

If the full load lifetime (D) minus the lifetime expired is nought, the chain hoist must be overhauled by the manufacturer.

The chain drive is classified in accordance with FEM 9.671.



Components which are in the power flux may only be overhauled by the manufacturer.

In particular, the criteria important for explosion protection must be observed.



As the service life of components such as gears is limited corresponding to the classification, it must be ensured that this is not exceeded. After the scheduled service life has expired hazards may arise, also with regard to explosion protection. Thus the operator must take the responsibility for the remaining service life and the necessity of a general overhaul. We cannot accept any liability for damage occasioned by non-observance.

7.1 What is to be done if

7.1.1 Chain hoist not functioning

- Chain hoist is switched off
→ Switch on.
- Temperature control has been activated
→ Allow to cool off.
- Emergency stop activated
→ Release emergency stop.
- Fuse blown
→ Fit new fuse or switch on automatic circuit-breaker.
- Power supply interrupted
→ Reconnect power supply

7.1.2 Heavy loads can no longer be lifted

- Overload
→ Reduce load.
- Slipping clutch set incorrectly or worn
→ Adjust slipping clutch if rated load cannot be lifted (see "Adjusting slipping clutch")

7.1.3 Braking path above 10 cm

- Brake lining worn
→ Adjust brake, replace brake disc if necessary

7.1.4 Direction of motion does not correspond to symbols on control pendant

- Power supply wrongly connected
→ Interchange 2 phases of power supply

7.1.5 Loud noises when lifting and lowering loads

- Chain worn
→ Replace load chain
(See "Replacing load chain")
- Chain sprocket or chain guide worn
→ Replace chain sprocket or chain guide (contact after-sales service)
- Chain sheave in bottom hook block worn
→ Check chain sheave, replace if necessary
- Chain drive not lubricated
→ Lubricate chain drive
- Oil level too low
→ Top up with oil

8.1 Repairs



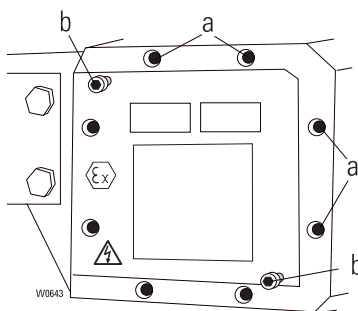
Repairs may only be performed by skilled electricians and Ex specialists.

Use only **original parts**, as otherwise the explosion protection may no longer be guaranteed!

On principle we recommend having repairs on explosion-protected equipment carried out by the manufacturing works or in one of our branch offices.

Modifications or adding external components may only be performed in agreement with the manufacturing works. Furthermore, the information on inspection and maintenance is applicable, see page 18.

1



Opening and closing the flameproof panel box

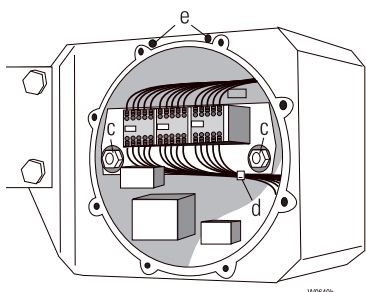
- Unscrew socket head screws (a).
- Press off cover with jack screws (b). (1)
- Unscrew nuts (c) and release the bundle of cables (d). (2)

The front mounting plate can be swivelled upwards to enable work to be carried out on the rear mounting plate:

- Pull front mounting plate off the stud bolts and push the pins into the holes (e) in the housing. (2).

When closing the lid, take particular care that all the screws are fitted and screwed down tight.

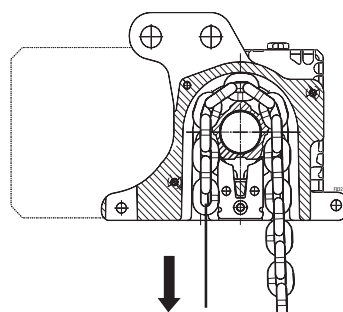
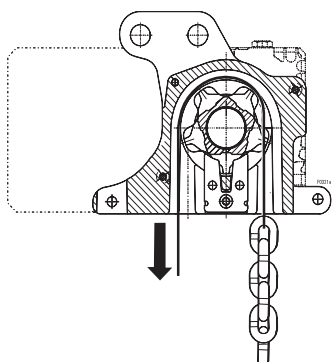
2



All socket head cap screws must be grade 8.8.

Replacing load chain

Use only original manufacturer chains. The standard galvanised chain, in combination with smooth running, provides sufficient protection from mechanical explosion hazards. See sticker on chain box for max. chain length.



1. Attach a fitting aid, e.g. cable tie, to last link.

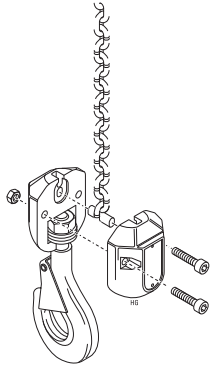
2. Let chain run into guide at slow speed.

Caution: risk of injury!

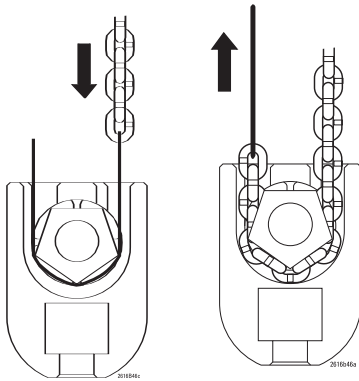
8.1 Repairs

(continued)

Replacing single fall bottom hook block

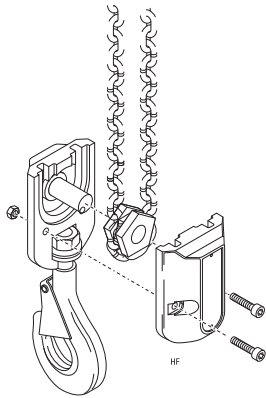


Replacing two-fall bottom hook block

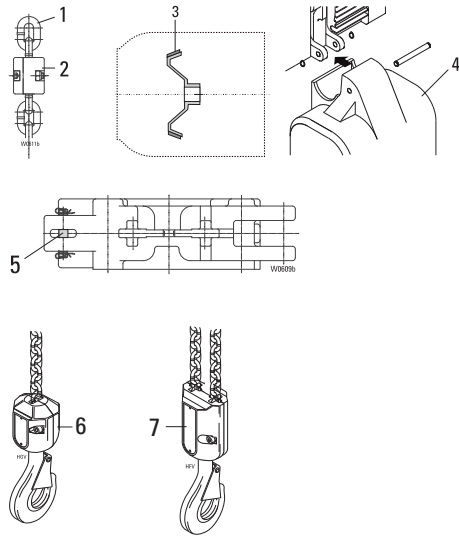


1. Unscrew chain anchorage.
2. Run chain into new bottom hook block.
3. Refit chain anchorage.
4. Grease moving parts.
5. Run through hook path, check that chain is not twisted.

Replacing idler sheave

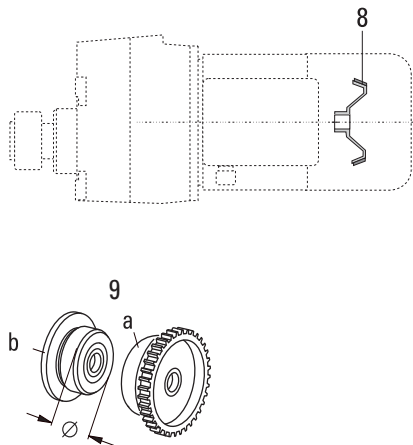


9.1 Hoist



| | Designation | ST20 | ST50 |
|-----|-------------------------------|----------------|----------------|
| 1*1 | Chain | 331 001 9 | 331 013 9 |
| 2 | Chain stopper | 16 320 01 27 0 | 18 320 02 27 0 |
| 3 | Brake disc (hoist motor) | | |
| | A05 | 35 330 20 18 0 | |
| | A1 | 41 330 20 18 0 | 41 330 20 18 0 |
| | A2 | 42 330 20 18 0 | 42 330 20 18 0 |
| 4 | Chain box | | |
| | 8m | 35 322 04 32 0 | 18 320 00 26 0 |
| | 16m | 32 320 03 26 0 | 18 322 00 32 0 |
| | 12m | | 18 322 00 32 0 |
| 5 | Suspension bolt | 16 322 05 92 0 | 18 320 00 24 0 |
| 6 | Single-fall bottom hook block | 16 320 02 59 0 | 18 320 00 59 0 |
| 7 | Two-fall bottom hook block | 16 320 03 50 0 | 18 320 01 50 0 |

9.2 Trolley



| | Designation | ST20 | ST50 |
|---|-------------|----------------|----------------|
| 8 | Brake disc | 35 330 20 18 0 | 35 330 20 18 0 |
| 9 | Wheel | | |
| | | ∅ 80 | ∅ 125 |
| | a | 03 250 00 40 0 | 05 250 04 40 0 |
| | b | 03 250 00 41 0 | 05 250 03 41 0 |

*1 Please state length

10.1 Classification in acc. with FEM (ISO)

| 1/1 | | | | 2/1 | | | | Type |
|----------|----------|---------|---------|----------|----------|---------|---------|------------------|
| 1Bm (M3) | 1Am (M4) | 2m (M5) | 3m (M6) | 1Bm (M3) | 1Am (M4) | 2m (M5) | 3m (M6) | |
| [kg] | | | | [kg] | | | | |
| - | - | - | 250 | - | - | - | 500 | ST2002-8/2 ex |
| - | - | - | 500 | - | - | - | 1000 | ST2005-12/2 ex |
| - | 1000 | 800 | 630 | - | 2000 | 1600 | 1250 | ST2010-10/1,6 ex |
| - | 2500 | 2000 | 1600 | - | 5000 | 4000 | 3200 | ST5025-4/1 ex |
| | | | | - | | | | |

10.2 Ambient conditions

The hoist is designed for use in industry and for the ambient conditions usual in industry.

Special measures must be taken for particular applications such as e.g. high degree of chemical pollution, outdoor use, offshore application, etc.

The manufacturer will be pleased to advise you.

Equipment classification

Zone 1



Equipment group II
Category 2G

Zone 21



Equipment group II
Category 2D

Explosion protection

Zone 1

 II 2 G Ex de IIB T4
 II 2 G ck T4
 (Ex de IIC T4)

Zone 21

 II 2D tD A21 IP66 120°C
 II 2D ck T120°C

Protection against dust and humidity in acc. with EN 60 529

Zone 1

IP 54 (IP66)

Zone 21

IP66

Permissible ambient temperatures

Zone 1

-20°C ... +40°C (option +60°)

Zone 21

-20°C ... +40°C (option +60°)

10.3 Hoist

Hoist motor data

| 50 Hz | | | | | | | | | | | | | | |
|---|------------------|-----------|-------|---------|----------|---------|---------|-----------|----------|----------|-----------|-----------|------|------|
| Chain hoist | Hoist motor type | kW | DC % | c/h | In | | | Ik | | | cos φ k | Main fuse | | |
| | | | | | 230V | 400V | 500V | 230V | 400V | 500V | | 230V | 400V | 500V |
| | | | | | [A] | | | [A] | | | | | | |
| ST2002-8/2 ex | 2/8A05 ex | 0,40/0,07 | 40/20 | 240/240 | 2,5/2,0 | 1,4/1,1 | 1,1/0,9 | 7,4/2,5 | 4,3/1,4 | 3,4/1,1 | 0,82/0,65 | 6 | 6 | 6 |
| ST2002-12/2 ex ST2005-12/2 ex | 2/12A1 ex | 1,20/0,17 | 40/20 | 240/240 | 6,1/3,8 | 3,5/2,2 | 2,8/1,7 | 29,7/5 | 17,1/2,8 | 13,7/2,2 | 0,85/0,57 | 16 | 10 | 6 |
| ST2008-10/1,6 ex ST2010-10/1,6 ex ST5016-4/1 ex ST5020-4/1 ex ST5025-4/1 ex | 2/12A2 ex | 2,00/0,28 | 40/20 | 240/240 | 11,6/9,1 | 6,7/5,2 | 5,3/4,2 | 48,4/10,2 | 27,8/5,9 | 22,3/4,7 | 0,87/0,53 | 16 | 10 | 10 |

| 60 Hz | | | | | | | | | | | | | | |
|---|------------------|-----------|-------|---------|---------|---------|---------|----------|----------|----------|-----------|-----------|------|------|
| Chain hoist | Hoist motor type | kW | DC % | c/h | In | | | Ik | | | cos φ k | Main fuse | | |
| | | | | | 400V | 460V | 575V | 400V | 460V | 575V | | 400V | 460V | 575V |
| | | | | | [A] | | | [A] | | | | | | |
| ST2002-8/2 ex | 2/8A05 ex | 0,49/0,09 | 40/20 | 240/240 | 1,8/1,6 | 1,6/1,4 | 1,3/1,1 | 5,7/1,8 | 5,0/1,6 | 4,0/1,3 | 0,82/0,65 | 6 | 6 | 6 |
| ST2002-12/2 ex ST2005-12/2 ex | 2/12A1 ex | 1,50/0,21 | 40/20 | 240/240 | 4,4/2,7 | 3,8/2,3 | 3,0/1,9 | 20,9/3,3 | 18,2/2,9 | 14,5/2,3 | 0,85/0,57 | 16 | 10 | 6 |
| ST2008-10/1,6 ex ST2010-10/1,6 ex ST5016-4/1 ex ST5020-4/1 ex ST5025-4/1 ex | 2/12A2 ex | 2,40/0,33 | 30/15 | 180/180 | 8,0/6,6 | 6,9/5,7 | 5,6/4,6 | 38,0/7,6 | 33,0/7,6 | 26,4/5,1 | 0,87/0,53 | 16 | 16 | 10 |

10.4 Trolley

Travel motor data

| 50 Hz | | | | | | | | | | | | | | |
|--------------|-------------------|-----------|-------|-----|------|---------|------|------|---------|------|-----------|-----------|------|------|
| Travel drive | Travel motor type | kW | DC % | c/h | In | | | Ik | | | cos φ k | Main fuse | | |
| | | | | | 230V | 400V | 500V | 230V | 400V | 500V | | 230V | 400V | 500V |
| | | | | | [A] | | | [A] | | | | | | |
| FU-B .. ex | 2/8A05 ex | 0,32/0,06 | 40/20 | | | 1,1/1,0 | | | 3,4/1,1 | | 0,89/0,79 | | | |

| 60 Hz | | | | | | | | | | | | | | |
|--------------|-------------------|-----------|-------|-----|---------|------|------|---------|------|------|----------|-----------|------|------|
| Travel drive | Travel motor type | kW | DC % | c/h | In | | | Ik | | | cos φ k | Main fuse | | |
| | | | | | 400V | 460V | 575V | 400V | 460V | 575V | | 400V | 460V | 575V |
| | | | | | [A] | | | [A] | | | | | | |
| FU-B .. ex | 2/8A05 ex | 0,39/0,08 | 40/20 | | 1,5/1,4 | | | 4,7/1,6 | | | 0,9/0,78 | | | |

10.5 Specifications for mains connection

- All poles of the mains cable must be disconnected by a lockable switch.
- The mains voltage must correspond to that stated on the rating plate.
- Fixed installed cables e.g. NYM, NYY
- Flexible cables e.g. RN-F, NGFLGöu

10.6 Cable cross-sections and length of supply cable

| Hoist motor type | Stationary Fixed installation in PVC conduit supply to hoist | | | | | | Trolley Fixed installation in PVC conduit supply to infeed point (rising mains) | | | | | | Trolley Festoon cable in free air - flexible rubber-sheathed cable along runway | | | | | |
|------------------|--|-----|-------------------|-----|-------------------|-----|---|-----|-------------------|-----|-------------------|-----|--|-----|-------------------|-----|-------------------|-----|
| | $\Delta U \leq 5\%$ | | | | | | $\Delta U \leq 1\%$ | | | | | | $\Delta U \leq 4\%$ | | | | | |
| 50 Hz | | | | | | | | | | | | | | | | | | |
| | 230V | | 400V | | 500V | | 230V | | 400V | | 500V | | 230V | | 400V | | 500V | |
| | S | L1 | S | L1 | S | L1 | S | L2 | S | L2 | S | L2 | S | L3 | S | L3 | S | L3 |
| | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] |
| 2/8A05ex | 1.5 | 73 | 1.5 | 224 | 1.5 | 348 | 1.5 | 15 | 1.5 | 45 | 1.5 | 70 | 1.5 | 59 | 1.5 | 179 | 1.5 | 279 |
| 2/12A1ex | 2.5 | 35 | 1.5 | 64 | 1.5 | 100 | 2.5 | 7 | 1.5 | 13 | 1.5 | 20 | 2.5 | 28 | 1.5 | 51 | 1.5 | 80 |
| 2/12A2ex | 2.5 | 22 | 1.5 | 39 | 1.5 | 61 | 2.5 | 4 | 1.5 | 8 | 1.5 | 12 | 2.5 | 17 | 1.5 | 31 | 1.5 | 49 |
| 60 Hz | | | | | | | | | | | | | | | | | | |
| | 400V | | 460V | | 575V | | 400V | | 460V | | 575V | | 400V | | 460V | | 575V | |
| | S | L1 | S | L1 | S | L1 | S | L2 | S | L2 | S | L2 | S | L3 | S | L3 | S | L3 |
| | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] | [mm] ² | [m] |
| 2/8A05ex | 1.5 | 167 | 1.5 | 221 | 1.5 | 342 | 1.5 | 33 | 1.5 | 44 | 1.5 | 68 | 1.5 | 134 | 1.5 | 177 | 1.5 | 273 |
| 2/12A1ex | 1.5 | 52 | 1.5 | 69 | 1.5 | 107 | 1.5 | 10 | 1.5 | 14 | 1.5 | 21 | 1.5 | 41 | 1.5 | 55 | 1.5 | 85 |
| 2/12A2ex | 2.5 | 48 | 2.5 | 63 | 1.5 | 59 | 2.5 | 10 | 2.5 | 13 | 1.5 | 12 | 2.5 | 38 | 2.5 | 51 | 1.5 | 47 |

S = Minimum cross-section

L1...L3 = Max. supply cable length of the individual types of power supply \geq sum of voltage drops $< 5\%$.

A loop impedance of max. 250 mΩ was taken as basis for coordinating the short circuit protection of the power contactors and calculating the cable lengths. The minimum cross-sections take into consideration the overload protection of the cables corresponding to the types of cable and installation.

In the case of larger cable cross-sections, the max. cable lengths are calculated as follows: $L^* = L \times S^* / S$

10.7 Circuit diagram

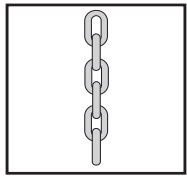
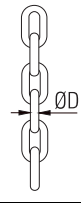
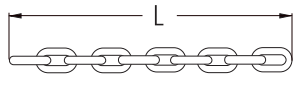
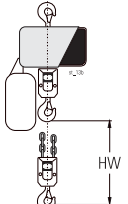
See separate enclosure

10.8 Noise level

Noise level at 1 m distance from chain hoist, averaged out for a work cycle of 50% with rated load and 50% without load.

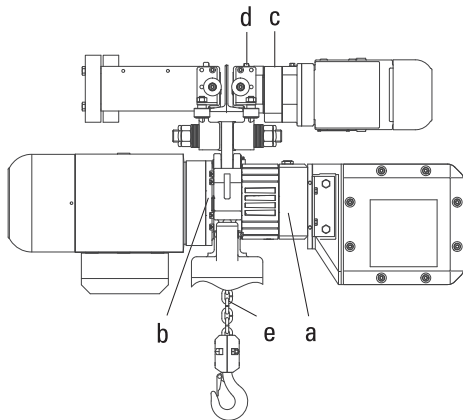
| |
|--------|
| [dB A] |
| 74 |

10.9 Chain certificate

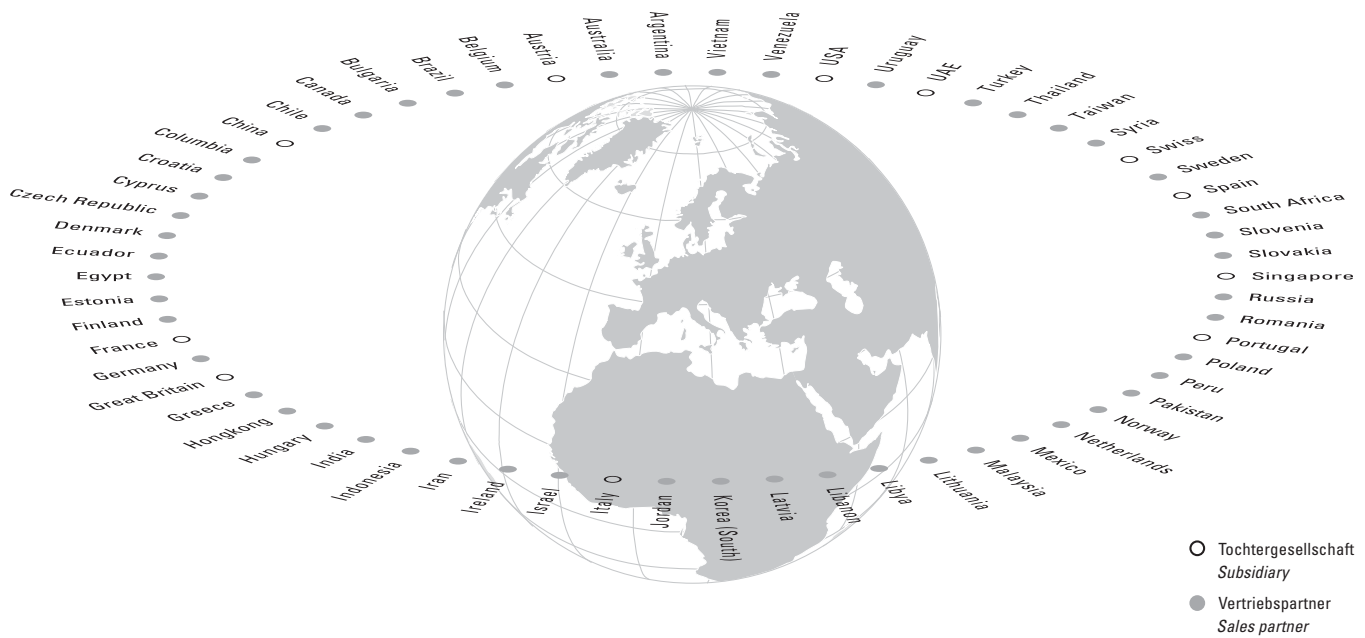
|  | Order No. |  | *1 | *2 | *3 |  | |
|--|------------------------|---|--------------|-----------|-----------|---|--------------------------|
| | | | [kg] | [kN] | [kN] | 1/1 | 2/1 |
| | | [mm] | [kg] | [kN] | [kN] | 3 [m] | |
|  ST 20 ST 50 | 331 001 9 331 013 9 | 7 11.3 | 1000 2500 | 40 100 | 60 160 | HW + 0.6 HW + 0.7 | 2xHW + 0.7 2xHW + 1.0 |

*1 Tractive force on chain
*2 Test load
*3 Minimum breaking load

10.10 Lubricants



| Lubrication point | Type of lubricant | Designation DIN 51502 | Quantity | Characteristics, makes | |
|-----------------------|-------------------|---------------------------|----------------------------------|------------------------|--|
| a = Hoist gear | Oil | CLP 460 (PG 220) | ST 20: 2800 ml ST 50: 3800 ml | 1 | 1 Viscosity 460 cSt/40°C, pourpoint -20°C, flash point +265°C e.g. Fuchs Renep Compound 110 (Werksfüllung), Aral Degol BG 460, BP Energol GR-XP 460, Esso Spartan EP 460, Mobilgear 634, Shell Omala Oil 460, Texaco Meropa 460 2 Viscosity 220/s/40 °C; pourpoint -40°C, flash point +320°C e.g. Shell Tivela Oil WB 3 Soap base: lithium+MoS2, dripping point approx. +180°C penetration: 355-385, operating temperature: -30°C to 120°C z.B. Fuchs Renolit FLM O*, Aralub PDP 0 4 Soap base: synthetic+lithium, penetration: 420-450, operating temperature: -35°C to 130°C e.g. Tivela Compount A*, Küblersynth UH1 14-1600 5 Soap base: natron, dripping point approx. +150°C, penetration: 400-430, operating temperature: -30°C to 80°C e.g. Aralub PDP 00, BP Energrease HT 00 EP ESSO-Getriebe Fließfett 6 Soap base: Li / polyglycol oil, dripping point approx. + 180°C penetration 400 - 430, operating temperature: up to -40°C e.g. Esso Fließfett S 420 7 Oil or liquid grease Normal ambient conditions: Ceplattyn chain lubricant fluid Foodstuff industry, SKD 3000 |
| | | | | 2 | |
| | | | | 3 | |
| | | | | 4 | |
| b = Intermediate gear | Grease | KPF 0K -20 (GPG 00 K -40) | ST 20: 250 ml ST50: 300 ml | 3 | |
| | | | | 4 | |
| c = Travel gear | Oil | CLP 460 (PG 220) | FU-B: 170 ml | 1 | |
| | | | FU-B: 170 ml | 2 | |
| | Grease | GOOF (GPGOOK) | SF 14-1... 100 g | 5 | |
| | | | SF 14-1... 100 g | 6 | |
| d = Wheel gearing | Grease | GOOF (GPGOOK) | | 5 | |
| | | | | 6 | |
| e = Chain | Oil | - | | 7 | |



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