

YKF
SKF

YKG
SKG

Wire Rope Hoists

Operation & Service Manual

en-US

**Before installing hoist, fill in the information below.
Refer to the Hoist and Motor data plates.**

Model No. _____

Serial No. _____

Purchase Date _____

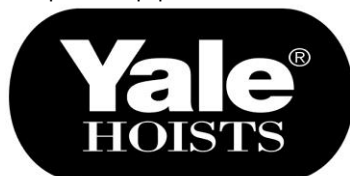
Voltage _____

Rated Load _____

Follow all instructions and warnings for inspecting, maintaining and operating this product.

The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. Retain this manual for future reference and use.

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.



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1 General information




1 General information

You have purchased a Yale product.
This product was constructed in accordance with the applicable European standards and regulations.
Read carefully and observe this manual. Store the manual within easy reach at the place of operation.

1.1 Information about safety messages

1.1.1 Explanation of signal words and symbols

The following signal words are used in safety messages.

| Signal word | Meaning |
|--|--|
|  DANGER | Indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
|  WARNING | Indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
|  CAUTION | Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
| NOTICE | Indicates possible material or environmental damage. |

1.1.2 Safety instructions

The fundamental hazards and required safety measures are listed in section **“General safety notes”**.

1.1.3 Section safety messages


Section safety messages relate to an entire section and are laid out as follows.

SIGNAL WORD

Type and source of hazard
Possible consequences if disregarded
➤ Measures to prevent the hazard






1.1.4 Embedded safety messages

Embedded safety messages are placed directly before or after a required action and are structured as follows.


 **SIGNAL WORD** Type and source of hazard, possible consequences if disregarded.
➤ Measures to prevent the hazard,

1 General information

1.1.5 Safety alert symbols

| Symbol | Meaning |
|---|-----------------------|
|  | General hazard |
|  | Electric shock hazard |
|  | Falling parts hazard |
|  | Suspended load hazard |
|  | Hand injury hazard |

1.1.6 Additional symbol

| Symbol | Meaning |
|---|----------------|
|  | Important note |

1.2 Spare parts

WARNING

Safety hazard. Incorrect or defective spare parts may lead to damage, malfunctions or the complete failure of the machine.

➤ Use only original spare parts.

1.3 Target audience and responsibilities

Owner

Whoever uses and employs the product or has it operated by suitable trained personnel is considered to be the owner (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 behavior, have been advised on the necessary protective devices, precautions, applicable regulations, accident prevention regulations and prevailing conditions and have proven their ability.

Qualified person

A qualified person is a person who by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, successfully demonstrates the ability to solve/resolve problems relating to the subject matter, the work, or the project.

Electrical qualified person

An electrical qualified person is defined as:

One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazard involved.

1 General information

1.4 Crane logbook

A completed test logbook must be kept for each hoist. The results of the periodic inspections must be entered in the logbook.

1.5 Transport and storage

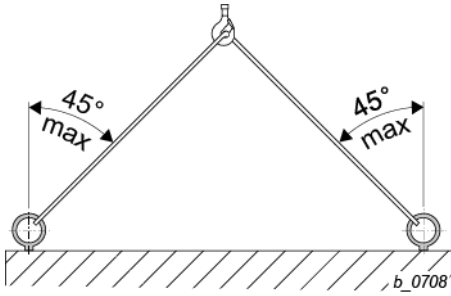


Fig. 1

Transport

The product is delivered on a special pallet. This enables it to be loaded and unloaded safely with a fork-lift truck.

1. **⚠ WARNING Falling parts hazard.** If the product is to be transported suspended, attach the product to the sling points provided. The sling points are designed for a max. diagonal pull $\geq 45^\circ$.
2. Do not allow the hoist to drop. Set the product down on the ground correctly.
3. Avoid damage to the product and its components by loading and unloading it correctly.

Storage

1. Store the product and its accessories in a dry place.
2. Store it in a stable position, secure it against toppling or overturning.
3. Observe environmental protection laws for storage (do not allow oil etc. to leak).
4. Make sure that the ground is firm and does not permit the machine to sink in.
5. Ensure the load is evenly distributed, support the hoist at several points.
6. Do not kink the ropes and avoid contact with the ground.

1.6 Weight

See factory certificate.

1.7 Installation, commissioning, maintenance and repairs

1. Make sure that installation, commissioning, maintenance and repairs are carried out by qualified persons only.
2. We recommend having installation carried out by qualified personnel engaged by the manufacturer.
3. Do not carry out any alterations or modifications.
4. Make sure that additional fitments are approved by the manufacturer.
(During welding work, electrode and ground must be in contact with the same component!)
5. Use only original spare parts for repairs.
6. Make sure that dismantled guards are screwed down again and locked.

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

- For detailed information about installation see section "**Installation**".
- For detailed information about commissioning see section "**Commissioning**".
- For detailed information and about maintenance and repairs see section "**Inspection and maintenance**".

1 General information

1.8 After-sales service

You have purchased a high-quality product. Our after sales service will give you advice on its correct use.

In order to maintain the safety and constant availability of the product, we recommend concluding a maintenance agreement.

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 system.

Ask for our seminar program.

1.9 Periodic inspections

- Hoists and cranes must be inspected by a qualified person at least once a year, more frequently if so specified by national regulations.
- The results of the test must be recorded and filed in the test logbook.
- The remaining service life of the hoist must also be established during this inspection.
- The periodic inspections must be adapted to the hoist's use. Intensive use or adverse environmental conditions entail shorter maintenance intervals.

All tests must always be initiated by the owner!

1.10 Environmental information

Environmental aspects have been taken into account when developing and manufacturing this equipment. Please note the instructions on safe lubrication and waste disposal to avoid pollution risks during use. Appropriate use and correct maintenance will improve the environmental performance of this product.

1.10.1 Life cycle assessment

The stages of the product service life are:

- Production of materials,
- components and energy,
- transport to factory,
- manufacture and assembly,
- transport to customer,
- on-site installation,
- operating phase including maintenance and modernization,
- dismantling and recycling of materials at end of service life.

1.10.2 Energy consumption

The energy consumption during the operating phase has the highest impact on the environment. Electricity is required for starting and running the motors and for lighting, heating, cooling and other optional electrical components and parts of the hoist.

2 General safety notes

2 General safety notes



The products are constructed according to the state of the art and recognized safety rules. However, during use danger to the life and limb of the user or a third party can arise, or adverse effects can affect the product and other property.

2.1 Use for intended purpose

- Wire rope hoists are intended for lifting freely movable loads. Depending on their design, they are for stationary or mobile use.
- In the case of wire rope hoists with multiple load-bearing equipment, ensure that the load is distributed evenly between the falls.
- Any fundamental alterations and modifications to the product, 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 authorized by the manufacturer, otherwise the declaration of conformity/declaration of incorporation will be invalidated.
- Also, any work on or additions to the control must be authorized by the manufacturer. The manufacturer cannot accept any liability for malfunctioning after unauthorized work on the control.
- The conditions in the place of use of the hoist must correspond to the operating conditions for which the hoist was designed (including indoor/outdoor use, ambient temperature, radiation temperature, wind, dust, splash water, snow, water, etc.
- For hoists, which work in combination and have more than one control (tandem operation), action must be taken to coordinate the controls. This applies also to the reaction of the protective devices. Controls must be constructed accordingly.
- For hoists intended for automatic operation, the control must be designed accordingly.

2 General safety notes

2.2 Inappropriate use

- Use in areas with potentially explosive atmosphere
- Transporting molten metal
- Exceeding the maximum working load.
- Transporting persons.
- Pulling/towing or raising/lowering of a guided load.
- Using the hoist in applications in which the working load changes with the position of the load, as the hoist is not equipped with a load display and additional warning device when it cuts off at overload.
- Breaking away, pulling or towing of loads.
- Use of rope drive for “guided loads” without being designed for this type of application.
- Breaking away of tilted loads if the rope drive is designed for the “guided load” application.
- Pulling loads at an angle, dragging loads or moving vehicles with the load or load suspension equipment.
- Do not knot load ropes or chains or shorten them with devices such as bolts, screws or similar.
- Removing the safety latch from suspension and load hooks.
- Manipulating the overload safety device.
- Operation with slack rope (loose windings on the rope drum).
- If the product forms “part of a machine”, the person placing it on the market must ensure that the product meets the specific regulations of the application.
- Application of external torques due to forces that are exercised from outside the system, e.g. with gripper operation or through tilting/bumping of the load, in particular with the option 4 × 90° hook locking.

2.3 Residual dangers

The machine has been subjected to a risk analysis. The design and construction based on this correspond to the state of the art. However, residual hazards remain during operation and maintenance and these could result in serious or even fatal injuries to personnel.

- Risk of crushing
- Hazard due to falling parts (attached to the load or on the load)
- Load toppling due to unsuitable or damaged load-bearing equipment
- Risk of electric shock

Preventative measures:

1. Use LOTO (Lockout/Tagout) procedure in accordance to national, state and local regulations and company policy.
2. Switch the machine off and ensure it cannot be switched on again before carrying out maintenance, cleaning and repair work.
3. Switch off the power supply before all work on the electrical system. Check that the components to be replaced are free of current and voltage.
4. Do not remove any safety devices or override them by manipulating them.
5. When lifting, or lowering loads ensure that no-one is in the immediate danger area.
6. It is forbidden for anyone to stand in the danger area.

2 General safety notes

2.4 Organizational safety precautions

- The owner may only employ insured persons to operate a crane single-handedly (crane operator), install or perform maintenance on the product if they are capable both physically and mentally,
 - have been instructed in operating and maintaining the crane and have shown him proof of their competence and
 - may be expected to perform the duties assigned them reliably.
- At regular intervals, check that work is being carried out in a safety-conscious manner.
- Observe the intervals specified for periodic inspections. File the test reports in the logbook.

2.5 General regulations

- Safety and accident prevention regulations.
- All national, state and local regulations.

2.6 Recommended PPE



Fig. 2

Personal protective equipment to be provided by the owner

- Safety shoes
- Gloves (only if there is no danger of them being drawn into equipment)
- Protective goggles
- Protective helmet
- Hearing protection
- Closely fitting clothes (danger of clothing being drawn into equipment)
- When operating hoist, or standing close to hoist, wire rope or chain there is a danger of fingers, clothing, jewelry, etc. being drawn into equipment

2 General safety notes

2.7 Working above floor level

Personnel must be protected from falling. Observe the national, state, and local regulations, and company policies when working above the floor level.

2.8 Sound pressure level

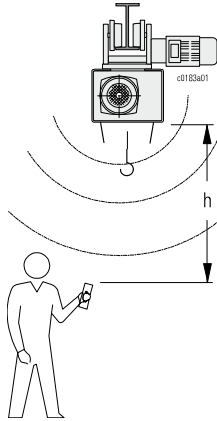


Fig. 3

The sound pressure level was measured at a distance of **3 ft** from the wire rope hoist. The mean sound pressure level is calculated for one operating cycle (50% with maximum permissible load, 50% without load).

Instead of stating an emission value based on a workplace, the values from Tab. 1 and Tab. 2 at measuring distance "h" can be used.

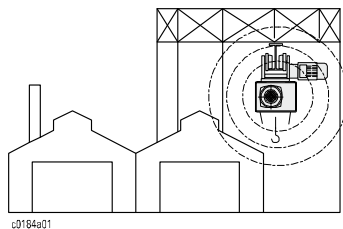
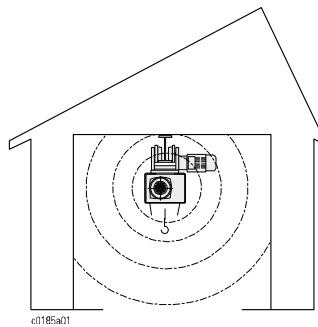


Fig. 4

| Type | [db (A)] + / - 3 | | | | |
|---------|------------------|------|-------|-------|-------|
| | h [ft] | | | | |
| | 3 ft | 7 ft | 13 ft | 26 ft | 52 ft |
| YKF/SKF | 77 | 74 | 71 | 68 | 65 |
| YKG/SKG | | | | | |

Tab. 1

| Type | [db (A)] + / - 3 | | | | |
|---------|------------------|------|-------|-------|-------|
| | h [ft] | | | | |
| | 3 ft | 7 ft | 13 ft | 26 ft | 52 ft |
| YKF/SKF | 77 | 71 | 65 | 59 | 53 |
| YKG/SKG | | | | | |

Tab. 2

2.9 Fire safety

⚠ WARNING

Safety hazard. Never use a powder extinguisher in the presence of high voltages. Only fight the fire if this is possible without subjecting yourself to risk. Switch off the crane if this is possible. Evacuate the area. Advise other persons on potential danger and call for help.

2.10 Safety-conscious operation

YK/SK wire rope hoists are constructed according to the state of the art and equipped with an overload safety device in standard version. In spite of this, dangers may arise from inappropriate use or use for an unintended purpose.

1. The owner is responsible for ensuring that work is carried out with safety in mind and avoiding risks.
2. Read the instructions before starting to work with the product.
3. Standing under a suspended load is forbidden. Danger to life and limb!
4. Observe the "Duties of crane operator".
5. Before starting work, find out where the emergency stop button is (usually in the control pendant).
6. Do not put your hand between edges which might crush or cut.
7. Do not grasp the moving rope.
8. Take note of the relevant instructions when attaching loads.
9. Do not stand between load and wall.
10. Start lifting the load carefully.
11. Never attempt to remedy a malfunction while the load is suspended.
12. Never use bent, open or distorted load hooks, or attempt to straighten them.
13. Have a damaged hook latch repaired.
14. Never anneal the hook.
15. Never lock the buttons of the control switch in place.
16. Never allow the load to drop into the hoist's load-bearing equipment.
17. Before lifting loads, ensure that the stated maximum working load is not exceeded.
18. When lifting, and setting down loads, ensure that they are in a stable position in order to avoid accidents due to the load toppling or overturning.
19. Secure the load if the power is cut.
20. Do not kink or crush control cables.
21. Choose a safe place from which to operate the hoist.
22. Joining or mending ropes, chains or belts is not permitted.
23. Never touch metal components that are colder than 32 °F or hotter than 131 °F without wearing protective gloves.
24. Do not use the emergency limit switch (ultimate limit switch for highest and lowest hook position) as an operational limit switch.
25. Report damage and defects to the product (abnormal noises, impaired braking function, deformations, ...) to the person responsible immediately. Do not use the product until the faults have been eliminated.
26. Do not remove information plates from the product. Replace illegible or damaged plates.
27. Have hoist inspected by the relevant authority before commissioning.

2.11 Attaching load

1. Use only tested and approved slings for attaching the load.
2. The hoist rope must not be wound around the load.
3. The load must always be suspended from the base of the hook. The tip of the hook must not be subjected to load.
4. Removing the safety latch from suspension and load hooks is not permitted.
5. Only attach hook block when stopped.
6. Hook or hook block turns under load – release the hook block and rope when lifting the load.
7. Do not reach into the hook block opening at the rope inlet – crushing hazard!
8. Guide the hook block on the load hook bracket - not on the hook base! – crushing hazard!

3 Introduction

3 Introduction

Wire rope hoists are intended for lifting freely movable loads.

The modular concept of our series of wire rope hoists permits a multitude of variations on the basis of series components.

The design is characterized by the motor, gear and rope drum being mounted in series on a common shaft.

The hoist drive is a cylindrical rotor motor with separately controlled D.C. brake. Its design complies with the FEM calculation regulations which are adapted to the requirements of hoist operation.

The main components of the wire rope hoist are the hoist motor, the gear, the rope drum and the control box with connection parts.

Our certified quality assurance system to DIN ISO 9001/EN 29001 guarantees consistently high quality.

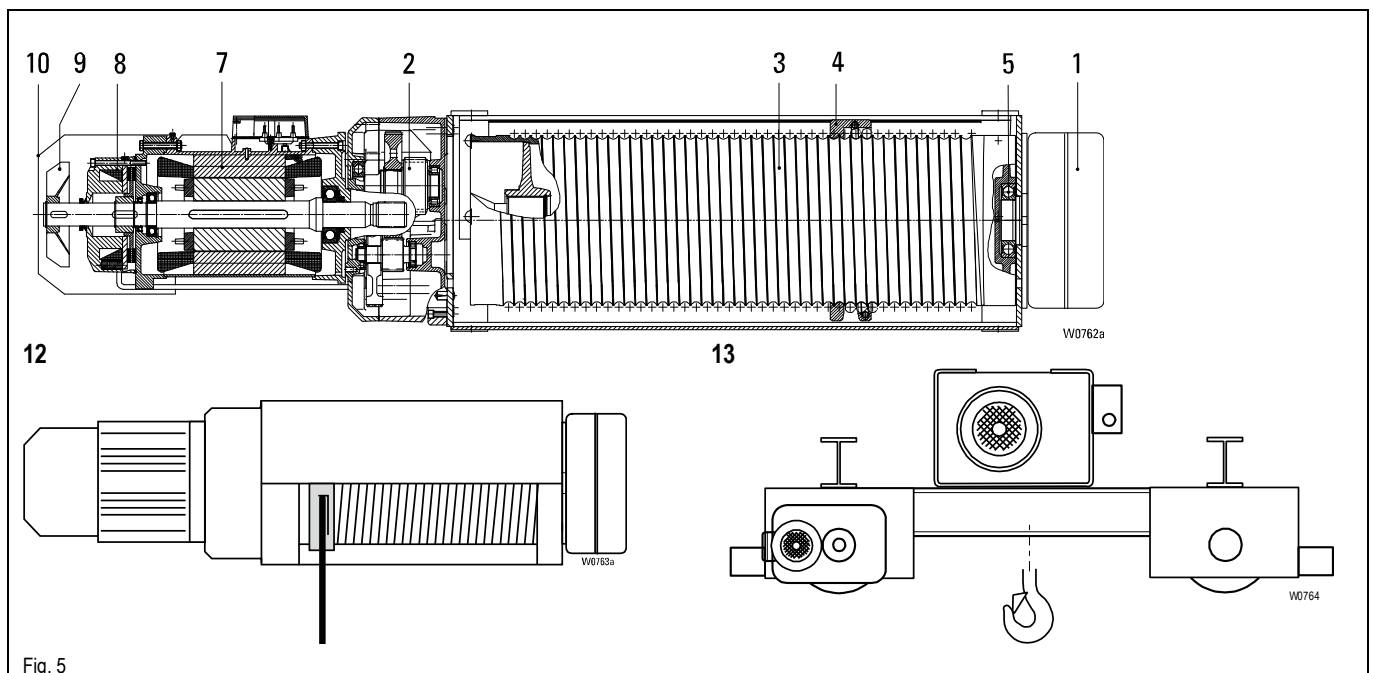


Fig. 5

- | | | | |
|---|-----------------------------------|----|---|
| 1 | Connection box | 8 | Brake |
| 2 | Gear | 9 | Fan |
| 3 | Rope drum | 10 | Fan cover |
| 4 | Rope guide with tensioning spring | 12 | Stationary wire rope hoist, hoist for incorporation |
| 5 | Rope drum bearing | 13 | Wire rope hoist with double rail trolley |
| 7 | Motor | | |

4 Installation

4 Installation

4.1 Incorporation

Stationary hoist (hoist for incorporation)

The hoist is connected to a fixed structure by means of bolt joints permitting it to be attached to a base, wall or ceiling.

4.2 Stationary wire rope hoist

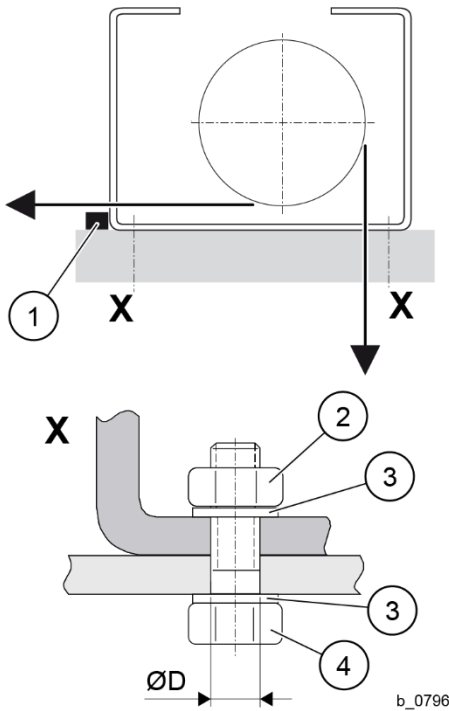


Fig. 6

D 1.3 in

- (1) Shear bar
- (2) Nut M30
- (3) Safety washer S30 (Schnorr)
- (4) Screw M30

Possible installation positions

In standard design with rope lead-off vertically downwards, the wire rope hoist is bolted onto a horizontal surface by means of the foot holes. Please consult us in the case of other rope lead-offs.

- Use the fixing elements specified, see sketch.
- Take care that no distortion arises from unevenness, etc.
- Take up any lateral forces in the attachment by a shear bar (1).
- For tightening torques see chap. 11.4 page 87).

| Standard reevings | | | | | | | |
|-------------------|-----|-----|-----|-----|-----|-----|-----|
| 2PS | 4PS | 6PS | 8PS | 1PD | 2PD | 4PD | 5PD |
| | | | | | | | |

Fig. 7

4 Installation

4.3 Fleet angle

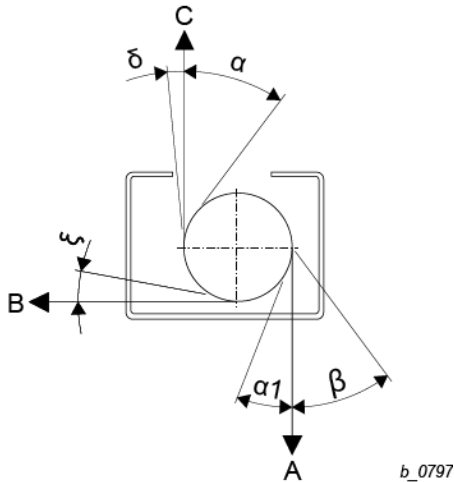


Fig. 8

4.3.1 Fleet angles

The fleet angles given in the table can be obtained by rotating the rope guide on the rope drum and positioning the wire rope hoist accordingly. The rope guide must be adapted to the fleet angle. Observe also the radial rope exit angle γ .

| Type | Standard | | By rotating rope guide | | | |
|--------------------|------------|---------|------------------------|------------|----------|-----|
| | A | | B | C | | |
| | α_1 | β | ξ | α | δ | |
| YKF/SKF YKG/SKG | 18° | 30° | 3–10° | on request | | 55° |

Tab. 3

4.3.2 Angle of installation

▲ WARNING

Danger of damage to rope

The wire rope must not touch the rope guide or structural elements.

➤ Always install the hoist horizontal.

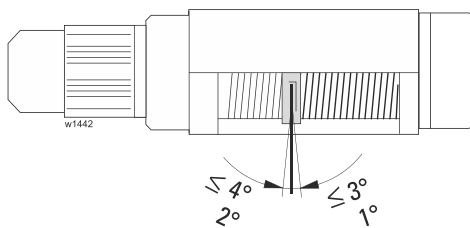


Fig. 9

- Hoists with rope drives with bottom hook blocks must always be installed horizontal to their longitudinal axis.
- Do not exceed the fleet angle to the direction of the rope drum groove and the rope sheave of 4°/3° for non-rotation-resistant wire ropes, 2°/1° for rotation-resistant wire ropes. However even at these angles a reduction in service life is to be expected. Rope sheaves must be equipped with a suitable guard to prevent the rope jumping out of the groove, max. clearance of the guard $0.5 \times \text{rope diameter}$. The rope must not slip off the sheave axle if the sheave breaks. The rope suspension must be designed to prevent kinking and other additional stresses. The rope suspension for non-rotation-resistant wire ropes must be designed so that it cannot rotate around its longitudinal axis. The rope spread angle of 45° in top hook position must not be exceeded.

4 Installation

4.4 Double rail trolley

The trolleys are constructed according to the state of the art and supplied with mounted buffers.

NOTICE

The trolley must run 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 increased wear.

➤ Ensure that the trolley runs smoothly without increased friction at the wheel flanges.

1. The runway must meet the requirements of ISO 12488-1.
2. Make sure that the rail joints are even on both running and guide surfaces. Grind down if necessary.

Check track gage

| $\varnothing D$ [in] | a [in] | b min [in] |
|-------------------------|-------------|---------------|
| 12.4 | 0.18 - 0.28 | 1.2 |

Tab. 4

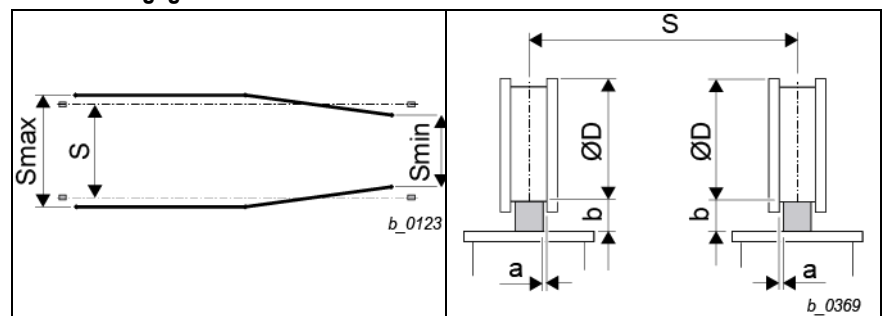


Fig. 10

1. Check track gage “S” on trolley and rail ($S_{max} - S_{min} = 0.197$ in.)
2. Check lateral play “a” between rail and flange.
3. “a” as per Tab.4, if trolley is positioned symmetrically on runway.
If asymmetrically, $a_{left} + a_{right} = 2 \times a$.

Bolt buffers and stops

1. Bolt rubber buffers onto trolley or runway end stop.
2. Fit suitable stops (dimensions see next section).

4 Installation

4.5 End stops for double rail trolleys

⚠ WARNING



Danger of falling parts

Travel motions must be limited by suitable end stops.

If there are no end stops, there is a danger of the trolley travelling over the end of the runway.

➤ Mount suitable end stops at the end of the runway before commissioning the hoist.

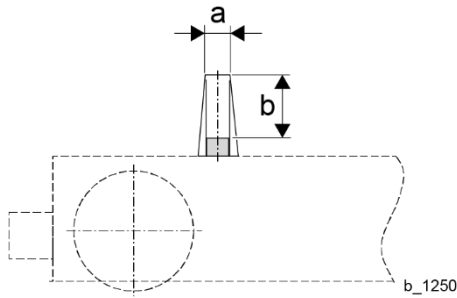


Fig. 11

| Wheel Ø D | a | b |
|-----------|-----|-----|
| [in] | | |
| 9.8 | 4.7 | 6.3 |
| 12.4 | 4.7 | 6.3 |

Tab. 5

4 Installation

4.6 Anti-jump catch (option)

4.6.1 Description of system

The anti-jump catch acts as an anti-derail device, preventing the trolley jumping off the rail and falling.

OE-R08 - OE-R09

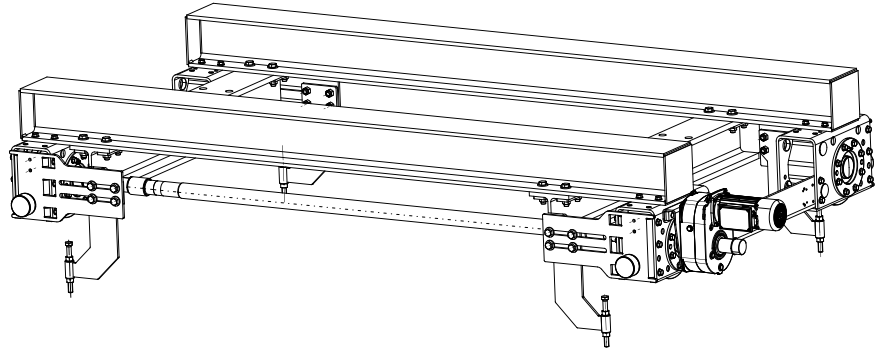


Fig. 12

4.6.2 Procedure

⚠ WARNING



Danger of falling parts

- Cordon off and secure danger area during installation and dismantling work.

The anti-jump catch is supplied pre-mounted on the trolley and must be adapted to the actual runway situation.

1. Unscrew nuts (1).
2. Dismantle hook (2) and swivel by 180°.
3. Replace hook (2) and tighten nuts (1) hand-tight.

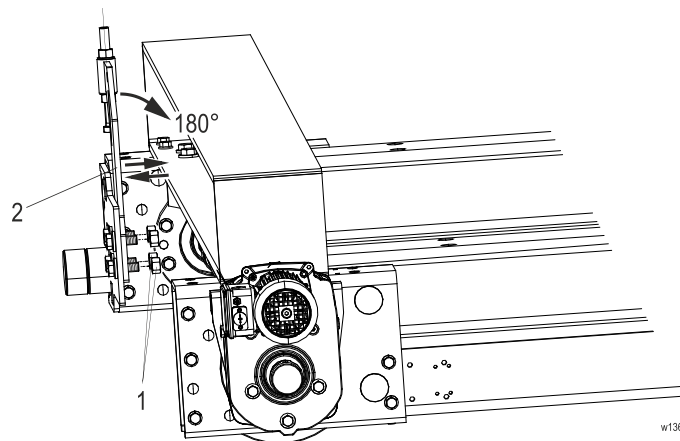


Fig. 13

4 Installation

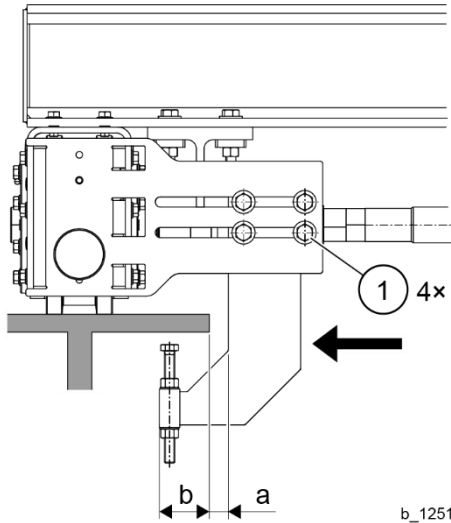


Fig. 14

b_1251

Horizontal adjustment:

- Adjust final hook position to the distances $a \geq 0.59$ in and $b \geq 1.2$ in.
- Tighten fixing elements (1) to tightening torque $M20 = 317$ lb_r ft.

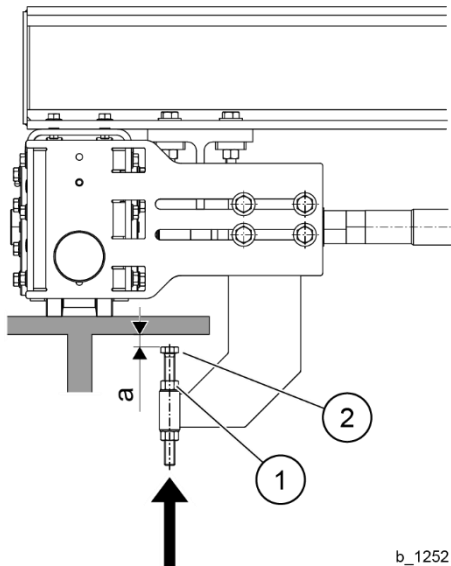


Fig. 15

b_1252

Vertical adjustment:

- Unscrew nuts (1).
- Set adjusting screw (2) to the distance $a = 0.39$ in.
- Tighten nuts (1) to tightening torque $M20 = 317$ lb_r ft.

NOTICE

In the event of a fault (trolley running into the runway end stops unchecked, broken rope) all elements of the anti-jump catch must be checked immediately for damage/faults and completely replaced if necessary.

The functional reliability of the system must be guaranteed!

4.7 Travel limit switches

4.7.1 Double rail trolley

The travel limit switch assembly is supplied ready-wired but not mounted and must be secured to the towing arm for the power supply.

⚠ WARNING



Danger of falling parts

If limit switches are defective, wrongly installed or wrongly set, the trolley will run into the end stops without being braked.

- Check the correct functioning and settings of the limit switches before commissioning.

The switching contacts are designed for control current.

Switching functions:

1. Limit switching in both directions of travel (1 two-way switch, 2 ramps).
 2. Pre-switching and limit switching in both directions of travel (1 two-way switch, 4 ramps).
- The speed is switched over from "fast" to "slow" before the end of the runway is reached and is cut off at the end of the runway.



Fig. 16

X = stop, left
Y = stop, right
Z = fast / slow

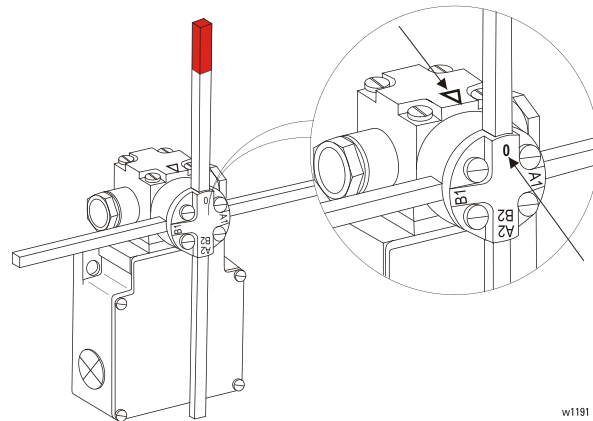


Fig. 17

NOTICE

No mechanical stop follows after the switch has been activated twice in the same direction

- When mounting, ensure that the cross of the switch is in neutral position.
Red mark: 0

Neutral position: "0" on the rotating head coincides with the arrow marking on the switch housing..

4.8 Electrical equipment



⚠ DANGER

Electric shock hazard

- Make sure an electrical qualified person performs the work.
 - Observe the relevant safety and accident prevention regulations.
-

Electrical equipment was installed per NFPA 70 or other National, State, and Local regulations. It comprises all electrical equipment of the hoist:

- Energy supply (main isolator...)
- Energy distribution (transformers, crane disconnect switch, special circuits...)
- Operator interface and control devices mounted on the hoist (control pendant, radio transmitter, devices for emergency stop, limit switches...)
- Hoist control (electronic control devices, safety devices, radio receiver...)
- Drive, motor controls (power contactors, inverters...)
- Main drives (motors, brakes...)
- Auxiliary drives, sensors, load suspension equipment, actuators...)

4.8.1 Supply cables

Electrical service can be either power by cable or guarded system having sliding shoe contacts or wheel type collectors.

- See chap 11.3 or circuit diagram for minimum cross-section and max. length of supply cable.
- Cables, leads and conductor lines must be selected to match the existing operating conditions (e.g. voltage, current, protection against electric shock, amassment of cables and leads) and for external influences (e.g. ambient temperature, presence of water or corrosive materials, mechanical stress).

4.8.2 Terminals

- Check that all terminals are firm.

4.8.3 Protection of equipment

Protective devices include:

- Devices for overcurrent protection (fuses, circuit breakers)
- Motor protection devices
- Overload protection
- Temperature monitors
- Limit switches

The protective devices in the electrical equipment installed in the scope of supply must in no case be removed, replaced by different devices or bridged.

If a protective device has reacted, the hoist must not be put back in service until the cause has been determined and eliminated with the assistance of a qualified person.

Overcurrent protection devices

Every hoist must have devices for disconnecting and switching the power supply. This function is performed by the following devices:

4.8.4 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.

4.8.5 Runway conductor disconnecting means

- must disconnect the wire rope hoist on all poles,
- must be lockable in OFF position,
- must be installed in an easily accessible place in the system,
- must be marked as such to avoid mistakes.

4.8.6 Disconnect switch

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

4.8.7 Protective conductor



▲ WARNING

With a missing protective conductor, an electric shock hazard exists. Material damage, severe injuries or death can result.

- Connect the external protective earth system (PE) close to the terminals of the phase conductor using a protective conductor for each mains connection.

Without a protective earth connection, malfunctions can arise during operation. The protective earth connection facilitates protective equipotential bonding for protection against electric shocks, as well as functional equipotential bonding for the avoidance of electrical interference effects on electronic systems.

4.8.8 Connection fuses

- Overcurrent protection devices.
- The fuse values must be observed so that the crane switch contacts do not weld if there is a short circuit and overload protection of lead is ensured.

4.8.9 Electromagnetic compatibility

Electromagnetic compatibility (EMC) mainly concerns the emission of electromagnetic interference and the immunity of electronic components and systems to this interference. If the following interference suppression measures are correctly installed and applied, the equipment will not cause any electromagnetic interference above the level permissible for the intended operating environment and have sufficient resistance to electromagnetic interference to function without error.

Detailed information on EMC-compliant installation is given in a separate instruction manual. The system builder is responsible for the EMC of the system as a whole.

In general, the product is designed for the operating environment "industrial environment", or "2nd environment" in the case of use of frequency-controlled drives.

The electronic control devices of the overload safety device and any frequency inverters installed are interference-suppressed. You will find further information in the relevant operating instructions of the devices.

The contacts of power contactors and rectifiers for motor brakes may generate interference exceeding the permissible values depending on output, cable length and other system parameters.

Ready-to-connect electric wire rope hoists with declaration of conformity complying with machinery and EMC directives are interference-suppressed for the above operating environment.

No particular protective measures have been taken on electric wire rope hoists with control by customer or crane builder's control. Appropriate precautions must be taken by the customer in order to comply with EMC standards with regard to interference values.

In order to achieve an optimum result with minimum outlay, we recommend using our radio interference suppression module FEM1 for the YK/SK wire rope hoist.

Order no. A5785250 ≤ 415 V.

Order no. A5785260 ≤ 800 V.

Clip the module onto the top-hat rail and connect it to the mains supply cable.

4.8.10 Overload safety device

The wire rope hoist is supplied with an overload protection.

Description of system

The overload safety device is a device which automatically prevents the hoist moving loads exceeding its safe working load during normal operation, taking into account the dynamic effects. This is achieved by measuring the force transmitted with the aid of a sensor and cutting the energy supply to the hoist drive and brake (stopping the hoist motion) (indirect-acting overload protection). In hoist controls the overload protection (safety-related function) is provided by various components (SRP/CS). The point of departure is where the safety-related signals are generated and the endpoint is the output of the power control elements. The electronic control device (SLE/SMC) acts as a safety device.

The protective devices of the electrical equipment installed in the scope of supply must in no case be removed, replaced by different devices or bridged.

Load measurement at gear

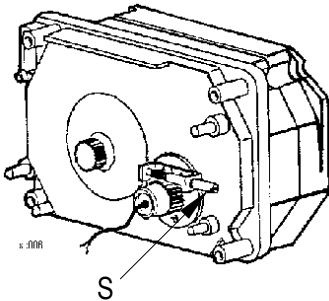


Fig. 18

Load measurement at rope anchorage with electronic shear force sensor

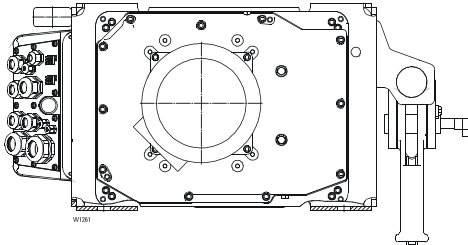


Fig. 19

Load measurement at rope anchorage

with electronic pressure sensor

The overload safety device is set to maximum working load +10%.

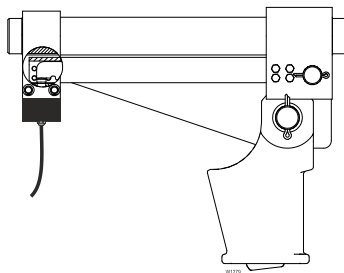


Fig. 20

Overload safety device by others



When the overload safety device and thus the placement of the load sensors to measure the rope, forces are designed by others, all requirements relating to rope reeving, fleet angle and angle of installation of the hoist must be observed, see chap. 4.3

The overload safety device must be set during commissioning, see supplementary operating instructions. The overload safety device cannot be set by the manufacturer if it is provided by others.

4.8.11 Connecting to mains

WARNING

Safety hazard. If this procedure is not observed, serious accidents or damage to the hoist may occur!

1. Compare existing mains voltage and frequency with the information on the rating plate.
2. Route cables into the hoist connection box through the cable glands.
3. Connect according to the circuit diagrams supplied.
4. Measure control voltage. If the measured value exceeds the rated control voltage by more than 10 %, a different tapping point must be selected on the primary side of the control transformer.
5. Do not connect any live lead to the temperature sensors! Damaged temperature sensors cannot protect the motor.

WARNING

On three phase hoists, it is possible to have "Reverse Phasing" causing the block to lower when the UP button is depressed. When this condition exists, the hoist operation will be dangerous.

6. Check that the direction of rotation of the rope drum corresponds to the symbols on the control pendant: Activate **SLOW UP button** on control pendant. Never activate **DOWN button** first! If the hook moves upwards or does not move because the hoist limit switch has disconnected in top hook position, the phase connection is correct.
7. Crosscheck by activating **SLOW DOWN button** on control pendant.
8. If the movement of the hook does not correspond to the symbols on the control pendant, interchange two phase conductors of the supply cable.

4.8.12 Control and control functions

Each hoist control is equipped with an electronic control device. This electronic control device functions as a central safety device for the overload safety device and as motor control and monitoring unit. The device functions are adapted to the different hoist and drive types and the particular function modules selected (load limits, pole-changing or frequency-controlled motors, etc.) by parametrizing the device.

Two variants are used for this electronic control pendant:

- SLE load monitor
Standard control
Parametrized with HEX and DIP switches
- SMC multi-controller
Extended functions - optional device
Parametrized with Config-Tool and RS232 data interface or a USB interface

The following safety functions are integrated into the electronic control devices:

- overload safety device
- crane test possible with the aid of test button
- protection against unexpected start-up
- control of hoist motors with motor management

In addition, the devices perform the following non-safety-relevant control functions:

- recording operating hours
- temperature control for hoist and travel motors
- display of system status

The general description of the control merely provides an outline. Detailed information on technical data, functions, integrating the control supplied into superordinate crane controls and troubleshooting are described in separate operating instructions for the electronic control devices and shown in the circuit diagrams. The same applies for frequency inverter controls.

Controls by others

- If the unit is being supplied less controls. CMCO cannot guarantee hoist / motor performance utilizing controls not recommended or provided by CMCO.
- If the controls are supplied by others, connect the temperature sensors of the hoist and travel motors, the hoist brake, the overload safety device and the emergency hoist limit switch according to the connection diagrams.
- Do not connect any live lead to the temperature sensors! Damaged temperature sensors cannot protect the motor.
- When integrating the supplied control sections into an overall control, the product standards for hoists and technical specifications as regards functionality, signal sequence and timing of this control must be observed. The circuit diagrams and block circuit diagrams supplied as hoist documentation must be followed and implemented by the customer when constructing the control. The system builder is responsible for the system as a whole.



The declaration of conformity / declaration of incorporation is valid only for the scope supplied by the manufacturer.

4.8.13 Electric motors and related equipment

The hoist motors meet the standards of EN 60034-1 and are specially dimensioned and designed for hoist operating conditions.

Hoist motor:

- 12/2-pole motor with separately controlled D.C. brake for contactor control
 - The brake is designed as an operating brake
- or
- 4-pole motor with separately controlled D.C. brake for frequency control
 - The brake is designed as a holding brake and discharges the function of emergency stop
 - Encoder with 600 pulses/rotation mounted on motor as standard. (Signals: A+, A-, B+, B-, Z+, Z-), HTL Type 9...30 VDC, IP65

Travel motor:

- 8/2-pole motor with separately controlled D.C. brake for contactor control
 - Integrated centrifugal mass for smooth acceleration and braking
- or
- 4-pole motor with separately controlled D.C. brake for frequency control

The motors are equipped with closable condensation holes ¹⁾. All motors have ptc sensors integrated into the winding as thermal overload protection.

Specification:

| | | |
|----------------|--------|-------------------------------------|
| Thermal class: | F / H | utilization / insulation system |
| Construction: | IM B5 | flange mounting on drive side |
| Cooling: | IC 411 | surface cooling with integrated fan |

Standard operating conditions

- -4 °F ... +104 °F
- Humidity up to 80 %
- Air pressure up to 3280 ft above sea level

Options

- IP66 ¹⁾
- Forced ventilation
- Space heating ¹⁾
- Manual release for brake

1) Motors whose winding is subject to condensation due to climatic conditions, e.g. motors standing still in damp environments or motors exposed to high temperature fluctuations, can be equipped with space heaters. They must also always be used in combination with type of protection IP66 and high humidity.

The motors have condensation holes.

Condensation drainage holes are fitted to the lowest point of the drive/non-drive end bearing plate depending on mounting position. They are sealed with a labyrinth plug.

Hoist motor:

The condensation holes (in the drive end bearing plate) for all mounting positions are sealed with labyrinth plugs ensuring the type of protection supplied.

Travel drive:

The condensation holes (in the drive-end bearing plate) are sealed with a labyrinth plug (bottom) and a blanking plug (top). Particularly on small motors, the condensation holes should be opened regularly to drain off the condensed water.

4.9 YK/SK hoists with frequency inverter

- For information on the frequency inverter, see the separate instructions.

4.10 Reeving rope

The wire rope is wound onto the drum in the factory. If not, see page 68, "Replacing wire rope".

If the bottom hook block is not fitted, proceed as follows:

- Gripper pliers hold the rope securely.
 - The wire rope hoist must be switched on in order to reeve the rope. All work must therefore be carried out with extreme care: for your safety and for trouble-free functioning of the wire rope hoist!
1. Lay out the end of the rope not wound on the drum, or let it hang freely.
 2. Check that the wire rope lies snugly on the rope drum, tighten if necessary.

NOTICE

Danger of damage

Avoid slack rope on the drum! Slack rope can destroy the rope guide and the wire rope.

3. Color code the beginning of the rope on one side.
4. Reeve the end of the rope into the rope sheave(s) of the bottom hook block and return pulley(s), see Fig. 22 page 31.



Fig. 21

NOTICE

Danger of damage to wire rope

Do not twist the rope; the color coding facilitates checking.

5. Fasten the end of the rope in the rope anchorage, see page 32
6. Perform several runs over the full height of lift without load.
7. Repeat with increasing loads.
8. Make any twisting in the rope which may occur visible by sticking on a paper tag. Severe twisting is shown by the bottom hook block's turning, especially when not under load.

NOTICE

Danger of damage

Twisted ropes compromise safety and damage the rope.

If any twisting should occur, remove the wire rope and untwist by letting it hang freely or laying it out. Twisting in the wire rope prejudices safety and service life.

Any twisting should therefore be removed before subjecting the hoist to any further load.

The rope could otherwise be permanently distorted and might have to be replaced!

NOTICE

Reeving rope

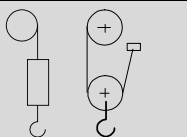
Reeve the rope as shown in the schematic drawings and attach the end of the rope at the rope anchorage.

The bottom hook block must hang horizontally (.PD)

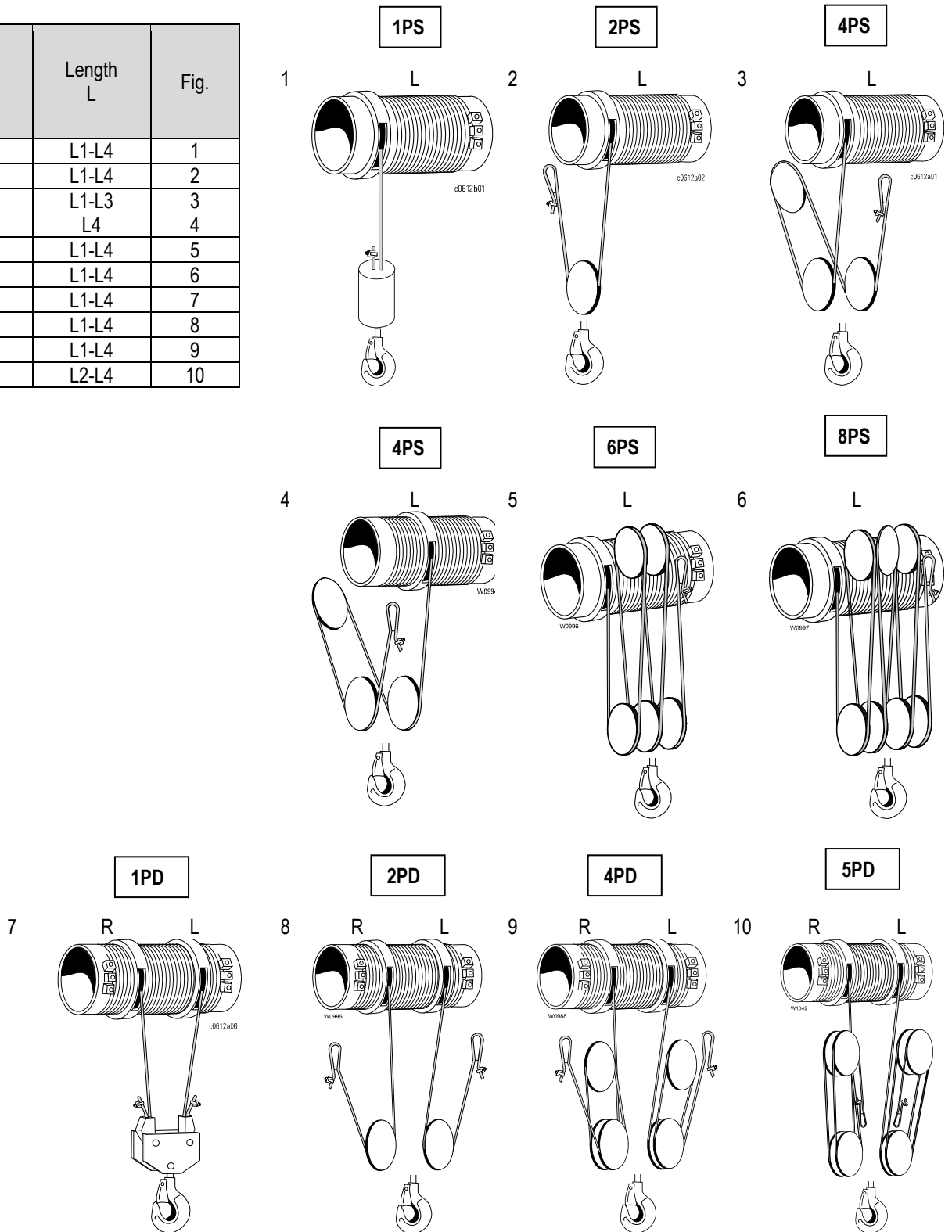
The hook may rotate after a short time in operation due to residual stress in the rope.

4 Installation

4.10.1 Overview of reeving

|  | Length L | Fig. |
|---|-------------|--------|
| 1PS | L1-L4 | 1 |
| 2PS | L1-L4 | 2 |
| 4PS | L1-L3 L4 | 3 4 |
| 6PS | L1-L4 | 5 |
| 8PS | L1-L4 | 6 |
| 1PD | L1-L4 | 7 |
| 2PD | L1-L4 | 8 |
| 4PD | L1-L4 | 9 |
| 5PD | L2-L4 | 10 |

Tab. 6



L = left-hand thread
R = right-hand thread

Fig. 22

4.10.2 Rope fastening point

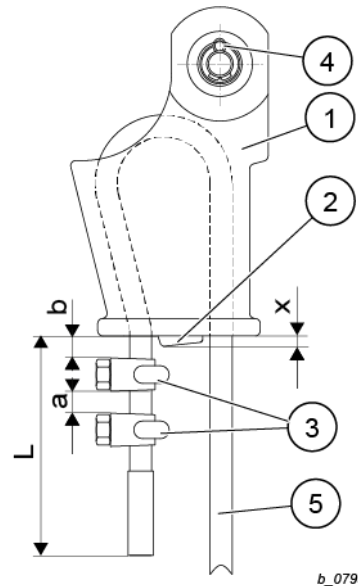
⚠ WARNING



Danger of falling load

If ropes are not secured according to instructions, this leads to the rope slipping and the load falling.

- Always tighten and secure ropes at the rope fastening point according to instructions.
- Replace cotter pins every time after disassembly.



- (1) Rope bag
- (2) Rope wedge
- (3) Rope clamp
- (4) Cotter pin
- (5) Rope

1. Feed the rope end through the rope bag (1) (see figure).
2. Lay rope (4) around the rope wedge (2) and draw together in the rope bag (1).
 - The rope end must protrude out of the rope bag (1) by length “L” (see table).
3. Secure rope end with rope clamps away from the rope bag at the specified points. The rope clamp must not be mounted at the rope binding. Secure.
 - For dimension “a” and “b” and the tightening torque, refer to the table.
4. Assemble the rope bag at the fastening point.
 - Observe the indicating label on the rope fastening point and the chapter “Position of the rope fastening point”.
5. Secure with a cotter pin.
 - The cotter pin must always be replaced after disassembly.
6. Load the wire rope hoist multiple times (max. load). The following is recommended:
 - Load and hold 5 times; each holding phase should last at least one minute.
 - The result of the load is a rope that is firmly drawn into the rope bag.
7. Check the protruding end of the rope wedge.
 - Maximum value per “x” (see table).

4 Installation

8. Check dimension “a” and “b” during annual maintenance.
- To ensure the rope does not slip out of the rope bag.
- With deviations, assemble the rope again as described.

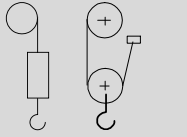
| Rope Ø | L | a | b | x | Tightening torque |
|--------|------|------|------|------|-------------------|
| [in] | [in] | [in] | [in] | [in] | [lb·ft] |
| 0.63 | 6.9 | 1.3 | 1.3 | 12 | 48 |
| 0.79 | 8.3 | 1.6 | 1.6 | 12 | 74 |
| 0.87 | 8.7 | 1.8 | 1.8 | 12 | 92 |
| 0.98 | 9.8 | 2 | 2 | 12 | 103 |

4 Installation

4.10.3 Position of the rope fastening point

| Rope Ø [in] | Thread | Tightening torque [lb _f ft] |
|-------------|--------|--|
| 0.79 | M16 | 96 |
| 0.94/1.02 | M20 | 184 |

Tab. 7

|  | Length L | Fig. |
|---|-------------|----------|
| 1PS | L1-L4 | 12 |
| 2PS | L1-L4 | 13 |
| 4PS | L1-L3 L4 | 14 15 |
| 6PS | L1-L4 | 16 |
| 8PS | L1-L4 | 16 |
| 1PD | - | - |
| 2PD | L1-L4 | 17 |
| 4PD | L1-L4 | 18 |
| 5PD | L2-L4 | 19 |

Tab. 8

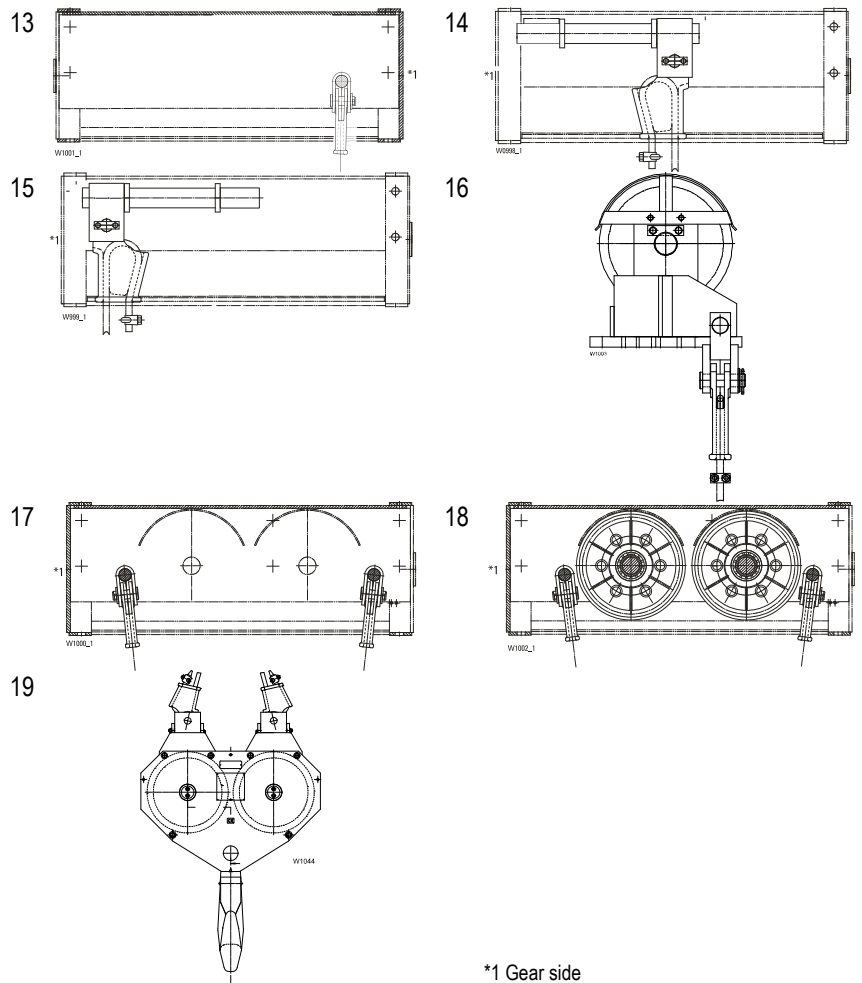


Fig. 23

*1 Gear side

5 Commissioning

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

▲ WARNING

Safety hazard.

- Make sure a qualified person performs commissioning.

When the hoist is commissioned and / or after a service call a comprehensive retest must always be performed.

The following checks must be carried out:

- That the wire rope hoist is completed with the original accessories as supplied (e.g. bottom hook block).
- Tight fit of the rope on the drum
 - Dismount the rope guide, see chapter 7.14.3.
 - Tighten up the wire rope on the rope drum and tension.
 - Mount the rope guide, see chapter 7.14.5 .
- Correct selection and installation of all electrical equipment.
- Connecting to mains, see page 27.
- Rope reeving, fleet angle and angle of installation of wire rope hoist as specified in "Installation", chap.4.3.

- Mains connection
- That fixing screws are firm and secure, see page 16 and 87.
- Correct functioning of runway end stops.
- The direction of motion of the load hook must correspond to the symbols on the control pendant.
- Presence and correct functioning of all safety devices.
- Emergency hoist limit switch or combined operational and emergency hoist limit switch, see page 59, 59.
- Run rope in under partial load (will improve service life).
- That the electrical equipment corresponds to the technical documentation
- Functional test of all control functions and safety circuits (motions, brakes, emergency stop, limit switches).
- Maximum working load of hoist with test loads (crane test, see chapter 7.13.
Dynamic test: $1.1 \times$ maximum working load
Static test: $1.25 \times$ maximum working load
The test loads must be provided by the owner.
- Function of overload safety device, see page 64. The overload safety device cannot be set in the factory if it is provided by others, it must therefore be set during commissioning.
- Confirm that commissioning has been duly carried out in the test log book in section "Confirmation of commissioning".

6 Operating

⚠ WARNING

Safety hazard. Bridging limit switches or operating the hoist with a damaged rope or brake is not permissible.

6.1 Operating precautions

1. **DO** read the Operation & Service Manual.
2. **DO** read the applicable sections of FEM 9.756, Section IX "SERIES LIFTING EQUIPMENT"
3. **DO** be familiar with hoist operating controls, procedures, and warnings.
4. **DO** make sure that the hook travel is in the same direction as shown on the controls.
5. **DO** maintain firm footing when operating hoist.
6. **DO** make sure that the load slings or other approved attachments are properly sized and seated in the hook saddle.
7. **DO** make sure that the hook latch is closed and not supporting the load.
8. **DO** make sure that load is free to move and will clear all obstructions.
9. **DO** take up slack carefully, check load balance, lift a few inches and check load's holding action before continuing.
10. **DO** avoid swinging load or load hook.
11. **DO** make sure that all persons stay clear of the suspended load.
12. **DO** warn personnel of an approaching load.
13. **DO** protect wire from weld splatter or other damaging contaminants.
14. **DO** promptly report any malfunction, unusual performance or damage of the hoist.
15. **DO** inspect the hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
16. **DO** use hoist manufacturer's recommended parts when repairing a hoist.
17. **DO** use hook latches.
18. **DO** apply lubricant to the wire rope as recommended.
19. **DO NOT** lift more than rated load.
20. **DO NOT** use the hoist load-limiting device to measure the load.
21. **DO NOT** use a damaged hoist or a hoist that is not working properly.
22. **DO NOT** use the hoist with twisted, kinked, damaged, or worn wire rope.
23. **DO NOT** lift a load unless wire rope is properly seated in its groove(s).
24. **DO NOT** use wire rope as a sling or wrap rope around the load.
25. **DO NOT** lift a load if any binding prevents equal loading on all supporting ropes.
26. **DO NOT** apply the load to the tip of the hook.
27. **DO NOT** operate unless load is centered under hoist.
28. **DO NOT** allow your attention to be diverted from operating the hoist.
29. **DO NOT** operate the hoist beyond limits of wire rope travel.
30. **DO NOT** use limit switches as routine operating stops unless recommended. They are emergency devices only.
31. **DO NOT** use the hoist to lift, support, or transport people.
32. **DO NOT** lift loads over people.
33. **DO NOT** leave a suspended load unattended unless specific precautions have been taken.
34. **DO NOT** allow sharp contact between two hoists or between hoist and obstructions.

35. **DO NOT** allow the rope or hook to be used as a ground for welding.
36. **DO NOT** allow the rope or hook to be touched by a live welding electrode.
37. **DO NOT** remove or obscure the warnings on the hoist.
38. **DO NOT** adjust or repair a hoist unless qualified to perform hoist maintenance.
39. **DO NOT** attempt to lengthen the wire rope or repair damaged wire rope.
40. **DO NOT** allow personnel not physically fit or properly qualified, to operate hoist.
41. **DO NOT** operate hoists unless hook moves in the same direction as indicated on the push button.
42. **DO NOT** operate hoist unless limit switches are operating properly.
43. **DO** avoid operating hoist when hook is not centered under hoist. Avoid side pulls and swinging of load or load hook when traveling hoist.
44. **DO** operate hoist within recommended duty cycle and **DO NOT** jog unnecessarily.
45. **DO** conduct regular visual inspections for signs of damage and wear.
46. **DO NOT** operate the hoist with hooks that have opened up.
47. **DO** provide supporting structure that has an appropriate design factor based on the load rating and dead weight of the hoist. If in doubt of the supporting structure's strength, consult a structural engineer.
48. **DO NOT** use hoist in location that will not allow operator movement to be free of the load.
49. **DO**, when starting to lift, move the load a few inches at which time the hoist should be checked for proper load holding action. The operation shall be continued only after the operator is assured that the hoist is operating properly and that the load is supported in the center of the base bowl/saddle of the hook.
50. **DO** observe recommended inspection and maintenance procedures.
51. **DO** use common sense and best judgment whenever operating a hoist.
52. **DO NOT** remove drop lugs. Removal will create an unsafe operating condition.
53. **DO NOT** lift guided loads.

6.2 Duties of crane operator

Personal protective equipment to be provided by the owner

Requirements for workplace

1. The operator must not stand in the hazard area.
2. The hazard area must be clearly visible.
3. The movement of the load in all directions must be clearly visible.

▲ WARNING

Danger of bodily injury

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

- The crane operator must observe the load, or if the crane is unloaded, the load suspension equipment during all movements of the crane if they could cause danger. If it is not possible to observe the crane, the crane operator may only control the crane by following signals from a signaller.
- Wear ear protectors in noisy environments.
- Start lifting load with the slowest hoisting speed.
- The crane operator must give warning signals as necessary.
- Loads attached by hand may only be moved by the crane operator after an unambiguous signal from the person attaching the load, the signaller or another person responsible appointed by the owner. If signals need to be used to communicate with the crane operator, they must be agreed between the person responsible and the crane operator before being used.
- 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.
- At close of work, secure cranes which are exposed to wind with the wind safeguard mechanism.
- The rope drum and rope must be free of foreign matter.
- Do not move loads above people.
- Before starting work, ensure there is sufficient workspace.
- Do not leave suspended loads unattended, the control pendant must be within easy reach.
- Do not activate emergency hoist limit switch during normal operation.
- Do not load above the permitted maximum working load.
- Use only tested and approved sling equipment
- Pulling loads at angles, dragging loads, or towing vehicles with the load or load suspension equipment is forbidden!
- Do not jerk free any loads which are jammed.
- Approach final positions for hoisting, lowering and travel in normal operation only if an operational hoist 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 in this manual.

6.3 Using control pendant

NOTICE

Danger of unintentional movement of hoist

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.

STH

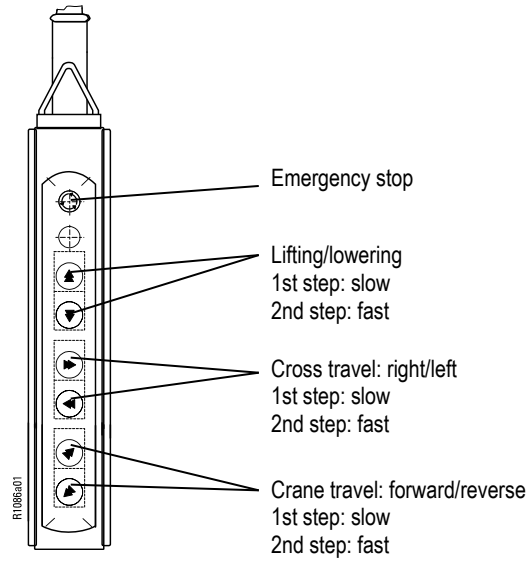


Fig. 24

CPS

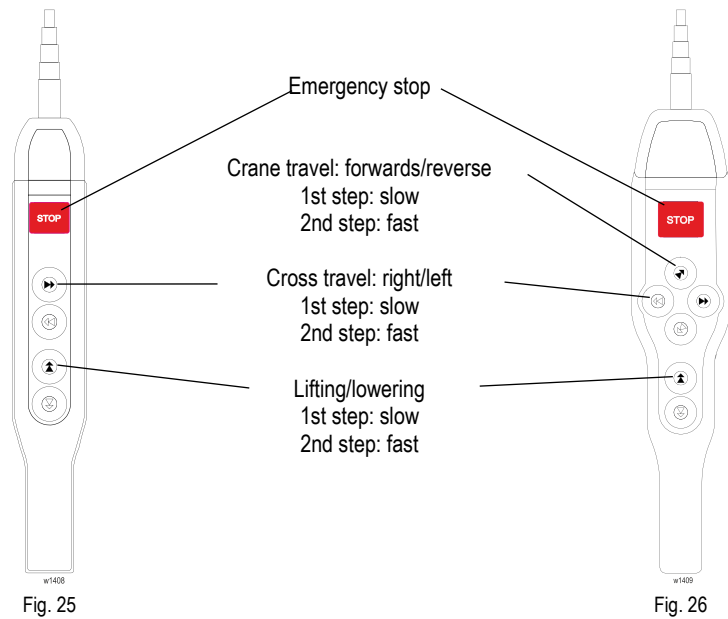


Fig. 25

Fig. 26

6.4 Operating hoist with frequency inverter

1st step: slow
2nd step: accelerate

When the 1st step is activated, the hoist is accelerated to slow speed and slow speed is maintained. When the 2nd step of the pushbutton is activated, the hoist is accelerated as long as the 2nd step is activated or until maximum speed is reached. If the pushbutton is returned from 2nd step to 1st step before maximum speed is reached, the current speed is maintained. If the pushbutton is then released, the speed is reduced. If the 1st step is activated before the motion is stopped, the current speed is maintained.

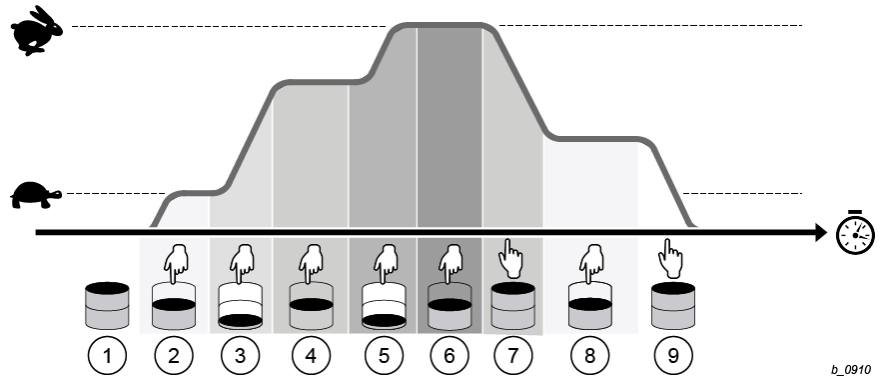


Fig. 27

b_0910

6.5 Emergency stop

⚠ WARNING

Danger of bodily injury

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.

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

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

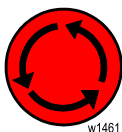


Fig. 28



Fig. 29

7 Inspection and maintenance

This section deals with operational reliability, availability, and maintaining the value of your wire rope hoist.
Although this wire rope hoist is practically maintenance-free, the components subject to wear (e.g. wire rope, brake) must be inspected regularly.
Inspection and maintenance must be carried out by qualified persons.



▲ WARNING

Danger of falling parts

- Cordon off and secure the danger zone prior to performing testing and maintenance work.

NOTICE

General information on inspection and maintenance

- Make sure a qualified person performs inspection and maintenance.
- Maintenance and repair work may only be carried out when the hoist is unloaded.
- Before starting, switch off and lock main isolator.
- Check that the hoist is de-energized.
- Periodic inspections including maintenance every 12 months, possibly earlier if so prescribed by national regulations like ASME B30.16.

NOTE: The specified inspection and maintenance intervals apply for normal conditions of use.

If major components are replaced, further tests must be performed.

- Replacing components of the overload safety device (sensor, electronic overload device)
For load test of cut-off values of system, see separate Operating instructions / Service manual
- Replacement of electrical equipment and renewal of electric leads and connections
Insulation resistance test and testing the continuity of the PE system
- Correct phase connection

The hoist's electrical equipment must be checked regularly. Damage to electrical equipment, loose terminals, damaged cables and worn switchgear contacts must be remedied immediately.

The inspection and maintenance intervals must be adapted accordingly if one or more the following conditions apply:

- If after evaluating the actual use it can be seen that the theoretical useful life of the hoist will be less than 10 years.
- In the case of operation in more than one shift or heavy duty.
- In the case of adverse conditions (dirt, solvents, temperature, etc.).
- If abrasive dusts are present (foundry, cement industry, glass manufacture or processing, etc.) the maintenance intervals for the rope guide (cleaning, lubricating, checking and if necessary replacing tension spring, etc.) must be reduced.
- A general overhaul must be carried out after the useful lifetime has expired.
- Lubricants and lubrication points, see page 88.

7 Inspection and maintenance

7.1 Inspection intervals

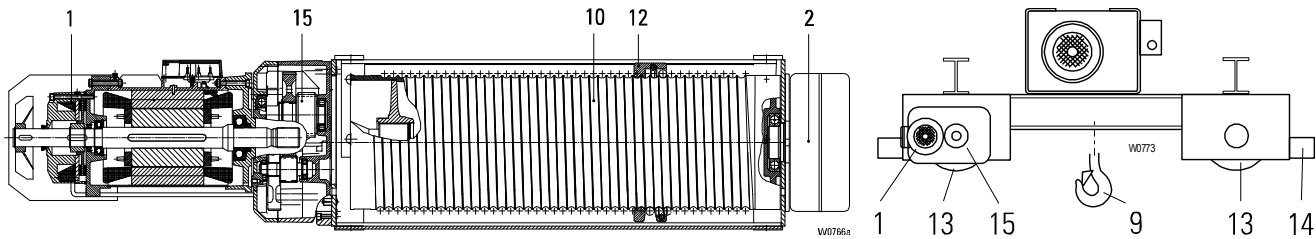


Fig. 30

| Test every day before starting work *1 | Periodic test every 12 months *2 | Inspection table | see page |
|--|----------------------------------|---|----------|
| • | | Function of brakes (1) with regard to braking efficiency and activation | |
| • | • | Emergency hoist limit switch (2), if there is no operational hoist limit switch, operational hoist limit switch, if any | 59, 59 |
| • | | Emergency stop, travel limit switches, crane switch | 24 |
| • | | Rope (10) | 66 |
| • | | Check state of system for obvious defects | |
| | • | Check suspension of control pendant (cable and steel wire must be correctly attached and undamaged) | |
| | • | Load hook (9), cracks, distortion, wear, corrosion, function of hook safety latch | |
| | • | Overload safety device | 64 |
| | • | Disconnect switch and main isolator | 24 |
| | • | PE connections and equipotential bonding | |
| | • | Establish remaining service life | 74 |
| | • | Rope attachment and rope sheaves | 66, 70 |
| | • | Rope guide (12) | 67, 69 |
| | • | Drive parts (13), wheel flanges, wheels etc. | 72 |
| | • | Bolt joints, welds | |
| | • | End stops, buffers (14) | |
| | • | Gear (15) | |
| | • | Safety clearances | |
| | • | Power supply cable | |
| | • | Cable glands | |
| | • | Switching functions | |
| | • | All parts in the power flux | |

*1 By user

*2 Periodic inspections including maintenance at least every 12 months, possibly more frequently if so prescribed by national regulations, to be performed by a qualified person.

NOTICE

Heavy duty or unfavorable conditions (dirt, solvents, multi-shift operation, etc.) entail a reduction of this inspection and maintenance interval.

⚠ WARNING

If work needs to be carried out on live parts, a second person must be present who can stop dangerous movements in an emergency by means of the emergency stop button or disconnect the power supply by means of the main isolator / disconnect switch.

7 Inspection and maintenance

7.2 Maintenance intervals

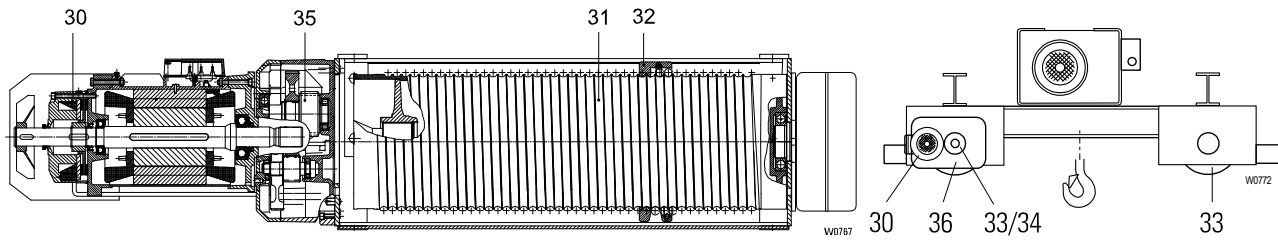


Fig. 31

| Periodic test every 12 months *2 | Maintenance table | See page |
|----------------------------------|--|----------------|
| • | Brake (30), measure air gap, replace brake disc if necessary | 45, 48, 50, 53 |
| • | Grease rope (31) with brush | 88 |
| • | Grease rope guide (32) with brush | 88 |
| • | Drive parts (33) grease gearing with brush | |
| • | Tighten clamping points for electric cables | |

*2 Periodic inspections including maintenance at least every 12 months, possibly more frequently if so prescribed by national regulations, to be performed by a qualified person.

NOTICE

Heavy duty or unfavorable conditions (dirt, solvents, multi-shift operation, etc.) entail a reduction of this inspection and maintenance interval.

NOTICE

Danger of material damage from damage or wear

If increased wear or damage is ascertained when inspecting or maintaining the hoist, the latter must not be put into operation again until the faults have been eliminated.

7.3 Motors



⚠ DANGER

Electric shock hazard. Some motor parts are live. Any contact with live parts can cause severe injury or death. Motors have dangerous rotating parts and hot surfaces.

Ensure that:

- the motor runs correctly (e.g. no variations in speed, no noise emission),
- there are no strong vibrations.

The insulation resistance must be checked after a long period of storage or shutdown, if possible at a winding temperature of +68 °F ... +86 °F. Before starting to measure the insulation resistance, pay attention to the operating instructions of the insulation measurement instrument being used.

Measuring voltage: 500 V.

Minimum insulation resistance for new, cleaned or overhauled windings: 10 MΩ.

Critical specific insulation resistance after a long period of operation: 0.5 MΩ / kV.

If the critical insulation resistance is reached or undershot, the windings must be dried, or thoroughly cleaned and dried after removing the rotor.

7 Inspection and maintenance

7.4 Hoist motor brake (RSM)

This inspection and maintenance is of particularly important to ensure safety. If brake maintenance is not performed correctly or the brake does not function correctly, the load may fall!

▲ WARNING

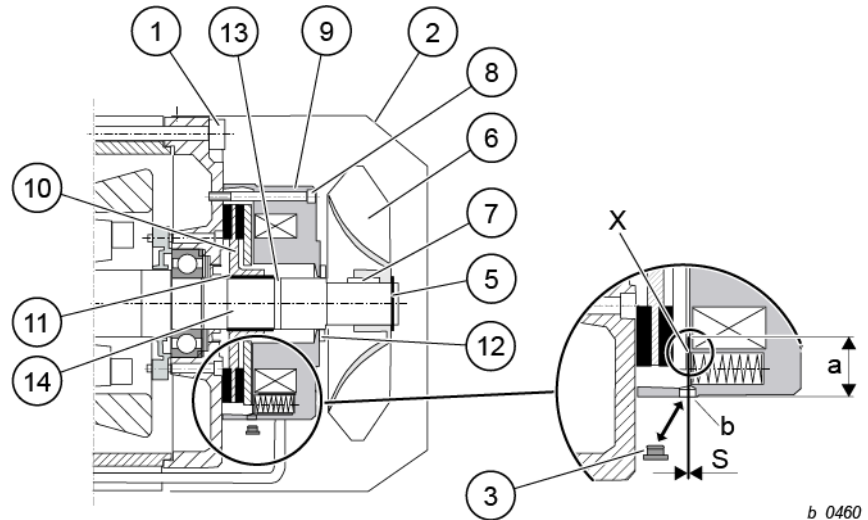


Danger of falling load

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

➤ Switch off the main isolation switch and secure against being switched on again!

- (1) Fastening screws
- (2) Fan cover
- (3) Stopping plug
- (5) Retaining ring
- (6) Fanwheel
- (7) Parallel key
- (8) Fastening screws
- (9) Coil carrier
- (10) Brake rotor
- (11) Hub
- (12) V-ring (IP66)
- (13) Retaining ring
- (14) Motor shaft



7.4.1 Checking the brake

1. Remove fan cover (2)
2. Remove stopping plug (3)
3. Measure the air gap (S) with a feeler gauge (b).
4. **NOTICE** When measuring, ensure that the feeler gauge (b) is slid up to insertion depth "a" as a minimum and does not become caught on the ledge (!). Refer to the table for the maximum permissible air gap (S). The brake is not readjustable. Once the max. permissible air gap (S) has been reached, the brake rotor must be replaced.

7.4.2 Replacing the brake rotor

⚠ CAUTION

Brake dust is hazardous to health.

- Do not clean brakes with compressed air, brushes or similar.
- Use a vacuum system or a damp cloth to remove brake dust.
- If dust develops, wear safety eyewear and a fine dust mask.

⚠ WARNING



With an incorrectly assembled brake rotor, the brake cannot hold the load and the load will fall.

This can lead to serious injuries and even death.

- Replacement work may only be carried out by a competent person.



The pressure springs of the brake must always be replaced at the same time.

1. Remove fan cover (1)
2. Remove retaining ring (5)
3. Take off fanwheel (6), remove parallel key (7)
4. Disconnect electrical connection of the brake
5. Unscrew the fastening screws (8)
6. Remove coil carrier (9)
7. Take off brake rotor (10)

NOTICE When dampening the cloths, **only use** isopropyl alcohol. The use of brake cleaner is **not permissible**.

- Ensure sufficient drying time for the cleaned surfaces.



We cannot recommend cleaning the rotor / friction linings because oil / grease has usually worked into the lining and this can only be removed from the surface area to a limited degree.

Furthermore, it is not possible to fully exclude negative reactions between the cleaning products and the lining. We therefore recommend use of the spare parts kit here.

8. Check friction surfaces for wear and clean with a damp cloth.
9. Slide a new brake rotor (10) onto the hub (11) and check the available clearance.


NOTICE Danger of damage

- If increased clearance is present in the gearing between the brake rotor (10) and hub (11), remove the hub (11) from the motor shaft (14) and replace it. Be sure to consult the production factory before removing the hub (8).

10. Clean coil carrier.
11. Replace the brake pressure springs (see chapter 7.11).
12. Check the O-ring of the coil carrier for damage and replace if necessary.

13. Assemble in reverse order.

- Steps 7 to 12 are omitted.
- Make sure that the inspection bore for the air gap measurement is in the lower area.
- After tightening the fastening screws (8) (for tightening torque see table), mark the fastening screws (8).

| Hoist motor type | Hoist brake | S max. | a | Tightening torque  |
|------------------|-------------|--------|------|---|
| | | [in] | [in] | [lbf ft] |
| 12/2H73/100.822 | RSM150 | 0.063 | 1.2 | 16 |
| 12/2H73-1PC3052 | | 0.035 | 1.2 | |
| 24/4H92 | RSM500 | 0.079 | 1.6 | 33 |

Tab. 9

Check brake data according to rating plate on hoist motor!

7.5 Hoist motor brake (NM) 12/2H..-MF

▲ WARNING

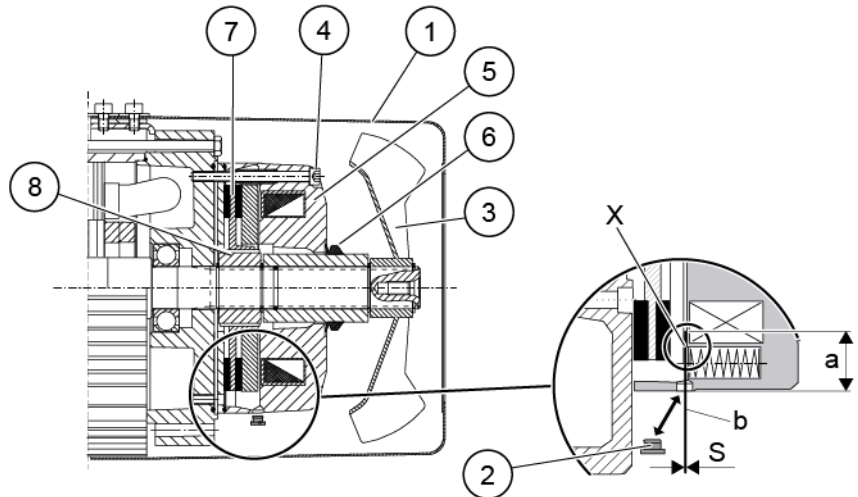


Danger of falling load

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

- Switch off the main isolation switch and secure against being switched on again!

- (1) Fan cover
- (2) Stopping plug
- (3) Fanwheel
- (4) Fastening screws
- (5) Coil carrier
- (6) V-ring (IP66)
- (7) Brake rotor
- (8) Hub



b_1128

7.5.1 Checking the brake

1. Remove fan cover (1).
2. Remove stopping plug (2).
3. Measure the air gap (S) with a feeler gauge (b).
4. **NOTICE** When measuring, ensure that the feeler gauge is slid up to insertion depth "a" as a minimum and does not become caught on the ledge (!). For the maximum permissible air gap (S). The brake is not readjustable. Once the max. permissible air gap (S) has been reached, the brake rotor must be replaced.

7.5.2 Replacing the brake rotor

▲ CAUTION

Brake dust is hazardous to health.

- Do not clean brakes with compressed air, brushes or similar.
- Use a vacuum system or a damp cloth to remove brake dust.
- If dust develops, wear safety eyewear and a fine dust mask.

▲ WARNING



With an incorrectly assembled brake rotor, the brake cannot hold the load and the load will fall. This can result in serious injuries and even death.

- Ensure that a competent person carries out the replacement work.



The pressure springs of the brake must always be replaced at the same time.

1. Remove fan cover (1).
2. Take off fanwheel (3), remove bushing with V-ring (6).

3. Disassemble electrical connection of the brake.
4. Unscrew the fastening screws (4)
5. Remove coil carrier (5) complete with anchor plate (6).
6. Take off brake rotor (7).

NOTICE When dampening the cloths, **only use** isopropyl alcohol. The use of brake cleaner is **not permissible**.

- Ensure sufficient drying time for the cleaned surfaces.



We cannot recommend cleaning the rotor / friction linings because oil / grease has usually worked into the lining and this can only be removed from the surface area to a limited degree. Furthermore, it is not possible to fully exclude negative reactions between the cleaning products and the lining. We therefore recommend use of the spare parts kit here.

7. Check friction surfaces for wear and clean with a damp cloth.
8. Slide a new brake rotor (7) onto the hub (8) and check the available clearance.

NOTICE Danger of damage

- If increased clearance is present in the gearing between the brake rotor (7) and hub (8), remove the hub (8) from the motor shaft and replace it. Be sure to consult the production factory before removing the hub (8).

9. Clean coil carrier.
10. Replace the brake pressure springs (see chapter 7.11).
11. Check the O-ring of the coil carrier for damage and replace if necessary.
12. Assemble in reverse order.
 - Steps 6 to 11 are omitted.
 - Make sure that the inspection bore for the air gap measurement is in the lower area.
 - After tightening the fastening screws (4) (for tightening torque see Tab. 10) mark the fastening screws (4).

| Hoist motor type | Hoist brake | S max. | a | Tightening torque |
|--------------------|-------------|--------|------|-------------------|
| | | [in] | [in] | [lbf ft] |
| 12/2H72-MF13Z-106 | NM38754 | 0.035 | 1.2 | 16 |
| 12/2H91-MF-16ZC106 | NM38790 | 0.035 | 1.6 | 33 |

Tab. 10

Check brake data according to rating plate on hoist motor!

7.6 Hoist motor brake (NM) 4H.-MF

⚠ WARNING

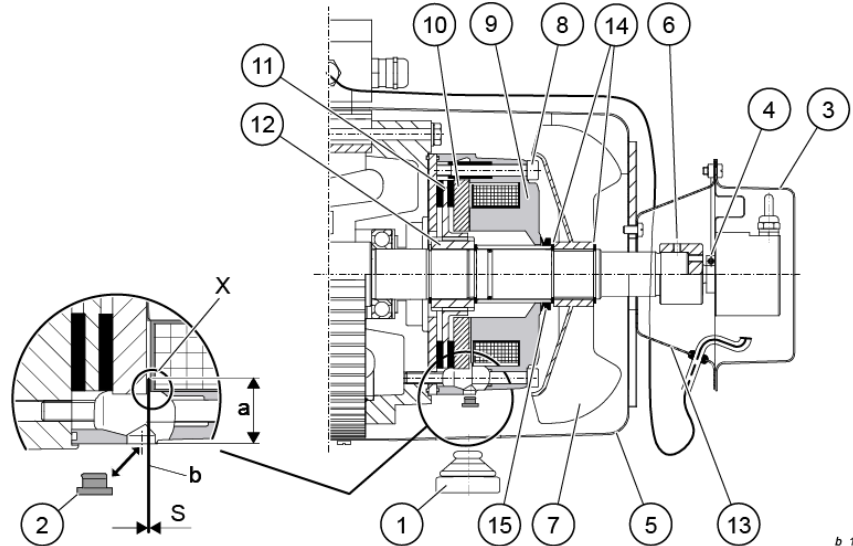


Danger of falling load

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

- Switch off the main isolation switch and secure against being switched on again!

- (1) Stopping plug
- (2) Stopping plug
- (3) Enclosure upper part
- (4) Stud bolt
- (5) Fan cover
- (6) Stud bolts
- (7) Fanwheel
- (8) Fastening screws
- (9) Coil carrier
- (10) Anchor plate
- (11) Brake rotor
- (12) Hub
- (13) Enclosure lower part
- (14) Retaining ring
- (15) V-ring (IP66)



b_1129

7.6.1 Checking the brake

1. Remove stopping plug from the fan cover.
2. Remove stopping plug (2) with pliers
3. Measure the air gap (S) with a feeler gauge (b).
4. **NOTICE** When measuring, ensure that the feeler gauge (b) is slid up to insertion depth "a" as a minimum and does not become caught on the ledge (!). Refer to the table for the maximum permissible air gap (S). The brake is not readjustable. Once the max. permissible air gap (S) has been reached, the brake rotor must be replaced.

7.6.2 Replacing the brake rotor

⚠ CAUTION

Brake dust is hazardous to health.

- Do not clean brakes with compressed air, brushes or similar.
- Use a vacuum system or a damp cloth to remove brake dust.
- If dust develops, wear safety eyewear and a fine dust mask.

⚠ WARNING



With an incorrectly assembled brake rotor, the brake cannot hold the load and the load will fall. This can result in serious injuries and even death.

- Ensure that a competent person carries out the replacement work.



The pressure springs of the brake must always be replaced at the same time.

1. Disassemble enclosure upper part (3).
2. Loosen stud bolt (4).
3. Take off encoder and leave attached to the connection cable.
4. Disassemble enclosure lower part (13).
5. Disassemble fan cover (5).
6. Loosen stud bolts (6) on the adapter shaft.
7. Disassemble adapter shaft with jacking screws (M6).
8. Remove retaining ring (14) for fanwheel (7).
9. Take off fanwheel (7), remove V-ring (15).
10. Remove retaining ring (14).
11. Disconnect electrical connection of the brake.
12. Unscrew the fastening screws (8).
13. Remove coil carrier (9).
14. Take off brake rotor (11).

NOTICE When dampening the cloths, **only use** isopropyl alcohol. The use of brake cleaner is **not permissible**.

- Ensure sufficient drying time for the cleaned surfaces.



We cannot recommend cleaning the rotor / friction linings because oil / grease has usually worked into the lining and this can only be removed from the surface area to a limited degree.

Furthermore, it is not possible to fully exclude negative reactions between the cleaning products and the lining. We therefore recommend use of the spare parts kit here.

15. Check friction surfaces for wear and clean with a damp cloth.

16. Slide a new brake rotor (11), identical to the previous rotor, onto the hub (12) and check the clearance.

NOTICE Danger of damage

- If increased clearance is present in the gearing between the brake rotor (11) and hub (12), remove the hub (12) from the motor shaft and replace it. Be sure to consult the production factory before removing the hub (12).


17. Replace the brake pressure springs (see chapter 7.11).

18. Check the O-ring of the coil carrier for damage and replace if necessary.

19. Clean coil carrier.

20. Assemble in reverse order.

- Steps 14 to 19 are omitted.
- Make sure that the inspection bore for the air gap measurement matches with the opening in the fan cover. Secure the stud bolts (6) with thread locker.
- After tightening the fastening screws (8) (for tightening torque see Tab. 11), mark the fastening screws (8).

| Hoist motor type | Hoist brake | S max. | a | Tightening torque  |
|------------------|-------------|--------|------|---|
| | | [in] | [in] | [lb _r ft] |
| 4H72-MF13Z-200 | NM38741 | 0.031 | 1.2 | 16 |
| 4H73-MF13ZB-200 | NM38753 | 0.035 | 1.2 | 16 |
| 4H81-MF13ZC-200 | NM38753 | 0.035 | 1.2 | 16 |
| 4H82-MF13X-200 | NM38781 | 0.035 | 1.2 | 16 |

Tab. 11

Check brake data according to rating plate on hoist motor!

7.7 Hoist motor brake (NM) 4HS

⚠ WARNING

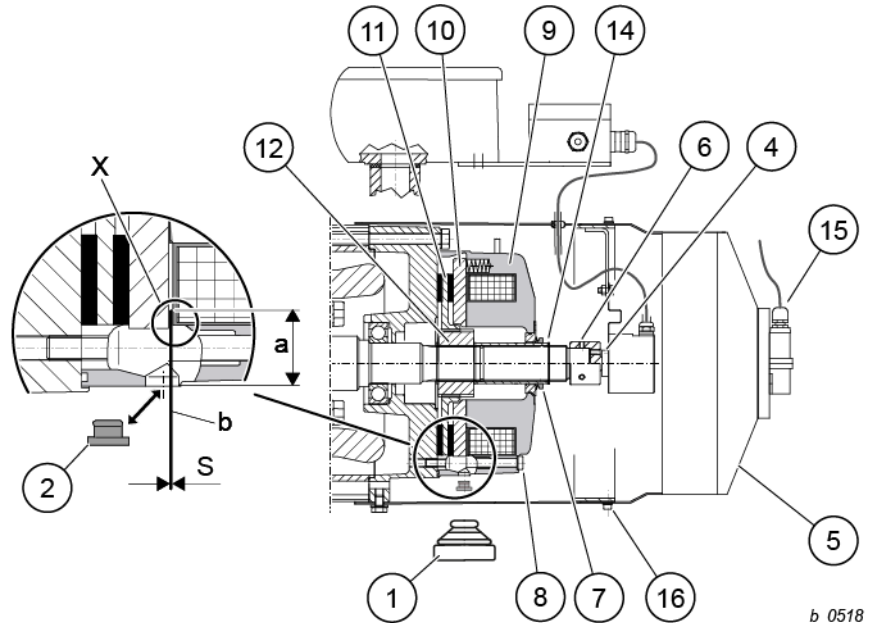


Danger of falling load

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

- Switch off the main isolation switch and secure against being switched on again!

- (1) Stopping plug
- (2) Stopping plug
- (4) Stud bolt
- (5) External ventilation
- (6) Stud bolt
- (7) V-ring
- (8) Fastening screws
- (9) Coil carrier
- (10) Anchor plate
- (11) Brake rotor
- (12) Hub
- (16) Fastening screws



7.7.1 Checking the brake

1. Remove stopping plug (1)
2. Remove stopping plug (2) with pliers
3. Measure the air gap (S) with a feeler gauge (b).
4. **NOTICE** When measuring, ensure that the feeler gauge (b) is slid up to insertion depth "a" as a minimum and does not become caught on the ledge (!). For the maximum permissible air gap (S). The brake is not readjustable. Once the max. permissible air gap (S) has been reached, the brake rotor must be replaced.

7.7.2 Replacing the brake rotor

⚠ CAUTION

Brake dust is hazardous to health.

- Do not clean brakes with compressed air, brushes or similar.
 - Use a vacuum system or a damp cloth to remove brake dust.
 - If dust develops, wear safety eyewear and a fine dust mask.
-

⚠ WARNING



With an incorrectly assembled brake rotor, the brake cannot hold the load and the load will fall. This can result in serious injuries and even death.

- Ensure that a competent person carries out the replacement work.
-



The pressure springs of the brake must always be replaced at the same time.

1. Unplug the plug (15).
2. Unscrew the fastening screws (16).
3. Disassemble external ventilation (5).
4. Loosen stud bolt (4).
5. Disassemble the encoder.
6. Disassemble the encoder bracket.
7. Loosen stud bolts (6) on the adapter shaft.
8. Disassemble adapter shaft with jacking screws (M6).
9. Remove V-Ring (7) (IP66).
10. Remove retaining ring (14).
11. Disassemble electrical connection of the brake.
12. Unscrew the fastening screws (8).
13. Remove coil carrier (9).
14. Take off brake rotor (11).

NOTICE When dampening the cloths, **only use** isopropyl alcohol. The use of brake cleaner is **not permissible**.

- Ensure sufficient drying time for the cleaned surfaces.



We cannot recommend cleaning the rotor / friction linings because oil / grease has usually worked into the lining and this can only be removed from the surface area to a limited degree.

Furthermore, it is not possible to fully exclude negative reactions between the cleaning products and the lining. We therefore recommend use of the spare parts kit here.

15. Check friction surfaces for wear and clean with a damp cloth.

16. Slide a new brake rotor (11), identical to the previous rotor, onto the hub (12) and check the clearance.

NOTICE Danger of damage

- If increased clearance is present in the gearing between the brake rotor (11) and hub (12), remove the hub (12) from the motor shaft and replace it. Be sure to consult the production factory before removing the hub (12).


17. Replace the brake pressure springs (see chapter 7.11).

18. Check the O-ring of the coil carrier for damage and replace if necessary.

19. Clean coil carrier.

20. Assemble in reverse order.

- Steps 14 to 19 are omitted.
- Make sure that the inspection bore for the air gap measurement matches with the opening in the fan cover. Secure the stud bolts (6) with thread locker.
- After tightening the fastening screws (8) (for tightening torque see Tab. 12) mark the fastening screws (8).

| Hoist motor type | Hoist brake | S max. | a | Tightening torque  |
|------------------|-------------|--------|------|---|
| | | [in] | [in] | [lb _r ft] |
| 4HS7 | NM40951 | 0.031 | 1.2 | 16 |
| 4HS8 | NM40980 | 0.035 | 1.2 | 16 |
| 4HSA | NM40980 | 0.035 | 1.2 | 16 |

Tab. 12

Check brake data according to rating plate on hoist motor!

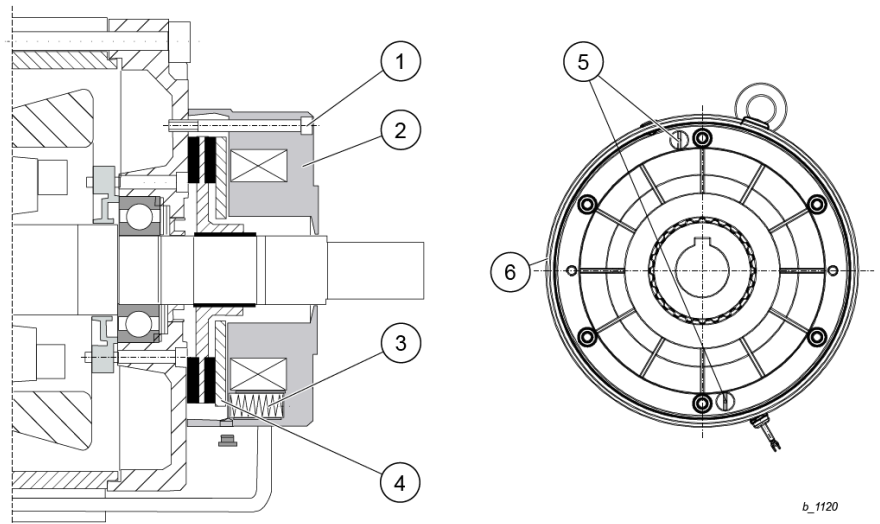
7.8 Replacing the pressure springs

⚠ CAUTION

Brake dust is hazardous to health.

- Do not clean brakes with compressed air, brushes or similar.
- Use a vacuum system or a damp cloth to remove brake dust.
- If dust develops, wear safety eyewear and a fine dust mask.

- (1) Fastening screws
- (2) Coil carrier
- (3) Pressure spring
- (4) Anchor plate
- (5) Shoulder screws
- (6) O-ring



1. For preparatory works, see hoist motor brake chapter for the respective motor.
2. Set the coil carrier (2) down on a clean work surface.

⚠ CAUTION The pressure springs push against the anchor plate; injuries can result from incorrect loosening.

- In order to remove the shoulder screws, press the anchor plate against the coil carrier (with larger sizes use a spindle press if necessary) to avoid sudden relief of the spring pressure. Observe the installation of the anchor plate.
3. Unscrew both shoulder screws (5) uniformly in turn.
 4. Remove and set down the anchor plate (4) and shoulder screws (5).

NOTICE When dampening the cloths, **only use** isopropyl alcohol. The use of brake cleaner is **not permissible**.

- Ensure sufficient drying time for the cleaned surfaces.
5. Clean the anchor plate (4) with a damp cloth.

7 Inspection and maintenance

6. Remove all old pressure screws (3) from the coil carrier (2).
7. Clean the coil carrier (2) with a damp cloth.



The thickness and number of windings of the pressure screws may vary. It is therefore essential to symmetrically distribute the pressure springs in the coil carrier.

8. Equip the coil carrier (2) with the correct new pressure spring set.
9. Lay anchor plate (4) on the coil carrier or pressure springs,
 - (observe the installation position, with size 16 to 60, use fastening screws (1) as a centring aid if necessary).
10. Press the anchor plate (4) down against the spring force (e.g. with a spindle press) and screw in the shoulder screws with the tightening torque specified in the table.
11. Clean the friction surface of the anchor plate (4) so that this is **clear of grease**.
12. For subsequent work, see hoist motor brake chapter for the respective motor.

| Hoist motor type | Brake fastening screws (1) | Shoulder screws (5) |
|--------------------|----------------------------|---------------------|
| | [lb _r ft] | |
| 4H72-MF13Z-200 | 16 | 3 |
| 4H73-MF13ZB-200 | | |
| 4H81-MF13ZC-200 | | |
| 4H82-MF13X-200 | | 6 |
| 12/2H72-MF13Z-106 | | |
| 4HS7 | | |
| 4HS8 | | |
| 4HSA | | |
| 12/2H73/100.822 | | |
| 12/2H73-1PC3052 | | |
| 24/4H92 | 33 | 14 |
| 12/2H91-MF16ZC-106 | | |

7.9 Travel motor brake

See instructions for travel motors.

7.10 Hoist limit switch



The hoist limit switch layout installed must be determined on the basis of the sticker in the limit switch (see stickers).
More free switching elements, hoist limit switch layouts are possible as an option (see circuit diagram)

7.10.1 Hoist limit switch (standard)

Version 1: Operational limit switch for top hook position (standard on YK/SK)

Description of system see chap. 7.11, page 59.

Testing emergency hoist limit switch see chap. 7.11.2, page 59

Testing operational hoist limit switch see chap. 7.11.3, page 59

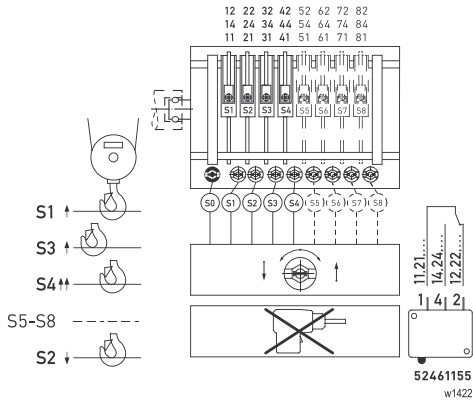


Fig. 32

Version 2: Operational hoist limit switch for top and bottom hook position

(standard on YK/SK with frequency inverter, option on YK/SK without frequency inverter)

Description of system see chap. 7.11, page 59

Testing emergency hoist limit switch see chap. 7.11.4, page 60

Testing operational hoist limit switch see chap. 7.11.5, page 60

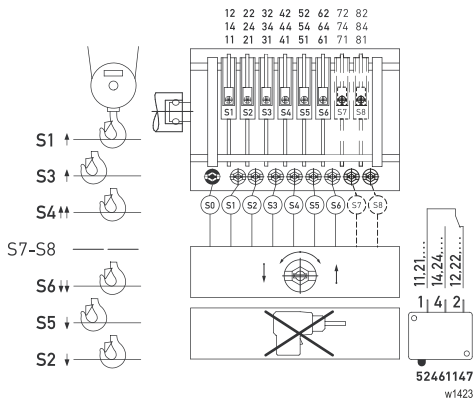


Fig. 33

7.11 Hoist limit switch

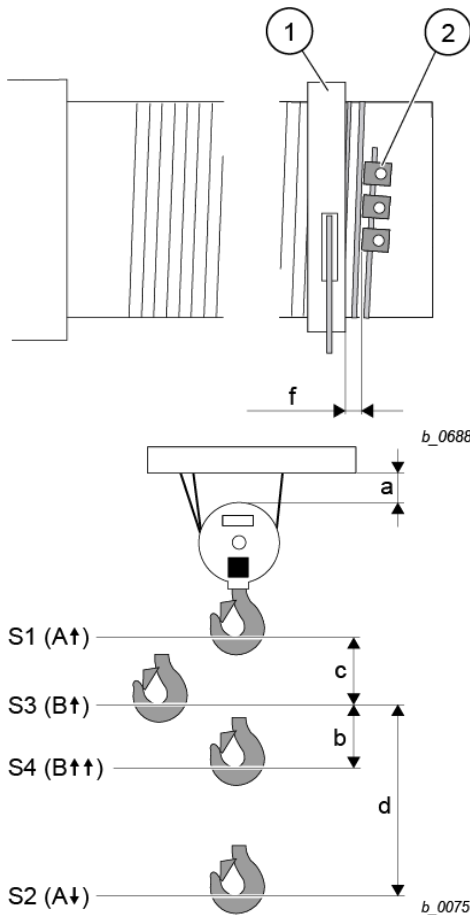





Fig. 34

d = Effective hook path

| Wire rope hoist type YK/SK | a [in] | |
|---|--------|-------|
| | 50 Hz | 60 Hz |
|  1PS 1PD | 5.1 | 5.9 |
|  2PS 2PD | 2.8 | 3.1 |
|  4PS | 1.6 | 2 |

Tab. 13

7.11.1 Description of hoist limit switch system

The wire rope hoist is equipped as standard with an emergency hoist limit switch for disconnecting in top and bottom hook position (switching points A↑ and A↓). The hoist is also equipped with an operational hoist limit switch for disconnecting in top hook position during normal operation (switching points B↑ and B↑↑). Switching point B↑↑ disconnects the fast speed and B↑ the slow speed in upwards direction.

If the operational limit switch (B↑, B↑↑) is overrun during a malfunction, the emergency hoist limit switch (A↑) disconnects the main contactor / hoist contactor. The hoist can only leave the hoist limit switch area by activating switch S261 in the hoist control after the fault has been eliminated.

The hoist limit switch (S220) is in the panel box on the gear.

For version 2, an additional operational hoist limit switch for disconnecting in bottom hook position during normal operation is fitted as an option (switching points B↓, B↓↓) see chap. 7.11.4, page 60.

Switching point B↓↓ disconnects the fast speed and B↓ the slow speed in downwards direction.

If the operational limit switch (B↓, B↓↓) is overrun during a malfunction, the emergency hoist limit switch (A↓) disconnects the main contactor / hoist contactor. The hoist can only leave the hoist limit switch area by activating switch S261 in the hoist control after the fault has been eliminated.

7.11.2 Testing emergency hoist limit switch, version 1

- Test at slow speed without load.
1. Activate the UP button on the control pendant carefully, observing the hoisting motion, until the hoist limit switch disconnects in the highest operational hook position (B↑).
 2. Activate the override button (S260) in the control and at the same time the UP button until the emergency hoist limit switch disconnects (A↑). If the hoist does not continue to move, the emergency hoist limit switch was activated in step 1 and the operational hoist limit switch is not functioning.
 3. Minimum clearance "a" between bottom hook block and the nearest obstacle see Tab. 13, if necessary reset the hoist limit switch, see page 61.
 4. Activate the override button (S261) in the control panel and at the same time the DOWN button to leave the hoist limit switch area.
 5. Activate the DOWN button on the control pendant until the emergency hoist limit switch disconnects (A↓).
 6. Minimum clearance between rope guide (1) and clamping claws (2) for rope anchorage $f = 0.79$ in, see Fig. 34, if necessary reset hoist limit switch, see page 61.

7.11.3 Testing operational hoist limit switch, version 1

- Test without load.
1. Activate the UP button on the control pendant carefully, observing the hoisting motion, until the hoist limit switch disconnects in the highest operational hook position (B↑).
 2. The hoist must be switched over to slow speed (B↑↑) before reaching cut-off point (B↑).
 3. Minimum clearance $a + c$ ($c = 2.4$ in) between bottom hook block and the nearest obstacle, see Tab. 13, if necessary reset hoist limit switch, see page 61.

The clearances between the switching points for operational and emergency hoist limit switches are set for normal operating conditions, however they can be increased if necessary.

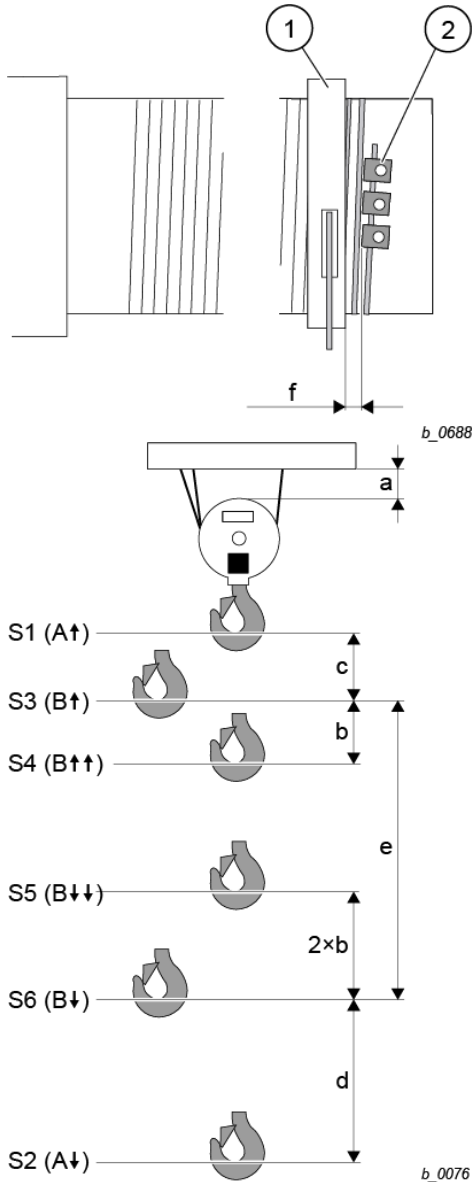


Fig. 35

e = Effective hook path

7.11.4 Testing emergency hoist limit switch, version 2

- Test at slow speed without load.
1. Activate the UP button on the control pendant carefully, observing the hoisting motion, until the hoist limit switch disconnects in top operational hook position (B↑).
 2. Activate the override button (S260) in the control and at the same time the UP button until the emergency hoist limit switch disconnects (A↑). If the hoist does not continue to move, the emergency hoist limit switch was activated in step 1 and the operational hoist limit switch is not working.
 3. Minimum clearance “a” between bottom hook block and the nearest obstacle, see Tab. 13, if necessary reset hoist limit switch, see page 61.
 4. Activate the override button (S261) in the control panel and at the same time the DOWN button to leave the limit switch area.
 5. Activate the DOWN button on the control pendant carefully, observing the hoisting motion, until the hoist limit switch disconnects in bottom operational hook position (B↓).
 6. Activate the override button (S262) in the control and at the same time the UP button until the emergency hoist limit switch disconnects (A↓). If the hoist does not continue to move, the emergency hoist limit switch was activated in step 5 and the operational hoist limit switch is not working.
 7. Minimum clearance between rope guide (1) and clamping claws (2) for rope anchorage $f = 0.79$ in, see Fig. 35, if necessary reset hoist limit switch, see page 61
 8. Activate the override button (S261) in the control panel and at the same time the UP button to leave the limit switch area.

7.11.5 Testing operational hoist limit switch, version 2

- Test without load.
1. Activate the UP button on the control pendant carefully, observing the hoisting motion, until the hoist limit switch disconnects in the highest operational hook position (B↑). Ensure that the hoist switches over to slow speed (B↑↑) before reaching cut-off point (B↑).
 2. Minimum clearance $a + c$ ($c = 2.4$ in) between bottom hook block and the nearest obstacle, see Tab. 13, if necessary reset hoist limit switch, see page 61.
 3. Activate the DOWN button on the control pendant carefully, observing the hoisting motion, until the hoist limit switch disconnects in the highest operational hook position (B↓). Ensure that the hoist switches over to slow speed (B↓↓) before reaching cut-off point (B↓).
 4. Minimum clearance $d = 4.7$ in between switching points (B↓) and (A↓), see Fig. 35, if necessary reset hoist limit switch, see page 61.

7.11.6 Setting hoist limit switch

⚠ DANGER



Danger from voltage

The cover of the hoist limit switch must be removed to set the contacts. This exposes live contact connections. There is thus a danger of contact with live parts!

Adjust hoist limit switch at the setscrews (S1) - (S6) depending on version:

Turning to the left: switching point is moved **upwards**,
Turning to the right: switching point is moved **downwards**.

Adjusting en bloc

All the cam discs can be moved together with the aid of the black setscrew (S0). The settings of the individual contacts relative to one another remain unchanged (see Fig. 36).

Set the limit switch using socket spanner (A0443050990) and without using undue force. Do not use a power screwdriver.

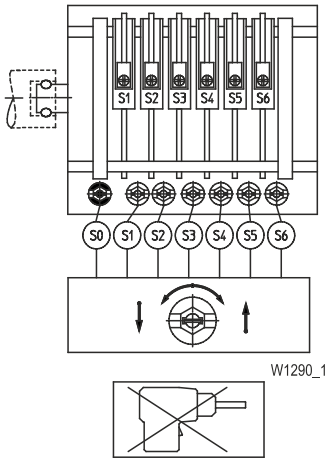


Fig. 36

Adjust the switching points in the following sequence:

1. A↑ (S1)
2. B↑ (S3)
3. B↑↑ (S4)
4. A↓ (S2)
5. B↓ (S5) (option)
6. B↓↓ (S6) (option)

Switching point A↑ (S1)

“Emergency hoist limit switch top hook position”

1. Set without load in creep lifting.
2. Lift bottom hook block to $a + 0.39$ in (Fig. 37, Tab. 14). If necessary, turn setscrew (S1) to the right beforehand.
3. Turn setscrew (S1) to the left until contact S1 switches audibly.
4. Activate override button (S261) in control panel and at the same time DOWN button to leave the hoist limit switch area.
5. Check cut-off point at fast and slow speed.

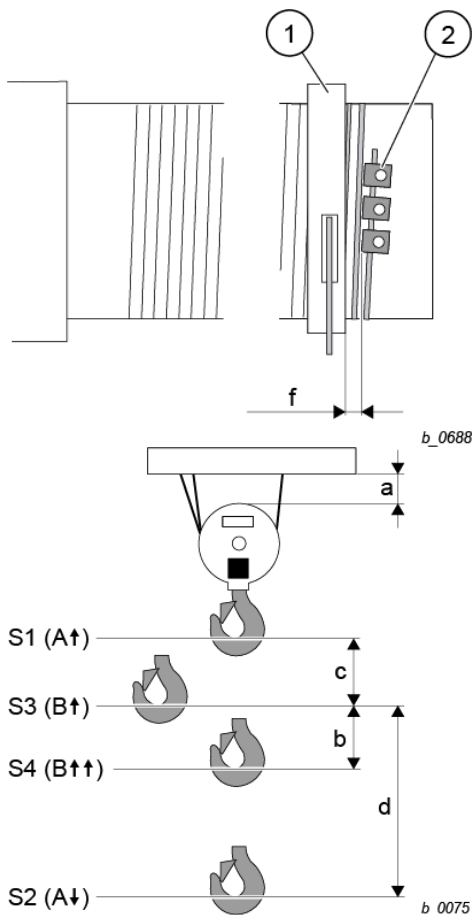





Fig. 37

7 Inspection and maintenance

| Wire rope hoist type YK/SK | a [in] | |
|--|--------|-------|
| | 50 Hz | 60 Hz |
|  1PS 1PD | 5.1 | 5.9 |
|  2PS 2PD | 2.8 | 3.1 |
|  4PS | 1.6 | 2 |

Tab. 14

| Type | b |
|-------------------------------------|---|
| YK/SK | $b = a$ |
| YK/SK with frequency inverter | $b = V \times t \times 0.023$ $V =$ Hoist speed [fpm] (YKG/SKG-B32-18S404-2) $t =$ Brake ramp [s] 1.5 s (factory setting) |

Tab. 15

Example: YKG/SKG-B32-18S404-2

$$b = 4 \text{ fpm} \times 1.5 \text{ s} \times 0.023 = 0.14 \text{ ft}$$

Switching point B↑/B↑↑ (S3/S4)

(minimum clearance between B↑ and A↑ $c = 2.4$ in)

1. Lift bottom hook block to 0.39 in before the desired cut-off point, if necessary turn setscrew (S3) to the right beforehand.
2. Turn setscrew (S3) to the left until contact S3 switches audibly.
3. Lower and lift bottom hook block until B↑ (S3) switches.
4. Type YK/SK: lower bottom hook block by "b = a" (Fig. 37, Tab. 14).
Type YK/SK with frequency inverter: use formula to calculate clearance "b" between (B↑↑) and (B↑).
The factory setting of the brake ramp (t) is 1.5 s.
The switching point (B↑↑) is dependent on hoist speed (V) and brake ramp (t).
If brake ramp (t) is altered, clearance "b" must be recalculated and reset.
Lower bottom hook block by "b".
5. Turn setscrew S4 to the left until contact S4 switches audibly.
6. Check cut-off point at fast and slow speed.
7. Ensure that hoist switches over to slow speed before cut-off point (B↑) is reached.

Switching point A↓ (S2)

"Emergency hoist limit switch bottom hook position"

(Minimum clearance between rope guide (1) and clamping claws (2) for rope anchorage $f = 0.79$ in, see Fig. 37)

Set bottom hook position so that the bottom hook block does not touch the ground (would cause slack rope).

1. Lower bottom hook block to desired hook position, if necessary turn setscrew (S2) to the left beforehand. Observe minimum clearances/lowest hook position.
2. Turn setscrew (S2) to the right until contact S2 switches audibly.
 - Only for option with operational hoist limit switch for bottom hook position!
Activate override button (S261) in control panel and at the same time the UP button to leave the limit switch area.
3. Check cut-off point at fast and slow speed.

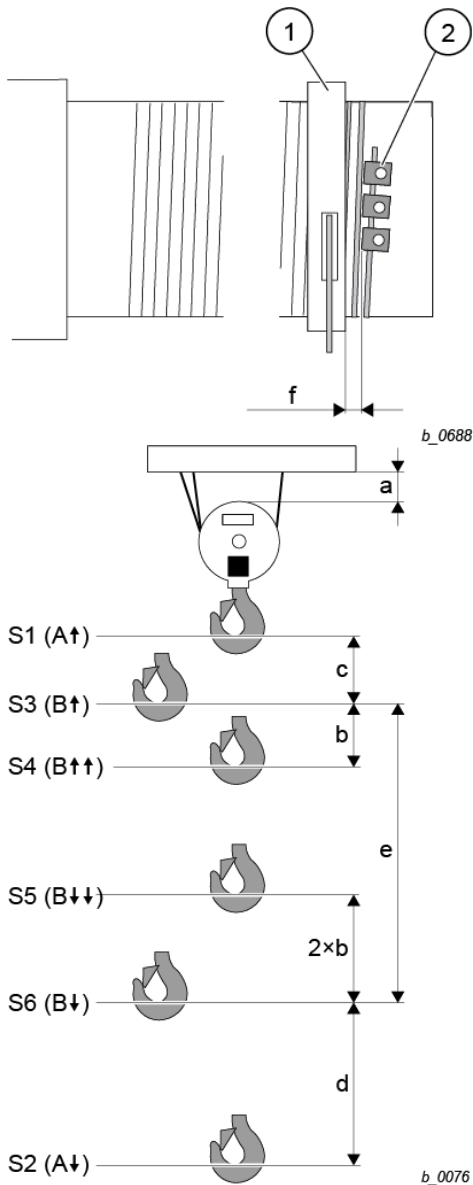


Fig. 38

Switching point B↓/B↓↓ (S5/S6) (version 2 only) (Minimum clearance between B↓ and A↓ d = 4.7 in)

1. Lower bottom hook block to 0.39 in above desired hook position, if necessary turn setscrew (S5) to the left beforehand. Observe minimum clearance, see Fig. 38.
2. Turn setscrew (S5) to the right until contact S5 switches audibly.
3. Lift and lower bottom hook block until B↓ (S5) is activated.

The following steps apply only for option operational hoist limit switch with pre-switching for bottom hook position!

- Type YK/SK: lift bottom hook block by $2 \times "b"$ (Fig. 38, Tab. 14).
Type YK/SK with frequency inverter: use formula to calculate clearance $2 \times "b"$ between (B↓↓) and (B↓).
The factory setting of the brake ramp (t) is 1.5 s.
The switching point (B↓↓) is dependent on hoist speed (V) and brake ramp (t).
If brake ramp (t) is altered, clearance "a" must be recalculated and reset.
Lift bottom hook block by $2 \times "b"$.
- Turn setscrew S6 to the right until contact S6 switches audibly.
- Check cut-off point at fast and slow speed.
- Ensure that hoist switches over to slow speed before cut-off point (B↓) is reached.

⚠ WARNING

Danger of bodily injury

Incorrectly set hoist limit switches may cause serious accidents.
Check operational hoist limit switch for function and correct setting every day.

7.11.7 Servicing hoist limit switch

Maintenance work is restricted to checking the cut-off points. No maintenance or inspection is necessary for the hoist limit switch itself.

NOTICE

Danger of material damage

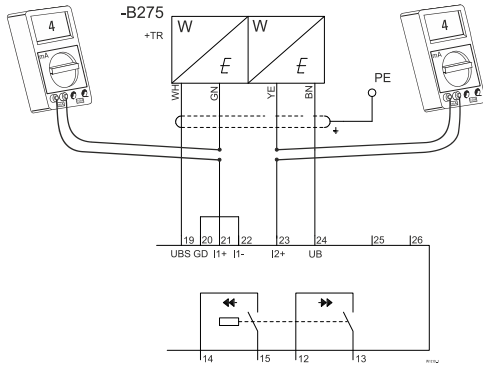
Any dust deposits that may be visible when the housing is opened must on no account be removed with compressed air as this would force the dust into the contacts and impair the switching function.
On no account use benzene or other solvents to clean the hoist limit switch!

7.12 Overload safety device

7.12.1 Testing overload safety device

If an overload is detected, the wire rope hoist is switched off in the upwards direction. Only lowering is then possible. Lifting is not possible until the wire rope hoist has been unloaded.

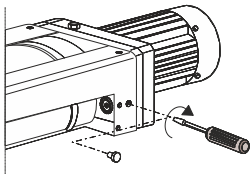
- Attach a test load of 100% maximum working load + 10% overload and take load up slowly. After the rope has been tautened the overload safety device must disconnect the hoist. If the hoist is not disconnected, see original operating instructions of overload device.



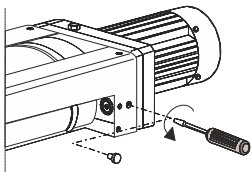
7.12.2 Maintenance of overload safety device with sensor

The sensor measures the axial force in the hoist gear and is maintenance-free. The setting may only be altered if the factory setting (4 mA without load) has changed.

- Measure current at terminal 21 I 1+ and terminal 23 I 2+. Disconnect leads and measure current. A current of 4 ± 0.3 mA must flow without load.



- Closed-circuit current > 4 mA
Turn adjusting spindle to the right



- Closed-circuit current < 4 mA
Turn adjusting spindle to the left

Fig. 39

Test the overload safety device again after carrying out corrections.

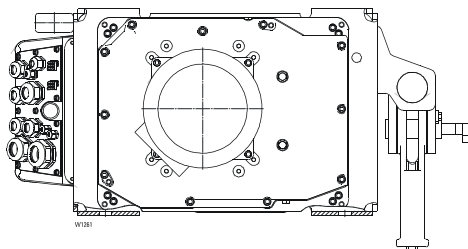


Fig. 40

7.12.3 Maintenance of overload safety device with shear force sensor

- The overload safety device with shear force sensor is maintenance-free.

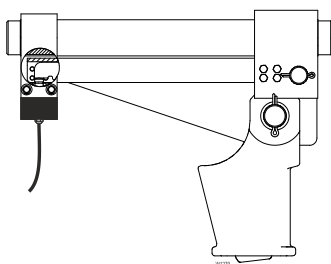


Fig. 41

7.12.4 Maintenance of overload safety device with pressure sensor

- After off-loading hoist, check all moving parts for ease of movement. Clean without dismantling and grease from the outside with a thin-bodied lubricant.

7.13 Crane test

WARNING

Danger of overload

Extremely heavy loads can be lifted. The crane test may only be performed by a qualified person.

The crane test is part of commissioning the wire rope hoist. The test comprises:

- | | |
|---------------|---|
| Dynamic test: | 1.1 × maximum working load Test each direction of movement at slow and fast speed. The crane must operate smoothly during the test. |
| Static test: | 1.25 × maximum working load The test load must not be lifted more than max. 7.9 in from the ground at slow speed during the static test. |
- Test loads must be provided by the owner.



To enable this test to be performed, a qualified person can raise the overload cut-off threshold following the original operating instructions of the overload device.

7.14 Rope drive

7.14.1 Rope and rope attachment - general information

After commissioning a new wire rope hoist, or after replacing the rope, the rope of multi-fall hoists may twist.

This can be seen from the bottom hook block turning, particularly when unloaded.

▲ WARNING



Danger from damaged or twisted ropes

Twisting in the rope prejudices safety and service life.

- Remove any twists!

▲ WARNING



Danger of wire fractures

In certain applications (e.g. twist-free wire rope, constant deadweight, recurrent stopping position, automatic operation etc.) wire fractures may occur inside the rope without being visible from outside.

Risk of accident!

- In case of doubt please contact the manufacturer.

- Regularly inspect the rope for twisting. To do so, run the hoist into highest and lowest hook positions without load.
- If any twisting is detected, untwist the rope immediately. See page 30 "Reeving rope" and see page 68, "Removing rope".
- Check rope. Take particular note of the sections of rope near rope pulleys, return pulleys or equalizing pulleys and in the region of the rope anchorage.
- If any of the following damage should occur, replace the rope immediately.
 - Excess visible wire fractures, see chap. 7.14.2.
 - The rope must be free of load for testing to facilitate detecting any broken wires when bending the rope by hand (approximately by radius of rope sheave).
 - Nest of wire fractures or broken strand.
 -
 - In case of equal diameter reduction of 5% along the rope
 - In case of a local diameter reduction, e.g. if a rope core fails
 - Formation of baskets or loops, knots, kinks, kink or other mechanical damage.
 - Corkscrew-type deformation. Divergence due to deformation: $\geq 1/10 \times$ rope diameter.
 - In case of a projecting core or strands
 - In case the rope diameter is increased $\geq 5\%$
 - In case of external corrosion like severely worn wire surfaces, slack wires
 - In case of internal corrosion, e.g. corrosion particles released from the valleys between external strands
 - In case of damage due to heat effects or an arc with corresponding external heat discoloration on the wires or clear loss of lubricants
 - In addition, the rope must be replaced as required by ISO 4309. In case of wire breakage in the strand valleys of 2 or more on $6 \times d$, set down the wire rope (danger of internal wire breaks)

7.14.2 Replacement of wire rope due to broken wires

Part number of rope see factory certificate.

Number of permissible broken wires see rope certificate.

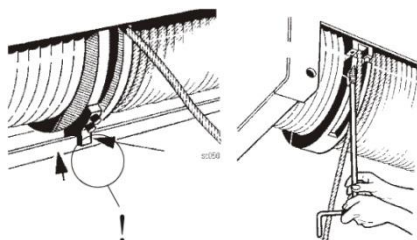


Fig. 42

7.14.3 Removing rope guide

- Unscrew stop (a) of rope guide.
- Unscrew screws (d).
- Remove half-rings.
- Unhook rope tensioning spring.

7.14.4 Replacing wire rope

YK/SK wire rope hoists have a special rope which is the optimum for the most common applications.

⚠ WARNING

Danger from unsuitable rope

The substitute rope must be equivalent to the original in terms of quality, strength and make-up. Please consult the works certificate or the rope certificate to see which rope is fitted.

⚠ WARNING

Always insert the rope correctly into the rope anchorage and secure. Replace split pin every time it is dismantled.

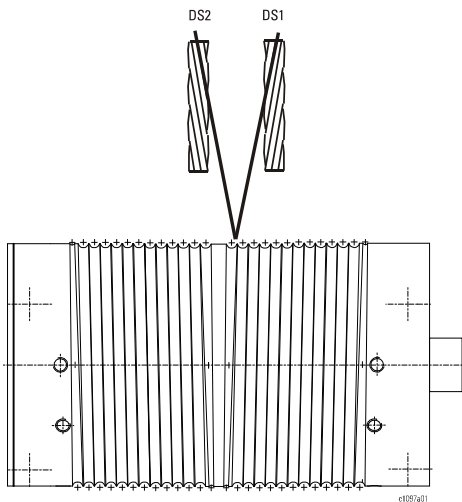


Fig. 43

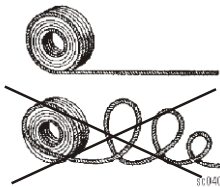


Fig. 44

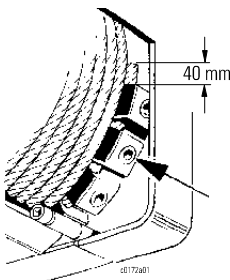



Fig. 45

| Thread |  |
|--------|---|
| | [lb _r ft] |
| M16 | 155 |
| M20 | 302 |

Tab. 16

In the case of 2 wire ropes with different lays

- wire rope with right-hand lay (DS1) on rope drum with left-hand groove
- wire rope with left-hand lay (DS2) on rope drum with right-hand groove
- The direction of lay of the wire ropes makes a V-pattern (see Fig. 43)

Removing wire rope

- Lower bottom hook block to just above the lowest hook position and set it down on a firm support.
- Release end of wire rope in rope anchorage (rope clamp with rope wedge).
- Run the remaining rope off the drum.
- Unscrew the fixing screws in the clamping plates on the rope drum.

Fitting rope

- Unroll new rope out straight if possible, without twists, kinks or loops. Protect rope from dirt.
- Attach rope to rope drum with all the clamping plates (do not forget the lock washers!). Allow the rope end to project by approx. 1.2-1.6 in.
- Tightly wind about 5-10 turns onto the drum under power. Let the rope run through a greased rag. For type of grease see page 88.
- Fit rope guide, see page 69, "Fitting rope guide".
- Reeve the loose end of the rope according to the number of falls, fasten with the rope wedge and secure with a rope clamp, see page 33, "Rope anchorage".
- Retighten clamping plates. For tightening torques see Tab. 16.
- Run rope in with partial load.
- After fitting a new rope, or shortening the old one, reset the hoist limit switch. See page 61, "Setting emergency hoist limit switch".
- If the new rope twists after some time in operation, untwist the rope immediately. See page 30, "Reeving rope" and "Removing rope"

7.14.5 Fitting rope guide

- Grease thread and groove in rope guide thoroughly.
- Push the half-ring with the threaded holes onto the drum (1).
Block half-ring against the supporting frame with a wooden wedge (2).
- Push the spring into the guide groove of the half-ring (1) and hook the ends of the spring together. (Use special tool (a), see Fig. 46).
- Push the half-ring with the rope exit slot onto the drum so that the first empty groove of the drum engages the corresponding thread of the half-ring (4).
- Screw half-rings together with compression springs and bolts (5).
- The rope guide must rest lightly on the drum and be able to be turned by hand. If this is not the case, the guide has been fitted incorrectly or the rope drum is damaged.
- Screw down stop to prevent it turning and grease (6).

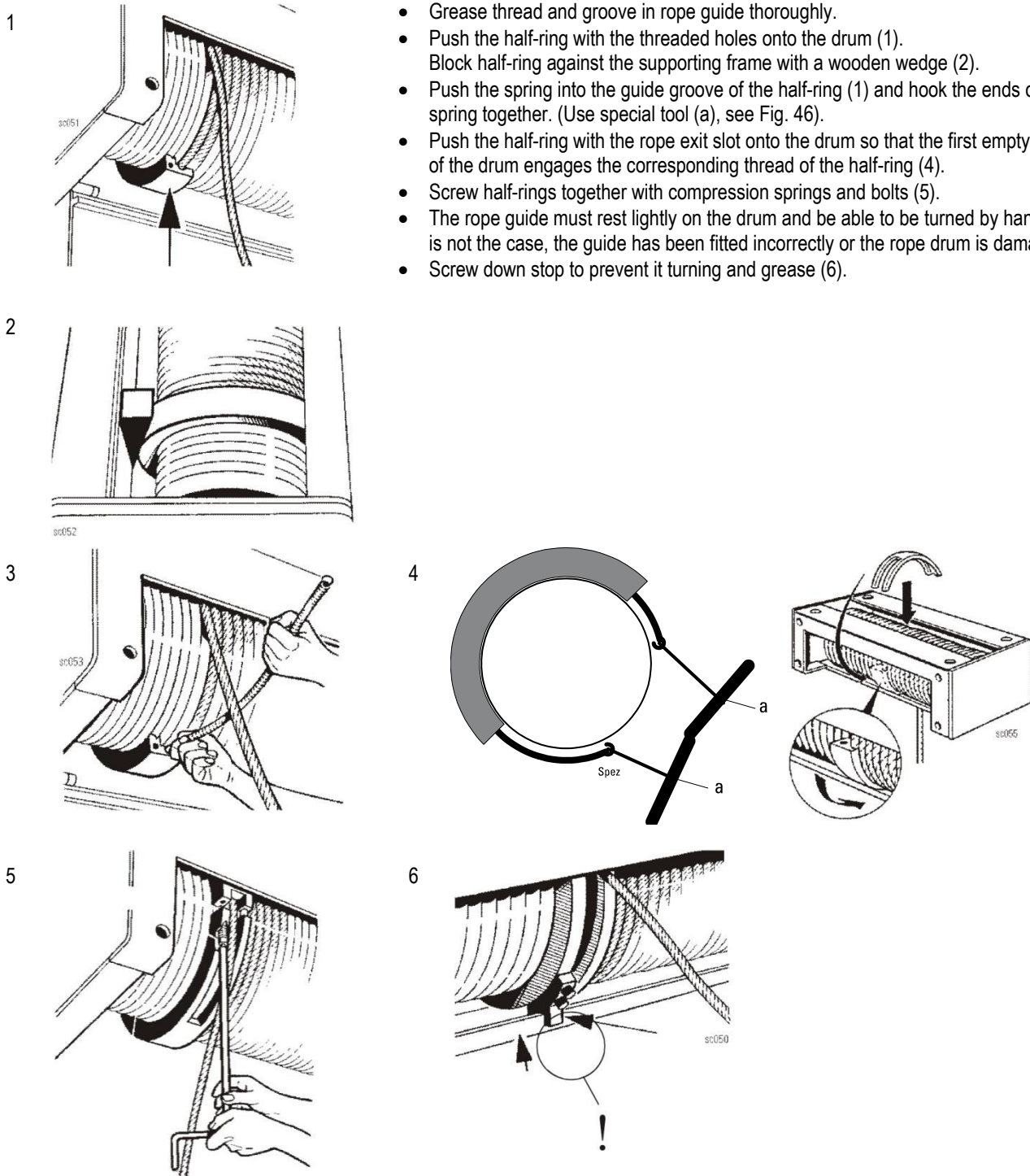


Fig. 46

7.14.6 Checking rope drum for wear

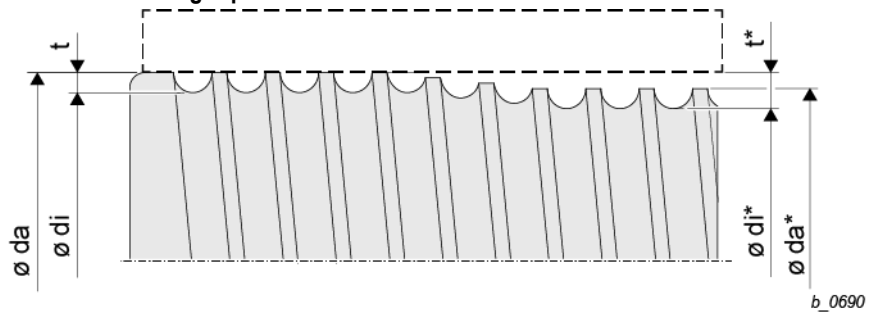


Abb. 47

| Type of wire rope hoist | Rope diameter | Nominal values | | | Limits for wear | | |
|-------------------------|---------------|----------------|--------|-------|-----------------|---------|--------|
| | | da | di | t | da* min | di* min | t* max |
| | | [in] | [in] | [in] | [in] | [in] | [in] |
| YK/SK | 0.59 | 16.378 | 15.945 | 0.217 | 16.315 | 15.89 | 0.244 |
| | 0.63 | 16.378 | 15.906 | 0.236 | 16.307 | 15.85 | 0.264 |
| | 0.79 | 16.378 | 15.787 | 0.295 | 16.299 | 15.717 | 0.331 |
| | 0.98 | 16.378 | 15.701 | 0.339 | 16.291 | 15.614 | 0.382 |

Tab. 17

7.14.7 Inspection and maintenance of rope sheave

- Check rope sheaves for wear. We recommend having them checked by personnel trained by us. They should also be checked for easy running, indicating that the ball bearings are in good condition.

Wear on rope sheave

Indications of limits for wear

| Rope sheave | | | | |
|-------------|-------|-------|-------|-------|
| Part no. | D new | t min | h max | h new |
| | [in] | [in] | [in] | [in] |
| A0333001530 | 14.8 | 0.256 | 1.476 | 1.339 |
| A2533003530 | 14.8 | 0.256 | 1.417 | 1.28 |
| A4633000530 | 15.7 | 0.276 | 1.319 | 1.181 |
| A2633001530 | 17.7 | 0.394 | 1.535 | 1.378 |
| A0943000530 | 17.7 | 0.394 | 1.535 | 1.378 |
| A4633001530 | 18.9 | 0.394 | 1.437 | 1.28 |

Tab. 18

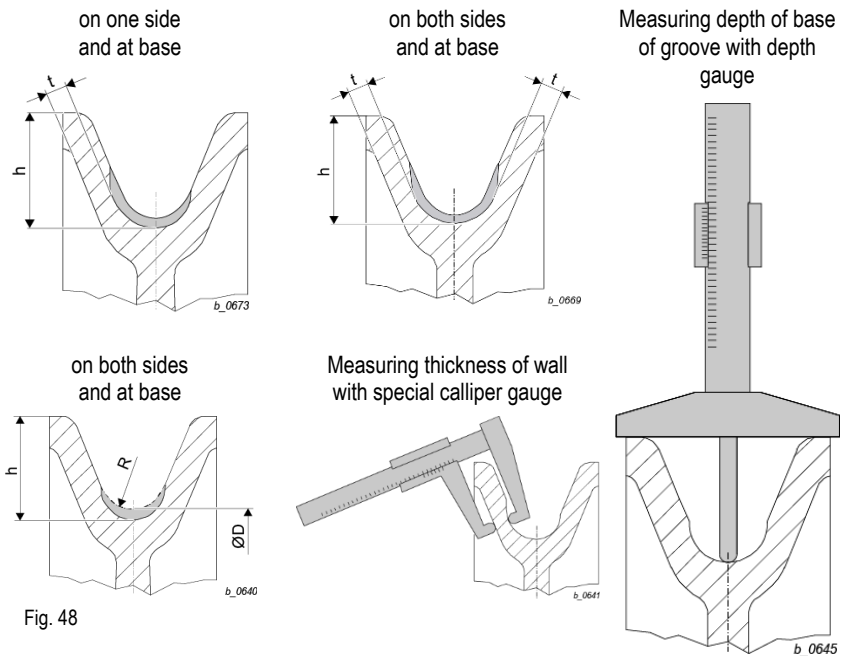


Fig. 48

7 Inspection and maintenance

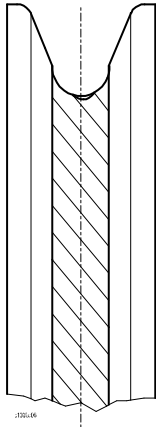


Fig. 49

The rope sheave must be replaced if the wall thickness as measured is $< t_{min}$ or the groove depth as measured is $> h_{max}$. Furthermore, the rope sheave must be replaced when replacing the wire rope if the rope strands have dug into the base of the groove. Impressions of single wires are acceptable.

A rope sheave must also be replaced if the radius of the base of the groove R has become too small for the new rope due to reduction in diameter of the old rope or wear.

i The negative profile of the rope in the base of the groove may provide optimum contact to the wire rope currently fitted. Rope sheaves should be rotated without load on the rope to check the easy and concentric running of the bearings.

Bottom hook blocks

NOTICE

Danger of material damage

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

The damage can only be assessed by trained maintenance personnel.

7.14.8 Checking load hook

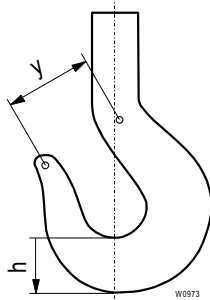



Fig. 50

| RSN, RF |  | | | | |
|------------|---|-------|------|-------|-------|
| | 5 | 10 | 20 | 32 | 40 |
| | [in] | | | | |
| h | 2.95 | 4.17 | 5.91 | 7.48 | 8.35 |
| h min. | 2.807 | 3.965 | 5.61 | 7.106 | 7.929 |

Tab. 19

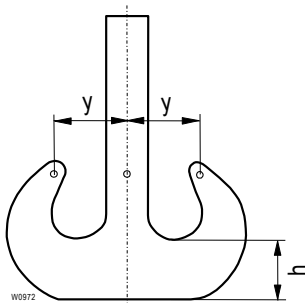



Fig. 51

| RSN, RF |  | | | |
|------------|---|-------|-------|-------|
| | 10 | 20 | 32 | 40 |
| | [in] | | | |
| h | 3.74 | 5.20 | 6.69 | 7.48 |
| h min. | 3.555 | 4.937 | 6.358 | 7.106 |

Tab. 20

y_{new} see hook certificate

$y_{perm} \leq 1.1 \times y_{new}$

If value h_{min} and/or y_{perm} are reached, replace hook.

7.15 Trolley

Wheels, wheel drive and runway

- Visual inspection of wheels for wear. See Tab. 21.
- Visual inspection of runway girder for wear.
- Visual 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.

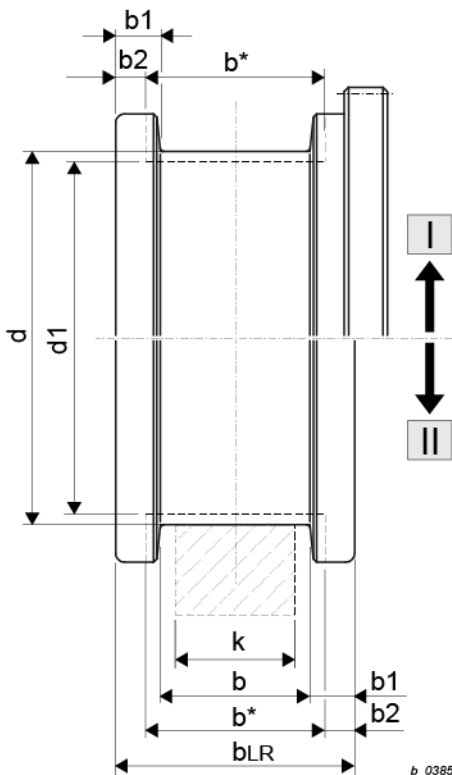


Fig. 52

| Fig. | d | bLR | Nominal value | | | | Limit for wear | | | |
|------|------|-----|---------------|-------|-------|-------|----------------|----------------------|-------|-------|
| | | | b | k | | b1 | d1 | Max play = $b^* - k$ | | |
| [in] | | | | | | | | | | |
| II | 9.8 | 4.5 | 2.13 | 1.57 | 1.77 | 1.201 | 9.5 | 0.433 | 0.709 | 0.709 |
| | | | 2.52 | 1.97 | 2.17 | 1.004 | | | | |
| | | | 2.91 | 2.36 | 2.56 | 0.807 | | | | |
| | | | 3.31 | 2.76 | 2.95 | 0.61 | | | | |
| II | 12.4 | 5.1 | 2.52 | 1.97 | 2.17 | 1.299 | 12 | 0.531 | 0.709 | 0.709 |
| | | | 2.91 | 2.36 | 2.56 | 1.102 | | | | |
| | | | 3.31 | 2.76 | 2.95 | 0.906 | | | | |
| | | | 3.7 | 3.15 | 3.35 | 0.709 | | | | |
| | | | 0.531 | 0.709 | 0.709 | 0.709 | | | | |

Tab. 21

NOTICE

Danger of material damage

If any one of the limits for wear d_1 , b_2 ($b^* - k$) is attained, 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, see page 11, to prevent the trolley 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 center of the stop elements provided and that the materials exhibit no detrimental characteristics, see page 19.

7.16 Gear

The gearing of YK/SK hoists is hardened, hard-machined and has a high safety factor. With their minimum classification of 1Bm or 2m to FEM 9.511 the gears have a long service life. All bearing points have roller bearings.

- During annual maintenance, 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, the oil must be changed and repairs scheduled 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.)
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.

7.16.1 Oil level

When the wire rope hoist is horizontal the oil level should reach the inspection plug. (The oil level inspection plug is marked in red.)

- See page 88 for type and quantity of oil.
- Dispose of used oil correctly to protect the environment.

a = Oil drainage plug
b = Oil inspection plug
c = Oil filling plug

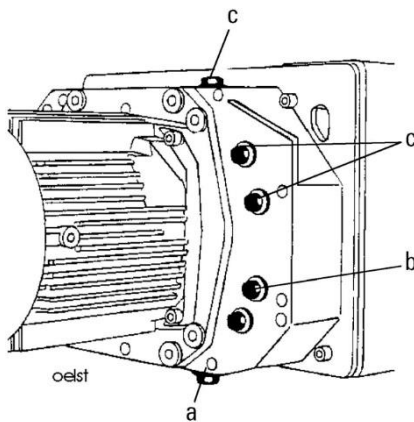


Fig. 53

7.17 Remaining service life

The operating mode and operating time must be established by the owner and recorded in the test log book in order to calculate the remaining service life. After the service life has expired a general overhaul (S.W.P. = Safe Working Period) must be carried out.

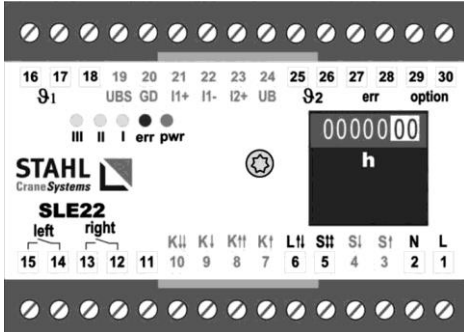


Fig. 54

7.17.1 Operating hours counter in SLE load monitor

The operating hours counter in the load monitor of the overload cut-off adds up the operating time of the hoist. In order to obtain the lifetime expired in full load hours, the operating hours must be calculated with load factor “k”. This is carried out by a qualified person, during the annual “periodic inspection”.

If 90% of the theoretical full load lifetime has expired, a general overhaul (GO) must be scheduled and carried out at the earliest possible date.

7.17.2 SMC multi-controller (optional)

The operating time of the hoist and the full load operating hours are recorded in the SMC. The SMC calculates the full load operating hours from the relevant hoisted load and the operating hours of the hoist. The remaining service life is calculated with reference to the mechanism group and can be read off by means of a PC (laptop).

If the theoretical full load lifetime has expired, also indicated by an illuminated red LED, a general overhaul must be scheduled and carried out.

i Reading the full load operating hours does not replace the prescribed tests including inspecting the wearing parts (rope, return sheave).

7.18 General overhaul

| ISO | M3 | M4 | M5 | M6 | M7 |
|-------|-----|-----|------|------|------|
| D [h] | 400 | 800 | 1600 | 3200 | 6400 |

Tab. 22

The mechanism (motor and gear; not applicable to wearing parts) of the YK/SK wire rope hoist is classified according to ISO. 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 wire rope hoist must be overhauled by the manufacturer.

NOTICE

Danger of material damage

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

The rope drive is classified according to FEM 9.661, see factory certificate.

As the service life of components such as gears is limited in accordance with the classification, it must be ensured that this is not exceeded. After the scheduled service life has expired hazards may arise. 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.

8 Wearing parts

8 Wearing parts

NOTICE

Danger of material damage

Replacement and repairs may be carried out by trained personnel only.

8.1 Serial number

When ordering original spare parts, please always indicate the serial number of the hoist.

8.2 Hoist

Brake rotor

When replacing the brake rotor, the pressure springs must always be replaced.

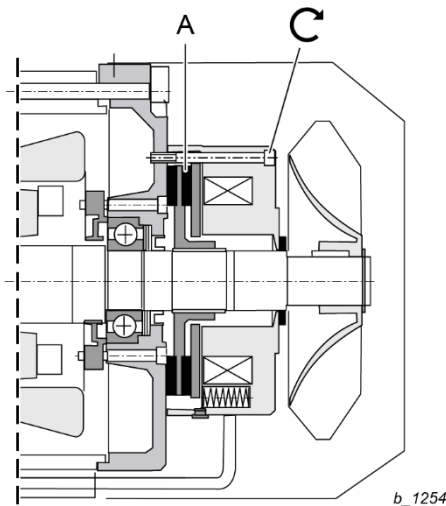


Fig. 55

RSM brake rotor

| Hoist motor | Hoist motor brake | A | Tightening torque |
|-----------------|-------------------|-------------|----------------------|
| | | Order no. | [lb _f ft] |
| 12/2H73/100.822 | RSM150 | A0443075650 | 16 |
| 12/2H73-1PC3052 | | A70017594 | |
| 24/4H92 | RSM500 | A0543011650 | 33 |

Tab. 23

NM brake rotor

| Hoist motor | Hoist motor brake | A | Tightening torque | |
|---------------|-------------------|-----------|----------------------|----|
| | | Order no. | [lb _f ft] | |
| 12/2H72-MF... | NM 38754 | A5675700 | 16 | |
| 4H72-MF... | NM 38741 | A5675690 | | |
| 4HS7-MF... | NM 40951 | A5676340 | | |
| 4H73-MF... | NM 38753 | A5675500 | | |
| 4SH8-MF... | NM 40980 | A5676350 | | |
| 4H81-MF... | NM 38753 | A5675500 | | |
| 4H82-MF... | NM 38781 | A5675710 | | |
| 4HSA-MF... | NM 40980 | A5676350 | | |
| 12/2H91-MF... | NM 38790 | A5675910 | | 33 |

Tab. 24

Rope guide

| Wire rope hoist type | B | C | D |
|----------------------|-------------|-------------|-------------|
| | Order no. | Order no. | Order no. |
| YKG/SKG | A4733000430 | A4633008430 | A0343000430 |
| YKF/SKF | A4633000430 | - | - |

Tab. 25

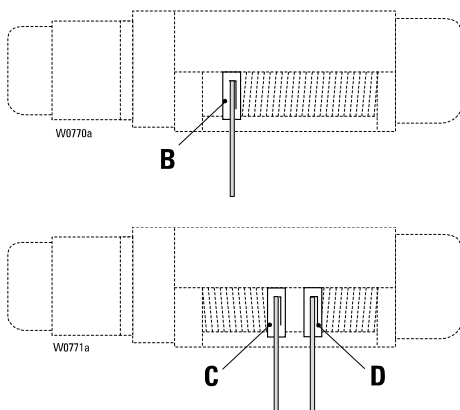


Fig. 56

8 Wearing parts

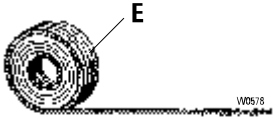


Fig. 57

Wire rope (E)

See factory certificate or rope certificate for length and number of wire rope.

9 Malfunctions

9 Malfunctions

⚠ DANGER



Electric shock hazard.

- Make sure an electrical qualified person performs the work.
- Disconnect power and implement a Lockout/Tagout (LOTO) procedure before servicing the equipment.

| Trouble | Possible cause | Remedy |
|---|---|---|
| Hoist does NOT operate | No power to hoist | <ol style="list-style-type: none"> 1. Check switches, and fuses. 2. Check connections in power supply lines. 3. Check power collectors. |
| | Wrong voltage | <ol style="list-style-type: none"> 1. Check if the supply voltage is in accordance with the voltage indicated on motor data plate. |
| | Loose or broken wire connections | <ol style="list-style-type: none"> 1. Shut off the power. 2. Remove electrical cover, and check wire connections. 3. Check wire connections of control pendant. 4. Check wire connections of limit switches. 5. Correct wiring if necessary. |
| | Contactors not functioning | <ol style="list-style-type: none"> 1. Check if jumper wires are properly installed. 2. Check if contactor armatures move freely. 3. Check if contactor is burned or welded. 4. Replace contactor if necessary. |
| | No control voltage | <ol style="list-style-type: none"> 1. Check if transformer fuse is blown. 2. If fuse is burn, check control pendant for grounding and/or shorts. 3. Check transformer coil for signs of overheating. 4. Check if the transformer secondary is the same voltage as the coils to which it is connected. 5. Replace transformer if necessary. |
| | Motor burned out | <ol style="list-style-type: none"> 1. Replace motor. 2. Check input power supply. 3. Check hoist motor connections. |
| Hoist does NOT operate, motor hums | Not all power phases are present | <ol style="list-style-type: none"> 1. Check fuses, replace if necessary 2. Check input power supply. 3. Check control pendant. |
| Hoist does NOT start after a longer shutdown, or starts with difficulty, motor hums. | Hoist brake stuck | <ol style="list-style-type: none"> 1. Check brake. 2. Replace brake if necessary. |
| Hoist motor overheats | Excessive load | <ol style="list-style-type: none"> 1. Reduce load to rated load of hoist, as shown on name-plate. |
| | Excessive duty cycle | <ol style="list-style-type: none"> 1. Reduce frequency of lifts. 2. Reduce amount of jogging. |
| | Wrong voltage or frequency | <ol style="list-style-type: none"> 1. Check if the supply voltage is in accordance with the voltage indicated on motor data plate. 2. Check hoist and inspect for defective, worn or damaged parts. |
| | Defective motor or worn bearings in hoist frame | <ol style="list-style-type: none"> 1. Disassemble hoist. 2. Inspect for defective, worn or damaged parts. 3. Replace parts if necessary. |
| Hoist operates intermittently | Collectors make poor contact | <ol style="list-style-type: none"> 1. Check electrical connections. 2. Check collectors for free movement of spring arms, or weak springs. |
| | Loose contacts | <ol style="list-style-type: none"> 1. Check wire connections. 2. Correct wiring if necessary. |
| Braking distance is too long | Brake lining worn | <ol style="list-style-type: none"> 1. Replace brake disk. |

9 Malfunctions

| Trouble | Possible cause | Remedy |
|---|---|--|
| Loud clicking noise when motor starts | Air gap on brake is too wide | <ol style="list-style-type: none"> 1. Measure air gap on motor. 2. Replace brake disk if the maximum air gap is reached. |
| Lifting of rated load NOT possible | Low voltage | <ol style="list-style-type: none"> 1. Check if the supply voltage is in accordance with the voltage indicated on motor data plate. 2. Check hoist motor connections. 3. Check size of power supply lines. |
| Hook moves in wrong direction | Hoist wired incorrectly | <ol style="list-style-type: none"> 1. Check wiring connections with appropriate wiring diagram. 2. Correct wiring if necessary. |
| Lifting NOT possible | Upper hook position is reached | 1. Activate DOWN button |
| | Excessive load | 2. Reduce load to rated load of hoist, as shown on nameplate |
| | Limit switch defective | <ol style="list-style-type: none"> 1. Check operational hoist limit switch. 2. Check emergency hoist limit switch. 3. Replace limit switch if necessary. |
| | Condition monitoring device (SMC, SLE) is activated or is defective | 1. Check supplied manual of the condition monitoring device (SMC, SLE) |
| | UP button inoperative | <ol style="list-style-type: none"> 1. Check button contacts and wires. 2. Correct wiring or repair control pendant if necessary. |
| | Contact assembly not functioning | <ol style="list-style-type: none"> 1. Check if jumper wires are properly installed. 2. Check if contactor armatures move freely. 3. Check if contactor is burned or welded. 4. Correct wiring or replace contactor if necessary. |
| | Hoist electrical circuit open | <ol style="list-style-type: none"> 1. Check if connections are loose. 2. Check if jumper wires on contactor are properly installed. 3. Correct wiring if necessary. |
| Lowering NOT possible | Bottom hook position is reached | 1. Activate UP button |
| | Limit switch faulty | <ol style="list-style-type: none"> 1. Check operational hoist limit switch. 2. Check emergency hoist limit switch. 3. Replace limit switch if necessary. |
| | DOWN button inoperative | <ol style="list-style-type: none"> 1. Check button contacts and wires. 2. Correct wiring or repair control pendant if necessary. |
| | Contact assembly not functioning | <ol style="list-style-type: none"> 1. Check if jumper wires are properly installed. 2. Check if contactor armatures move freely. 3. Check if contactor is burned or welded. 4. Correct wiring or replace contactor if necessary. |
| | Lower electrical circuit open | <ol style="list-style-type: none"> 1. Check if connections are loose. 2. Check if jumper wires on contactor are properly installed. 3. Correct wiring if necessary. |
| Hook block and rope are rotating | Rope twisted | <ol style="list-style-type: none"> 1. Turn rope anchorage 1 to 2 times in opposite direction (360°) to the twisted rope. 2. Perform several runs without load over the full lifting height. 3. If necessary, repeat these steps 2 times. |
| Hoist does NOT follow the control commands | Condition monitoring device error | 1. Check supplied manual of the condition monitoring device (SMC, SLE) |
| Cross traveling NOT possible | Excessive load | 1. Reduce load to rated load of hoist, as shown on nameplate. |
| | Travel limit switch defective | 1. Check travel limit switch, replace if necessary |
| | Fuses defective | 1. Check fuses, replace if necessary |
| Load drifts excessively when hoist is stopped | Excessive load | 1. Reduce load to rated load of hoist, as shown on nameplate. |

10 Decommissioning

10 Decommissioning

10.1 Dismantling

▲ WARNING

Falling parts

- Secure hoist when dismantling.

Dismantle hoist correctly. First of all drain off lubricants.

10.2 Scrap disposal

NOTICE

Electronic components, electric scrap, lubricants and other auxiliary substances are hazardous waste and may only be disposed of by approved recycling companies. Overload devices must be returned to the manufacturer.

Dismantled components must be recycled after correct dismantling. It is imperative to observe national regulations on environmentally compatible disposal. Local authorities will provide relevant information.

11 Technical data

11 Technical data

11.1 Conditions of use

The hoist is designed for use in industry and for the ambient conditions usual in industry in non-hazardous areas.

Special measures are necessary 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.

Protection against dust and moisture to EN 60529

IP55

Permissible ambient temperatures

see factory certificate

11.2 Hoist

The designation of the type of wire rope hoist and the motor installed can be seen from the rating plate/factory certificate.

All technical data given refer to the standard version and standard operating conditions. The technical data given in the order acknowledgement or individual documentation apply for optional versions and off-standard applications. Motor specifications for more information and further technical details are available on request.

11.2.1 Pole-changing hoist motors 12/2H..-MF 50Hz

| 50 Hz | | | | | | | | | | |
|---------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 220...240 V | | 380...415 V | | | 220...240 V | 380...415 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H72-MF *1 | 2.7/16.1 | 20/50 | 360/180 | 20.9/43.5 | 43.5/252.0 | 12.0/25.0 | 25.0/145.0 | 0.68/0.67 | 80 | 50 |
| | 3.4/20.1 | 20/40 | 240/120 | 24.0/56.0 | | 14.0/32.0 | | | | |
| 12/2H91-MF *1 | 6.7/40.2 | 20/40 | 240/120 | 45.0/101.0 | 78.3/435.0 | 26.0/58.0 | 45.0/250.0 | 0.60/0.70 | 100 | 60 |

| 50 Hz | | | | | | | | | | |
|---------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 420...460 V | | 500...525 V | | | 420...460 V | 500...525 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H72-MF *1 | 2.7/16.1 | 20/50 | 360/180 | 10.9/22.7 | 22.7/132.0 | 9.6/20.0 | 20.0/116.0 | 0.68/0.67 | 50 | 30 |
| | 3.4/20.1 | 20/40 | 240/120 | 12.7/29.0 | | 11.0/26.0 | | | | |
| 12/2H91-MF *1 | 6.7/40.2 | 20/40 | 240/120 | 24.0/53.0 | 40.9/227.0 | 21.0/47.0 | 36.0/200.0 | 0.60/0.70 | 60 | 50 |

Tab. 26

11.2.2 Pole-changing hoist motors 12/2H..-MF 60Hz

| 60 Hz | | | | | | | | | | |
|---------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 208...230 V | | 360...400 V | | | 208...230 V | 360...400 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H72-MF *1 | 3.1/18.8 | 20/50 | 360/180 | 27.2/54.4 | 52.3/312.0 | 15.7/31.5 | 30.3/180.0 | 0.64/0.60 | 80 | 50 |
| | 4/24.1 | 20/40 | 240/120 | 27.0/67.0 | | 16.0/39.0 | | | | |
| 12/2H91-MF *1 | 8/48.3 | 20/40 | 240/120 | 54.0/121.0 | 94.1/523.0 | 31.5/70.0 | 54.5/303.0 | 0.60/0.70 | 125 | 60 |

| 60 Hz | | | | | | | | | | |
|---------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 440...480 V | | 575...600 V | | | 440...480 V | 575...600 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H72-MF *1 | 3.1/18.8 | 20/50 | 360/180 | 13.0/26.0 | 25.0/149.0 | 10.4/20.8 | 20.0/119.0 | 0.64/0.60 | 50 | 30 |
| | 4/24.1 | 20/40 | 240/120 | 13.0/32.0 | | 10.0/26.0 | | | | |
| 12/2H91-MF *1 | 8/48.3 | 20/40 | 240/120 | 26.0/58.0 | 45.0/250.0 | 21.0/47.0 | 36.0/200.0 | 0.60/0.70 | 60 | 50 |

Tab. 27

Motor currents at other voltages:

$$\text{Formula } I_{xV} = I_{400V} * \frac{400V}{xV}$$

- *1 Operation always with special starting circuit via 12-pole winding.
- *2 The 2-pole starting current for main hoist and the rated current for the travel motor were taken into consideration when selecting the main fuse.
- *3 The motors are designed for rated voltage ranges. In accordance with EN 60034 a voltage tolerance of ±5 % and a frequency tolerance of ±2 % apply on top of the rated voltage ranges. The maximum current occurring in the rated voltage range is given.

11 Technical data

11.2.3 Pole-changing hoist motors ../H.. 50Hz

| 50 Hz | | | | | | | | | | |
|------------------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 220...240 V | | 380...415 V | | | 220...240 V | 380...415 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H73/ 100.822 *1 | 4.2/25.5 | 20/50 | 360/180 | 38.3/62.6 | 76.5/423 | 22.0/36.0 | 44.0/243 | 0.59/0.63 | 100 | 60 |
| | 5.1/32.2 | 20/40 | 240/120 | 38.3/83.5 | | 22.0/48.0 | | | | |
| 12/2H73- 1PC3052 *1 | 4.2/25.5 | 20/50 | 360/180 | 36.0/81.0 | 69.0/483 | 21.0/47.0 | 40.0/278 | 0.56/0.66 | 100 | 60 |
| | 5.1/32.2 | 20/40 | 240/120 | 38.0/96.0 | | 22.0/55.0 | | | | |
| 24/4H92 *1 | 7.5/51 | 13/27 | 160/80 | - | - | 53.0/73.0 | 76.0/471 | 0.51/0.63 | - | 100 |

| 50 Hz | | | | | | | | | | |
|------------------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|---|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 480...525 V | | - | | | 480...525 V | - |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H73/ 100.822 *1 | 4.2/25.5 | 20/50 | 360/180 | 17.6/28.8 | 35.2/194 | - | - | 0.59/0.63 | 60 | - |
| | 5.1/32.2 | 20/40 | 240/120 | 17.6/38.4 | | - | | | | |
| 12/2H73- 1PC3052 *1 | 4.2/25.5 | 20/50 | 360/180 | 16.6/37.0 | 32.0/222 | - | - | 0.56/0.66 | 60 | - |
| | 5.1/32.2 | 20/40 | 240/120 | 17.6/44.0 | | - | | | | |
| 24/4H92 *1 | 7.5/51 | 13/27 | 160/80 | 42.4/58.4 | 60.8/377 | - | - | 0.51/0.63 | 80 | - |

Tab. 28

11.2.4 Pole-changing hoist motors ../H.. 60Hz

| 60 Hz | | | | | | | | | | |
|------------------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 220...240 V | | 380...415 V | | | 220...240 V | 380...415 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H73/ 100.822 *1 | 5/30.6 | 20/50 | 360/180 | 44.0/72.0 | 88.0/486 | 25.3/41.4 | 50.6/279 | 0.59/0.63 | 125 | 80 |
| | 6/38.6 | 20/40 | 240/120 | 44.0/96.0 | | 25.3/55.2 | | | | |
| 12/2H73- 1PC3052 *1 | 5/30.8 | 20/50 | 360/180 | 41.0/90.0 | 80.0/576 | 24.0/52.0 | 46.0/331 | 0.52/0.60 | 125 | 80 |
| | 6/38.9 | 20/40 | 240/120 | 42.0/108 | | 24.0/62.0 | | | | |
| 24/4H92 *1 | 9.1/61.7 | 13/27 | 160/80 | - | - | 61.0/84.0 | 87.4/542 | 0.51/0.63 | - | 125 |

| 60 Hz | | | | | | | | | | |
|------------------------|----------|-----------------|----------------|--------------------|--------------------|--------------------|--------------------|-----------|---------------------|-------------|
| Motor *3 | Power | Duration factor | Switching/hour | Nominal current | Starting current | Nominal current | Starting current | cos phi k | Main fuse CC / J *2 | |
| | | | | 440...480 V | | 550...600 V | | | 440...480 V | 550...600 V |
| | [HP] | CDF [%] | [c/h] | I _N [A] | I _k [A] | I _N [A] | I _k [A] | [A] | | |
| 12/2H73/ 100.822 *1 | 5/30.6 | 20/50 | 360/180 | 22.0/36.0 | 44.0/243 | 17.6/28.8 | 35.2/194 | 0.59/0.63 | 60 | 60 |
| | 6/38.6 | 20/40 | 240/120 | 22.0/48.0 | | 17.6/38.4 | | | | |
| 12/2H73- 1PC3052 *1 | 5/30.8 | 20/50 | 360/180 | 21.0/45.0 | 40.0/288 | 16.5/36.0 | 32.0/230 | 0.52/0.60 | 60 | 60 |
| | 6/38.9 | 20/40 | 240/120 | 21.0/45.0 | | 16.8/43.0 | | | | |
| 24/4H92 *1 | 9.1/61.7 | 13/27 | 160/80 | 53.0/73.0 | 76.0/471 | 42.4/58.4 | 60.8/377 | 0.51/0.63 | 100 | 80 |

Tab. 29

Motor currents at other voltages:

$$\text{Formula } I_{xV} = I_{400V} * \frac{400V}{xV}$$

*1 Operation always with special starting circuit via 12-pole or 24-pole winding.

*2 The 2-pole starting current for main hoist and the rated current for the travel motor were taken into consideration when selecting the main fuse.

*3 The motors are designed for rated voltage ranges. In accordance with EN 60034 a voltage tolerance of ±5 % and a frequency tolerance of ±2 % apply on top of the rated voltage ranges. The maximum current occurring in the rated voltage range is given.

11.2.5 Frequency-controlled hoist motors 4H..-MF 100 Hz

| 100 Hz | | | | | | | | |
|----------------|-------|-----------------|--------------------|-------------|-------------|---------------------|-------------|-------------|
| Hoist motor *2 | Power | Duration factor | Nominal current | | | Main fuse CC / J *1 | | |
| | | | 380...415 V | 500...525 V | 660...690 V | 380...415 V | 500...525 V | 660...690 V |
| | [HP] | CDF [%] | I _N [A] | | | [A] | | |
| 4H72-MF | 16.1 | 70 | 25.0 | 20.0 | 15.2 | 30 | 20 | 20 |
| | 20.1 | 60 | 31.0 | 25.0 | 19.0 | | | |
| 4H73-MF | 24.1 | 70 | 34.0 | 27.2 | 20.6 | 50 | 30 | 30 |
| | 30.8 | 60 | 42.0 | 34.0 | 26.0 | | | |
| 4H81-MF | 30.8 | 70 | 45.0 | 36.0 | 27.3 | 60 | 40 | 40 |
| | 37.5 | 60 | 55.0 | 44.0 | 33.0 | | | |
| 4H82-MF | 37.5 | 70 | 57.0 | 45.6 | 34.5 | 80 | 50 | 50 |
| | 46.9 | 60 | 64.0 | 51.0 | 39.0 | | | |

Tab. 30

11.2.6 Frequency-controlled hoist motors 4H..-MF 120 Hz

| 120 Hz | | | | | | | | |
|----------------|-------|-----------------|--------------------|-------------|-------------|---------------------|-------------|-------------|
| Hoist motor *2 | Power | Duration factor | Nominal current | | | Main fuse CC / J *1 | | |
| | | | 360...400 V | 440...480 V | 575...600 V | 360...400 V | 440...480 V | 575...600 V |
| | [HP] | CDF [%] | I _N [A] | | | [A] | | |
| 4H72-MF | 18.8 | 70 | 31.5 | 26.0 | 20.8 | 30 | 30 | 20 |
| | 24.1 | 60 | 38.0 | 31.0 | 25.0 | | | |
| 4H73-MF | 28.2 | 70 | 43.6 | 36.0 | 28.8 | 50 | 50 | 30 |
| | 36.2 | 60 | 53.0 | 44.0 | 35.0 | | | |
| 4H81-MF | 37.5 | 70 | 55.7 | 46.0 | 36.8 | 60 | 60 | 40 |
| | 45.6 | 60 | 68.0 | 56.0 | 45.0 | | | |
| 4H82-MF | 45.6 | 70 | 67.8 | 56.0 | 44.8 | 80 | 80 | 50 |
| | 56.3 | 60 | 79.0 | 65.0 | 52.0 | | | |

Tab. 31

*1 Protection not 100 % with CC / J, we recommend additional semiconductor fuses.

*2 The motors are designed for rated voltage ranges. In accordance with EN 60034 a voltage tolerance of $\pm 5\%$ and a frequency tolerance of $\pm 2\%$ apply on top of the rated voltage ranges. If these are fully utilized, the permissible limit temperature of the temperature class may be exceeded by 10 K. The maximum current occurring in the rated voltage range is given.

11.2.7 Frequency-controlled hoist motors 4HS.-MF 100 Hz

| 100 Hz | | | | | | | | |
|----------------|-------|-----------------|--------------------|-------------|---|---------------------|-------------|---|
| Hoist motor *2 | Power | Duration factor | Nominal current | | | Main fuse CC / J *1 | | |
| | | | 380...415 V | 500...525 V | - | 380...415 V | 500...525 V | - |
| | [HP] | CDF [%] | I _N [A] | | | [A] | | |
| 4HS7 | 16.1 | 80 | 24.0 | 19.2 | - | 50 | 25 | - |
| | 20.1 | 70 | 28.0 | 22.4 | - | | | |
| | 24.1 | 60 | 34.0 | 27.2 | - | | | |
| 4HS8 | 24.1 | 70 | 34.0 | 27.2 | - | 50 | 30 | - |
| | 30.8 | 60 | 42.0 | 33.6 | - | | | |
| 4HSA | 37.5 | 70 | 57.0 | 45.6 | - | 80 | 50 | - |
| | 46.9 | 60 | 64.0 | 51.2 | - | | | |

Tab. 32

11.2.8 Frequency-controlled hoist motors 4HS.-MF 120 Hz

| 120 Hz | | | | | | | | |
|----------------|-------|-----------------|--------------------|-------------|---|---------------------|-------------|---|
| Hoist motor *2 | Power | Duration factor | Nominal current | | | Main fuse CC / J *1 | | |
| | | | 440...480 V | 575...600 V | - | 440...480 V | 575...600 V | - |
| | [HP] | CDF [%] | I _N [A] | | | [A] | | |
| 4HS7 | 18.8 | 80 | 23.0 | 18.4 | - | 50 | 25 | - |
| | 24.1 | 70 | 26.0 | 20.8 | - | | | |
| | 28.2 | 60 | 36.0 | 28.8 | - | | | |
| 4HS8 | 28.2 | 70 | 36.0 | 28.8 | - | 50 | 30 | - |
| | 36.2 | 60 | 44.0 | 35.2 | - | | | |
| 4HSA | 45.6 | 70 | 56.0 | 44.8 | - | 80 | 50 | - |
| | 56.3 | 60 | 65.0 | 52.0 | - | | | |

Tab. 33

*1 Protection not 100 % with CC / J, we recommend additional semiconductor fuses.

*2 The motors are designed for rated voltage ranges. In accordance with EN 60034 a voltage tolerance of $\pm 5\%$ and a frequency tolerance of $\pm 2\%$ apply on top of the rated voltage ranges. If these are fully utilized, the permissible limit temperature of the temperature class may be exceeded by 10 K. The maximum current occurring in the rated voltage range is given.

11 Technical data

11.3 Cable cross sections and lengths of supply cable

11.3.1 Cable cross sections and lengths of supply cable for pole-changing hoist motors 12/2H..-MF

| 1 Hoist motor type | 2 Stationary Hoist | | | | 3 Hoist/crane | | | | 4 Hoist | | | | 5 Rising mains max. 33 ft | | 6 Crane | | | | 7 Crane | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-----------------------------------|-------------|---|-------------|---|-------------|---|-------------|--|-------------|----|-------|---|-------|--|-------------|-----------------------------|-------------|--|-------------|-----------------------|-------------|---|-------------|---|-------------|---|-------------|---|-------------|--|-----|--|------|--|---|--|----|--|
| | Fixed installation in PVC conduit | | | | Fixed installation in PVC conduit | | | | Festoon cable in free air as flexible PVC-sheathed cable | | | | Fixed installation in PVC conduit | | Festoon cable in free air as flexible PVC-sheathed cable | | | | Festoon cable in free air as flexible PVC-sheathed cable | | | | | | | | | | | | | | | | | | | | |
| | Power supply to hoist | | | | Power supply to in-feed (customer's cable to beginning of rising mains) | | | | From end of rising mains to hoist | | | | From main isolator to end of rising mains | | From end of rising mains along crane runway to crane control | | | | Power supply along crane bridge to hoist | | | | | | | | | | | | | | | | | | | | |
| | $\Delta U \leq 5\%$ | | | | $\Delta U \leq 1\%$ | | | | $\Delta U \leq 4\% (4+5)$ | | | | | | | | $\Delta U \leq 1.5\% (5+6)$ | | | | $\Delta U \leq 2.5\%$ | | | | | | | | | | | | | | | | | | |
| S | | L1 | | S | | L1 | | S | | L2 | | S | | L2 | | S | | L3 | | S | | L3 | | S | | L4 | | S | | L4 | | S | | L5 | | S | | L5 | |
| AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | | | | |
| 50 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 400 V | | 500 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | | | | | | | | |
| 12/2H72 | 6 | 223 | 8 | 210 | 4 | 69 | 6 | 69 | 6 | 154 | 8 | 144 | 4 | 6 | 4 | 72 | 6 | 69 | 6 | 108 | 8 | 102 | 6 | 108 | 8 | 102 | 6 | 98 | 6 | 95 | | | | | | | | | |
| 12/2H91 | 4 | 197 | 6 | 194 | 2 | 62 | 4 | 62 | 4 | 135 | 6 | 131 | 2 | 4 | 2 | 59 | 4 | 59 | 4 | 98 | 6 | 95 | 4 | 98 | 6 | 95 | 4 | 98 | 6 | 95 | | | | | | | | | |
| 60 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 440...480 V | | 575...600 V | | 440...480 V | | 575...600V | | 440...480 V | | 575...600 V | | 460 V | | 575 V | | 440...480 V | | 575...600 V | | 440...480 V | | 575...600 V | | 440...480 V | | 575...600 V | | 440...480 V | | 575...600 V | | | | | | | | | |
| 12/2H72 | 6 | 279 | 8 | 259 | 4 | 89 | 6 | 85 | 8 | 118 | 10 | 121 | 4 | 6 | 6 | 62 | 8 | 56 | 6 | 135 | 8 | 128 | 6 | 135 | 8 | 128 | 6 | 112 | 6 | 108 | | | | | | | | | |
| 12/2H91 | 4 | 226 | 6 | 223 | 2 | 69 | 4 | 69 | 6 | 98 | 6 | 154 | 2 | 4 | 2 | 72 | 4 | 72 | 4 | 112 | 6 | 108 | 4 | 112 | 6 | 108 | 4 | 112 | 6 | 108 | | | | | | | | | |

Tab. 34

11.3.2 Cable cross sections and lengths of supply cable for pole-changing hoist motors ../..H..

| 1 Hoist motor type | 2 Stationary Hoist | | | | 3 Hoist/crane | | | | 4 Hoist | | | | 5 Rising mains max. 33 ft | | 6 Crane | | | | 7 Crane | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-----------------------------------|-------------|---|-------------|---|-------------|---|-------------|--|-------------|---|-------|---|-------|--|-------------|-----------------------------|-------------|--|-------------|-----------------------|-------------|---|-------------|---|-------------|---|-------------|---|-------------|--|-----|--|------|--|---|--|----|--|
| | Fixed installation in PVC conduit | | | | Fixed installation in PVC conduit | | | | Festoon cable in free air as flexible PVC-sheathed cable | | | | Fixed installation in PVC conduit | | Festoon cable in free air as flexible PVC-sheathed cable | | | | Festoon cable in free air as flexible PVC-sheathed cable | | | | | | | | | | | | | | | | | | | | |
| | Power supply to hoist | | | | Power supply to in-feed (customer's cable to beginning of rising mains) | | | | From end of rising mains to hoist | | | | From main isolator to end of rising mains | | From end of rising mains along crane runway to crane control | | | | Power supply along crane bridge to hoist | | | | | | | | | | | | | | | | | | | | |
| | $\Delta U \leq 5\%$ | | | | $\Delta U \leq 1\%$ | | | | $\Delta U \leq 4\% (4+5)$ | | | | | | | | $\Delta U \leq 1.5\% (5+6)$ | | | | $\Delta U \leq 2.5\%$ | | | | | | | | | | | | | | | | | | |
| S | | L1 | | S | | L1 | | S | | L2 | | S | | L2 | | S | | L3 | | S | | L3 | | S | | L4 | | S | | L4 | | S | | L5 | | S | | L5 | |
| AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | AWG | | [ft] | | | | | |
| 50 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 400 V | | 500 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | 380...415 V | | 500...525 V | | | | | | | | | |
| 12/2H73/100.822 | 4 | 226 | 6 | 220 | 2 | 69 | 4 | 69 | 6 | 98 | 6 | 154 | 2 | 4 | 2 | 72 | 4 | 72 | 4 | 112 | 6 | 108 | 4 | 112 | 6 | 108 | 4 | 112 | 6 | 108 | | | | | | | | | |
| 12/2H73-1PC3052 | 4 | 187 | 6 | 184 | 1 | 82 | 2 | 92 | 6 | 82 | 6 | 131 | 1 | 2 | 2 | 62 | 4 | 66 | 4 | 92 | 6 | 92 | 4 | 92 | 6 | 92 | 4 | 92 | 6 | 92 | | | | | | | | | |
| 24/4H92 | 2 | 180 | 4 | 180 | -1 | 72 | 1 | 79 | 2 | 128 | 4 | 128 | -1 | 1 | 1 | 52 | 2 | 62 | 1 | 125 | 4 | 89 | 2 | 125 | 4 | 89 | 2 | 125 | 4 | 89 | | | | | | | | | |
| 60 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 440...480 V | | 575...600 V | | 440...480 V | | 575...600V | | 440...480 V | | 575...600 V | | 460 V | | 575 V | | 440...480 V | | 575...600 V | | 440...480 V | | 575...600 V | | 440...480 V | | 575...600 V | | 440...480 V | | 575...600 V | | | | | | | | | |
| 12/2H73/100.822 | 4 | 259 | 6 | 253 | 2 | 79 | 4 | 79 | 6 | 115 | 8 | 108 | 2 | 4 | 4 | 56 | 6 | 56 | 4 | 128 | 6 | 125 | 4 | 128 | 6 | 125 | 4 | 128 | 6 | 125 | | | | | | | | | |
| 12/2H73-1PC3052 | 4 | 230 | 6 | 223 | 2 | 72 | 4 | 72 | 6 | 102 | 8 | 95 | 2 | 4 | 2 | 72 | 4 | 72 | 4 | 115 | 6 | 112 | 4 | 115 | 6 | 112 | 4 | 115 | 6 | 112 | | | | | | | | | |
| 24/4H92 | 2 | 210 | 4 | 210 | -1 | 82 | 1 | 92 | 2 | 151 | 4 | 151 | -1 | 1 | 1 | 66 | 2 | 72 | 2 | 105 | 4 | 105 | 2 | 105 | 4 | 105 | 2 | 105 | 4 | 105 | | | | | | | | | |

Tab. 35

ba-o 2.1.0-us-1.3-ys | A11869301 Rev AC

11 Technical data

11.4 Tightening torques

All screws should be tightened with a torque spanner. See Tab. 36 for the tightening torques generally applicable for screws grade 8.8 and 10.9.

⚠ WARNING

Danger of bodily injury

Unsuitable installation material and incorrect tightening torques may lead to damage and accidents.

- Use only original spare parts.
- Tighten screws with the prescribed tightening torque.

| Thread size | Screw grade | | |
|-------------|--|------|---|
| | 8.8 | 10.9 | - |
| | Standard | | - |
| | Tightening torque [lb _f ft] | | |
| M6 | 8 | 11 | - |
| M8 | 18 | 26 | - |
| M10 | 36 | 51 | - |
| M12 | 63 | 90 | - |
| M16 | 155 | 221 | - |
| M20 | 302 | - | - |
| M24 | 524 | - | - |
| M30 | 1040 | - | - |
| M36 | 1814 | - | - |

Tab. 36

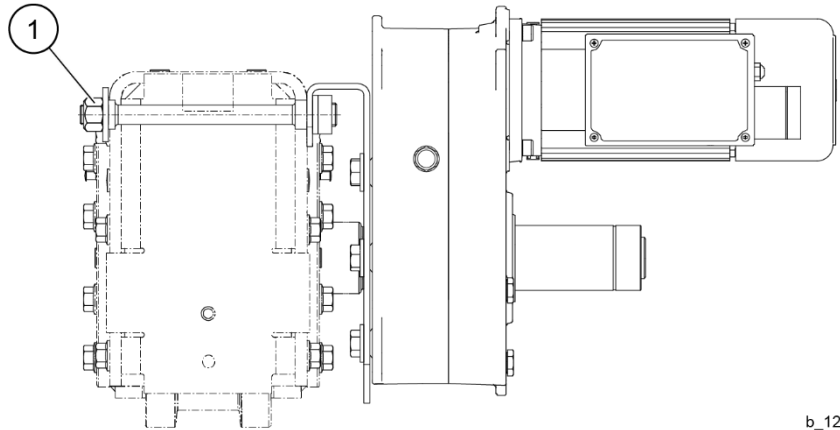


Fig. 58

b_1253

| Pos. | Trolley type | Tightening torque |
|------|--------------|----------------------|
| | | [lb _f ft] |
| (1) | OE-R 08 | 52 |
| | OE-R 09 | 111 |

11 Technical data

11.5 Lubricants

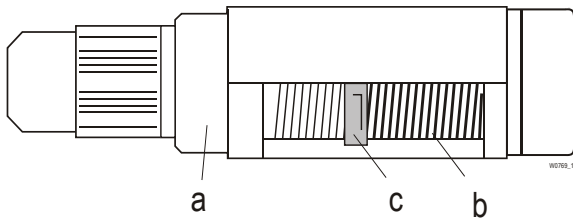


Fig. 59

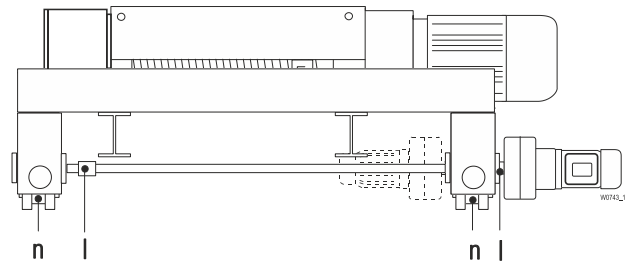


Fig. 60

| Position of lubrication point | Type of lubricant | Factory filling DIN 51502 | Alternative lubricants | Quantity of lubricant |
|-------------------------------|-------------------|---|--|-----------------------|
| a | Oil | Fuchs Renolin CLP 460 (Fuchs Renolin Unisyn CLP 220) | Aral Degol BG 460 Plus Castrol Alpha SP 460 Castrol Tribol 1100/460 Shell Omala S4 WE 320 | 12.32 qt |
| b | Grease | Shell Gadus S2 V220 00 (Fuchs Renolit RHF1 GPG 00k) | Fuchs Renolit Duraplex EP3 BP Energrease LS-EP 00 CENTOPLEX GLP 500 | 5.5 lb |
| c | Grease | Mobilux EP 3 (Fuchs Renolit RHF1 GPG 00k) | Shell Gadus S2 V220 2 Fuchs Renolit Duraplex EP3 BP Energrease LS-EP3 Klüberplex BEM 41-132 | 3.5 oz |
| l | Grease | Fuchs Renolit FLM 0 (Fuchs Renolit RHF1 GPG 00k) | Shell Gadus S2 V220 0 Castrol Viscogen 0 Klüberplex AG 11-461 | 3.5 oz |
| n | Oil | Klüberplub BE 41-542 (Fuchs Renolit RHF1 GPG 00k) | Shell Gadus S3 V460 2 Fuchs Renolit Duraplex EP3 Castrol Spherol LCX 6002 | Ø 315: 1.8 oz |

Tab. 37

() Synthetic lubricant for operating temperatures -40 °F ... + 104 °F

11.6 Lubricants for travel drive

See instructions for travel drive

11.7 Circuit diagrams

See separate enclosure.

WARRANTY

LIMITATION OF WARRANTIES, REMEDIES AND DAMAGES

INDEMNIFICATION AND SAFE OPERATION

Buyer shall comply with and require its employees to comply with directions set forth in instructions and manuals furnished by Seller and shall use and require its employees to follow such instructions and manuals and to use reasonable care in the use and maintenance of the goods. Buyer shall not remove or permit anyone to remove any warning or instruction signs on the goods. In the event of personal injury or damage to property or business arising from the use of the goods, Buyer shall within 48 hours thereafter give Seller written notice of such injury or damage. Buyer shall cooperate with Seller in investigating any such injury or damage and in the defense of any claims arising therefrom.

If Buyer fails to comply with this section or if any injury or damage is caused, in whole or in part, by Buyer's failure to comply with applicable federal or state safety requirements, Buyer shall indemnify and hold Seller harmless against any claims, loss or expense for injury or damage arising from the use of the goods.

CMCO Warranty (HOISTS)

- A. Columbus McKinnon Corporation ("Seller") warrants to the original end user ("Buyer") that: (a) for a period of one (1) year from the date of Seller's delivery of the goods (collectively, the "Goods") to the carrier, the electrical components of the Goods will be free from defects in workmanship and materials; and (b) for a period of three (3) years from the date of Seller's delivery of the goods (collectively, the "Goods") to the carrier, the mechanical components of the Goods will be free from defects in workmanship and materials.
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D. Seller shall not be liable for any damage, injury or loss arising out of the use of the Goods if, prior to such damage, injury or loss, such Goods are: (1) damaged or misused following Seller's delivery to the carrier; (2) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; or (3) installed, repaired, altered or modified (a) with any part or accessory other than those supplied by Seller or (b) without compliance with such laws, instructions or recommendations.

E. This warranty is limited and provided only to the original end user. **Each Good must be registered within sixty (60) days of receipt of each product to establish eligibility.** Please register at www.cmworks.com/hoist-warranty-registration or submit registration card via US mail.

F. Any action against Seller for breach of warranty, negligence or otherwise in connection with the electrical components of any Good must be commenced by Buyer within one (1) year after: (a) the date any alleged claim accrues; or (b) the date of delivery of the Goods to Buyer, whichever is earlier. Any action against Seller for breach of warranty, negligence or otherwise in connection with the mechanical components of any Good must be commenced by Buyer within one (1) year after the date any alleged claim accrues.

G. This warranty is contingent upon Buyer's proper maintenance and care of the Goods, and does not extend to normal wear and tear. Seller reserves the right, at its option, to void this warranty in the event of Buyer's use with the Goods of parts or accessories other than those supplied by Seller.

WARNING

Alterations or modifications of equipment and use of non-factory repair parts can lead to dangerous operation and injury.

TO AVOID INJURY:

- Do not alter or modify equipment.
- Do use only factory replacement parts.



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