Operating and Maintenance Instructions

CHAIN HOIST DC-II

07 June 2024

21157444

DEMAG

Contact information

Contact the manufacturer’s local representative or
Demag Cranes & Components GmbH
Forststraße 16
40597 Düsseldorf
GERMANY
www.demagcranes.com

After-sales service

If you have any questions about the product, need technical information, or wish to place spare parts orders, contact our after-sales service. Keep a note of the serial or order number. Specifying this data ensures that you receive the correct information or the required spare parts.
The current addresses of the sales offices in Germany and the subsidiaries and agencies worldwide can be found on the Demag Cranes & Components GmbH homepage at www.demagcranes.com.

Customer and order form

Table 1.

Customer name
Customer application
Order number
Contract number
DDS ID
IS classification number

Product owner form

Fill in the following form before first putting the unit into service. This provides you with important information if you ever have to contact the manufacturer or his representative.

Owner	
Where in use	
Crane type	
Year of manufacture	
Load capacity	
Crane serial number	
Chain hoist model code	
Chain hoist serial number	
Drawing number	
Operating voltage	
Control voltage	
Frequency	
Wiring diagram number	
Contactor control/direct control	
Supplier	
Assembled by	
Signature	Date

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1 Introduction

1.1 About this information

This information offers guidance to enable safe and efficient operation of the product.

Taking the time to read this information helps you to prevent damage to the product, and, most importantly, personnel that are situated close to it. The product is safe when used correctly. However, there are many potential hazards that are associated with incorrect operation and these hazards can be avoided when you know how to recognize and anticipate them.

This information also makes you aware of your responsibilities regarding the product and help you to ensure that it is kept in a safe operating condition throughout its lifetime.

This information is not intended as a substitute for proper training but provides recommendations and methods for safe and efficient operation and maintenance. The owner of the product must ensure that operators are properly trained before operation and, always, comply with all of the applicable and prevailing safety and other standards, rules, and regulations.

1.1.1 How to use this information

Every person that is exposed to the equipment of the manufacturer must, before operating, servicing and maintaining such products, read and understand the contents of this information and strictly adhere and conform their conduct with and to the information, recommendations, and warnings that are provided in this document.

NOTE ***Keep these instructions in a safe, accessible location for future reference by personnel operating the equipment or exposed to the operating equipment.***

WARNING! IGNORING INSTRUCTIONS HAZARD

Failure to follow the given instructions can cause death, serious injury, or property damage.

Read and understand this information before operating, servicing, and maintaining the product.

The manufacturer makes absolutely no warranty whatsoever regarding the contents of this document, express or implied, whether arising by operation of law or otherwise, including, but not limited to, any implied warranties of merchantability or fitness for a particular purpose.

1.1.2 Copyright notice

This document and the information contained herein, is the exclusive property of Demag Cranes & Components GmbH and represents a non-public, confidential and proprietary trade secret that may not be reproduced, disclosed to third parties, altered or otherwise employed in any manner whatsoever without the express written consent of Demag Cranes & Components GmbH. Demag Cranes & Components GmbH © 2024. All rights reserved.

1.1.3 Definition of terms

All brand names, product names and trademarks that are used in this document are registered trademarks of their respective owners.

The following terms and definitions may have been used in this document:

ANSI	American National Standards Institute
Authorized personnel	Persons who the owner authorizes and who have the necessary training to carry out operation or service actions.

cCSAus	CSA means "Canadian Standards Association". CSA is an independent organization for the testing and certification of products. The CSA standard guarantees high quality and safety and grants access to the North American market. The subscripted c and the subscripted us means for use in both the USA and Canada.
CE marking	The CE marking indicates that the product complies with the appropriate CE regulations.
Check	A visual and functional assessment (not a test) of the product without dismantling.
Controller	A pendant controller or another type of controller that the operator uses to give commands to the product.
Dynamic braking	A method of controlling speed by using the motor as a generator, with the energy being dissipated in resistors.
Electric panel	The electric panel controls the power to the motors.
Expert	A person with extensive knowledge about the current subject matter.
Floor-operated hoist	A hoist which an operator controls by using a radio controller or a pendant controller which is suspended from the hoist.
Hoist	Drive mechanism for lifting and lowering the load.
Inching	Making small movements of the product by repeatedly and momentarily pressing the direction control.
Inspection	Checking the product looking for defects and checking the operation of the controls and limiting and indicating devices without loading the product. This inspection is more than a check but does not normally require any part of the product to be dismantled other than for removal or opening of covers, housings, or enclosures.
ISO	International Organization for Standardization
Main isolation switch	The main isolation switch is a power switch that the operator should use to turn on or switch off the power to the product.
Operating and Maintenance Instructions	Principal means by which the manufacturer provides information or instructions concerning the product which are relevant to the owner, operator, and maintenance personnel of the product.
Operator	Person operating the hoist for handling loads.
Qualified personnel	A person with the necessary qualification to perform required activities as listed in the operating and maintenance instructions of the product. The necessary qualification is based on theoretical and practical knowledge of the product. The person with the necessary qualification must be in a position to assess the safety of the installation together with the application. Persons with the authority to undertake certain maintenance work on the product include service engineers of the manufacturer and trained fitters with a corresponding certification.
Radio-controlled hoist	A hoist which an operator controls by using an operating station which is not attached to the hoist (for example, radio control).
Regenerative braking	A method of controlling speed in which the electrical energy generated by the motor is fed back into the power system.

Rated capacity	Load that the product is designed to lift for a given operating condition (for example, configuration, position of the load).
Secondary brake	Some chain hoists can have two similar brakes, one of which is redundant or a "secondary brake."
Standby hoist	A hoist which is used only occasionally or intermittently.
Trolley	The trolley supports the hoisting machinery, and moves along the main girder (bridge) or runway.
UKCA (UK Conformity Assessed)	The marking indicates that the product complies with the appropriate UK regulations.

1.1.4 Definition of personnel

The manufacturer is the person who,

1. manufactures the equipment under his or her own name and places it on the market for the first time,
2. resells other manufacturers' equipment under his or her own name, whereby the reseller is not considered to be the manufacturer provided the name of the manufacturer (as in 1) appears on the equipment,
3. imports the equipment into the country and places it on the market for the first time or
4. exports equipment to another member state of the European Union and hands it over direct to a user in that country.

Owner

Owners (employer, company) are defined as persons who own the machine and who use it as intended or allow it to be operated by suitable and trained persons.

Operating personnel or operator

Operating personnel or machine operators are defined as persons assigned by the owner of the machine to operate the machine. This person must be trained by the owner in accordance with the tasks to be performed.

Trained person

Trained persons are defined as persons who have been instructed and trained for the tasks that are assigned to them and on the possible hazards resulting from inappropriate conduct. Personnel must be informed about the required protective devices, protective measures, relevant regulations, codes of practice, accident prevention regulations and operating conditions and must provide verification of their competence. This person must be trained by the owner in accordance with the tasks to be performed.

Specialist personnel

Specialist personnel are defined as persons assigned by the owner of the machine to carry out special tasks, such as installation, setting-up, maintenance, and fault elimination. This person must be trained by the owner in accordance with the tasks to be performed.

Qualified electrician

Qualified electricians are defined as persons who, owing to their technical training, knowledge, and experience of electric machines as well as knowledge of the relevant valid standards, codes of practice and regulations, are able to assess the tasks that are given to them and to identify and eliminate potential hazards. This person must be trained by the owner in accordance with the tasks to be performed.

Experienced technician

Experienced technicians are defined as persons who, owing to their technical training and experience, have sufficient knowledge in the field of the machine. They must be familiar with the relevant national industrial safety regulations, codes of practice, accident prevention regulations, directives, and accepted engineering standards enabling them to judge the safe operating condition of machines.

Assigned expert engineer (where the rules and regulations of the German Social Accident Insurance (DGUV) apply in the Federal Republic of Germany)

An assigned expert engineer is defined as an experienced technician specifically assigned by the manufacturer to determine the remaining safe working period (S.W.P.) and to carry out a general overhaul of the machine.

Authorized expert engineer (where the rules and regulations of the German Social Accident Insurance (DGUV) apply in the Federal Republic of Germany)

In addition to the expert engineers of the Technical Supervisory and Inspection Board, an authorized expert engineer for the inspection of machines is defined as an expert engineer authorized by the Industrial Employers' Mutual Insurance Association.

1.1.5 Symbols and conventions

Familiarize yourself with the following symbols and conventions that are used in this document.

Symbol	Description
	Indicates that the product is slowing down or is moving at its slowest speed
	Indicates that the product is accelerating or moving at its highest speed
NOTE	Indicates items which require special attention by the reader. There is no obvious risk of injury that is associated with notes.
	Indicates fast steady movement
	Indicates slow steady movement
	Indicates rapidly accelerating movement
	Indicates slowly accelerating movement
	Time-related task
	Stop movement

Symbol	Description
	Product conforms to the ATEX directive
	Product conforms to the ATEX directive
	Measurement inspection
	Visual inspection
	Tools needed
	Operational inspection
	Grease brush lubrication needed
	Oil can lubrication needed
	Grease gun lubrication needed
	Noise check
	Ground symbol

1.1.6 Related information

For this product, there is technical information available for different purposes and audiences. Contact your supplier if you require any information listed here.

Operating and Maintenance Instructions	Describes the responsibilities of the owner. Includes the functionality, usage, and maintenance of the product.
Mechanical drawings	Describes the mechanical design information.
Electrical drawings	Describes the electrical design information and item lists.
Certificates	Describes that the equipment is in conformity with directives and manufactured according to standards. Includes also testing results.
Log Book	Consists of records of the usage and service history.
Spare Parts Catalog	Includes part numbers for all parts supplied.

NOTE ***Store documents in a safe, dry place where they can be easily located when required.***

Additional documents are available for sub-assemblies and components. The corresponding documents are supplied as necessary or can be ordered separately also for special designs or if additional options are ordered which differ from these instructions. Additional documents can be ordered from the relevant Demag office.

Table 1. Additional documents

Documents	Part no.
Technical data or catalogs	
KBK Aluline Crane Construction Kit, Classic/Ergo System; Project Engineering and Components	203 813 44
Technical Data and Fitting Instructions KP-A10 and KP-T16 Clamp-fitted Buffers	203 313 44
Technical Data DC-II Chain Hoist	203 825 44
Technical Data, Project Engineering and Components for KBK Crane Construction Kit, Classic/Ergo System	202 976 44
Log book	
Inspection and Test Log Book	211 745 44
Assembly, adjustment, and dimension documents	
Assembly Instructions for Chain Hoist Trolley U3.5, U11, U34, EU11, and EU34	203 896 44
Assembly Instructions for Click-fit Trolley CF5	203 892 44
Assembly Instructions for Friction Force Checking Device	206 973 44
Assembly Instructions for Travel Drive E11–E34 1/2WD	211 711 44
Assembly Instructions, Technical Data and Component Parts DSE–10C/CS multi-button Pendant Switches	214 998 44
Quick installation guides	
Quick installation E11-E34 Control Board Replacement	211 715 44

1.2 About this product

1.2.1 Intended use

The machine may only be used as intended and in compliance with the requirements for the owner and the following limitations as specified in these operating instructions. Any other use may result in a danger to life and limband/or cause damage to the machine and load.

- Chain hoists are only intended for lifting, lowering, and moving loads and may be used as stationary or traveling units.
- The suspension or support structure for the chain hoist must be designed to accommodate loads resulting from operation of the chain hoist. The maximum safe working load is the load capacity that is specified on the capacity plate. This must not be exceeded. The maximum permitted load capacity of the chain hoist includes the load and any load handling attachment.
- The machine may only be installed, used, operated, maintained, and removed by trained personnel when it is in perfect working order. Personnel must meet the requirements according to "Responsibility of the owner".
- Intended use includes compliance with the safety warnings and any other instructions on assembly and disassembly, commissioning, function and operation, maintenance and fault elimination as well as compliance with the instructions on the machine safety devices, any possible remaining hazards, and protection against hazards.
- The machine may only be used subject to the permissible technical data. For more information, see "Product description".
- The machine must be maintained regularly and appropriately by trained personnel in line with the specified deadlines and checked according to "Maintenance schedule". Wearing parts must be replaced in good time.
- National occupational health and safety regulations must be observed and followed.

Use of the pendant controller

Powered lifting and lowering and, if applicable, cross-travel and long-travel motions are controlled by the corresponding control elements on the controller. The slow speeds are intended for attaching the load, lifting it free and depositing it. Loads can be precisely positioned at slow speeds.

Short transport times can be achieved at higher speeds. They are suitable for traveling without a load or with a safely suspended load if no hazard can be caused by the faster motion sequences.

NOTE ***Inching (flick switching) must be avoided, as it causes increased wear and load sway.***

For more information on the required ambient conditions, see "Operating conditions". Contact the manufacturer or manufacturer's representative if there is doubt.

1.2.2 Conditions of warranty

The terms under which seller's equipment and/or services are warranted are defined pursuant to the warranty set forth in the contract between seller and customer for seller's products and/or services and, if not so set forth, the warranty for seller's products and/or services is seller's standard warranty in effect at the time of sale, a copy of which is available from seller upon request. THE FOREGOING REPRESENTS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SELLER AND IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

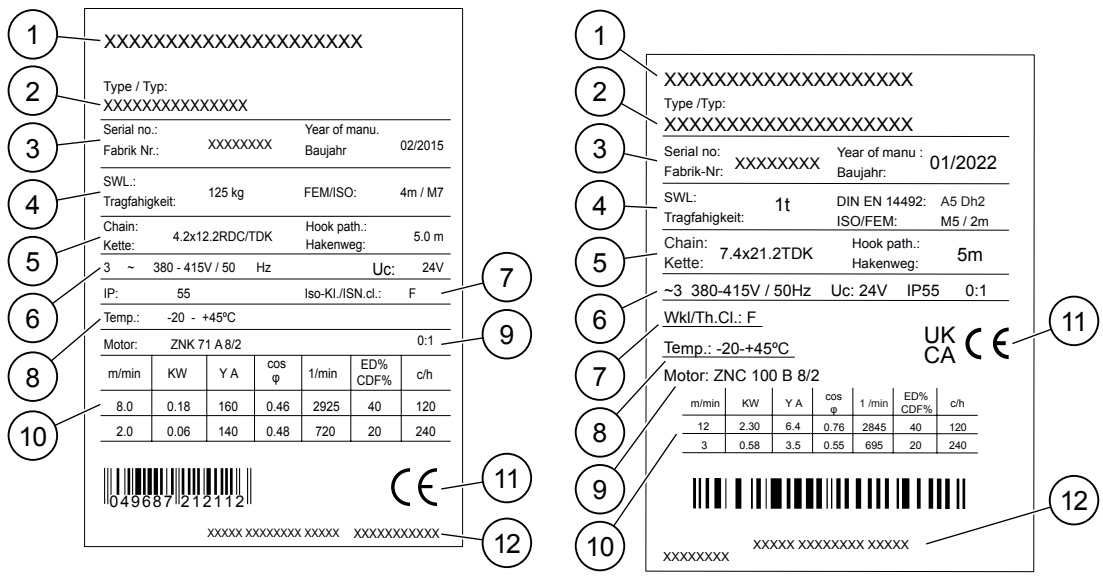
Seller provides no warranties for products manufactured or services provided by parties other than seller ("Third Party Products"). Modifying any seller product or incorporating any Third Party Product into any seller product or service without the seller's approval invalidates

warranty. Seller does not accept, shall not have any responsibility and disclaims any liability for accidents, injury or physical or property damage arising as a consequence of such unauthorized modifications and/or incorporation of Third Party Products.

Further, e.g. each of the following invalidates any warranty of seller and relieves seller from any responsibility and liability for accidents, injury or physical or property damage: failure to operate and/or maintain products in accordance with the applicable manuals, instructions, guides, recommendations etc., regardless of their form, concerning the maintenance and operation of products that may be communicated from time to time; side-pulling of load; shock loading; excessive jogging; eccentric loading; overloading; accidental occurrence; improper repair; improper handling or storage of products; chemical exposure; abnormal operating conditions not identified to seller in writing prior to seller's issuance of a quotation; or any other cause that in seller's sole discretion is not attributable to defects in material and workmanship. The applicable manuals, instructions, guidelines, recommendations etc. may include, for example, Installation and Commissioning Instructions, Owner's Manuals, Operator's Manuals, Operating and Maintenance Instructions, User's Guides.

UNLESS OTHERWISE REQUIRED BY MANDATORY LAW, SELLER DISCLAIMS ALL WARRANTIES RELATING TO THE CONTENTS OF THIS DOCUMENT, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE.

1.2.3 Product identification



Item	Designation	Section
1	Manufacturer	-
2	Chain hoist type	"Product code" "Product range"
3	Serial no., calendar week and year of manufacture	-
4	Load capacity and group of mechanisms	"Product code" "Product range"
5	Load capacity and group of mechanisms	"Available hoist chain" "Product code" "Product range"

Item	Designation	Section
6	Voltage and frequency	"Chain hoist motor data"
7	Type of enclosure and insulation class	"Operating conditions" "Chain hoist motor data"
8	Ambient temperature	"Operating conditions"
9	Motor type and oil grade	"Product range" "Chain hoist motor data" "Changing the gear oli"
10	Electric key data	"Chain hoist motor data" "Mains connection delay fuse links and supply lines"
11	Conformity symbol	-
12	Manufacturer’s address	-

1.2.4 Standards and directives

This product has been designed and manufactured to conform to the following standards and directives:

- Machinery Directive 2006/42/EC
- Electromagnetic Compatibility Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment Directive 2011/65/EU
- UK Statutory instrument Supply of Machinery (Safety) Regulations 2008 No. 1597
- UK Statutory instrument Electromagnetic Compatibility Regulations 2016 No. 1091
- UK Statutory instrument Electrical Equipment (Safety) Regulations 2016 No. 1101
- UK Statutory instrument Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032
- Structure and mechanisms: ISO, FEM and EN, or CMAA
- Electrification: IEC and EN, or NEC
- Hook forging: DIN (if not otherwise specified)
- Product also fulfills the requirements of the following standards (if applicable): CSA, UL.

The declaration of conformity and other certificates are included in the delivery package.

NOTE ***The manufacturer reserves the right to modify the design and material specifications without prior notice.***

1.2.5 Log book

The crane log book is supplied in the interest of accident prevention. It is an integral part of the equipment and shall be kept up-to-date and with equipment at all times. Do not remove or discard any parts of the log book for any reason. The log book records the complete maintenance history of the equipment and it must be transferred to the new owner when ownership of the equipment changes.

The log book consists of the following items:

- Product reference data: details of the product, its ownership, and persons who are qualified to work with it.
- Faults that have been noticed in daily inspections, together with corrective actions.
- Records of inspections and lubrication.
- Records of repairs.
- Records of condition monitoring unit or hour counter.
- Calculations of design working period and remaining lifetime.

According to the ISO 12482 standard, the crane owner should keep records of the crane use, so that the usage can be compared to the suppliers design principles and design limits. Records should be kept of maintenance, inspections, repairs, modifications and exceptional occurrences, for example, overloads, extreme climatic conditions, and collisions.

Where complete records are not available for the history of the crane, it shall be inspected in accordance with annex A of ISO 9927-1, and any requirements as a result of that inspection shall be carried out before further use of the crane.

2 Health, safety and the environment (HSE)

2.1 Safety messages and signals

This section includes explanations of the safety symbols, signs, signals, and labels used on the product and in the documentation.

2.1.1 Signal words

The following signal words and symbols are used to identify safety messages in these instructions.

Indicates an imminently hazardous situation that, if not avoided, will cause death or serious injury.

Indicates a potentially hazardous situation that, if not avoided, can cause death or serious injury.

Indicates a potentially hazardous situation that, if not avoided, can cause damage to property or environment.

2.1.2 Hazard symbols

Hazard symbols are used to indicate the type of the hazard and the potential consequences. Hazard symbols are indicated by a yellow triangle with black symbols and a black triangle band that is surrounded by a yellow border. All personnel working on or in proximity of the machine must understand and follow the information that is given in all hazard symbols.

General hazard symbol

The general hazard symbol identifies important safety messages in these instructions. When you see this symbol, carefully read and understand the message that follows, and inform other users when necessary.

Mechanical hazard symbols

Falling load hazard

Hand entanglement hazard

Slipping hazard

Falling hazard

Crushing hazard

Electrical hazard symbols

Electrical hazard

Material hazard symbols

Harmful substance hazard

Ignition hazard

Thermal hazard symbols

Hot surface hazard

Noise hazard symbols

Noise hazard

Radiation hazard symbols

Strong magnetic field hazard

2.1.3 Mandatory action symbols

Mandatory action symbols specify actions to be taken to avoid a hazard. Mandatory actions are indicated by white symbols on a blue background. All personnel working on or in proximity of the machine must understand and follow the information that is given in all mandatory action symbols.

Wear approved safety gloves

Wear approved hearing protectors

Wear approved safety harness

Switch off and lock-out equipment

Read manual

2.1.4 Prohibited action symbols

Prohibited action symbols indicate actions that are prohibited in order to avoid a hazard. Prohibited actions are indicated by a red circle with a red diagonal line across the circle. The action that is prohibited is always in black. All personnel working on or in proximity of the machine must understand and follow the information that is given in all prohibited action symbols.

Do not smoke

Do not modify

Do not touch

Pacemaker not allowed

2.1.5 Product safety labels

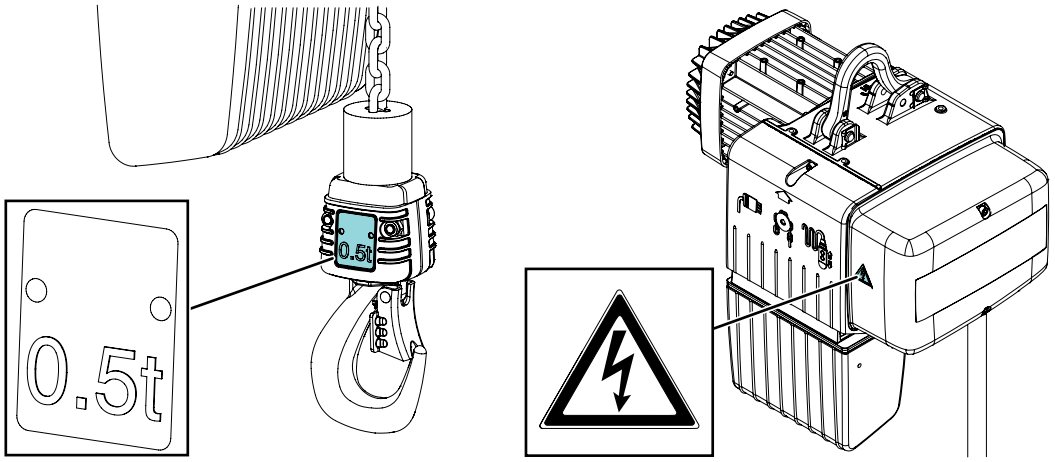
The product safety labels communicate the following:

- Level of risk that is based on the signal word **Danger**, **Warning**, or **Notice**
- Type of hazard, such as cutting parts, hanging load, hot surface, live parts
- Consequence of hazard, such as cutting, injection, crushing, burn, electric shock
- How to avoid the hazard

NOTE ***Always keep safety labels visible. Check the condition of safety labels daily. Before operating the machine, replace safety labels and instructions that are damaged, have come loose, or that do not meet the legibility requirements for safe viewing distance.***

2.1.6 Safety label locations

Any pictograms, signs or labels on the machine must be obeyed and must not be removed. Pictograms, signs or labels that are damaged or no longer legible must be replaced immediately.



2.2 Responsibilities of the owner

2.2.1 Preventing work-related hazards

The owner of the product must ensure that the operators have a sufficient knowledge of the work-related hazards and of the ways to avoid the hazards.

The operator must always perform a local risk assessment before every work phase or shift. The assessment ensures that the operator stops and thinks about what to do before starting to work.

- Identify potential hazards that could affect you, your colleagues, the environment, your product, or work method while you are performing the task
- Assess the risks and implement the actions that are needed to eliminate or reduce the risks

Only competent persons are allowed to carry out operation and other tasks. The responsibility of the owner is to:

- Provide training and orientation
- Validate training methods
- Verify competence and skills
- Monitor and evaluate user performance regularly

2.2.2 Preventive maintenance

Scheduled inspections and preventive maintenance are essential for keeping the product in safe working condition. Here are some general guidelines for preventive maintenance.

- It is the **product owner's responsibility** to organize proper regular inspections maintenance to ensure long-term safety, reliability, durability, operability, and warranty for the product.
- Owner must keep a record (log book) of all maintenance activities and usage relating to the product.
- Different maintenance actions must be carried out at different intervals and by different persons who are qualified and authorized to perform these checks.

- Daily checks and minor lubrication must be carried out by operators or maintenance personnel. These checks are important for catching small faults before they become major faults.
- Maintenance actions, excluding the daily actions that are performed by operators, must be done by service personnel who are authorized by the owner of the product.
- Owner shall ensure that replacement parts and materials meet the specifications that are defined by the product manufacturer.
- Keep this information in a safe, accessible location during the whole lifetime of the product.

WARNING! MACHINE MALFUNCTION HAZARD

Failure to regularly and properly maintain the product can cause death, serious injury, or property damage.

Do not allow the product to be used if it is not in proper condition or if it has not been maintained correctly.

Contact a service agent that is authorized by the manufacturer or manufacturer's representative immediately in case of doubt.

RISK OF PROPERTY DAMAGE

NOTICE

Only use genuine spare parts, materials, and lubricants that are approved by the product manufacturer or manufacturer's representative. For more information, see the product spare part catalog.

2.2.3 Personal protective equipment

NOTE ***This section proposes personal protective equipment to ensure the operator's safety. Follow the local regulations and requirements of the working environment. Use only approved and accepted personal protective equipment.***

For safety, the operator or others near the product are required to wear personal protective equipment (PPE). Various types of PPE are available as listed below and must be selected according to the requirements of the working environment.

- Hard hat
- Eye-protector
- Hearing protectors
- Safety shoes
- Respirator
- Safety gloves
- Protective clothing
- Safety harness when working at heights
- High-visibility clothing

Do not wear loose clothing or jewelry that can get caught on controls or pulled into moving parts of the product.

Tie back long hair. Long hair can get entangled.

Select the appropriate clothing for each task, for example:

- Wear fire-resistant clothing when welding, flame cutting, or using an angle grinder
- Tear-resistant clothing must resist damage from sharp edges in the steel structure
- Wear anti-static clothing when working on electrical circuits so that components do not get damaged by a discharge of static electricity

- When working with lubricants, clothing must prevent direct skin contact with the lubricant
- Choose the clothing with consideration to the temperature at the working site
- For work on explosion-proof products, clothing and equipment must be suitable for the hazardous area.

2.2.3.1 Fall protection

While personnel are doing installation, inspection, or maintenance work at heights, they must follow fall protection procedures as required by local regulations. Fall prevention practices and fall protection equipment aim at protecting personnel working on or around the equipment from exposure to falls.

If the equipment does not have a service platform or guardrail, personnel must use a properly fitted safety harness. The safety harness is attached to the dedicated fixing points on a building or equipment in order to prevent falls.

If the product does not have dedicated fixing points for fall protection, it is the owner's responsibility to make sure that suitable and secure fixing points are available or provide an appropriate manlift.

If ladders must be used, personnel must practice setting and securing the ladders before using them for actual work.

Fall protection system has four components:

- **Safety harness:** Safety harness helps to prevent employees to get hurt in a fall.
- **Lanyard belt:** Lanyard belt is connected to the anchor point and is attached to the safety harness. Lanyard belts are shock absorbing, which means that they slow down and eventually stop a fall.
- **Snap hook:** Snap hooks connect the D-ring to the safety harness. Snap hooks must be double locking. The basic rule is: connect only one snap hook to one D-ring.
- **Anchorage point:** Anchorage point is the point to which personal fall protection equipment is attached. The point must be capable of supporting at least 2,268 kg (5,000 lb) per employee. If there is any doubt about the strength of the attachment point, find an alternative point that can support the worker.

A typical fall protection program may include:

- Documented and established site policies and procedures
- Conducting site assessments for fall hazards
- Selection of the proper fall protection system and equipment
- Training on fall protection procedures and the proper use of fall protection systems
- Inspection and proper maintenance of fall protection equipment
- Measures to prevent falling objects
- Rescue plans

If necessary, contact your supplier or service organization for assistance with designing your fall protection program.

2.2.4 Working at heights

Maintenance and inspection work, repairs and on call services at heights must be carried out in a safe working environment.

If the equipment does not have a service platform, all control points for maintenance must be accessed in a safe manner by using aerial work platforms.

WARNING! FALLING HAZARD

Lifting personnel with an aerial work platform includes a risk of falling from heights, which can cause death or serious personal injury.

Each person on the aerial work platform must always wear a safety harness and be attached to the platform.

The following requirements and safety precautions must be observed when using an aerial work platform:

- All control points for maintenance must be safely reached from the aerial work platform.
- The service area must be free of obstacles and suitable for the use of the aerial work platform.
- The operating and safety instructions for the aerial work platform must be followed.
- The fall protection procedures must be followed.
- Unintended movements of the equipment must be prevented by necessary means, for example, by using lockout-tagout-tryout procedures.

2.2.5 Incident reporting

Product safety issues that you must report are events in which the manufacturer's product has been involved in an accident or near-miss incident. Contact your local manufacturer's representative immediately to report any safety-related feedback, such as unauthorized modifications, missing instructions and safety labels, neglected maintenance, or misuse.

Reporting is mandatory to ensure safe working conditions for employees, to provide information for the risk assessment process, and to initiate product and work procedure improvements.

2.3 Conditions for product use

2.3.1 Operating conditions

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Safe operation is only possible under the specified operating conditions. Using the product outside the specified operating conditions can lead to death, serious injury, or property damage.

Do not use the product outside the specified operating conditions. If you plan to use the product in operating conditions that differ from the specified operating conditions, contact the manufacturer. For more information, see "After-sales service."

The chain hoist and the trolley can be operated as described in following table.

Ambient temperature	Humidity	Height	Type of enclosure	Electromagnetic compatibility
-20°C...+45°C	Max. 90% relative humidity	Up to 2000 m above sea level	IP55	Resistance to interference in industrial environments. Interference emission for residential, commercial, and light industrial environments.

NOTE ***Chain hoists operating outdoors should be provided with a cover for protection against the weather or chain hoists, trolleys, and travel drives should be kept under cover if they are not in use.***

Special operating conditions may be agreed with the manufacturer in individual cases.

Such operating conditions may occur in the following applications, for example.

- Galvanizing plants or electroplating facilities
- Hygiene areas
- Low or high temperature applications

On request, suitably optimized equipment and important information for safe, low-wear operation can be supplied for these applications.

Reduced duty factor at increased ambient temperatures

If chain hoists are operated at ambient temperatures that differ from mentioned in preceding table, the duty factor must be reduced:

Ambient temperature	-20°C...+45°C	More than +45°C...+50°C	More than +50°C...+55°C	More than +55°C...+60°C
Chain hoist range	**Duty factor [%]**			
DC-Pro II, DC-Com II	20/40	15/35	15/25	10/20

2.3.2 Prohibited use

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Using the machine outside the limits of its duty class or operating conditions can cause malfunction of the machine and can cause death, serious injury, or property damage.

Do not use the machine outside the limits of the specified duty class or operating conditions.

Prohibited use of the product includes, but is not limited to:

- Neglecting safety messages of the indicating devices
- Using the product for lifting or transporting people
- Lifting unbalanced or manually attached load against the operating instructions
- Attempting to lift a load which is fastened to the ground or to a base
- Pulling or dragging a load sideways
- Colliding the load against an obstacle
- Standing under a load
- Moving unexpectedly into the operating range of the product
- Using the hoist as an earth reference for welding

In case of doubt, contact the manufacturer or the manufacturer's representative.

2.3.3 Changes to the product

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Unauthorized changes or modifications to the product can cause death, severe injury, or property damage.

Always contact the manufacturer to get advance written approval for any product change or modification.

All modifications and corrections that are not authorized in the product manuals or which may affect the maintenance, operation, safety, and availability of the product need to be approved in writing by the manufacturer before implementation. Approval requires risk assessment considering any new risks that the changes and modifications may bring.

Changes and modifications without proper risk assessment, elimination, or reduction of risk and without appropriate safety measures may lead to death, serious personal injuries, or damage to property or environment. Unauthorized modifications will also void the warranty.

If a modification or correction as described above has been implemented without the manufacturer's permission, its effect on warranty liability will be considered case-by-case. Thus, the warranty application may be rejected altogether. Should you consider a modification or alteration necessary, you must contact the organization that manufactured and designed the product. No modification is permitted unless you first obtain the written approval of the manufacturer.

2.4 Emergency stop

⚠ WARNING

UNCONTROLLED MOVEMENT HAZARD

Using the emergency stop can cause the machine to move or operate in an uncontrolled manner. This can cause death, serious injury, or property damage.

Only use the emergency stop button in an emergency situation.

In case of machine malfunction or other emergency situations, you can press the emergency stop button to stop all motions immediately. In normal operation, do not use the emergency stop button. Instead, use the direction controls. Routine use of the emergency stop button increases wear on the product and can cause the load to swing.

NOTE ***Do not operate the machine unless you know the location of the emergency stop button.***

NOTE ***There can also be a stop function button on the radio controller of the product. For such products, use the stop function button instead of emergency stop button. For more information, see the instructions of the radio controller.***

There are two main types of emergency stop buttons:

- Emergency stop button with a twist-release mechanism which latches in the activated position.
- Emergency stop button with a push-pull mechanism which remains pressed in.

To reset the latching-type of an emergency stop button, twist the button in the direction of an arrow in the mushroom head. The rotating movement releases the latch and allows the button to spring out to the normal reset position.

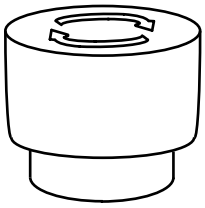


Figure 1. Emergency stop button with twist-release mechanism

To reset the push-pull type of emergency stop button (without a rotation arrow on the button head), pull the button manually outwards to the normal reset position.

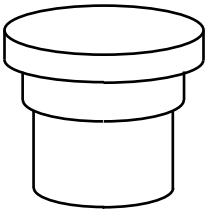


Figure 2. Emergency stop button with push-pull mechanism

You can restart the machine and operate the controls only after the emergency stop button is reset to the normal reset position.

2.5 Using the emergency stop button

⚠ WARNING

UNCONTROLLED MOVEMENT HAZARD

Using the emergency stop can cause the machine to move or operate in an uncontrolled manner. This can cause death, serious injury, or property damage.

Only use the emergency stop button in an emergency situation.

⚠ WARNING

UNEXPECTED MOVEMENT HAZARD

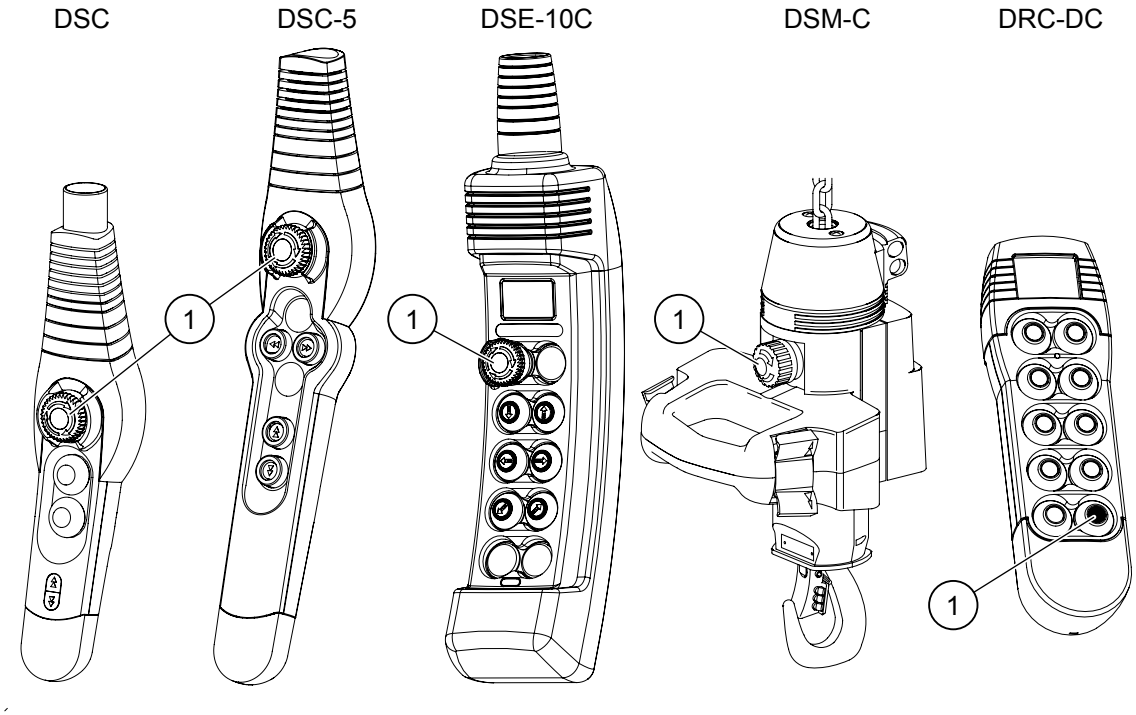
Releasing the emergency stop button before the reason for the emergency stop is eliminated can cause unexpected movements. Unexpected movements can cause death, serious injury, or property damage.

Always eliminate the danger before you release the emergency stop button.

In case of machine malfunction or other emergency situations, you can press the emergency stop button to stop all motions immediately. In normal operation, do not use the emergency stop button. Instead, use the direction controls in normal operation. Routine use of the emergency stop button increases wear on the product and can cause the load to swing.

NOTE ***Do not operate the machine unless you know the location of the emergency stop button.***

NOTE ***There can also be a stop function button on the radio controller of the product. For such products, use the stop function button instead of the emergency stop button. For more information, see the instructions of the radio controller.***



1. Emergency stop button or a stop function button

All motions can be stopped with the emergency stop button (1) in the event of a hazard. Anybody who identifies an immediate danger of personal injury or serious malfunctions must actuate the emergency stop without delay.

1. To actuate the emergency stop, press the emergency stop button (1) until it reaches the end stop.
   The emergency stop button locks automatically, and the chain hoist is shut down.
2. To release the emergency stop button, turn the emergency stop button (1) in the direction of the arrows (clockwise).
   Following an emergency stop, do not switch the machine on again until trained specialist personnel is satisfied that:
   - The cause which led to actuation of this function has been rectified.
   - Operation of the machine constitutes no further hazard.

2.6 Main isolation switch

You can only operate the product when power is turned on. The owner must identify and document the location and function of the main isolation switch and communicate this information to all operators.

NOTE ***You must know the location and functionality of main isolation switch before you operate the product.***

WARNING! ELECTRIC SHOCK HAZARD

Even though the power supply is disconnected, there may still be voltage present in some parts of the machine. This can result in exposure to electric shocks, which can cause death or serious injury.

Familiarize yourself with functionality of the main isolation switch.

WARNING! SWINGING LOAD HAZARD

Turning off the main isolation switch causes sudden loss of power. The sudden loss of power could cause the load to swing, which can cause death, serious injury, or property damage.

Avoid turning off the main isolation switch during load movement.

2.7 Lockout-tagout-tryout procedure

Before installation, inspection, and maintenance, the power sources must be de-energized, isolated, locked out, and tagged out. Lockout-tagout-tryout procedures are primarily intended to protect personnel by preventing accidental starting of the machinery or exposure to electric shocks.

Follow the lockout-tagout-tryout procedures in accordance with the local regulations and the documented site lockout-tagout-tryout policy. The owner must ensure that the operators are fully aware of the applicable lockout-tagout-tryout practices.

The following items are normally included in the documented lockout-tagout-tryout policy:

- Communication requirements: who to inform before using lockout-tagout
- When the use of lockout-tagout is permitted
- Identification of each of the switches, controls, valves, and other energy isolating devices present at the site. Role of each device should also be explained.
- Lockout-tagout sequences to be followed before, during, and after maintenance
- Safety and operational considerations regarding other products on the same runway or on adjacent runways

⚠ WARNING

STORED ENERGY HAZARD

When the product is switched off, there may still be stored energy in the electrical, hydraulic, or pneumatic systems, rotating parts, linearly moving parts, or in the load. Unintended release of energy can cause death, serious injury, or property damage.

Prevent the unintended release of energy by following the approved lockout-tagout-tryout procedures.

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Operating the product while it is under installation or maintenance can cause death, serious injury, or property damage.

Never attempt to operate a control, switch, valve, or other device when it is locked out or tagged out.

To lock out, tag out, and try out the product:

1. Turn off the product and disconnect power.
2. Place a personal lock and tag on controls to prevent their use until you remove the lock.
3. While performing the work, always keep the key to the lock with you.
4. If more than one person locks out the same machine, use individual locks and approved multi-lock devices.
5. Verify the absence of voltage with approved voltage test equipment.
6. Verify the isolation of other forms of energy with an approved method.
7. Attempt to operate the product using normal controls. If properly isolated or immobilized, no equipment or system starts nor any part activates or moves.
8. Release energy (pneumatic or hydraulic pressure or other stored energy) that may cause danger during the work in a safe way.
9. After completing the work, remove all locks and tags.

2.8 Fire safety

⚠ WARNING

FIRE AND EXPLOSION HAZARD

Ignition sources like smoking, open flames, welding work, and sparks, together with combustible materials, such as fuel, can cause fire and, if not avoided, can cause death or serious injury.

Ignition sources are prohibited near the machine.

During maintenance, follow appropriate fire prevention and protection measures, including but not limited to trained personnel, proper fire extinguishing equipment, and agents.

Before starting any maintenance or repairs that require ignition sources, such as welding or flame cutting, carry out a proper risk assessment to control the risk.

- Smoking and open fire are prohibited near the product.
- Access to all fire-fighting equipment must be granted at all times, especially during maintenance and repair works.
- All fire-fighting equipment must be inspected and serviced regularly, according to local regulations.
- Damaged fire-fighting equipment and used fire extinguishers must be replaced immediately.

- Know the various types of fires and the appropriate fire-fighting methods. Various fires must not be extinguished with water. In most cases special extinguishing agents, dry powders or deoxygenating agents are required.
- All personnel must be trained regularly in fire-fighting methods, in cooperation with local authorities and rescue organizations. If there is a fire, the fire alarm must be activated and all available personnel must help with fire-fighting according to the predetermined fire plan of the workplace.
- For explosion-proof products, the owner decides whether work can be performed safely. Usually the owner issues a specific work permit, that is required for welding and other spark-emitting work that causes dangers to arise. The permit applies also to associated tools such as electric drills.

2.9 Emissions

2.9.1 Measured sound levels

Hoists generate some audible noise during operation. The total sound pressure level that is experienced in the operating area is a combination of the individual noise sources around the operator. The main sources of noise from the hoist arise from its components, vibrating structures, and reflective surfaces.

Hoist components which generate noise:

- Hoisting machinery
- Trolley, bridge, or other moving structures associated with the hoist.

Sound pressure level (L_{pAF}) to DIN 45635 at a distance of one meter from the chain hoist is:

Chain hoist		DC-II 1-250	DC-II 2-250	DC-II 5-500	DC-II 10-1000
Lifting speed up to	[m/min]	8	8	8	6
Sound pressure level	[dB (A)]	65+	65+	68+	68+

These noise emission levels were measured under maximum load. The following structural influences were **not** considered in the preceding measurements:

- transmission of noise through steel structures,
- reflections from walls, and son on.

2.10 Personnel requirements

⚠ WARNING

SPECIALIST SKILLS REQUIRED

Incompetent operation and maintenance procedures can cause death or serious injury.

Operation and maintenance procedures require professional skills and special training regarding the tasks and working methods.

Do not operate the machine or do any maintenance tasks without proper training.

Always follow the instructions.

Use appropriate personal protective equipment, depending on the task.

To avoid hazardous situations and dangerous consequences, leave all operation and maintenance work to professionals. Tasks mentioned here below are examples of tasks which are allowed only for trained personnel. More details on the risks related to the tasks and instructions for carrying out these tasks safely can be found in the chapters where the procedures are instructed. Tasks that require special technical skills and training include, but are not limited to:

1. Hydraulic system maintenance
2. Pneumatic system maintenance
3. Electric system maintenance
4. Battery maintenance
5. Tire maintenance

2.11 Environmental information

Environmental impacts have been taken into account in designing and manufacturing this product. To prevent environmental risks during use, follow the instructions and local regulations for disposal of waste material. Proper use and maintenance improve the environmental performance of this product.

2.11.1 Product life-cycle stages

Product life-cycle stages include:

- Production of materials and components
- Equipment manufacturing and assembly
- Use phase, including maintenance and modernization
- Dismantling and recycling of waste materials
- Deliveries between each stage

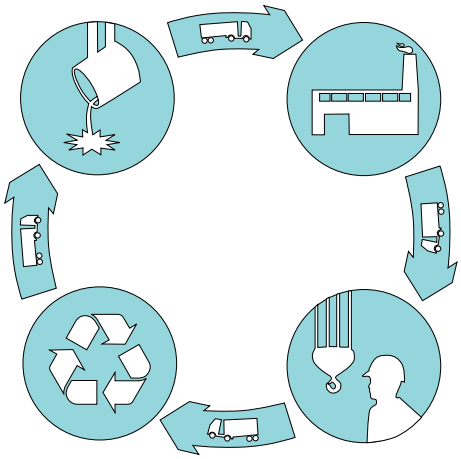


Figure 3. Product life-cycle stages

2.11.2 Handling waste material

Handle and dispose of the waste material from installation, maintenance, or dismantling according to local regulations. From the sustainability point of view, the preferred waste handling methods are reuse, recycle as material, energy recovery and, as a final resort, safe disposal.

As waste regulations and types of recovery and disposal methods vary regionally, no common, detailed guidance can be given. The following list provides proposals for adequate waste handling methods.

NOTE ***Always use licensed recycling companies.***

Table 2. Waste handling methods

Material	Waste handling method
Metals	Recycle the metals.
Electronics and electromechanical components	Some electrical parts may be treated as hazardous waste. Collect and recycle the electronics and electromechanical components separately.
Batteries	Batteries and other energy storage components may contain hazardous substances. Collect these items separately and recycle according to local regulations.
Plastics	Recycle plastic as material, use it for energy recovery, or deliver it to a landfill site.
Chemicals	Never spill chemicals, such as oil, grease, and other liquids, onto the ground, soil, or sewage. Store waste oil and grease in containers that are indicated for the purpose. More detailed information on chemical handling as waste can be found in the chemical's safety data sheet that is available from the manufacturer of the chemical.
Packing materials	Reuse or recycle packing materials, such as plastics, wood, and cardboard.
Rubber	Recycle rubber according to local regulations. Whenever possible, return the used rubber tires to the tire supplier for recycling.

2.11.3 Disposing of electronic products securely

When disposing of electronic products, remove securely the data stored (for example, parameters and settings) in the product. If stored data cannot be removed, dispose of the product securely to prevent potential disclosure of data contained in the product.

The following are examples of disposal methods. They are related to electronic components with capability of storing data long-term (such as hard drives, magnetic backup tapes, memory cards, and portable storage devices). The disposal must include one of the following:

- **Strong confidence erasure** by using industry-standard methods for permanently wiping data from a component. For example, depending on a device, writing the entire surface full of random data.
- **Physical destruction** by using industry-standard methods for physically destroying the component. For example, shredding or crushing the component, or in case of magnetic storage (non-solid state hard drives, magnetic backup tapes) degaussing with powerful magnets.

2.11.4 Notice on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

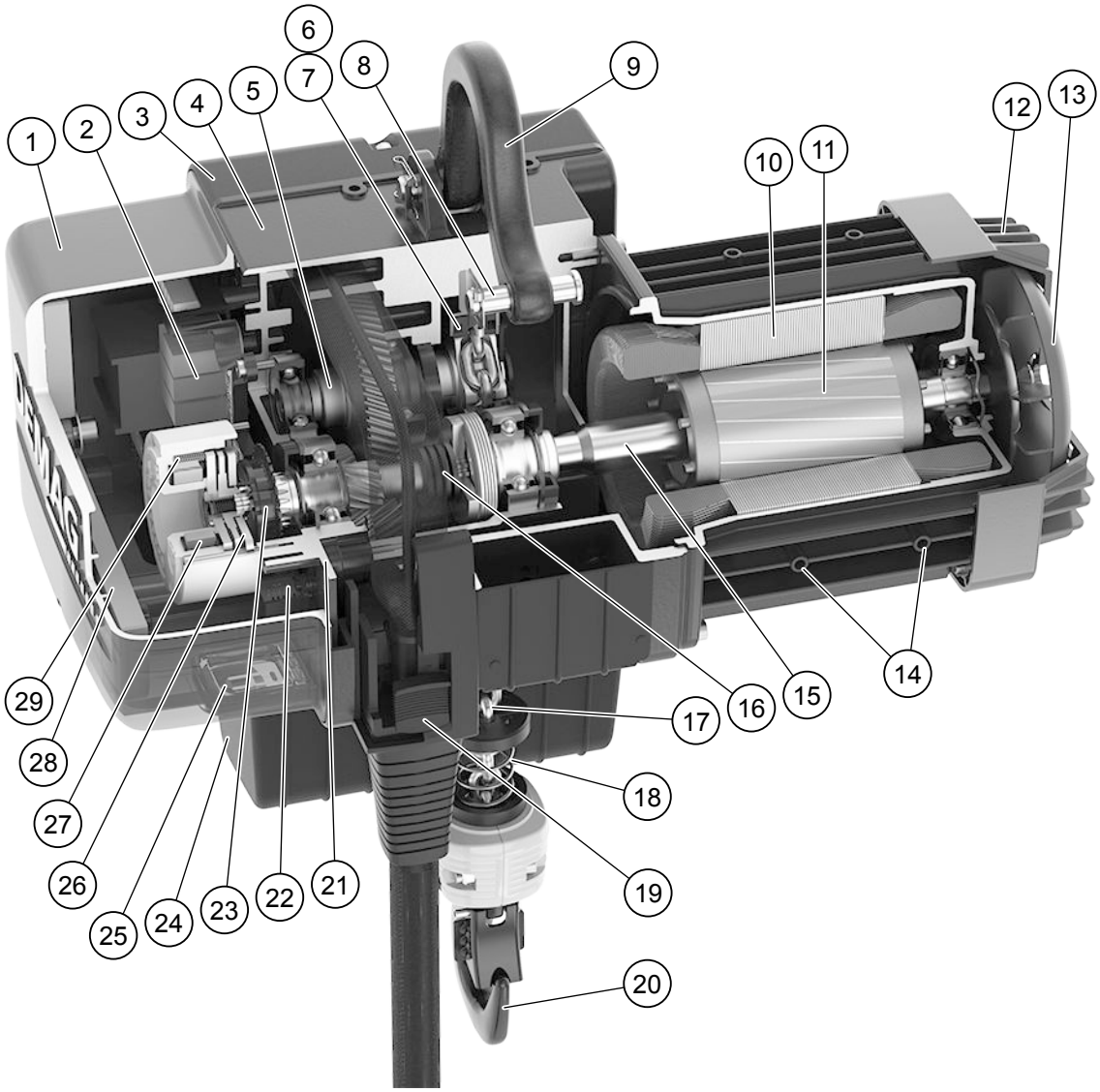
Demag Cranes & Components GmbH is fully aware of its obligations under Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), and under the UK REACH in the United Kingdom. Twice a year the EU publishes a Candidate list of Substances of Very High Concern (“SVHC”) for Authorization. Producers and EU importers/UK

importers have the duty to inform their EU/UK customers when a product contains SVHCs in a concentration above 0.1 % weight by weight. Some Demag products do include small quantities of SVHCs, such as lead which is typically used in brass and in certain electric components. These cases are exemptions, as there are currently no satisfactory alternatives available for such substances. We are actively searching for alternatives to substitute articles including SVHCs.

For a list of SVHCs, please see https://www.demagcranes.com/en/company/reach-notice.

3 Product description

3.1 Main parts of the chain hoist



1. Electric equipment cover
2. Control system
3. Service cover
4. Gearbox housing
5. Two-stage helical gearbox with sizes 1–5, three-stage helical gearbox with size 10
6. Chain guide
7. Chain sprocket
8. Suspension pin
9. Suspension bracket
10. Stator
11. Rotor
12. Fan cover
13. Fan
14. Mounting points
15. Motor shaft
16. Slipping clutch
17. Round-section steel chain
18. Cut-off buffer for operating limit switch
19. Adjusting mechanism for control cable
20. Hook assembly
21. Gearbox cover (cut)
22. Light barrier, 7-segment display (with elapsed operating time counter)
23. Pulse wheel for speed monitoring
24. Chain bucket
25. Window
26. Brake disc with linings
27. Brake magnet
28. Counterweight (cut)
29. Brake springs

3.2 Product code

3.2.1 Demag product code

Hoist type and feature code	Structural design [opt.]	Frame size	Load capacity	Reeving	Hook path	Hoist speed	Supply V/Hz	Hook lead off [opt.]	Hoist hook distance [opt.]	Trolley type	Trolley speed	Max. flange	Drive type
DC-Pro II (DES74)	K (DES01)	10 (GE09)	1000 (LOA01)	1/1 (DES27)	8 (DIM02)	V12/3 (SPD03/ SPD02)	400/50 (ELE01/ ELE03)	2/4-	2000	U11 (GE57)	24/6 (SPD06/ SPD05)	200 (DIM39)	E11 (TM02)
1-11	13-15	17-18	20-24	26-31	33-36	37-42	44-49	51-54	55-58	60-62	64-69	71-73	75-82
Positions 12, 16, 19, 25, 32, 43, 50, 59, 63, 70, and 74 are empty.													

Pos.	Feature code	Feature	Available properties	
1-11	(DES74)	Hoist type	DC-Pro II 1-10, DC-Com II 1-10	
13-15	(DES01)	Struct. design [opt.]	K Low-headroom monorail hoist	Standard-headroom monorail hoist
17-18	(GE09)	Frame size (FS)	1 Frame size (= FS) 1 2 Frame size (= FS) 2	5 Frame size (= FS) 5 10 Frame size (= FS) 10
20-24	(LOA01)	Load capacity	FS LOA01 value [kg] 1 125 2 250	FS LOA01 value [kg] 5 500 10 1000
26-31	(DES27)	Reeving	1/1 Reeving	2/1 Reeving
33-36	(DIM02)	Hook path	5.5 Hook path (height of lift) 5.5 m	8 Hook path (height of lift) 8 m
37-42	(SPD03/ SPD02)	Hoist speed	V6/1.5 hoist (lifting) speed V6/1.5 [m/min.]	V12/3 hoist (lifting) speed V12/3 [m/min.]
44-49	(ELE01/ ELE03)	Supply V/Hz	400/50 supply V/Hz	
51-54	(DIM78/ DIM79)	Hook lead off [opt.]	2/4- hook lead off (hook run-off position)	
55-58	(DIM77)	Hoist-hook distance [opt.]	Hoist-hook distance 2000 [mm]	
60-62	(GE57)	Trolley type	CF5 Click-fit 5, load capacity up to 550 kg U11 trolley size, load capacity up to 1100 kg	U22 trolley size load, load capacity up to 2200 kg U34 trolley size, load capacity up to 3400 kg
64-69	(SPD06/ SPD05)	Trolley speed	14/3.5 trolley speed 14/3.5 [m/min.]	24/6 trolley speed 24/6 [m/min.]
71-73	(DIM39)	Max. flange	200 Max. flange width of the trolley [mm]	
75-82	(TM02)	Drive type	E11-2WD travel drive: E11 with two-wheel drive E34-2WD travel drive: E34 with two-wheel drive	E22-C1WD travel drive: E22-C with one-wheel drive and contactor control E22-C2WD: E22-C with two-wheel drive and contactor control
Positions 12, 16, 19, 25, 32, 43, 50, 59, 63, 70, and 74 are empty.				

3.3 Technical data

3.3.1 Product range for DC-Com II

Load capacity	Frame size	Reeving	Hoist classification		Chain size	Lifting speed	Motor size[1)]	Max. weight for hook path
(LOA01)	(GE09)	(DES27)	(DIM01)	(DIM116)/ (DIM117)	(RR11)	(SPD03)	(HM18)	(DIM02)
			DIN EN 14492 / ISO 4301			at 50 Hz		4 m
[kg]			FEM/ISO	A/Dh class	[mm]	[m/min]		[kg]
125	1	1/1	M6/3m	A7/Dh2	4.2x12.2	8.0/2.0	ZNC 63 B 8/2	21
250	2	1/1	M5/2m	A6/Dh2	4.2x12.2	6.0/1.5	ZNC 63 B 8/2	21
500	5	1/1	M5/2m	A5/Dh2	5.3x15.2	4.0/1.0	ZNC 80 B 8/2	31
1000	10	1/1	M5/2m	A5/Dh2	7.4x21.2	4.0/1.0	ZNC 100 A 8/2	52
The standard hook path is 4 m. Other hook paths from 3 m, also longer than 4 m, are possible.								
1) Motor key data. For more information, see "Electric key data" or the motor data tables.								

The hoist type DC-ComA II is available in several stock hoist sizes, with very short lead time and attractive prices. Option range is limited. Technically the DC-ComA II is like the DC-Com II.

3.3.2 Product range for DC-Pro II

Load capacity	Frame size	Reeving	Hoist classification		Chain size	Lifting speed	Motor size[1)]	Max. weight for hook path
(LOA01)	(GE09)	(DES27)	(DIM01)	(DIM116)/ (DIM117)	(RR11)	(SPD03)	(HM18)	(DIM02)
			DIN EN 14492 / ISO 4301			at 50 Hz		5 m
[kg]			FEM/ISO	A/Dh class	[mm]	[m/min]		[kg]
125	1	1/1	M7/4m	A7.8[3)]/Dh2	4.2x12.2	8.0/2.0	ZNC 63 B 8/2	21
250	2	1/1	M5+/2m+[2)]	A6.0/Dh2	4.2x12.2	8.0/2.0	ZNC 63 B 8/2	21
500	5	1/1	M5+/2m+[2)]	A6.0/Dh2	5.3x15.2	8.0/2.0	ZNC 80 B 8/2	32
1000	10	1/1	M5+/2m+[2)]	A5.6[4)]/Dh2	7.4x21.2	6.0/1.5	ZNC 100 A 8/2	53

The standard hook path is 5 m. Optionally, hook paths of 3–180 m are available.

1) Motor key data. For more information, see "Electric key data" or the motor data tables.

2) 2m+ corresponds to a service life of 1900 hours at full load.

3) The first digit refers to the A-class A7. The second digit is an additional load cycle value as a percentage. For example, ".8" is 80%. A7.8 means A7 with 500,000 cycles and additional 80%, in total 900,000 cycles.

4) The first digit refers to the A-class A5. The second digit is an additional load cycle value as a percentage. For example, ".6" is 60%. A5.6 means A5 with 125,00 cycles and additional 60%, in total 200,000 cycles.

3.3.3 Hoist classification

The added A and Dh classes are based on EN 14492-2 and ISO 4301. A DC-II chain hoist is designed load cycle-based and not time-based with full load working hours. Load cycle-based is much more demanding regarding the design of the product than just time-based.

The first digit after A refers to the A-class. The second digit means an additional load cycle value as a percentage.

- A5.5 means A5 with 125.000 cycles and additional 50%, in total 187.500 cycles.
- A4.3 means A4 with 63.000 cycles and additional 30%, in total 81.000 cycles.

A-class	Load cycles
A5	125,000
A6	250,000
A7	500,000
A8	1,000,000

Dh class	Hook path per load cycle
Dh2	2.5 m (1.25 m up and 1.25 m down)
Dh3	5.0 m (2.5 m up and 2.5 m down)

3.3.4 Chain hoist motor data

Frame size	Motor size	Poles	P_N	CDF	n_N	Starts/h	I_N	I_{start}/I_N	$\cos\varphi_N$	Voltage[1)]	Frequency	Conformity
		[pcs]	[kW]	[%]	[rpm]		[A]	[A]		[V]	[Hz]	
DC-Pro II 1/2	ZNC 63 B 8/2	8	0.09	20	650	240	1.20	1.32	0.76	3 ~ 380–415	50	CE
		2	0.36	40	2820	120	1.60	4.64	0.67	3 ~ 380–415	50	CE
DC-Pro II 5	ZNC 80 B 8/2	8	0.18	20	665	240	1.60	2.35	0.51	3 ~ 380–415	50	CE
		2	0.72	40	2745	120	2.40	7.20	0.77	3 ~ 380–415	50	CE
DC-Pro II 10	ZNC 100 A 8/2	8	0.45	20	695	240	3.10	6.51	0.50	3 ~ 380–415	50	CE
		2	1.80	40	2790	120	4.90	20.10	0.80	3 ~ 380–415	50	CE
DC-Pro II 10	ZNC 100 B 8/2	8	0.57	20	700	240	3.90	7.41	0.50	3 ~ 380–415	50	CE
		2	2.30	40	2845	120	5.60	25.76	0.82	3 ~ 380–415	50	CE

1) Temporary voltage tolerances of ± 10% and temporary frequency tolerances of ± 2% are possible. Motors are rated to insulation class F.

3.3.5 Mains connection circuit breaker and supply lines

⚠ WARNING

ELECTRIC SHOCK HAZARD

In case of a short circuit, all phases must be disconnected from the power supply. Otherwise, an electric shock can occur, which could lead to death, serious injury, or damage to the equipment.

To make sure that all phases are disconnected, always use a 3-pole automatic circuit breaker in the power supply (EN 60898-1, tripping characteristic B).

Frame size	Motor size	[A]	[mm²]	[m]	[V]	[Hz]
1/2	ZNC 63 B 8/2	3	1.5	100	380–415	50
5	ZNC 80 B 8/2	4	1.5	100	380–415	50
10	ZNC 100 A 8/2	10	1.5	54	380–415	50
	ZNC 100 B 8/2	10	1.5	36	380–415	50

[A] = amperage of the mains circuit breaker (EN 60898-1, tripping characteristic B)

Minimum values have been specified here. Larger circuit breakers up to 10 A with 1.5 mm² supply lines or 13 A with 2.5 mm² supply lines can also be used.

[mm²] = cross-section of the supply line

[m] = max. cable length in meters

The lengths of the supply lines are calculated based on 5% voltage drop, start-up current, and an earth-loop impedance of 200 mOhm.

3.4 Dimensions

NOTE ***For more information, see the technical data document for the product.***

3.5 Materials and coating

Slipping clutch and brake linings are free of asbestos. As standard, the chain hoist is provided with corrosion protection (powder coating or paint finish).

Standard housing materials

Part	Material
Chain hoist housing and motor	Die-cast aluminum
Fan cover of the motor	Plastic, partially impact-resistant
Service cover	Plastic, partially impact-resistant
Chain collector box	Plastic, partially impact-resistant

The chain hoist or the trolley can be supplied with other than standard paint finishes.

Standard paint finish

Component	Color code	Color
Chain hoist body and motor	RAL 7021	Dark gray
Electric cover and fan	RAL 5009	Azure blue
Hook assembly	RAL 1007	Daffodil yellow
Load hook and suspension bracket	RAL 9005	Jet black
Trolley	RAL 5009	Azure blue

3.6 Drive and brake

A robust pole-changing AC asynchronous motor is used as the hoist motor. The brake is arranged on the load side in such a way that the load is safely braked and held if the slipping clutch is tripped. The brake is released electrically. Pressure springs ensure that the brake is applied automatically when power to the motor is switched off or if there is a power failure. The motor is automatically switched off and, at the same time, the brake is applied when the slipping clutch is tripped and if errors occur. In addition, for the chain hoist units, the motor is automatically switched off at the upper and lower limit positions of the lifting path.

The hoist drive first decelerates by switching from fast speed (2-pole winding) to creep speed (8-pole winding). Mechanical braking occurs when the creep lifting speed has almost been reached.

The mechanical brake is applied when the emergency stop is actuated, regardless of the lifting speed. Wear of the mechanical brake is reduced by electric and regenerative braking of the motor. The brakes of DC-II 1–DC-II 5 chain hoists are maintenance-free for up to 10 years, and the brakes of DC-II 10 chain hoists for up to 5 years.

3.7 Gearbox and slipping clutch

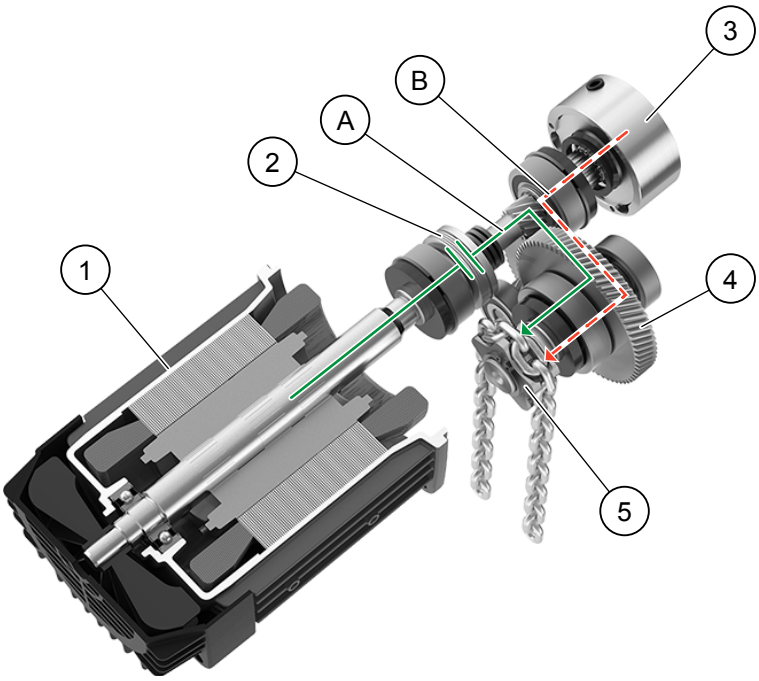


Figure 4. Parts in which the load is borne

A = Motor torque

B = Brake torque

1. Motor
2. Slipping clutch
3. Brake
4. Gearbox
5. Chain drive

The slipping clutch is arranged between the motor shaft and the gearbox input shaft. In connection with the limit stops on the chain, it performs the function of the emergency limit stop device for the highest and lowest hook position and protects the chain hoist against overload. The additional electric operating limit switches for the highest and lowest hook positions prevent the slipping clutch from being approached as an emergency limit stop device during normal operation. The slipping clutch also fulfills the EC Machinery Directive requirements for a load control device for load capacities as of 1000 kg.

The brake that is arranged on the load side prevents the load from slowly dropping when the unit is at rest. Monitoring of the slipping clutch and automatic cut-out of the drive if slip occurs increase the service life and protect the slipping clutch against overload and incorrect use.

The gearbox and the slipping clutch are maintenance-free for up to ten years.

3.8 Chain drive

The special Demag chain is of high-strength ageing-resistant material with a high degree of surface hardening, galvanized with another surface treatment. The dimension tolerances of this chain have been precisely adapted to the chain drive. Therefore urgently recommend that the Demag special chain be used to ensure safe operation. The maximum service life of the chain can only be reached if the specified regular lubrications are correctly carried out. The entire chain drive is always replaced when a chain is replaced. A chain set which can be easily replaced is available for this purpose.

The chain set offers the following benefits:

- Optimum duration of service is ensured for the chain.
- Certainty that the individual chain drive components are replaced when necessary.
- Reduction in service costs by replacement and installation in one step. Motor and gearbox do not need to be disassembled.

3.9 Electric equipment

3.9.1 Control system

The chain hoist is fitted with a 24 V contactor control system. The contactor control system is supplemented by an electronic system with programmed functions. This electronic system detects the control commands that are triggered by the operator with the pendant controller. Permissible control commands generate switching commands for the contactors to control the hoist motor.

The electronic system monitors the control sequence that is specified by the operator based on the speed feedback from the drive shaft, the operating limit switch contacts and, if applicable, from the thermal contacts in the motor. In there are any discrepancies, the chain hoist is automatically brought to a safe status and warning or error messages are generated. The positively disconnected emergency stop contact on the pendant controller immediately opens the electrical circuit for the contactor supply so that the motor is de-energized and the brake is applied.

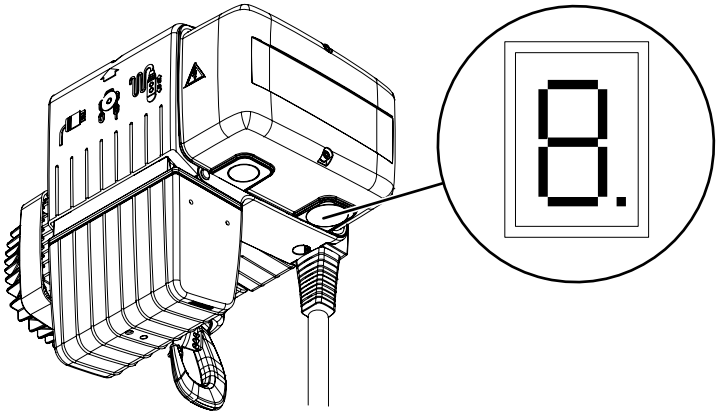
As standard, the control system features the following characteristics:

- Operating limit switches for lifting and lowering.
- Plug-in connections for pendant controller, power supply, motor connection, brake, operating limit switches.
- Connection for the E11–E34 trolley control system.
- 7-segment display for operating hours, operating status and error messages.
- Infrared interface for wireless transmission of service data.
- Replaceable socket-mounted contactor.
- Signal transmission in steps with 24V tri-state signals for controlled chain hoists (half-wave evaluation).

Pendant controllers are connected through plug-in connectors for manual control. Compact DSC control units, which are optimized for chain hoists without electric trolleys, are used for such applications. DSC-5/DSC-7 or DSE-10C units are used for applications with electric trolleys depending on the configuration.

NOTE ***For more information, see "Electric accessories" document for integrating chain hoists into existing installations with contactor control. A Polu box with integrated contactor control is needed to control pole-changing AC motors (with or without a brake) of long and cross-travel units, for more information, see "Polu box electric accessories" document.***

3.9.2 7-segment display for operating status and fault display



The 7-segment display is arranged on the control board under the electric equipment cover. It can be read through the window on the lower side of the chain hoist (arrow, lower side of electric equipment cover).

The following data can be read.

- Software version (For more information, see "Display of software version".)
- Operating hours (For more information, see "Display of operating hours".)
- Operating statuses (For more information, see "Operating statuses and general messages".)
- Warning messages (For more information, see "Warning messages".)
- Error messages (For more information, see "Error messages".)

3.9.3 Display of software version, operating hours, number of cycles

Display of software version

Figure 5. Example: software version 1.01

The software version is displayed every time power is switched on or after an emergency stop (from software version 1.01).

Display of operating hours

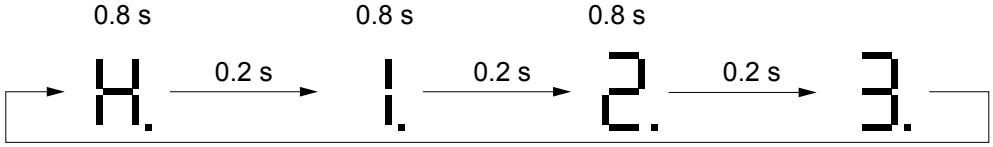


Figure 6. Example: 123 hours of operation

The display appears after 3 s without any lifting motion. If the control board has to be replaced, we recommend, if technically possible, that the details for the number of operating hours be read off and documented in the log book. The elapsed operating time counter starts at "zero" if a replacement control board is installed.

Display of the number of cycles of the K1 contactor

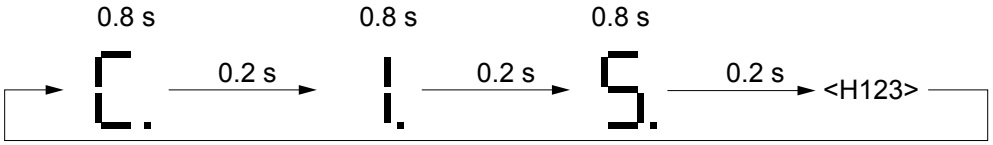
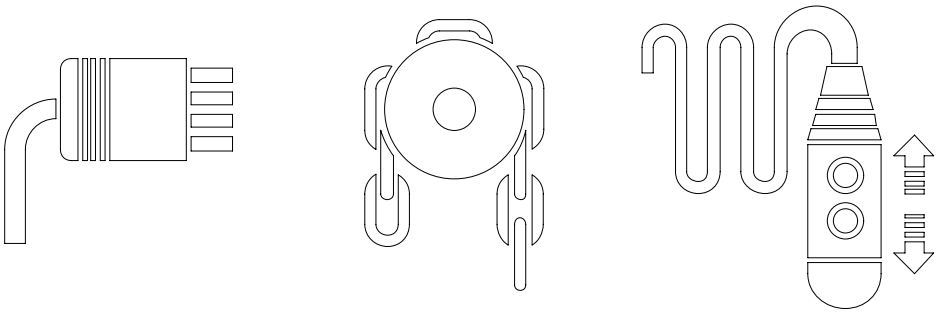


Figure 7. Example: C 15 corresponds to 15 x 100.000 = 1.5 million K1 switching cycles

The display alternates between showing this information and the number of hours of operation (not for inverter hoists). For more information, see "Service life of the contactor" on preventive maintenance.

3.10 Central service enclosure



All important service work can be carried out at a central point, the service enclosure. The relevant connectors for power supply, pendant controller, and travel drive are arranged under the impact-resistant plastic cover. The chain is also lubricated from this point.

In addition, any control cable length that is not required is kept under the cover.

The plastic cover also provides mechanical protection for the components that are fitted under it. The functions are indicated by pictograms that are fitted on the outside of the service cover.

3.11 Pendant controller

⚠ WARNING

STRONG MAGNETIC FIELD HAZARD

Magnets on the pendant controller can impact the functioning of pacemakers, implanted heart defibrillators, and hearing aids, which can lead to death, or personal injury.

If you wear any of these devices, follow the precautions that are associated with magnetic forces.

DSC pendant controllers (lifting or lowering) must be used for manual cable-connected control of the chain hoist. Pendant controller models DSC-5 (two motion axes), DSC-7 (three motion axes), and DSE-10C (2 to 3 motion axes) are also still available. The pendant controllers have the same plug-in connection for the control cable. The control cable and pendant controller are connected by a bayonet connector.

The shock and impact-resistant housings are of made high-quality thermoplastic and are resistant to fuels, salt water, greases, oils, and alkaline solutions with IP65 enclosure. Strong mineral acids (hydrochloric or sulphuric acid) can, however, corrode switch housings. To avoid corrosion, they must be replaced in good time.

The rubber button caps may be subject to premature wear under aggressive operating conditions (contact with corrosive substances or special chemicals). Replace any damaged button caps in good time.

4 Installation

4.1 Safety during installation

⚠ WARNING

SPECIALIST SKILLS REQUIRED

Incompetent installation can be unsafe, or cause unsafe and unreliable operation of the product that can cause death, serious injury, or property damage.

Only personnel who are authorized and properly trained may install the product. Local regulations and the instructions and warnings that are provided in product documentation must be obeyed.

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Using a defective machine can cause death, serious injury, or property damage.

Any defects or abnormalities that are detected during installation must be investigated and corrected in accordance with the instructions relevant for the component.

The owner of the product must make sure that these safety-related requirements are fulfilled

- Installation personnel must be professionally competent, qualified, and are provided with adequate instructions and training.
- Ensure that the test loading, test drive, and commissioning have been executed properly. Check that the handover log has been completed properly.
- Ensure that components, electrical connections, and steel structures of the product have been inspected and certified as defect-free.
- Check with your supplier that you have received all the relevant documents for the product delivery. Check that the documents correspond to the product you have received.
- Ensure that tools and equipment are available for installation, in accordance with the sales contract. Lifting equipment, manlift, and test loads may be required. In high places, safety equipment must be used to make sure that objects do not fall.
- Ensure that sufficient time has been reserved for installation and testing.
- Prevent access to the area from unauthorized persons and bystanders. Ensure that the secured area is spacious enough to prevent injuries that could occur if components or tools fall.
- Secure the area so that installation personnel are not at risk from movements of machines, automatic doors, or other cranes at the installation site.
- Before you allow the product to be used for normal operation, ensure that all safety devices have been restored to their full operational status. Safety devices may have been bypassed for test purposes. Never bypass a safety device for normal operation.
- Ensure that the runway is designed for the load of the product and that the runway rails meet the requirements and tolerances. Runway must be equipped with suitable end stops.
- Ensure that the operating environment and space that is reserved for the product is suitable for all functions of the product.
- Items that are not properly secured to the product, such as tools or detached components, could move or fall accidentally. When dismantling the product, lower the components to the ground at the earliest practical opportunity.
- If welding must be done at the site, make sure that suitable fire extinguishers are available. Do not use product structure or components for grounding. Hook must be isolated before any welding may be performed on it or equipment that is attached to it.
- After installation and before commissioning, check that the supplied parts conform to the drawings, instructions, parts lists, and structural measurements. Discuss any non-conformance with the supplier immediately.

Installation personnel must make sure that these safety-related requirements are fulfilled

- Use fall protection procedures.
- Obey local safety regulations.
- Make sure that you have all the appropriate personal protective equipment. Use them when required.
- Follow lockout-tagout-tryout procedure.
- Ensure that there is no possibility for personnel or body parts to be struck, crushed, or compressed by moving machinery:
  - Make sure that installation area is secured from the movements of machines, automatic doors, or other cranes at the installation site.
  - Ensure that products cannot start accidentally or move during installation.
  - To reduce the risks, maintain sufficient space in the area.
  - To prevent entrapment, shield moving parts with guards.
- Make sure that there are no hazards from loose items. Items that are not attached to the product, such as tools or detached components, could move or fall accidentally. Use proper safety equipment to make sure that objects do not fall when you work in high places.
- Check that the supply voltage and frequency match the requirements of the product. Check that the installed busbars are suitable for the product.
- Ensure that the operating environment and space that is reserved for the product is suitable for all functions of the product.
- If welding must be done at the site, make sure that suitable fire extinguishers are available. Do not use product structure or components for grounding. Hook must be isolated before any welding may be performed on it or equipment that is attached to it.
- Check for any electrical hazards in and around the operating area and take appropriate steps to minimize them. Only properly trained personnel may perform electrical work on the product and they must use safe working methods.
- Do not connect power supply before you have ensured that there are correct voltages, phases, and current ratings available for each component.

4.1.1 Responsibilities of installation personnel

⚠ WARNING	
	**MACHINE MALFUNCTION HAZARD** **Locally sourced substitute parts may not meet the required specification and could present safety hazards that can cause death, serious injury, or property damage.** **Do not substitute parts (for example, missing items) with locally sourced items without approval. Contact the manufacturer if there are doubts.**

NOTE ***Usually at least two people are needed to complete the installation safely. Some tasks can be done by one person but some are easier with two or more people. Make sure it is clearly agreed who does which task and that nothing is overlooked. All personnel must be properly trained for the tasks they perform and know how to install the product safely before installation at site.***

- Personnel must be aware of any risk of accident that is posed by the site.
- Personnel must familiarize themselves with the signs and warnings on the product.
- Personnel must familiarize themselves with use and safety instructions of needed tools, like manlifts and lifting equipment.
- Personnel must obey the local regulations.
- Personnel must be fit for the work.
  - Do not work when you are under the influence of alcohol or drugs. Alcohol and drugs can impair judgment and cause a hazard.
  - Do not work when you are under medication that may cause a hazard to you or others. If you are unsure, consult your doctor or pharmacist. Comply with local regulations about working under the influence of medication.
  - Do not work when you suffer from any illness or injury that can impair your ability to properly do the required tasks.

4.2 Installation preparation

4.2.1 Installation environment requirements

- Installation site must be sufficiently spacious and clear to permit the construction of the product. Floors must be level and the site should present no avoidable hazards to the installation personnel.
- Prevent unauthorized persons and bystanders from walking on or below the work site. To prevent injuries from possible falling components or tools, ensure that the secured area is spacious enough.
- Ensure that there is no possibility for personnel or body parts to be struck, crushed, or compressed by moving machinery:
  - Secure the area so that installation personnel are not at risk from the movements of machines, automatic doors, or adjacent cranes at the installation site.
  - Ensure that products cannot start accidentally or move during installation.
  - To reduce the risks, maintain sufficient space in the area.
- Adequate lighting must be available according to local regulations. For example, EN 12464.

4.2.2 Tool requirements for installation

Tools that are required during the installation work:

- Suitable lifting equipment that is able to lift the total weight of the product assembly.
- General tools such as screwdrivers, cutters, and hacksaws.
- Torque wrench to tighten fasteners to the specified torque.
- Painting equipment may be required to paint or touch up the product.
- If it is necessary to terminate the cables during installation, you need a suitable heat gun to shrink the heat-shrink sleeves.
- It is useful to have a range of electric or compressed air power tools available. These tools can include drills and powered wrenches for tightening fasteners. If you use compressed air, follow the correct procedures and be aware of the safety risks.
- Some lubricants such as cutting oil can be useful in installation. Handle and store lubricants according to applicable safety guidelines.

4.2.3 Preparing for installation

1. Familiarize yourself with the installation instructions delivered with the hoist before you start the work.
2. To remove the hoist from the packaging, first remove the temporary transport supports.
3. Make sure that all components match the order and are undamaged. If the delivery is damaged or incomplete, contact manufacturer or representative of the manufacturer immediately for instructions.

4. If the hoist has been stored for a long time or has been transported by sea, do the following checks.
   4.1 Make sure that the motors are dry.
   4.2 Check that brake lining is undamaged.
   4.3 Make sure that parts are lubricated.
   4.4 Make sure that electronic devices are charged.

   For more information, see chapter “Returning the product to use” in "Operating and Maintenance Instructions".
5. Move the hoist to the installation location.

4.2.4 Evaluating the weight of the hoist

⚠ WARNING

FALLING LOAD HAZARD

Lifting a load that exceeds the rated capacity of the lifting equipment and lifting accessories can cause the load to fall, which can cause death, serious injury, or property damage.

Never attempt to lift a load that is heavier than the rated capacity of the machine.

Never use an overload device to determine whether the load can be lifted.

NOTICE

Overloading can damage the lifting equipment.

Never attempt to lift a load until you are satisfied that it weighs less than the maximum permitted load of the lifting equipment.

It is important that you know the weight of the hoist before lifting so that you can select an appropriate lifting equipment and prevent overloading. The weight of the hoist can often be found from the packing list, the technical documents, or the data plate.

4.2.5 Lifting equipment

⚠ WARNING

FALLING LOAD HAZARD

If the lifting equipment fails, the load could fall, which can cause death, serious injury, or property damage.

Do not use a lifting equipment that does not clearly show the rated capacity or is not approved by authorities. Lifting equipment must be suitable for the purpose and undamaged. Carefully inspect lifting equipment before using them.

NOTICE

Always follow instructions that are provided by the lifting equipment manufacturer and the local authorities. The manufacturer of the hoist is not responsible for lifting equipment by other manufacturers.

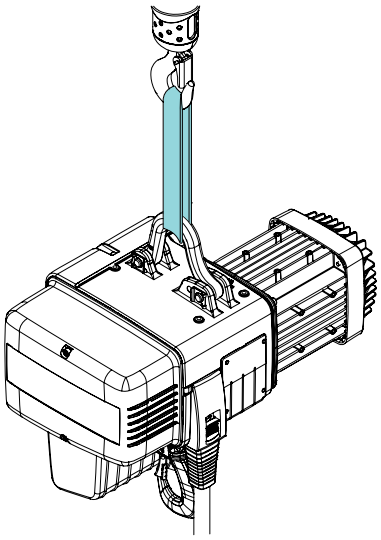
Typically, the hoist is lifted by using an auxiliary hoist and some kind of a lifting accessory. The most common lifting accessories are chains, wire rope slings, and lifting belts. Each lifting accessory must be clearly marked with the rated capacity and must be approved by authorities.

4.2.6 Lifting points on the hoist

Lift the hoist from the suspension bracket.

If lifting points are available on the hoist, they are marked with a sticker.

NOTE ***Before lifting the hoist, read the instructions in "Evaluating the weight of the hoist", "Lifting equipment", and "Before lifting".***



4.2.7 Before lifting

⚠ WARNING

FALLING LOAD HAZARD

Using lifting equipment contrary to instructions poses several risks, which can cause in death, serious injury, or property damage.

Use lifting equipment and lifting accessories in accordance with the instructions of the manufacturer.

⚠ WARNING

FALLING LOAD HAZARD

Lifting an improperly attached load can cause the load to fall, which can cause death, serious injury, or property damage.

Do not move the load until you have confirmation that it is properly attached.

⚠ WARNING

FALLING LOAD HAZARD

An unbalanced load can drop, which can cause death, serious injury, or property damage.

Place all slings and harnesses so that the pulling force is distributed evenly. If the load is unbalanced, do not try to support it with your hands. Lower the load down and adjust the lifting points until the load is balanced.

Check that the load is balanced and safely fastened at the lifting points. The load must not be able to slide, slip, or detach itself when suspended.

NOTE ***When you begin to lift, check that the load is properly balanced before lifting it high off the floor. If the load is not balanced, lower it down and adjust the lifting point.***

4.3 Installation procedure

1. Unpack the product, and check that the delivery is complete.
   For more information, see "Transportation, storage and dismantling".

2. Dispose of the packing material in an environmentally compatible way.
   For more information, see "Transportation, storage and dismantling".
3. Connect the pendant controller.
   For more information, see "Connecting the controller".
4. Check that the hoist is equipped with a suitable suspension bracket.
   For more information, see "Suspension of the chain hoist".
5. Adjust the height of the pendant controller.
   For more information, see "Pendant controller height adjustment".
6. Connect to the power supply.
   For more information, see "Mains connection".
7. Lubricate the chain with grease over its entire length before the equipment is put into operation for the first time. For more information, see "Lubricating the chain".

WARNING! FALLING LOAD HAZARD

Premature wear can lead to failure of the chain and a dropping load. Failure of the chain and a dropping load can cause death, serious injury, or property damage.

Lubricate the chain along its entire length. Covered chain links which are, for example, in the chain anchorage, hook assembly, limit stop, and the crab frame, must also be fully lubricated.

NOTE ***The chain is not lubricated before it leaves the factory, but only protected against corrosion.***

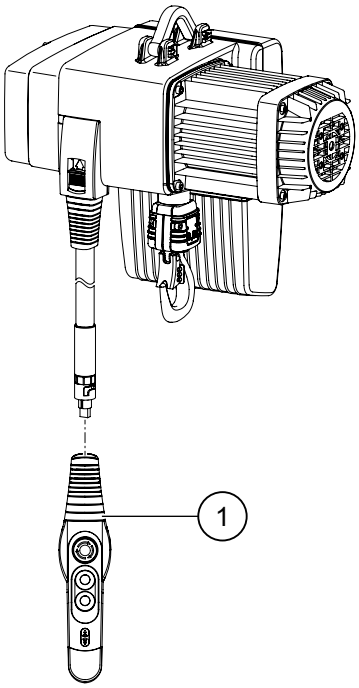
8. Set the lowest hook position.
   For more information, see "Adjusting the lower hook position".
9. Carry out the commissioning of the product.
   For more information, see "Commissioning".

4.4 Connecting the pendant controller to the control cable

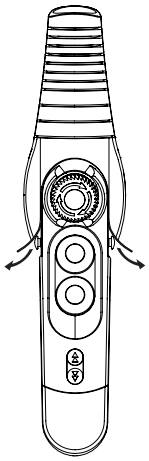
If the chain hoist is not supplied with the pendant controller fitted, connect the DSC pendant controller to the control cable and lock the connection with the bayonet lock.

The pendant controller is of plug-in design. The connector on the end of the control cable is turned and locked in the bayonet sleeve. If a connector is not locked, it can be pulled out and must be locked again by applying pressure.

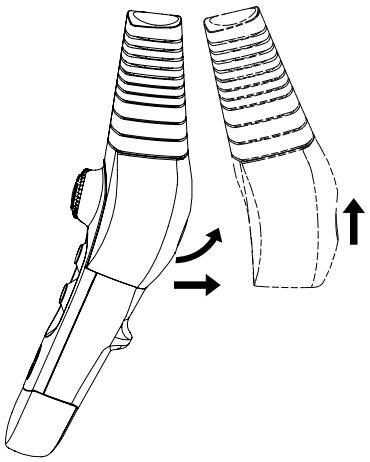
The pendant controller can also be installed as a traveling unit. For more information, see "Mobile control system".



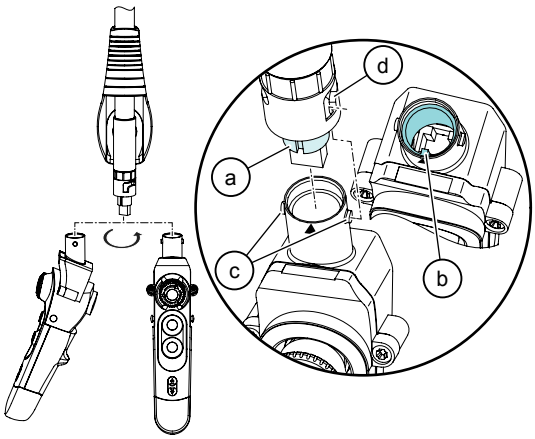
1. Lift the bend protection sleeve (1) on the pendant controller off the two pins.



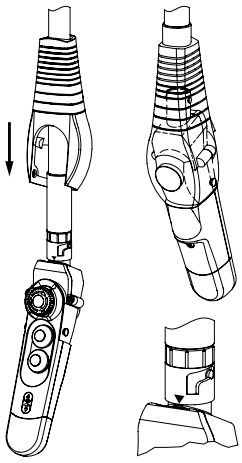
2. Pull the bend protection sleeve (1) off the pendant controller.



3. Slide the bend protection sleeve (1) upwards on the control cable, insert the control cable into the pendant controller, and turn the bayonet lock until it locks.
   - Check that the groove (a) on the connector fitting lines up with the swivel lock (b) in the pendant controller housing.
   - Check that the two pins (c) on the pendant controller housing line up with the bayonet lock (d).



4. Slide the bend protection sleeve (1) over the pendant controller again, and press the bend protection sleeve (1) firmly into place. Pay attention to the positioning markers.



4.5 Suspending the chain hoist

⚠ WARNING

OVERLOAD HAZARD

Overloaded components can cause malfunctions, which can cause serious injury, death, or damage to the equipment.

The suspension or supporting structure of the chain hoist must be designed for the maximum load that is caused by the operation of the chain hoist when the chain hoist is used as intended.

⚠ WARNING

FALLING HAZARD

The chain hoist may fall, which can cause death, serious injury, or damage to the equipment.

Do not use chain hoists that have a fixed suspension, such as a suspension bracket or suspension hook, for inclined pull of loads.

The chain hoist must be suspended with an articulated arrangement. Inclined pull must be prevented from rigid suspension arrangements.

⚠ WARNING

FALLING HAZARD

The chain hoist may fall, which can cause serious injury, death, or damage to the equipment.

Do not move the chain hoist or leave it unattended when the suspension bracket is open.

4.5.1 Supporting structure

According to DIN EN 14492-2, the force limitation factor is ϕDAL = 1,6 for chain hoists with a rated capacity that is greater than or equal to 1000 kg1 ston. The supporting structure must be designed to accommodate the static and dynamic forces that occur when the overload protection device is tripped.

According to DIN EN 14492-2, chain hoists with a rated capacity that is greater than or equal to 1000 kg1 ston must be equipped with overload protection. This chain hoist is delivered with a slipping clutch that acts directly as an overload protection.

The slipping clutch must be adjusted according to the rated capacity of the chain hoist. For more information, see "Adjustment of the slipping clutch".

4.5.2 Attaching the chain hoist to the supporting structure or the trolley

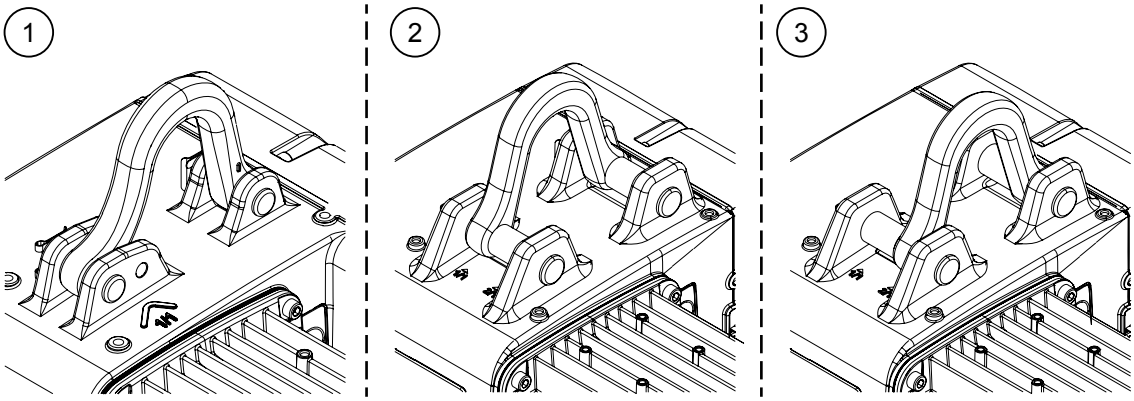
⚠ WARNING

MACHINE MALFUNCTION HAZARD

If the suspension bracket is installed incorrectly, the chain hoist hangs at an angle. Suspending the chain hoist at an angle results in premature wear of the chain drive.

Make sure that the suspension bracket is fitted to match the chain reeving arrangement of the chain hoist.

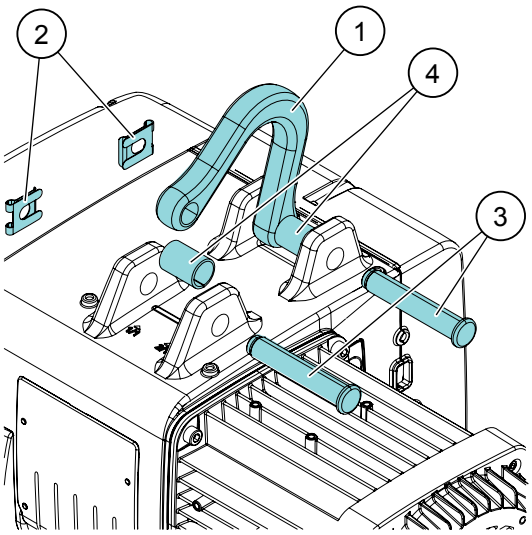
If special fittings are installed on the chain hoist, make sure that they are counter-balanced.



1. Suspension bracket for DC-II 1–DC-II 5
2. Suspension bracket for DC-II 10 1/1 reeving
3. Suspension bracket for DC-II 10 2/1 reeving

The chain hoist is delivered with the long suspension bracket fitted to the chain hoist. The enclosed short suspension bracket can be installed for an improved C-dimension.

1. Remove the retaining clip (2) and pin (3) on one side of the suspension bracket (1). For frame size DC-II 10, also remove the spacer tube (4).



2. Attach the suspension bracket to the supporting structure or the trolley.
3. Insert the pin through the suspension points on the hoist and the suspension bracket. For frame size DC-II 10, also insert the pin through the spacer tube.
4. Secure the pin with the retaining clip.

4.6 Electrical connections

4.6.1 Safety during electrical work

⚠ WARNING

SPECIALIST SKILLS REQUIRED

Incompetent electrical work can be unsafe, or cause unsafe and unreliable operation of the product that can result in death, serious injury, or property damage.

Electrical work must be carried out by authorized service personnel or an experienced service technician who is authorized by the manufacturer or representative of the manufacturer. Electrical connections must be made according to wiring diagrams provided with the product.

⚠ WARNING

ELECTRIC SHOCK HAZARD

If the power supply to the product is on when electrical work is done, there is a risk of electric shock that can cause death, serious injury, or property damage.

Before doing electrical work, make sure that the power supply to the product is off and obey local regulations for lockout-tagout-tryout procedure.

4.6.2 Circuit diagrams

NOTE ***The circuit diagrams for the chain hoist are shown in "APPENDIX: DC-II 1–DC-II 10 solo hoist circuit diagram."***

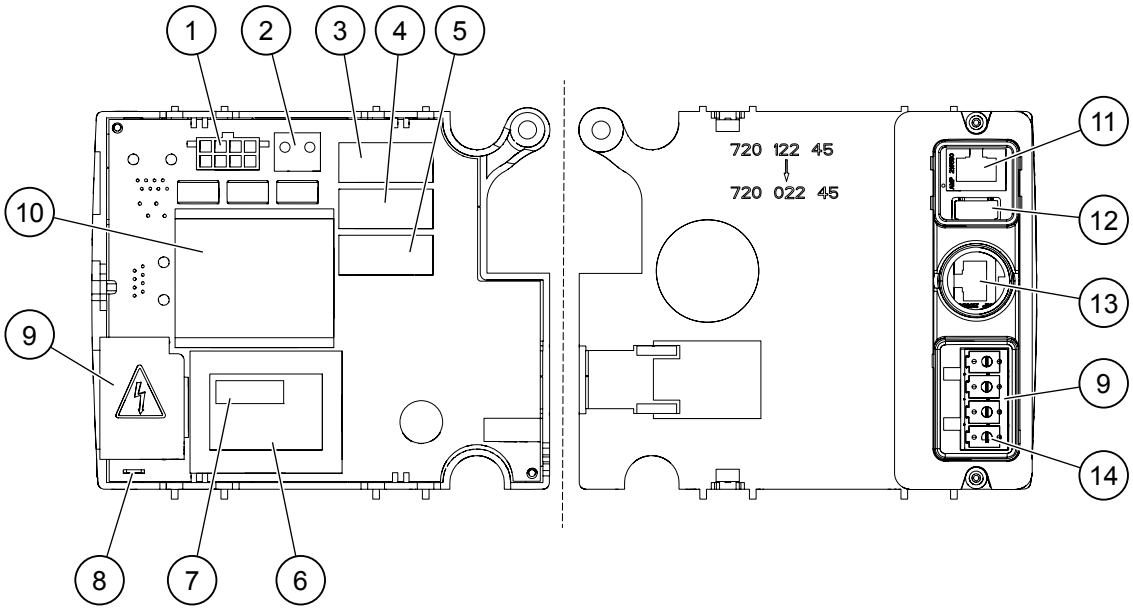
For more information on circuit diagrams with E11–E34 travel drives, see E11–E34 DC travel drive assembly instructions (II).

For more information on E11–E34 travel drives, see E11–E34 DC travel drive assembly instructions (I).

For more information on cross-travel limit switch part no. 716 663 45, see E11–E34 DC travel drive assembly instructions (I).

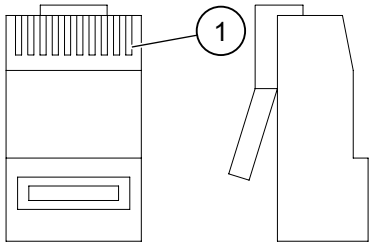
NOTE ***For more information on circuit diagrams, see "www.dc.demag-designer.com."***

4.6.3 Control board



Item	Designation	Terminal strip	Function
1	Plug-and-socket connector	X8	Motor
2	Plug-and-socket connector	X6	Brake
3	Relay		Fast or slow
4	Relay		Lifting or lowering
5	Relay		Lifting or lowering
6	Transformer		
7	Serial number		Label with: ■ Serial no. "SN..." ■ Modification status "MS…" ■ Calendar week/year production date "**/**"
8	Flat connector		Grounding, PE
9	Plug-and-socket connector	X1	Power
10	Contactor		On or off
11	Dummy plug	X5	(Optional) trolley
12	Plug-and-socket connector	X4	Operating limit switch or plug-in jumper
13	Plug-and-socket connector	X3	Control cable
14	Plug pin X1.4	X1	Grounding, PE

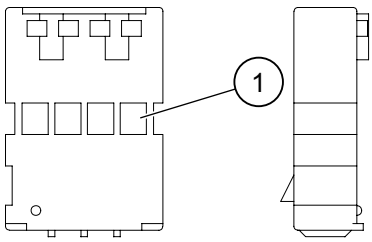
RJ45 connector



1. Pin 1

Pin	Function	
	Control cable X3	Trolley X5
1	Special F1	Special F1
2	Crane forwards	Crane forwards
3	Crane reverse	Crane reverse
4	Emergency stop	Emergency stop
5	Controller supply	Controller supply
6	Lift	24 V AC from chain hoist
7	Lower	Pendant controller reference potential
8	Traveling hoist right	Traveling hoist right
9	Traveling hoist left	Traveling hoist left
10	Special F2	Special F2

Limit switch connector



1. Pin 1

Pin	Function
	Lifting limit switch X4
1	Lift
2	
3	Lower
4	

4.6.4 Control cable

The control cable is protected by a flexible strain relief sleeve. If you need to adjust the suspension height of the pendant controller, you can unlock the self-locking clamp mechanism on the strain relief sleeve, and move the pendant controller to the preferred height. The part of the control cable that is not needed is stored under the service cover.

The strain relief sleeve for the control cable consists of an abrasion-resistant fabric hose with flame-protection impregnation. The control cable is reinforced by elastic rubber filler material in the gripping area (0.8 m) of the strain relief sleeve.

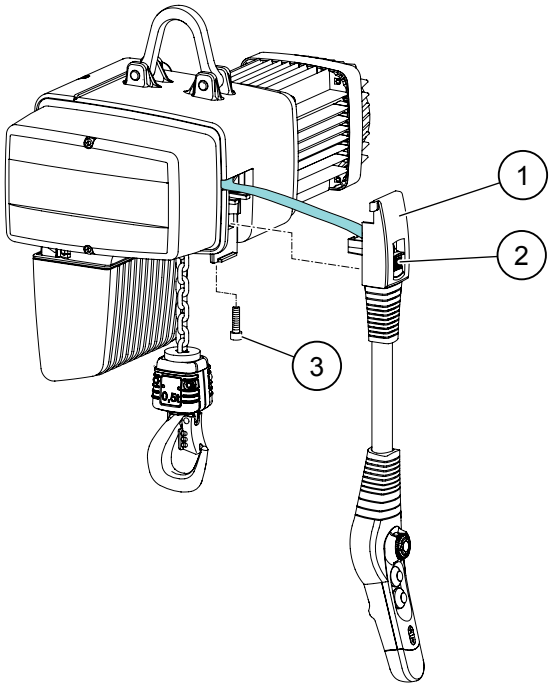


Figure 8. Control cable assembly

1. Sleeve compartment
2. Control cable locking mechanism latch
3. Control cable locking mechanism bolt, tightening torque 11 Nm

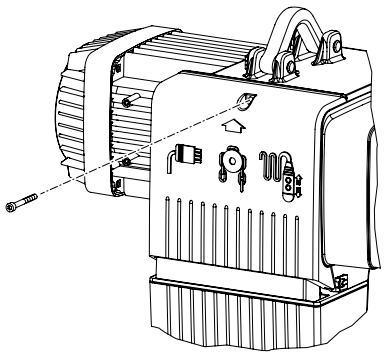
Hook path	H4	H5	H8	H11
Cable length [m]	0.8–2.8	0.8–3.8	3.8–6.8	6.8–9.8

The pendant controller is supplied with standard cable lengths. The length can be adjusted by 2 or 3 m, depending on the hook path. Longer control cable lengths can be provided, for example, by using a 2TY control cable and DST-C or DSE-C control pendants.

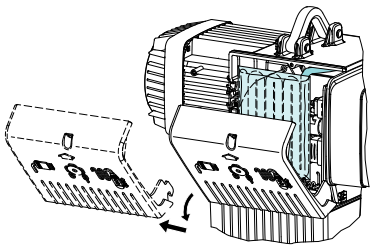
4.6.5 Adjusting the suspension height of the pendant controller

To obtain an ergonomic operating position, you can adjust the suspension height of the pendant controller, for example, in such a way that the control elements are arranged at elbow height.

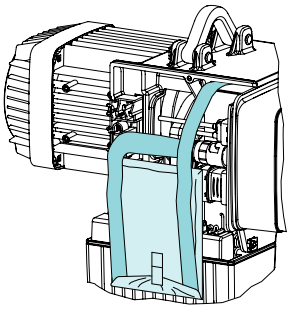
1. Unscrew the screws of the service cover.



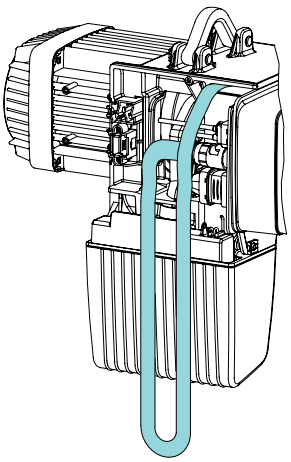
2. Open and disconnect the service cover.



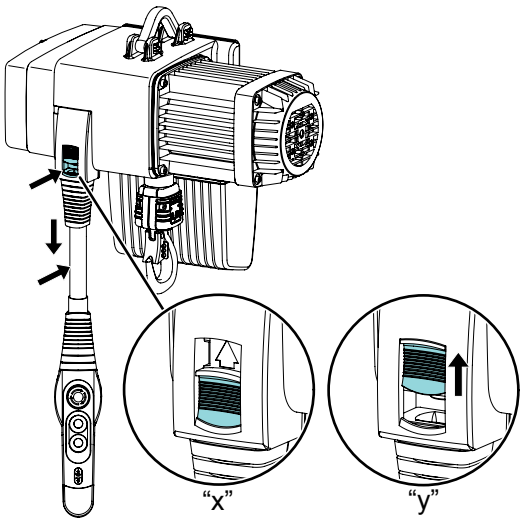
3. Remove and open the bag with the control cable.



4. Take the control cable out of the bag.



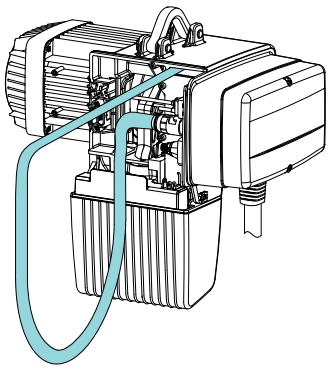
5. Slide the latch of the control cable locking mechanism upwards and hold it in place. At the same time, pull the control cable until the pendant controller reaches the correct height.



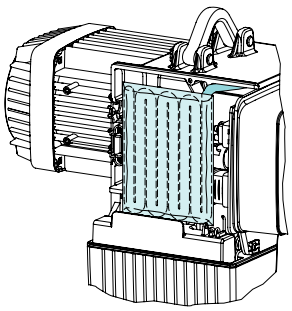
x = Control cable locking mechanism engaged

y = Control cable locking mechanism released

6. If the pendant controller is positioned too low, pull on the control cable sleeve behind the service cover, slide the latch of the control cable locking mechanism downwards, and lock the retainer by a short, strong pull on the control cable above the pendant controller.



7. Lay the remaining control cable in loops and place it in the bag.
The bag must be located behind the edge of the chain collector box.



8. Close the service cover.
Tighten the screws to the torque of 5.5 Nm.

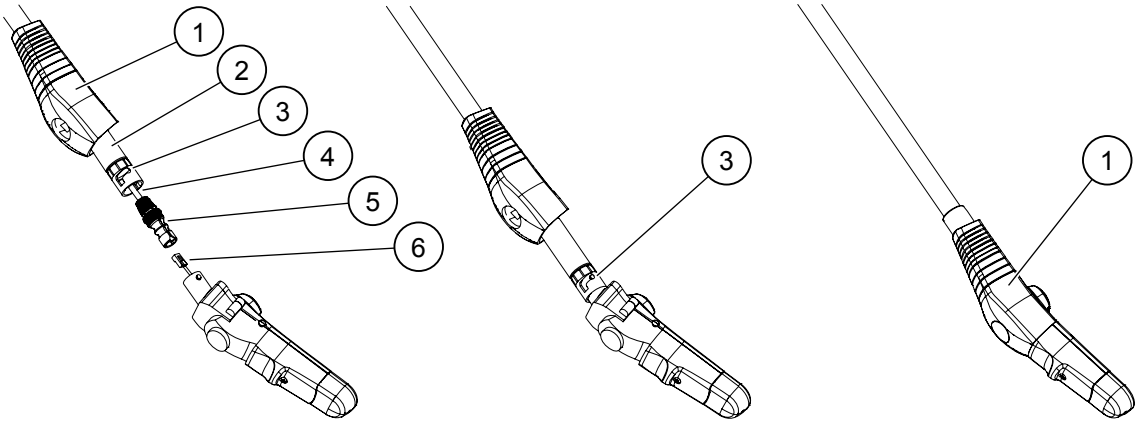
4.6.6 Installing the support sleeve on DSC, DSK or DST pendant controllers

4.6.6.1 Disassembling the DSC pendant controller

1. Slide the bend protection sleeve upwards on the control cable and turn the bayonet connector to disconnect the pendant controller from the control cable. For more information, see "Connecting the controller".
2. Remove the bend protection sleeve from the control cable.

3. Open the service cover and electric equipment cover, loosen the screw on the sleeve compartment and thread the control cable out of the chain hoist. For more information, see "Replacing the control cable".

4.6.6.2 Installing the support sleeve on DSC pendant controllers



1. Slide the bend protection sleeve (1) and the hose clip (3) onto the support sleeve (2) with the new control cable (4).
2. Pull the new control cable (4) out of support sleeve (2) by at least 50 mm on the pendant controller side.
   Keep the support sleeve stretched tight.
3. Slide the connector fitting (5) slightly away from the connector (6).
4. Press the connector (6) into the DSC pendant controller until you hear the connector click into place.
5. Press the connector fitting (5) into the DSC pendant controller.
6. Keep the support sleeve (2) stretched tight and slide it over the connecting sleeve of the pendant controller until it stops against the housing.
7. Secure the support sleeve (2) by tightening the hose clip (3).
   The screw of the hose clip (3) must be located at the back. Otherwise, the bend protection sleeve (1) cannot be correctly positioned.
8. Slide the bend protection sleeve (1) over the pendant controller again.
   Pay attention to the positioning markers.
9. Press the bend protection sleeve (1) firmly into place.

4.6.6.3 Installing the support sleeve on DSK pendant controllers

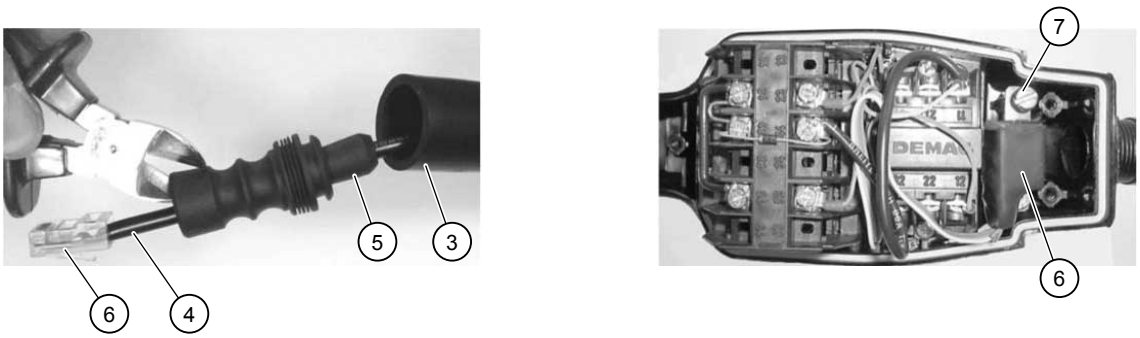


Figure 9.

1. Slide the bend protection sleeve upwards on the control cable and undo the screws of the DSK pendant controller housing.

2. Loosen the hose clip on the connecting sleeve and disconnect the plug from the DSK pendant controller.
3. Slide the bend protection sleeve and the hose clip onto support sleeve (3) with new control cable (4).
4. Remove strain relief (7) in the DSK pendant controller.
5. Pull new control cable (4) out of support sleeve (3) by at least 5 cm on the pendant controller side. Keep the support sleeve stretched tight.

NOTE ***Carefully cut connector fitting (5) with side cutters or a similar tool. Remove connector fitting (5) from control cable (4). Ensure that the control cable is not damaged.***

6. Insert control cable (4) into the DSK pendant controller and connect connector (6).
7. Keep support sleeve (3) stretched tight and slide it over the connecting sleeve of the pendant controller until it stops against the housing and secure support sleeve (3) by tightening the hose clip.
8. Slide the bend protection sleeve over the pendant controller again.

4.6.6.4 Installing the support sleeve on DST pendant controllers

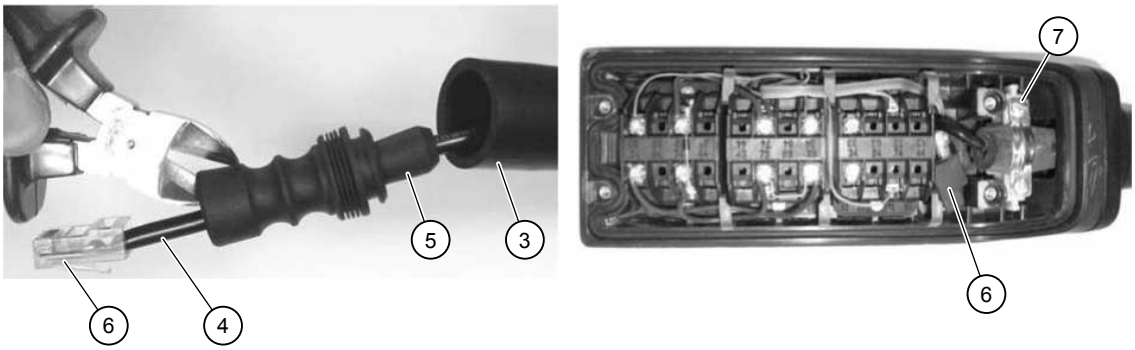


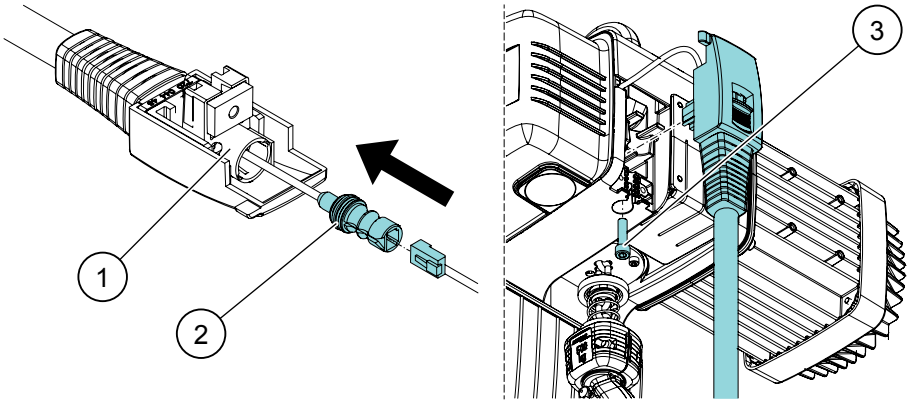
Figure 10.

1. Loosen the hose clip on the bend protection sleeve, undo the two screws for the housing cap below the bend protection sleeve and the housing screws of the DST pendant controller.
2. Open strain relief (7) in the pendant controller and disconnect the plug from the DST pendant controller.
3. Cut off the end of the bend protection sleeve to match the support sleeve and slide the hose clip, the housing cap and the bend protection sleeve onto support sleeve (3) with new control cable (4).
4. Pull new control cable (4) out of support sleeve (3) by at least 5 cm on the pendant controller side. Keep the support sleeve stretched tight.

NOTE ***Carefully cut connector fitting (5) with side cutters or a similar tool. Remove connector fitting (5) from control cable (4). Ensure that the control cable is not damaged.***

5. Insert control cable (4) into the DST pendant controller and connect connector (6).
6. Keep support sleeve (3) stretched tight and slide it until it stops against the housing of the pendant controller. Secure the bend protection sleeve by tightening the screw of the housing cap and secure support sleeve (3) by tightening the hose clip.
7. Close the pendant controller.

4.6.6.5 Installing the sleeve compartment on the rubber sleeve cable



1. Push the seal (1) into position against sleeve compartment (2).
2. Connect the new control cable to the chain hoist.
3. Attach the sleeve compartment to the chain hoist with the screw (3).
4. Close the service cover and the electric equipment cover.

4.6.7 Mobile control system

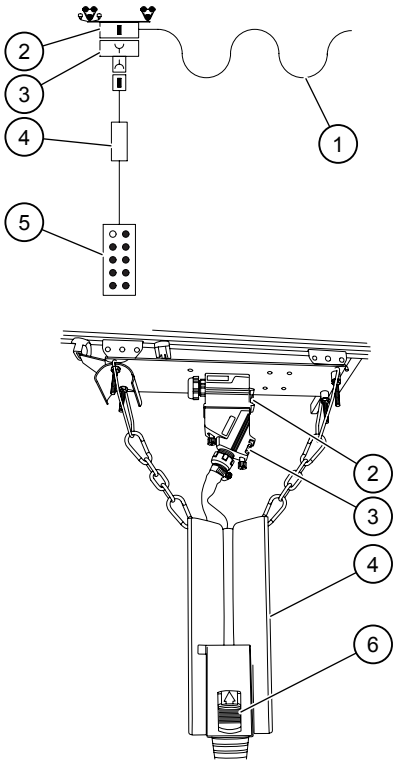


Figure 11.

Component parts			
Item	**Designation**	**Comprising**	**Part no.**
1	11-pole + PE flat cable		720 139 45
2	Connector enclosure cpl.	Socket enclosure	720 187 45
		Mounting frame	
		VC-AMS8 pin insert	
		Flat cable union	
3	Connector adapter cpl.	Bayonet lock	720 087 45
		VC-MP-1-R-M25 bush enclosure	
		VC-TR1/2M bush frame	
		VC-TFS8 socket insert	
4	Cable collector		720 065 45
5	DSE-10C pendant controller		773 352 45
	DSC-5 pendant controller		773 935 33
	DSC-7 pendant controller		773 937 33
6	Control cable locking mechanism		-

NOTE ***Height-adjustable standard control cables H4, H5, H8, H11 must be used if a cable collector is fitted.***

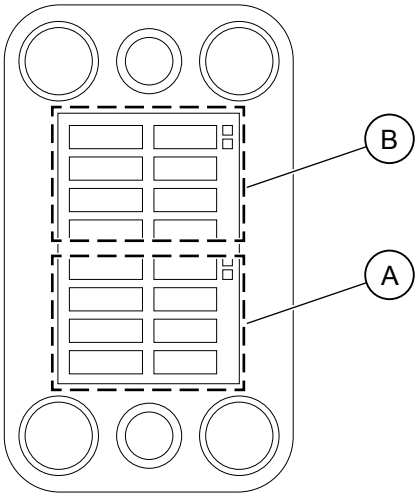


Figure 12. X40 plug connector

X40 plug connector pin assignment					
Signal	**Conductor**	**PIN**		**Conductor**	**Signal**
-	-	B4	B8	-	-
PE	PE	B3	B7	-	-
-	-	B2	B6	-	-

X40 plug connector pin assignment					
Signal	**Conductor**	**PIN**		**Conductor**	**Signal**
Special F2	10	B1	B5	8	Right
Left	9	A4	A8	7	Lower
Lift	6	A3	A7	5	Control voltage (24 V, STS)
Emergency stop	4	A2	A6	3	Reverse
Forwards	2	A1	A5	1	Special F1

4.6.8 Mains connection

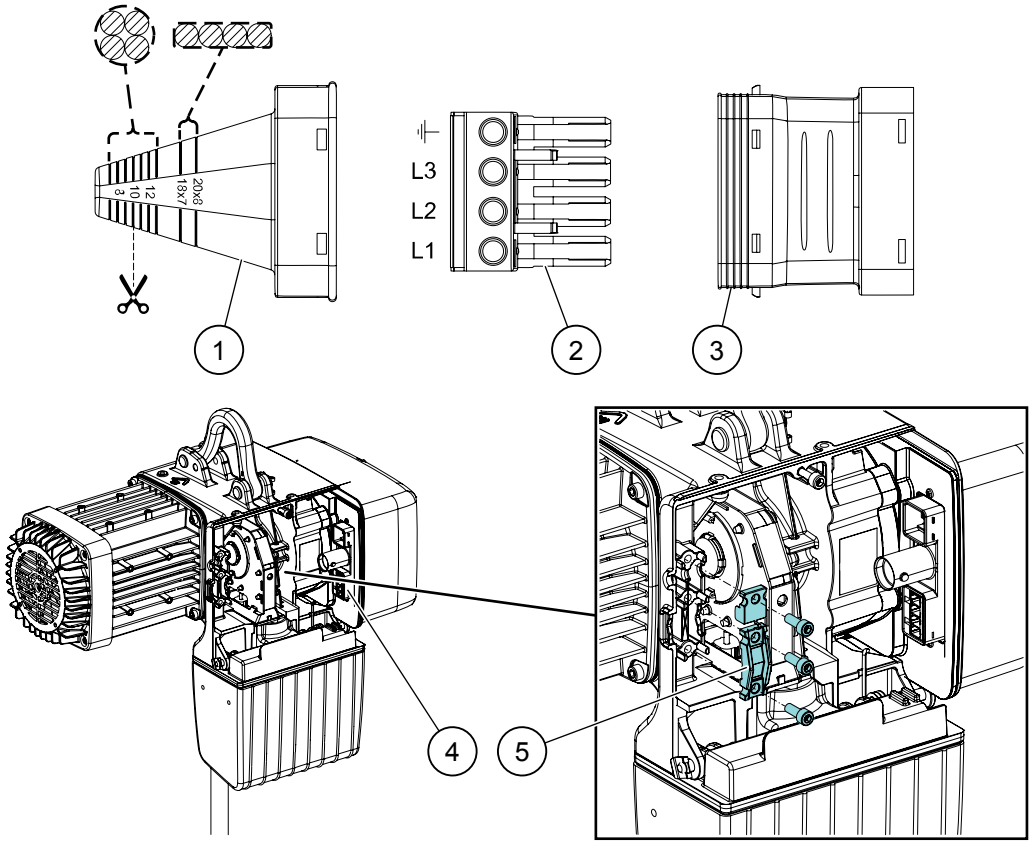


Figure 13.

1. Sealing sleeve
2. 4-pole connector
3. Connector enclosure
4. Mains connection
5. Recess for cable

The mains connection cable, the mains connection fuse links, and any devices to disconnect and switch the power feed must be available on site to connect the unit to the power supply. You need a 4-lead cable with a PE protective earth conductor which complies with the electric key data for the power supply. For more information, see "Electric key data".

The length of the supply cable that is specified for a given cross-section must not be exceeded to avoid excessive voltage drop and malfunctions caused by undervoltage when the motor starts up.

4.6.8.1 Connecting the chain hoist to the electric supply

1. Check that the voltage and the frequency that are specified on the rating plate match your mains supply.
2. Check that the power supply to the hoist is protected with correct size fuses.
3. Ensure that the mains connection cable is not connected to the power supply, and is secured against accidental restoration of the power supply.
   For more information, see "Logout-tagout-tryout procedure".
4. Remove the service cover.
5. Use the mains connection set included in the delivery for the plug connection to the mains connection cable.
6. Cut the sleeve (1) to match the shape of the mains cable.
   For the round cable, cut the sleeve within the area that is marked 7–13 on the sleeve. For the flat cable, cut the sleeve within the area that is marked 18x7 to 20x8. The system is designed for cable cross-sections of 4x1.5 mm^2 or 4x2.5 mm^2.
7. Slide the sleeve (1) onto the mains cable.
   Make sure that the sleeve (1) tightly encloses the cable for the specified enclosure requirements.
8. Connect the power supply cable on connector (2) to terminals L1, L2, L3 and to the PE.
   If necessary, use the wire end sleeves included in the delivery.
9. Slide the connector (2) into the housing (3) until it latches.
10. Close the housing (3) with the sleeve (1).
11. Insert the connector (2) into the control system until the housing (3) latches with the card bracket.
12. Insert the mains cable into the opening in the gearbox housing and secure it with the strain relief clamp.
    For DC-II 1–DC-II 5 units, the strain relief clamp must be turned to match the shape of the cable (flat or round cable).

NOTE

- ***Replace components 1, 2, and 3 as a set, since parts 2 and 3 from sets until 04/2021 are not compatible with parts from sets as of 05/2021.***
- ***All housing parts must be securely latched to make sure that the unit is sealed.***
- ***Check the continuity of the earth lead connection after the mains cable has been connected and before the chain hoist is put into operation.***
- ***The mains connector must never be disconnected under load.***

4.6.8.2 Phase sequence for connection to the AC power network

The chain hoist is configured for connection to clockwise R-S-T phases. The lift and lower buttons correspond to the movements of the load hook if the R-S-T mains phases are connected to L1-L2-L3 in the specified sequence. Then check the direction of movement as described below. If the phase sequence of the connection cable is unknown, connection with the correct phases is established in this way.

4.6.8.3 Checking directions of motion

The chain hoist must be connected to the power supply to check whether all phases are correctly connected. Turn on the power supply, unlock the emergency stop, and actuate the "Lift" button on the controller. The load hook must now move upwards.

WARNING! INCORRECT DIRECTION OF MOVEMENT

Indirect direction of movement can result in danger to life and limb.

If the direction of movement is not correct, disconnect the power supply at the mains connection switch and check to ensure that it is not live.

Swap phases L2 and L3 of the supply cable at the power supply plug.

4.7 Programming parameters with the pendant controller

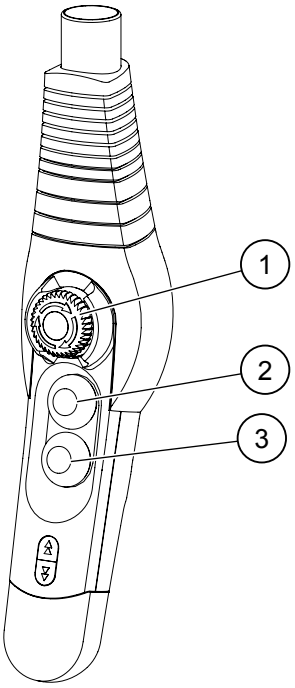
Parameters can be programmed to adapt the chain hoist to specific application requirements. The parameters can be programmed with the pendant controller and the 7-segment display on the bottom of the chain hoist.

4.7.1 Chain hoist parameters

In software version SW 2.10, the following parameters can be programmed.

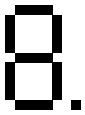
Display of parameter no.	Parameter name	Display of parameter value	Description
0.	-		
1.	-		
2.	Hoist only V2 speed	n.	**Default** V1/V2
		Y.	V2
3.	Lock the pendant controller	n.	**Default** Pendant controller is locked when several buttons are actuated.
		Y.	Priority is given to the first button that is pressed if the lifting and lowering buttons are actuated together.
4.	Time-controlled start-up (for example, for tandem operation)	n.	**Default** Speed-dependent start-up
		Y.	Time-controlled start-up
5.	Chain hoist	Y.	DC-Com 2-5, ZNK 71 B 8/4, ZNK 80 A 8/4
		n.	**Default** DC-Pro
6.	-		
7.	-		
8.	-		
9.	-		

4.7.2 Using parameter-programming mode, travel drive E22-C/E...WD



1. Emergency stop
2. Lift button
3. Lower button

1. Press the emergency stop (1).
   7-segment displays 8.



2. Press and hold the lift button (2) and unlock emergency stop (1). Wait for approximately 10 seconds.
   7-segment display displays a dot.

3. When "P." is displayed, release the lift button (2).
   "P." disappears after approximately 2 seconds.

4. Press and hold the lift button (2) until "o." is displayed.

5. Release the lift button (2).
   When parameter-programming mode has been activated, figures 0–9 are successively displayed for 2 seconds each.
   Parameter-programming mode is active.

6. To scroll through the menu items faster, press the lower button (3).
   Each figure represents a parameter. For more information, see "Chain hoist parameters".

7. To select the displayed parameter, press the lift button (2).
   For more information, see "Chain hoist parameters".
   The value selection menu for the parameter opens. The values are displayed symbolically with the characters "A.", "b.", "C."

8. To set a different value, press the lower button (3) until the required value is shown on the display.

9. To select the value, press the lift button (2).
   The system returns to the parameter selection mode. The 7-segment display is empty.

10. To return to normal operation, press the emergency stop (1).
    All changes are saved. The 7-segment display is empty.

4.8 Adjusting the lower hook position

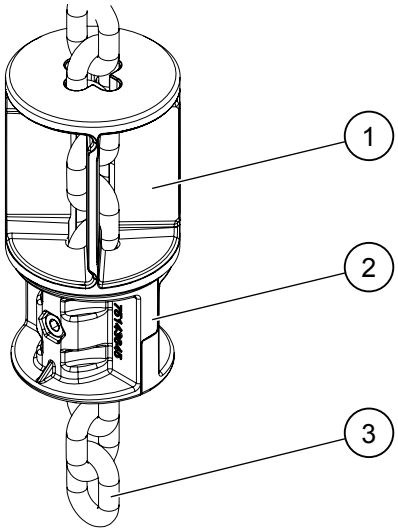


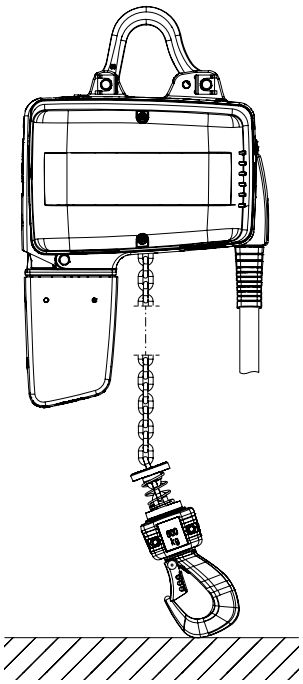
Figure 14. Limit stop

1. Buffer
2. Limit stop
3. Unloaded chain fall

When determining the hook path or the lifting height, ensure that the load hook touches the ground in the lower hook position. The chain hoists are provided with a hook path of 5 m or 8 m as standard.

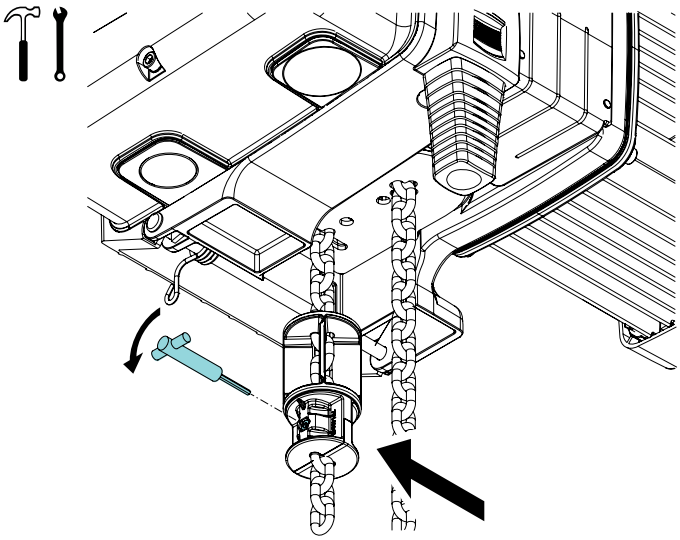
Frame size	Tightening torque of the limit stop [Nm]
DC-II 1–DC-II 5	2.9
DC-II 10	4.3

1. Lower the hook on the floor.



2. To stop the chain hoist, actuate the emergency stop or the mains connection switch, and secure it against switching on again.

3. Remove the chain collector box.
   For more information, see "Removing the chain collector box".
4. Remove the limit stop on the chain collector box end.



5. Attach the limit stop directly behind the buffer.

NOTE ***The unloaded chain fall behind the limit stop must consist of at least five chain links. For more information, see "Buffer and cut-off spring arrangement".***

6. Place the chain in the chain collector box.
7. Reconnect the chain collector box to the chain hoist.
8. Switch on the chain hoist.
9. To check the adjustment of the lower hook position, move the hook and run the chain over the entire adjusted hook path.

5 Commissioning

5.1 Safety during commissioning

⚠ WARNING

SPECIALIST SKILLS REQUIRED

Incompetent commissioning can be unsafe, or cause unsafe and unreliable operation of the product that can cause death, serious injury, or property damage.

Only personnel who are authorized and properly trained may commission the product. Local regulations and the instructions and warnings that are provided in product documentation must be obeyed.

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Using a defective machine can cause death, serious injury, or property damage.

If you notice any abnormalities or defects during commissioning, investigate and repair the products according to instructions. Defective products may not be taken into use.

NOTE ***Local regulation may demand other commissioning tests to be performed before the products can be taken into use. Make sure that all local requirements are fulfilled in commissioning.***

- Obey local safety regulations.
- Make sure that you have all the appropriate personal protective equipment. Use them when required.
- Follow the fall protection procedures.
- Prevent access to the area from unauthorized persons and bystanders.
- Ensure that the secured area is spacious enough to prevent injuries that could occur if components or tools fall.
- Follow lockout-tagout-tryout procedure.
- Inform personnel who work in close the area about the commissioning and tests.
- Use hand lines that are securely attached to the building structure to lift and lower materials and tools. When you work in high places, use safety equipment to make sure that objects do not fall.
- Make sure that personnel or body parts cannot be struck, crushed, or compressed by the product when it moves:
  - To prevent entrapment, use guards to shield parts that move.
  - Be prepared in case the equipment moves in the wrong direction during tests.
- Verify that installation of mechanical and electrical equipment is completed according to the SAT (site acceptance test) check list.

5.1.1 Responsibilities of commissioning personnel

- Personnel must know how to use basic controls correctly and safely for the purpose of functional tests.
- If you use a manlift, familiarize yourself with its operating and safety instructions.

5.2 Commissioning preparation

5.2.1 Commissioning environment requirements

- Mark the operating area where you carry out the commissioning tasks, such as test loading.
- Identify possible collision hazards of the crane to structures, obstacles, equipment, or personnel. Take proper actions to limit collision hazards.
- Adequate lighting must be available according to local regulations. For example, EN 12464.

5.2.2 Commissioning tool requirements

- Normally no electrical fault-finding is required but a multimeter may be required during functional tests.
- Tightening fasteners to the specified torque requires a torque wrench.

5.2.3 Preparing for commissioning

1. Before commissioning, check that the supplied parts conform to the drawings, instructions, parts lists, and structural measurements. Discuss any non-conformance with the supplier immediately.
2. Check that there are no hazards from loose items. Items that are not attached to the product, such as tools or detached components, could move or fall accidentally.
3. Check that no permanent or temporary obstructions are in the way of the product when it is operated.
4. Prepare for the load test. Find out how much load is required in local regulation. Normally the load that is required varies between 90%–130% of the rated capacity.

5.3 Commissioning instructions

5.3.1 Commissioning inspections

⚠ WARNING

FALLING LOAD HAZARD

Premature wear can lead to failure of the chain and a dropping load. Failure of the chain and a dropping load can cause death, serious injury, or property damage.

The chain must be lubricated along its entire length. Covered chain links, for example, in the chain anchorage, the hook assembly, the limit stop, and the frame of a low headroom trolley, must also be fully lubricated.

NOTE ***The chain is not lubricated before it leaves the factory, but only protected against corrosion.***

The owner is obliged to carry out the following checks before the unit is put into operation for the first time.

Activity	Section	Check
Check continuity of the PE conductor connection.	-	x
Check the emergency stop button.	-	x
Check the direction of movement.	"Mains connection"	x
Check the 7-segment display.	"7-segment display for operating status and fault display" "Display of software version, operating hours, number of cycles"	x
Check chain lubrication. (In arduous conditions, the chain must be lubricated more frequently.)	"Available chains"	x

Activity	Section	Check
Check the operation of the lifting-motion operating limit switch.	"Checking the operating limit switches"	x
Check the operation of the lowering-motion operating limit switch.	"Checking the operating limit switches"	x
Check the cut-off buffer, the cut-off spring, and the operating limit switch actuator.	"Checking the cut-off buffers and cut-off springs" "Checking the operating limit switch actuator"	x
Check the cable and the controller housing for damage.	-	x
Check the operation of the brake.	-	x
Check the hook and the hook safety latch.	"Load hook dimensions and wear"	x

5.3.2 Checks before first use

⚠ WARNING

IGNORING INSTRUCTIONS HAZARD

Failure to follow the given instructions can cause death, serious injury, or property damage.

Machines may only be put into service if they have been checked for compliance with the corresponding accident prevention regulations. Do the inspections as instructed in "Commissioning inspections" and all the relevant checks before you put the product into operation.

With suitable measures carried out by the owner or on his behalf, the owner must ensure that the load handling devices and machinery ready for operation function in complete safety before they are first put into service. The specified measures must allow for the static and dynamic features of the machinery.

The following checks must be carried out when the equipment enters service.

- The supporting structure must be in good condition and the load capacity of the chain hoist must be checked.
- Safety devices must be complete and effective.
- Clearances and safety distances must be maintained.
- The emergency stop button must be checked by actuating the emergency stop.

When the unit is first put into operation, it must be checked to ensure that it is used as intended in all possible applications, in each case with the maximum permissible load. Operation of the safety devices must be checked, for example, by lifting an overload. At the same time, the behavior of the chain hoist must be checked when it is not used correctly.

Various checks of the machine must be carried out before it is handed over.

- Check to ensure it is suitable for operation
- Acceptance inspection

The test and inspection records can be compiled when safe operation of the chain hoist is ensured.

The test and inspection records must be handed over when the machine is handed over.

The machine may be used as intended after it has been handed over.

5.4 Finishing commissioning

NOTE ***Local regulations may demand other commissioning testing to be performed before the product can be taken into use. Make sure that all the local requirements are fulfilled.***

NOTE ***All optional features must be tested before using the product.***

1. Make sure that any safety devices that have been bypassed for testing purposes are restored to full operational status. Never bypass a safety device for normal operation.
2. Turn off all controllers and main isolation switches that are on the ground level.
3. Check visually that the hoist or any other part has not damaged in any way during testing.
4. Make sure that tools and materials that are used during installation are removed from the hoist and the runway.
5. Ensure that the hoist operator and supervision personnel are aware of the need for user training.
   The authorized service organization of the hoist manufacturer can arrange user training by separate agreement.
6. Check the documents delivered with the hoist.
   Ensure that entries in the documents are properly recorded and that the reference data in the documentation matches that on the type data plates.
7. Compile a commissioning log for the hoist. Store the log with the other documentation for the hoist.

6 Operation

6.1 Safety during operation

⚠ DANGER

CRUSHING HAZARD

Persons within the operating area of the machine could become crushed by a falling load or moving machinery. This will cause death or serious injury.

Before starting and while operating the machine, make sure that there are no unauthorized persons on the machine or in the operating area.

- Do not deliberately use limit switches to stop the movement. Always stop the movement with the controller.
- If the controller has a hoist or crane selection switch, be sure to select the correct hoist or crane before operating.
- If the crane malfunctions during use, push the emergency stop button and contact the supervisor.

6.1.1 Operating environment

Operate the product only in operating conditions that the product is designed for. For more information, see "Operating conditions".

6.1.2 Responsibilities of the operator

⚠ WARNING

IGNORING INSTRUCTIONS HAZARD

Failure to follow the given instructions can cause death, serious injury, or property damage.

Read and understand this information before operating, servicing, and maintaining the machine.

Hoists are used for various purposes. They can be used to handle different types of loads, and many different operators use them in different ways. The hoists are often operated also by non-dedicated operators as part of work routines.

Because the manufacturer of the hoist has no direct involvement or control over the hoist operation and application, following the safety practices is the responsibility of the owner and the operating personnel. Only authorized and qualified personnel, who can demonstrate that they have read and understood the instructions, are permitted to work with the hoist. The qualified personnel must also understand the proper operation and maintenance of the product.

Operators must

- Operators must be trained by the owner of the product or a qualified designee. Operators must be competent for the task.
- Operators must learn how to operate the product safely, before they start to work with the product.
- Operators must know all the controls and they must be able to use them correctly and safely.
- Operators must learn how to control the movements of the hook and load.
- Operators must be aware of any risk of accident that is posed by the operating site.
- Operators must familiarize themselves with the labels and warnings on the product.
- Operators must use the instructions to familiarize themselves with the product and the product controls.

- Operators must learn the hand signals for directing the product movements.
- Operators must be familiar with proper rigging procedures.
- Operators must carry out daily inspections.
- Operators must follow local regulations.

Operators must not

- Operators must not operate the product when under the influence of alcohol or drugs. Alcohol and drugs can impair judgment and cause a hazard.
- Operators must not operate the product when under medication that may cause a hazard to the operator or others. If unsure, consult your doctor or pharmacist. Always comply with local regulations regarding working under the influence of medication.
- Operators must not operate the product while they suffer from any illness or injury that may impair their ability to properly use the product.

6.2 Checks before operating

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Operating a machine that is defective or in an abnormal condition can cause death, serious injury, or property damage.

If you notice any abnormalities or defects during the operational checks, report them immediately to the supervisor and remove the machine from use. Operation may only continue when safe operation of the machine is ensured.

6.2.1 Checking the hoist before every working shift

Before every working shift, check the general condition of the equipment and the working environment.

1. **Check the operating environment**
   Check the operating environment visually to make sure that there are no (new) hazards that can prevent the safe use of the product.
2. **Check the condition of the hoist**
   Check the general condition of the hoist.
3. **Perform visual checks**
   Check the hoist visually to see that there are no oil leaks from the hoist or other equipment.
4. **Check the operation of the emergency stop button**
   Check that the emergency stop button can be pressed down and that it stays in that position.

NOTE ***Never operate the product if it is locked or tagged out.***

5. **Check the chain**
   - Check the chain visually for any deformations, damage, or twisting.
   - Check the chain for cleanness and correct lubrication. For lubrication instructions, see chapter Lubrication.
6. **Check the hook**
   - Inspect the hook for nicks, gouges, and twisting. Also inspect the hook for deformation of the throat opening and wear on the saddle or load bearing point.
   - Check that the hook rotates freely.
7. **Check the pendant cable and the retaining wire**
   Check the condition of the pendant cable and its retaining wire. The pendant cable and the retaining wire may not be damaged, and no wires may come out of them.
8. **Check warning signs**

Check that all warning signs are in place. Check that the warning signs are in good condition and can be read easily.

6.2.2 Checking the operation with the emergency stop button pressed down

WARNING! UNCONTROLLED MOVEMENT HAZARD

If the emergency stop button is faulty, the product might move unexpectedly during the following checks. Unexpected movements during checks could cause serious injury or death.

Do not stand in the danger zone.

1. Turn on the main isolation switch.
   The product becomes operational (energized).
2. With the emergency stop button pressed down, check that the equipment does not move when you press the direction control push buttons.
   If the equipment does not move, it verifies that the emergency stop button works properly.
3. Check for smooth mechanical operation of each push button, joystick, or isolator on the controller.

6.2.3 Checking the operation with the controller enabled

Before every working shift, all of these checks must be done with the emergency stop button released and with the power to the hoist switched on.

WARNING! UNCONTROLLED MOVEMENT HAZARD

Releasing the emergency stop button and operating the product when it is unsafe could cause serious injury or death.

Never release the emergency stop button and operate the product until you are sure that it is safe to do so.

1. **Check the warning devices**
   Before starting to use the equipment, check that all warning devices (such as indicator lights, LEDs, displays, gongs, bells, alarm horns, alarm sirens, and beacon lights) work correctly.
2. **Set up the controller**
   Set up the controller. For instructions, see chapter Setting up the controller.
3. **Check the operating directions**
   Check that all movements correspond to directions that are given in the controller labels. Start the checking with the low speed.
4. **Check the brakes**
   Check that the brakes operate in all directions and that the speed increases as it should do in relation to the control.
5. **Check the noises**
   Listen for unusual noises.
6. **Check the mechanical limit switch operation**
   Check the upper and lower mechanical limit switches.
   1. Check the condition of the rubber part on top of the hook. The rubber parts activate the mechanical upper and lower limit switches on the hoist. If a rubber part is damaged or not in place, the limit switch does not function correctly.
   2. Check the correct operation of the limit switches by raising and lowering the hook at low speed. When doing the check, drive the chain from one end to the other.

7. **Check the geared limit switch operation (if equipped)**
   If the hoist is equipped with a rotating geared limit switch, check the operation of the limit switch. The cutting points (upper and lower limits) of the geared limit switch must be adjusted before starting to operate the hoist.
   1. First check the operation of the limit switch. For instructions, see chapter Testing the hoist without load.
   2. After checking the operation of the limit switch, adjust the upper and lower limits. For instructions, see chapter Adjusting the rotating geared limit switch. If the limit switches cannot be adjusted, the rotating geared limit switch must be replaced.
8. **Check the hook safety latch**
   Check to ensure that the hook safety latch is in place on the hook. Check that the hook safety latch is in good condition and that it closes automatically.

6.3 Starting the equipment

6.3.1 Setting up the controller

WARNING! UNCONTROLLED MOVEMENT HAZARD

Releasing the emergency stop button and driving the hoist when it is unsafe can cause serious injury or death.

Never release the emergency stop button and drive the product until you are sure that it is safe to do so.

1. Make sure that the main isolation switch is in the position ON.
   The hoist becomes operational (energized) only after connection between the product and controller has been established.
2. If applicable, use the key switch to turn on the controller.
3. To prepare the controller for operation, release the emergency stop button.
   To release the emergency stop button, turn it clockwise. If the emergency stop button is a push-pull type button, release it by lifting the button up to the raised position.
4. Energize the product by pressing the start push button (if equipped).

The controller is ready for the operational checks.

6.3.2 Operational checks

The operator must check operation of the emergency limit stop device when the operator starts work. The previous does not apply to a slipping clutch as an emergency limit stop device which does not need to be checked when starting work. Chain hoists are fitted with a slipping clutch as an emergency limit stop device which does not need to be checked by the crane operator. Therefore, a device to bypass the limit switches which are approached during normal operation is not fitted.

The following main functions of the machine must be checked before work begins.

Activity	Section	Check
Check the emergency stop button.	-	x
Check the 7-segment display.	"7-segment display for operating status and fault display" "Display of software version, operating hours, number of cycles"	x
Check chain lubrication. (In arduous conditions, the chain must be lubricated more frequently.)	"Available chains"	x
Check the operation of the lifting-motion operating limit switch.	"Checking the operating limit switches"	x
Check the cut-off buffer, the cut-off spring, and the operating limit switch actuator.	"Checking the cut-off buffers and cut-off springs"	x

Activity	Section	Check
Check the cable and the controller housing for damage.	-	x
Activity Section Check	-	x
Check the hook and the hook safety latch.	"Load hook dimensions and wear"	x

6.4 Safe load handling practices

⚠ WARNING

FALLING LOAD HAZARD

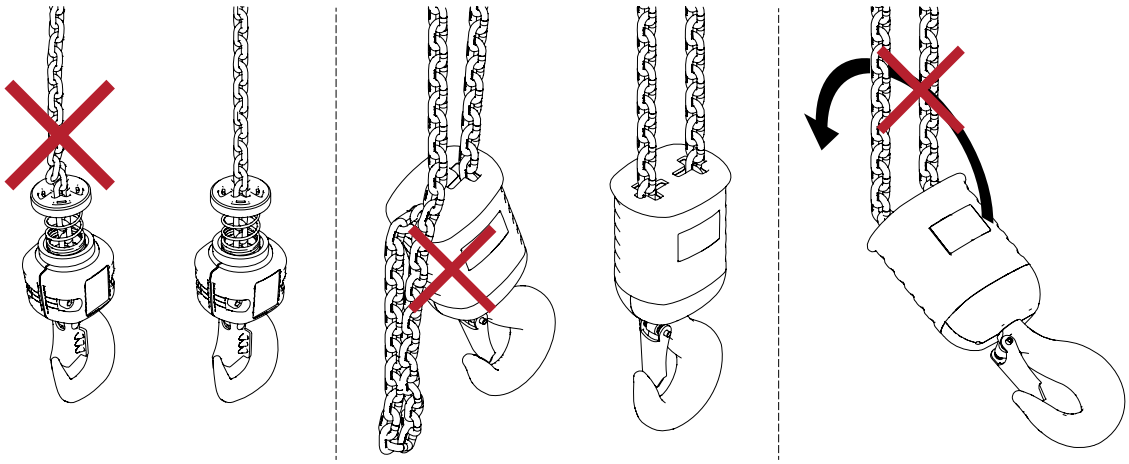
Knots or blockages in the chain can cause the chain to break and the load to fall. Falling loads can cause death, serious injury, or property damage.

Prevent knots and blockages in slack chain before lifting a load.

To prevent the chain from slackening, do not place the hook on a surface.

Do not let the hook in 2-fall chain hoists rotate between the chains.

Remove knots, blockages, and slack chain in both 1-fall and 2-fall chain hoists before attaching a load.



6.4.1 Load evaluation

⚠ WARNING

FALLING LOAD HAZARD

Lifting a load that exceeds the rated capacity of the machine and lifting accessories can cause the load to fall, which can cause death, serious injury, or property damage.

Never attempt to lift a load that is heavier than the rated capacity of the machine.

Never use an overload device to determine whether the load can be lifted.

To prevent overloading, determine the weight of the load before lifting. Lift the load only when you are sure that the weight of the load does not exceed the rated capacity of the product and accessories. Do not use the overload device of the product to determine if the load can be lifted.

6.4.2 Attaching the load

⚠ WARNING

FALLING LOAD HAZARD

Improper attachment of the load can cause death, serious injury, or property damage.

Always follow instructions provided by the lifting device manufacturer when using non-fixed load-lifting attachments.

Never use the ropes, chains, or belts of the product as a sling to attach to the load.

The load is usually attached to the product with some kind of non-fixed load-lifting attachment. The most common non-fixed load-lifting attachments are chains, wire rope slings, and lifting belts. The operator must select a non-fixed load-lifting attachment that is designed for the load.

6.4.2.1 Lockable hook

With lockable hook block, it is possible to lock the hook forging in steps of 90 degrees. Lockable hook helps to prevent load handling problems that are cause by load rotation.

6.4.3 Handling a load

Correct load handling allows you to move loads quickly and safely.

⚠ WARNING

PERSONAL INJURY HAZARD

Lifting or transporting people can cause death or serious injury.

Never use the machine for lifting or transporting people.

⚠ WARNING

COLLISION HAZARD

Failure to follow safe load handling practices can cause death, serious injury, or property damage.

Handle the load safely at all times. Ensure that the hook, the load, or the machine and its moving parts do not collide with objects or people.

1. To avoid damage to the hook, position lifting accessories on the load bearing surface of the hook. That is, the lowest point of the hook. Forces on ramshorn hooks must be equal on both load bearing surfaces.
2. Ensure that the hook safety latches are closed. Check that the hook safety latch is not subjected to any force by the load.
3. Check that the weight of the load is on the center line of the hook forging so that the load does not bend the hook shank.
4. Check that the load is balanced and safely fastened at the lifting points.
   The load must not be able to slide, slip, or detach itself when suspended.
5. Ensure that the hoist is positioned directly above the load so that there are no side-pulling forces.
6. Ensure that you have a clear view from the operating position. Remove any visual obstructions.
7. Drive carefully and reduce the speed when approaching the safety limits.

- Avoid short, jerky motions. Unnecessary short starts cause the hoisting motor to overheat quickly.
- Do not switch the controller back and forth unnecessarily because it causes wear.
- Do not swing the load intentionally.
- Do not use the mechanical limit switches as operational end stops by always driving the hook up to the highest or down to the lowest position.
- To avoid damage to the rubber part that activates the mechanical upper and lower limit switches, do not drive the hook up to the upper limit and leave it at that position for a longer time.

NOTICE

Incorrect handling of the load could damage the product or load.

Never drag a load or pull it from the side.

Never try to lift a load with the tip of the hook.

Never add any load to a hook that is already loaded.

Never twist the load chains.

NOTICE

Inattention could cause the load to collide with an obstacle or fall from the lifting device, which can damage the load or work site.

Observe the load at all times while it is in motion.

Never leave a load hanging on the lifting device unattended.

NOTICE

Using the mechanical limit switches as operational end stops could damage the product or load and lead to dangerous situations or accidents.

Do not always drive the hook up to the highest or down to the lowest position. It is not recommended to use the mechanical limit switches as operational end stops.

NOTICE

Leaving the hook at the upper limit damages the rubber part that activates the mechanical upper and lower limit switches.

Do not drive the hook up to the upper limit and leave it at that position for a longer time.

6.4.4 Load balancing

⚠ WARNING

PERSONAL INJURY HAZARD

Trying to balance an unbalanced load with your hands can cause death or serious injury.

Never try to balance an unbalanced load with your hands.

Lower the load and adjust the lifting point.

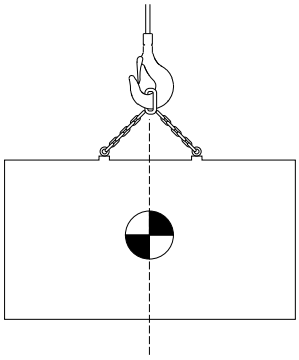
When you start to lift a load, check that is it properly balanced before lifting it high off the ground. If the load is not balanced, lower it down and adjust the lifting point.

The hook, slings, and harnesses must be positioned so that the pulling force of the product lies on the center of gravity of the load.

Lifting centrally balanced loads

The center of gravity is usually in line with the center of the load.

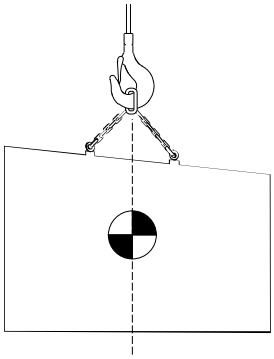
As long as the contents of the container cannot move around, the balance of the load stays the same.



Lifting off-center balanced loads

The center of gravity of an off-center balanced load is usually towards the heavier end of the load.

As long as the contents of the container cannot move around, the balance of the load stays the same.



6.4.5 Shock loading

The products and accessories are designed to take up the weight of loads gradually and steadily. They are not designed to withstand sudden increases or decreases in the apparent weight of the load. Shock loading can occur in any situation where the load on the hoist suddenly increases or decreases.

Shock loading can occur in many different ways. Here are some examples:

- Change in load balance can suddenly pull on the lifting medium, such as chain or rope.
- If the load is unstable, it can exert sudden force on the lifting medium. Contents of containers should be securely fastened so that they cannot move around during lifting.
- Sudden loss of the load can cause the trolley or hoist to jump and lead to derailment.

WARNING! MACHINE MALFUNCTION HAZARD

Using defective products can cause death or serious injury.

After a shock load, do not use the products until an experienced service technician authorized by the manufacturer or manufacturer's representative has determined that the products can be safely used.

NOTICE

Shock loading can damage the product or the load.

Avoid shock loading.

6.4.6 Load swing

The operator must use the correct techniques to properly control the load and prevent uncontrolled movements such as load swing or rotation. If the load tends to rotate or swing, a third person can guide the load with a tag line, if it is safe.

WARNING! CRUSHING HAZARD

Your hands or body could get crushed between the load and an obstacle or wall, which can cause death or serious injury.

Guiding or steadying suspended loads directly with your hands is prohibited. Use a tag line to guide the load or a more suitable lifting device.

Sudden changes in speed or direction of the trolley or bridge movements cause load swing. When starting up or accelerating, the load lags behind the bridge or trolley. When stopping or decelerating, the load tends to swing ahead and pull on the equipment. If the equipment moves at high speed and then decelerates quickly, this can result in violent load swing. The load swings further on a long lifting medium than on a short one.

6.4.6.1 Preventing load swing

⚠ WARNING

CRUSHING HAZARD

Your hands or body could get crushed between the load and an obstacle or wall, which can cause death or serious injury.

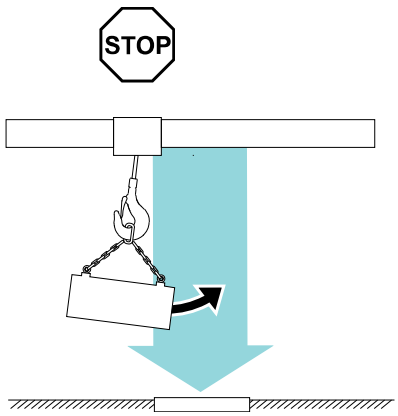
A swinging load moves with considerable force. Never try to stop a swinging load with your hands.

You can prevent or minimize load swing in several ways:

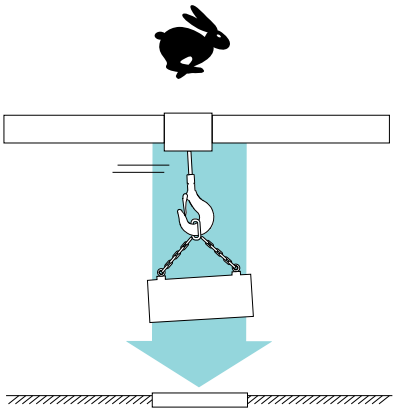
- Accelerate and decelerate as gently as possible.
- Move the equipment at a speed appropriate for the load. Higher speeds increase the likelihood of load swing.
- Transport the load close to the hoisting machinery, so that the lifting medium is short.
- Stop the equipment before you change direction.

To prevent load swing, you can take advantage of the pull of the load when you bring it to a stop:

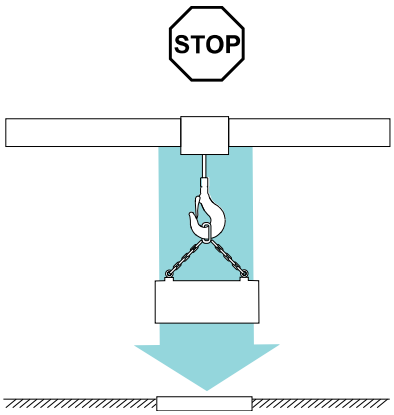
1. Anticipate the swing of the load and stop the equipment just before the setting point of the load.



2. When the load is directly over the setting point, accelerate the equipment so that it catches up with the load.



3. Stop over the setting point. You can stop both the load and the equipment simultaneously over the setting point.



NOTE ***You may have to repeat these actions several times to completely eliminate the load swing.***

6.5 Controlling the equipment

6.5.1 Picking up the load

- The load handling attachment and load must be flexibly suspended. Rigid connections cause uncontrolled forces to be transmitted and lead to fatigue fracture. To protect the chain from unwanted torsion when the load turns, movement of the hook assembly or bottom block must not be restricted.
- The bottom block must not be twisted or turned over for 2/1 reeving arrangements, chain links facing the same direction must be arranged opposite each other without being twisted.
- When attaching the load, ensure that the load or load attachment does not slip off the hook and that the load does not fall over, fall apart, slip, or roll off when it is picked up or set down.
- When the load is lifted, the hook must move to an upright position to ensure that the hook safety latch is not subjected to a load by the load handling slings and, as a result, damaged.
- Do not use the equipment to transport persons.
- The load capacity that is specified on the load capacity plate indicates the maximum permissible load, which must not be exceeded. This is the sum of the lifted load and the load handling attachment. Only approved load handling attachments may be used. The load capacity of the load handling attachment must not be exceeded.

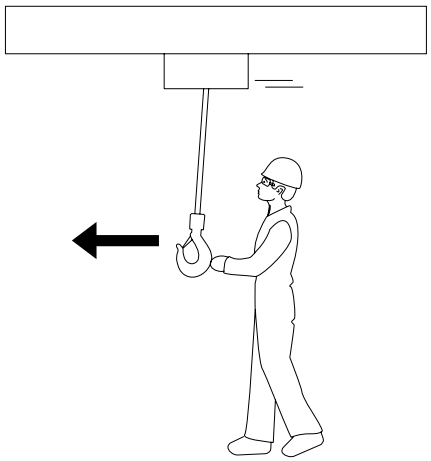
6.5.2 Moving loads

- For lifting and travel motions, adopt a position that provides a clear view of the danger zone or use a second person who can observe the danger zone.
- Push-travel hoists, trolleys, or cranes may only be moved by pulling or pushing the load, bottom block, or load hook assembly. Never pull on the pendant controller.
- Push-travel loads must be guided by hand. The load must never be thrown or hurled.
- Do not handle suspended loads over the persons.
- Do not pull or drag suspended loads at an angle. The chain drive mechanism may be damaged at angles of 4° or more.
- Do not pull free fixed or obstructed loads with the chain hoist.
- Do not leave suspended loads unsupervised.
- Do not allow the chain to pass over edges and do not use the chain as a load bearing sling.
- Do not allow loads to drop when the chain is not under load.
- Vibration from the load being transported (for example, when the load is deposited on vibrating machinery) must not be transmitted to the lifting equipment.
- Chain hoists must be suspended in such a way that they do not collide with stationary equipment and structures, for example, when slewing cranes are turned.
- Do not pick up the load at full speed.
- Avoid inching (for example, giving short pulses to the motor).

6.6 Controlling load movements

6.6.1 Moving the manual push trolley

1. Move the trolley by pushing on the load or hook. Do not on push on the chain or pendant cable.



NOTE ***Never leave an unattended load hanging from the hook.***

WARNING! CRUSHING HAZARD

Never pull on the load or chain. Pulling on the load or chain could cause a crushing hazard. You can get trapped and crushed, for example, between a wall and the moving load, which could cause serious injury or death.

Only move the trolley by pushing on the load or hook.

WARNING! ENTANGLEMENT HAZARD

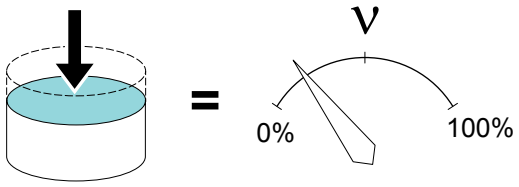
Safety gloves or other clothes may get entangled with the load or chain, which could cause serious injury.

Be careful when handling the movements by hand.

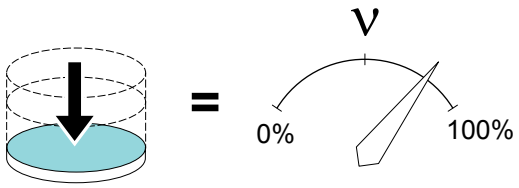
6.6.2 Controlling speed with the controller

Pendant controllers are usually equipped with two-stage control buttons for moving the load.

1. To activate the creep speed (creep lifting, slow travel), press a button until the button reaches the first step.



2. To activate the fast speed (fast lifting, fast travel), press a button until the button reaches the second step.



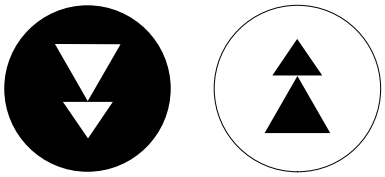
WARNING! CRUSHING HAZARD

If acceleration and deceleration are not taken into account, there is a risk that the movement does not start and stop like intended. This can result in, for example, being crushed by the load which can cause death or serious injury.

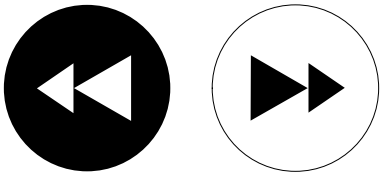
Take into account the starting and stopping distances before you make movements.

6.6.3 Moving the load with the controller

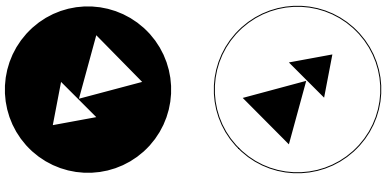
1. For lifting or lowering, press the buttons to lift or lower the load.



2. For moving the trolley, press the buttons to move the chain hoist right or left along the crane bridge.



3. For moving the bridge, press the buttons to move the crane bridge forwards or backwards along the runway beam.



6.6.4 Lifting a load with push button control

Attach the load securely to the lifting device and position the hoisting machinery directly above the load. If the controller has a hoist or crane selection switch, be sure to select the correct hoist or crane.

⚠ WARNING

FALLING LOAD HAZARD

Improperly attached load could fall which could cause death, serious injury, or property damage.

Before lifting, ensure that the load is properly attached.

⚠ WARNING

HAND ENTANGLEMENT HAZARD

Catching or trapping your hands could cause death or serious injury.

Never touch the lifting device, ropes, chains, belts, or lifting accessory during lifting.

NOTICE **Limit switches are safety devices. Do not use them for controlling movements. Always stop the movement with the controller.**

NOTICE **Do not attempt to lift a load that is fastened to the ground or to a base which prevents it from being lifted.**

1. Make sure that everything is ready for lifting.
2. If an alarm horn button is available, press it to warn people nearby that a load will be moved.
3. Press the up push button to slowly remove slack from the hook or lifting accessory before you lift the load from the ground.
4. Continue to press the up push button until the load is off the ground.
5. Press the up push button further to lift the load at a higher speed.
6. Release the up push button gradually to stop lifting.
   To avoid collisions with objects, do not lift the load higher than needed.

6.6.5 Lowering a load with push button control

⚠ WARNING

CRUSHING HAZARD

Lowering load could cause death or serious injury to persons working or moving under the load.

Make sure that nobody is underneath or nearby the load.

NOTICE **To avoid damage to the product, do not allow the lifting device to hit the landed load.**

1. Make sure that the landing area is clear of people and obstacles.
2. If an alarm horn button is available, press it to warn people nearby that a load will be moved.
3. Press the down push button to lower the load.

4. To decrease the lowering speed, gradually release the down push button when the load approaches the ground.
   Take into account the possible preset deceleration ramp.
5. Fully release the down push button when there is slack in the lifting accessory but before the lifting device hits the load.

6.6.6 Combining the movements

It is possible to combine trolley traversing, lifting, and lowering movements but there are limitations to the combined movements:

- Before starting to combine movements, ensure that you understand how the crane behaves in each direction individually. Different cranes have different driving characteristics.
- To reduce load swing, do not combine vertical movements (lifting or lowering) with horizontal movements (trolley traversing).
- Do not attempt to coordinate more movements than you can safely and confidently control. To safely control simultaneous actions, requires good observation, concentration, and coordination skills.

⚠ WARNING

PERSONAL INJURY HAZARD

Failing to observe the movement of the crane and load could cause serious injury or death.

Do not allow anything to divert your attention from the load and the movement of the crane.

NOTICE **Lowering the load during trolley movements accelerates load swing.**

6.6.7 Detaching a load

1. Detach the load from the hook by hand.
   Never try to use the product movements to detach the load from the hook. The safety latch on the hook should prevent this.

6.7 Slipping clutch operation

The chain hoist is equipped with a slipping clutch that activates automatically when an overload occurs. If an attached load is heavier than the rated hoist capacity, the slipping clutch limits the torque, which the motor of the chain hoist can apply to the lifting gear, and prevents lifting the load.

If the slipping clutch activates already at the rated capacity of the chain hoist, the friction force must be measured and readjusted, if needed. A qualified service technician must do the measurement and possible readjustment of the friction force. For more information, see chapter Adjusting the slipping clutch.

Frequency converter driven chain hoists can detect the activation of the slipping clutch by comparing the motor frequency and the speed that is measured at the pulse wheel. If they differ too much, the motor of the chain hoist is switched off.

6.8 Hoisting limit switch operation

When the mechanical limit switch is activated, it is only possible to move the hook in the opposite direction. The limit stops at both ends of the chain limit the lifting height. The brake activates automatically, and the power to the motor is turned off. Springs and buffers activate the contact points and stop the hook motion.

6.9 Shutting down the equipment

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Operating a defective product can cause death or serious injury.

Remove the product from service immediately if it is defective.

After every working shift, do the following procedure and checks to ensure that the product is left in safe condition.

1. Check that there is no load on the hook or the lifting device.
2. Stop the hook in a position where it does not present a hazard to people or traffic. Preferably leave the hook above head height, but not at the upper limit.
3. If applicable, park the product in an approved parking area.
4. Engage the emergency stop button.
5. Turn off all controls on the controller.
6. From the main isolation switch, turn off all power to the product.
7. If applicable, close the mechanical brakes, such as rail clamps and storm locks.
8. Check the product for any visible damage.
9. Report all observed defects and abnormalities in equipment or operation to the supervisor and to the next operator.

7 Maintenance

7.1 Safety during maintenance

⚠ WARNING

SPECIALIST SKILLS REQUIRED

Incompetent maintenance work can be unsafe, or cause unsafe and unreliable operation of the product that can cause death, serious injury, or property damage.

Installation must be carried out only by authorized service personnel or an experienced service technician who is authorized by the manufacturer or representative of the manufacturer.

⚠ WARNING

ELECTRIC SHOCK HAZARD

Even if the main isolation switch is off, electrical components can have stored electrical energy. Contact with the electrical energy can cause death, serious injury, or property damage.

Verify that there is no voltage with approved voltage test equipment and follow the component-specific waiting times.

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Unsuitable spare parts, materials, and lubricants can result in malfunctions that can cause death, serious injury, or property damage.

Use only original spare parts, materials, and lubricants that are approved by the manufacturer or representative of the manufacturer.

Do not modify the product without permission of the manufacturer. Any modifications to the product structures or performance values can be made only after they are approved by the product manufacturer.

NOTE ***Some maintenance tasks require two people.***

These instructions are general guidelines for safety:

- Observe local safety regulations.
- Make sure that you have all the appropriate personal protective equipment. Use them when required.
- Follow the fall protection procedures.
- Prevent access to the area from unauthorized persons and bystanders.
- Ensure that the secured area is spacious enough to prevent injuries that could occur if components or tools fall.
- Follow lockout-tagout-tryout procedure.
- Use hand lines that are securely attached to the building structure to lift and lower materials and tools. When you work in high places, use safety equipment to make sure that objects do not fall.
- Ensure that safety devices work properly so that they provide protection against human error.
- Beware of hot components. Some components, such as motors, can become hot in use. Check that components are cool before you perform maintenance.
- Do not disassemble components further than instructed.

7.2 Maintenance preparation

7.2.1 Maintenance environment

- Prevent unauthorized persons and bystanders from walking on or below the work site. To prevent injuries from possible falling components or tools, ensure that the secured area is spacious enough.
- Ensure that there is no possibility for personnel or body parts to be struck, crushed, or compressed by moving machinery:
  - Secure the area so that maintenance personnel are not at risk from the movements of machines, automatic doors, or adjacent cranes at the installation site.
  - Ensure that products cannot start accidentally or move during maintenance.
  - To reduce the risks, maintain sufficient space in the area.
  - To prevent entrapment, shield parts that move with guards.
  - Be prepared in case the equipment moves in the wrong direction during tests.
  - When an aerial work platform is in use, there must be an additional person to observe the environment and ensure safety during maintenance and inspection activities.
- Adequate lighting must be available according to local regulations. For example, EN 12464.

7.2.2 Preparing for maintenance

1. Familiarize yourself with the product and its user instructions.
2. Find out the location of the main isolation switch and the emergency stop buttons.
3. Choose a safe working location. Move the product to a location where it causes the least disturbance and where you can access it easily.
4. Inform that the product is under maintenance and that it is not in operation.
5. Make sure that there is no load on the hook. If there is any chance that you open the hoisting brake during maintenance, lower the hook on the floor.
6. If applicable, check the parameters of the condition monitoring unit before you switch off the power supply.

WARNING! UNEXPECTED MOVEMENT HAZARD

Unexpected movement when you are on the service platform or manlift can cause death or severe injury.

When you enter the service platform or use a manlift to check the parameters, take precautions. Take the radio controller with you or make sure that the pendant controller is held by service personnel.

7. Turn off all controllers and main isolation switches before you start maintenance work.
8. Lock out and tag out the product power source if necessary, in accordance with local regulations. For more information, see "Lockout-tagout-tryout procedure".
9. To make sure that power is disconnected, measure between the phases and between each phase to ground.

7.3 About maintenance

7.3.1 Maintenance intervals

The owner or operator of a product has the responsibility to carry out proper and regular inspections to ensure the safe operation of the product. The periodic inspections must be carried out according to the instructions of the manufacturer. The owner of the product must keep a record of the performed inspections and their related findings.

Inspection intervals that provided in the instructions are general guidelines. Depending on the use of the product, the required inspection intervals can also be shorter than instructed here.

If the working environment or product use changes, the inspection and maintenance intervals must be revised. Products that are used under harsh conditions may require shorter inspection and maintenance intervals. For a tailored service agreement, consult the manufacturer or representative of the manufacturer.

Periodic inspections must be done according to local regulations.

WARNING! MACHINE MALFUNCTION HAZARD

Defects or abnormalities can result in malfunctions that can cause death, serious injury, or property damage.

Correct any defects and abnormalities that are detected during the periodic inspections according to instructions.

7.3.2 Service personnel

Only authorized service personnel or an experienced service technician that is authorized by the manufacturer or the manufacturer's representative may perform the detailed maintenance inspections. The inspections must be performed according to the inspection and maintenance plan that is provided by the manufacturer. The service personnel that maintain the products must be authorized by the original manufacturer or the manufacturer's representative.

The owner or operator of the product must perform the daily checks and, if necessary, daily lubrication. The service personnel that are authorized by the owner may also lubricate the product at necessary intervals.

NOTE ***Mechanical and electrical maintenance work requires special skills and tools to ensure safe and reliable operation of the product. Maintenance work must be carried out only by authorized service personnel or an experienced service technician who is authorized by the product manufacturer or the manufacturer's representative.***

7.3.3 Measures for achieving safe working periods in Germany

The safety and health provisions of the EC Machinery Directive make it a legal requirement to eliminate special hazards which may be caused, for example, by fatigue and aging.

This requirement is also reflected by the rules and regulations of the German Social Accident Insurance (DGUV), for more information, see "Regulation 54, section 23 (4)".

An owner of serial hoist units is obliged to determine the actual duration of service of the chain hoist based on the operating hours, load spectra and/or recording factors. This is based on FEM 9.755: Measures for achieving safe working periods for motorized serial hoist units (S.W.P.).

The objective of this rule is to determine measures for achieving safe working periods over the entire duration of service, although, according to the state-of-the-art, the chain hoists are designed for specific periods of operation.

Premature failure cannot, however, be ruled out.

The following items have been taken from FEM rule 9.755 regarding the electric chain hoist:

1. Recording the mode of operation is divided into three classes. The owner responsible for recording and documenting information in the log book. The information must be documented at least once for each year during the checks to be performed (ISO/DIS 9927/1).
2. Operating time T_i (number of operating hours) can be estimated or read on an operating time counter.
3. Load k_{mi} (load spectrum) must be estimated, if necessary.

4. **Recording with devices (for example, load spectrum recorder):** Load spectra and the corresponding operating hours are recorded by suitable devices. The actual duration of service S is obtained by evaluating the recorded data.

   When information is recorded by devices, recording factor f = 1.0. (that is, the value is used without any changes, FEM 9.755, 3.1.)
5. **Documentation and suitable counting devices (for example, operating time counter):** The actual load spectra and the load spectrum factors (Km1 to Km4) and the relevant operating hours T_i are documented by the owner. Serial hoist units are equipped with a suitable counting device (for time or distance) to enable the effective operating hours T_i to be calculated. Serial hoist units are equipped with a lifted load limiter (overload protection) (slipping clutch, electric overload cut-off, and so on).

   The value that is determined for operating time T_i and documented in the log book using an operating time counter must be multiplied by the type of recording factor f = 1.1 (FEM 9.755, 3.2 and 4.2).
6. **Documentation without counting devices:** The owner documents the load spectra and operating hours according to item 5., however without suitable counting devices.

   The value determined for the estimated load spectra and operating hours based on documented production must be multiplied by the type of recording factor f = 1.2 (FEM 9.755, 3.3 and 4.3).
7. For unknown operating hours and loads[1)2)], the estimated value (according to the duty class and age of the chain hoist) must be multiplied by the type of recording factor f = 1.5 (FEM 9.755, 6.2.1 and 6.2.2).
8. Actual duration of service S is calculated as: $S = k_{mi} \times T_i \times f$
9. A general overhaul must be carried out when the theoretical duration of service is reached.
10. All checks and inspections and the general overhaul must be arranged by the owner of the chain hoist.

1) The following assumptions are made for periods where the use or mode of operation is unknown: The operating conditions are assumed as $K_m = 0.25$. The annual operating time is assumed to be 250 hours (1 hour for each day x 250 days for each year).

2) For periods of non-use, the following assumptions are made as a precaution: The operating conditions are theoretically specified as $K_m = 0.125$. The theoretical annual operating time is assumed to be 125 hours (0.5 hour for each day x 250 days per year).

For electric chain hoists classified according to FEM 9.511, the following theoretical durations of service apply (converted into full load hours):

Duty class/Group of mechanisms	M2/1Cm	M3/1Bm	M4/1Am	M5/2m	M5+/2m+	M6/3m	M7/4m	M8/5m
Duration of service and full load hours [h]	200	400	800	1600	1900	3200	6300	12500

The actual duration of service is considerably increased if the chain hoist is only operated with partial loads. For a chain hoist operated on average with half load, for example, this results in an 8-fold increase in the actual duration of service with operation at one quarter of the full load, a 64-fold increase.

7.3.3.1 Calculating actual duration of service S according to FEM 9.755 (Germany)

The actual duration of service S of the electric chain hoist can be determined as follows:

$S = k_{mi} \times T_i \times f$

k_{mi}: Actual load spectrum factor

T_i: Number of operating hours

f: factor depending on the type of recording

Calculating the number of hours of operation (operating time) T_i (by the owner)

The operating time can be calculated by an operating time counter or according to the following method:

Operating time for each inspection interval:

$$T_i = \frac{\text{(lifting + lowering) x cycles/h x operating time/day x days/inspection interval}}{\text{60 x lifting speed}}$$

Only lifting and lowering motions are counted, long, and cross-travel times are not considered.

Estimating load spectrum factor k_{mi} (by the owner)

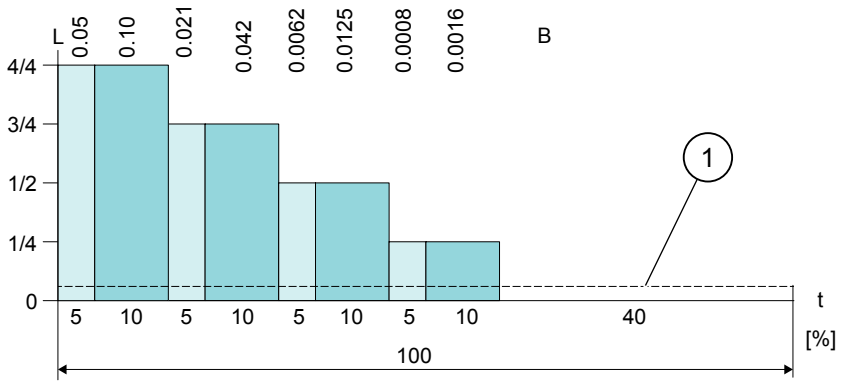
To simplify estimation, each type of load can be grouped into k_m load spectrum modules. The types of load are simplified and quoted as 1/4, 1/2, 3/4 load and full load.

Dead loads are added to the loads. Loads up to 20% of the rated load capacity are not considered.

The operating time for each type of load is divided up within the inspection interval (for example, one year) in terms of percentage.

The following bar diagram shows the k_m load spectrum modules for the load conditions without load up to full load in time increments of 5%–10%. Larger shares of the time period must be correspondingly added. Load spectrum factor k_{mi} can be obtained by adding the individual k_m load spectrum modules.

k_{mi} load spectrum factor diagram



B = Loading

L = Load

t = Time

1. Dead load

Factor depending on the type of recording

Recording operating hours and load spectrum	Recording factor [f]
Operating hours recorded using an operating time counter and the load spectrum recorded with a load spectrum recorder and documented in the log book.	1.0
Value for operating time T_i determined with an operating time counter and load spectra documented in the log book.	1.1
Load spectra and operating hours documented without suitable counting devices.	1.2
Estimated value for unknown operating hours and loading (depending on duty class and age of the chain hoist)	1.5

7.3.3.2 Example of duration of service S according to FEM 9.755 (Germany) for chain hoist size 10 1250 kg 1/1 H5 V8/2 in 1Am

In the following example, f = 1.1 is assumed as the factor for the recording method.

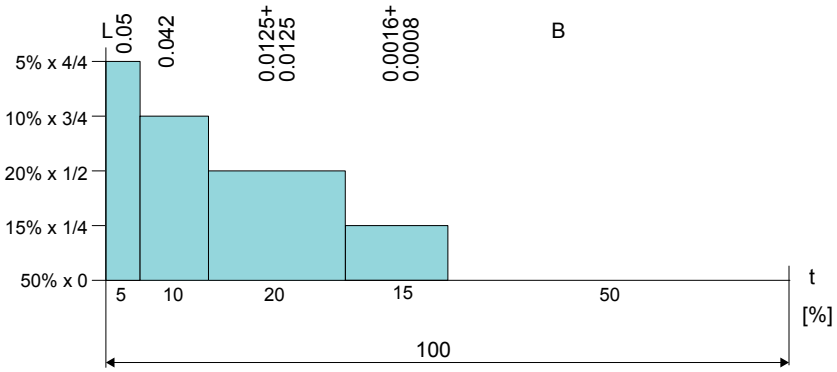
Lifting speed	8/2 m/min
No. of cycles per hour	10 cycles
Lifting and lowering	(2+2) m/cycle = 4 m/cycle
Operating time per day	8 hours
Days per inspection interval	250 days

Calculation

$$T_i = \frac{10 \times 4 \times 8 \times 250}{60 \times 8}$$

With operating time read: $T_i = 167$

In the operating time as read above, the chain hoist has transported the following loads:



B = Loading

L = Load

t = Time

Adding the load spectrum modules k_m together results in load spectrum factor $k_{mi} = 0.119$

Thus, the actual duration of service amounts to S [h] = k_{mi} x T_i x f
- With operating time read 0.119 x 167 x 1.1 = 21.9

For classification in FEM group of mechanisms 1Am (see chain hoist data plate) with a theoretical duration ofservice of 800 hours (see following table) the hoist has a theoretical remaining duration of service of 778.1 hours.

Documentation:

Enter these values in your log book or crane log book. This entry may appear as follows:

Date		Operating hours	Load [%] km factor					Load factor		Actual duration of service	Theoretical duration of service	Remaining use
From	To	T_i value [h]	full	3/4	1/2	1/4	none	k_{mi}	f	S [h]	D [h] Group of mechanisms	D–S [h]
3.1.-	30.12.-	Read 167	5	10	20	15	50	0.119	1.1	21.9	800/1Am	778.1
			0.05	0.042	0.025	0.002	-					

7.3.4 Measures for achieving safe working periods according to ISO 12482

The safety and health provisions of the EC Machinery Directive make it a legal requirement to eliminate special hazards which may be caused, for example, by fatigue and aging.

An owner of serial hoist units is obliged to determine the actual duration of service of the chain hoist based on the operating hours, load spectra and/or recording factors.

According to ISO 12482, the group of mechanisms and operating conditions of the equipment must be regularly checked for changes so that the remaining service life can be corrected, if necessary. ISO 12482 uses the term "(DWP) Design Working Period", that is, the (theoretical) total service life for which the hoist unit is rated.

The following items have been taken from ISO 12482 with reference to electric chain hoists:

1. The actual duration of service determined on the basis of operating time and load must be documented at least once per year.
2. Operating time T_i (number of operating hours) can be estimated or read on an operating time counter.
3. Load k_{mi} (load spectrum) must be estimated.
4. The value determined for operating time T_i and documented in the log book using an operating time counter must be multiplied by the recording factor f = 1.1 (ISO 12482, 4.3).
5. The value determined for the estimated operating hours and load spectrum based on documented production must be multiplied by the recording factor f = 1.2 (ISO 12482, 4.3).
6. The value determined for the estimated operating hours and load spectrum based on undocumented production must be multiplied by the recording factor f = 1.3 (ISO 12482, 4.3).
7. For unknown operating hours and loads, the estimated value (according to the duty class and age of the chain hoist) must be multiplied by the recording factor f = 1.5 (ISO 12482, 4.3).
8. The actual duration of service S is calculated as: S = k_{mi} x Ti x f
9. A general overhaul must be carried out when the theoretical duration of service is reached.
10. All checks and inspections and the general overhaul must be arranged by the owner of the chain hoist.

For electric chain hoists classified according to FEM 9.511, the following theoretical durations of service apply (converted into full load hours):

Duty class/Group of mechanisms	M2/1Cm	M3/1Bm	M4/1Am	M5/2m	M5+/2m+	M6/3m	M7/4m	M8/5m
Duration of service and full load hours [h]	200	400	800	1600	1900	3200	6300	12500

The actual duration of service is considerably increased if the chain hoist is only operated with partial loads. For a chain hoist operated on average with half load, for example, this results in an 8-fold increase in the actual duration of service with operation at one quarter of the full load, a 64-fold increase.

7.3.4.1 Determining the remaining service life according to ISO 12482

The remaining service life A of the electric chain hoist can be determined as follows:

$S = k_{mi} \times T_i \times f$

k_{mi}: Actual load spectrum factor

T_i: Number of operating hours

f: factor depending on the type of recording

Calculating or estimating the operating hours (operating time) T_i (by the owner)

The operating time can be estimated by an operating time counter or according to the following method:

Estimated operating time per inspection interval:

$$T_i = \frac{\text{(lifting + lowering) x cycles/h x operating time/day x days/inspection interval}}{\text{60 x lifting speed}}$$

Only lifting and lowering motions are counted, long, and cross-travel times are not considered.

Estimating load spectrum factor k_{mi} (by the owner)

To simplify, each type of load can be calculated using km load spectrum modules based on the load spectra in ISO 4301-1.

Table 3. Based on table B1 on page 10 of ISO 12482, however, with values for 5% and 10% for simplified calculation

Load	k_{mi} value for 5% operating time	k_{mi} value for 10% operating time	Calculated k_{mi} value
4/4 full load	0.05	0.1	-
¾ load	0.025	0.05	-
½ load	0.0125	0.025	-
¼ load	0.0063	0.0125	-

If more precise information is available on loads and operating times resulting from estimates or records relating to use, load details can be calculated according to ISO 4301-1.

For widely differing types of use, value km should be determined more precisely with the following equation*:

*For even more detailed calculations, for example, for different operating times with and without a load in one cycle, see Annex A and B of ISO 12482.

$k_m = (b_1 + g)^3 \times c_1 + (b_2 + g)^3 \times c_2 + \ldots$

Where:

$$b_1 = \frac{\text{Partial load}}{\text{Load capacity}}$$

$$g = \frac{\text{Dead load}}{\text{Load capacity}}$$

$$c_1 = \frac{\text{Number of load cycles with this load (Partial load + dead load)}}{\text{Number of all load cycles with all loads}}$$

The values that are given in the following diagram are based on the information given in ISO 4301-1.

The types of load are simplified and quoted as 1/4, 1/2, 3/4 load and full load.

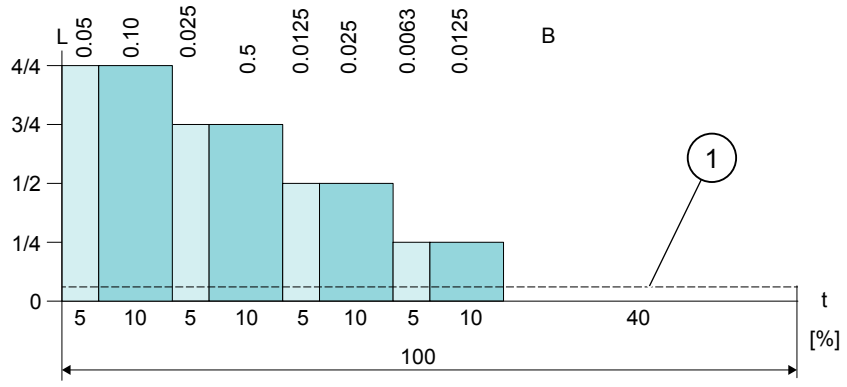
Dead loads are added to the loads. Loads up to 20% of the rated load capacity are not considered.

The operating time for each type of load is divided up within the inspection interval (for example, one year) in terms of percentage.

The following bar diagram shows the km load spectrum modules for the load conditions without load up to full load in time increments of 5 and 10%. Larger shares of the time period must be correspondingly added.

Load spectrum factor k_m can be obtained by adding together the individual km load spectrum modules.

k_{mi} load spectrum factor diagram



B = Loading

L = Load

t = Time

1. Dead load

Factor depending on the type of recording

Recording operating hours and load spectrum	Recording factor [f]
Crane operating data are recorded by a special, purpose-built system, which always operates automatically when the crane is in use. The crane operator does not have a possibility to switch off the recording system.	1.0
The crane is provided with counters that record the crane operating data. The user collects and documents operating data manually from the counters.	1.1
The crane duty history is calculated based on a regular process in which the crane is working. The crane is an integral part of the process. Process data are documented.	1.2
The crane duty history is estimated based on general production data of the site where the crane is working.	1.3
The crane duty history is incomplete or unknown (for example, in the case of a second-hand crane). The operating data for calculation of the remaining safe working period are based on estimates or the assumption that usage corresponds to the classification (see also no. 5 in table 1 on page 3 of ISO 12482).	1.5

7.3.4.2 Example for determining the remaining service life according to ISO 12482 for chain hoist size 10 1250 kg 1/1 H5 V8/2 in 1Am

In the following example, f = 1.3 is assumed as the factor for the recording method, since usage data are estimated based on production data at the workplace.

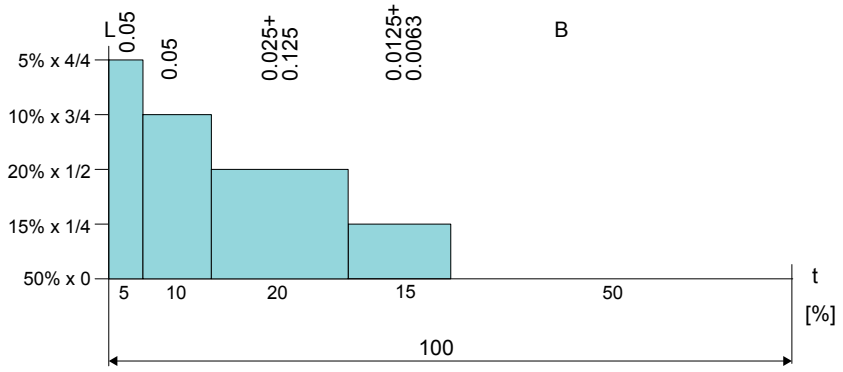
Lifting speed	8/2 m/min
No. of cycles per hour	10 cycles
Lifting and lowering	(2+2) m/cycle = 4 m/cycle
Operating time per day	8 hours
Days per inspection interval	250 days

Calculation

$$T_i = \frac{10 \times 4 \times 8 \times 250}{60 \times 8}$$

With estimated operating time: $T_i = 166.6$

In the operating time as read above, the chain hoist has transported the following loads:



B = Loading

L = Load

t = Time

Adding the load spectrum modules k_m together results in load spectrum factor k_{mi} = 0.1688

Thus, the Design Working Period amounts to A [h] = k_{mi} x T_i x f
- With estimated operating time read 0.1688 x 166.6 x 1.3 = 36.56

For classification in M4 with a theoretical duration of service of 800 hours according to the M classes of ISO 4301:2016, there is a theoretical remaining duration of service of 763.44 hours.

Documentation:

Enter these values in your log book or crane log book. This entry may appear as follows:

Date		Operating hours	Load [%] km factor					Loading factor		Actual duration of service	Theoretical duration of service	Remaining service life
From	To	T_i value [h]	full	3/4	1/2	1/4	none	k_{mi}	f	S [h]	D [h] Group of mechanisms	D–S [h]
3.1.-	30.12.-	Read 166.6	5	10	20	15	50	0.1688	1.3	36.56	800/1Am	763.44
			0.05	0.05	0.05	0.0188	-					

7.3.5 GO general overhaul

NOTICE

The chain hoist is designed to be used for at least ten years until the first general overhaul is carried out. This is based on the condition that the specified group of mechanisms is not exceeded by the actual duration of service. When the actual duration of service has reached the theoretical duration of service relevant for the given group of mechanisms, further operation of the chain hoist is only permitted after a general overhaul has been carried out.

7.3.5.1 General overhaul in Germany according to DGVU and ISO 12482 (FEM 9.755)

The theoretical duration of service D (hours at full load h) depends on the Group of Mechanisms classification of the chain hoist. The actual duration of service should be determined every year according to ISO 12482 (FEM 9.755). You can arrange to have the actual service life that is calculated as part of the annual inspection by our after-sales service.

The owner must arrange for a GO general overhaul to be carried out when 90% of the theoretical duration of service has elapsed, if the chain hoists are correctly classified after 8 to 10 years. A GO general overhaul must be carried out by the end of the theoretical duration of service.

A general overhaul is defined as:

Inspection of the machinery for detecting all defective components and/or components and parts close to failure and the replacement of all such components and parts. Following a general overhaul, the machinery is in a condition similar to that of the same machinery in new condition as far as the principle of operation and performance values are concerned.

During the general overhaul, the following parts must be replaced in addition to the checks and work specified in the inspection and maintenance schedule:

- Gearbox housing with installed gear parts,
- Gear oil and gearbox cover with seal,
- Connecting elements,
- Shaft sealing rings, bearings, plugs,
- Brake.

The small parts (screws, washers, and so on) to be replaced when maintenance and assembly work is carried out are not listed separately.

The general overhaul carried out by the manufacturer or a specialist company that is authorized by him satisfies the requirement to be met for continued operation of the chain hoist.

Therefore, the provisions of the German Social Accident Insurance (DGUV) are satisfied.

The equipment may continue to be used when an expert engineer has entered the conditions for continued operation in the log book. Completion of the general overhaul must be confirmed in the log book and a further period of utilization in accordance with FEM 9.755 must be entered.

7.3.5.2 General information on inspection and general overhaul according to ISO 12482

A general overhaul is a combination of repair, replacement, and maintenance measures that are necessary for the continued safe use of a crane. Some items can require that measures must be taken immediately, others can be postponed. In this case, these measures must be planned according to the actual future use of the crane.

The need for and timing of a general overhaul are determined by a special assessment. The contents of a general overhaul should follow the manufacturer’s instructions.

When the first general overhaul is performed, various components have reached different stages of cumulative fatigue or wear. Depending on the type of component and stage of fatigue, the component under review will require a particular type of general overhaul activity.

A distinction is made between the following measures according to ISO 12482:

- The component is always replaced during a general overhaul, whereby replacement can also be necessary even if there are no physical signs.
- The component can be repaired, only some parts may must be replaced.
- Replacement of the components is uneconomical, in this case a complete inspection is conducted during the first general overhaul and increased shorter inspection frequency and rejection criteria are specified for the future.

The manufacturer must provide maintenance instructions for the crane containing information on inspection, repair, and replacement criteria for the components.

7.3.5.3 Theoretical duration of service

A general overhaul must be conducted if the theoretical safe working period is found to have reached 90% when the mandatory calculation of the remaining safe working period is performed every year. The theoretical duration of service D (for example, hours at full load h) depends on

the classification of the chain hoist according to ISO 4301-1/FEM 9.755. The actual duration of service should be determined every year according to ISO 12482. You can arrange to have the actual service life that is calculated as part of the annual inspection by our after-sales service.

The owner must arrange for a GO general overhaul to be carried out when 90% of the theoretical duration of service has elapsed. A GO general overhaul must be carried out by the end of the theoretical duration of service.

A general overhaul is defined as:

Inspection of the machinery for detecting all defective components and/or components and parts close to failure and the replacement of all such components and parts.

Following a general overhaul, the machinery is in a condition similar to that of the same machinery in new condition as far as the principle of operation and performance values are concerned.

During the general overhaul, the following parts must be replaced in addition to the checks and work specified in the inspection and maintenance schedule:

- Gearbox housing with installed gear parts,
- Gear oil and gearbox cover with seal,
- Connecting elements,
- Shaft sealing rings, bearings, plugs,
- Brake.

The small parts (screws, washers, and so on) to be replaced when maintenance and assembly work is carried out are not listed separately.

The general overhaul carried out by the manufacturer or a specialist company authorized by him satisfies the requirement to be met for continued operation of the chain hoist.

The equipment may continue to be used when an expert engineer has entered the conditions for continued operation in the log book. Completion of the general overhaul must be confirmed in the log book and a further period of utilization in accordance with ISO 12482 must be entered.

7.4 Basic maintenance requirements

The specified inspection and maintenance intervals apply to normal chain hoist operating conditions. For more information, see "Maintenance schedule". All wearing parts must be checked during the annual inspection.

If routine maintenance reveals that the maintenance intervals are too long, they should be adapted to the specific operating conditions.

7.4.1 Electric components

Only fuse links with the specified amperage and tripping characteristics may be used in the electric circuits. Defective fuse links must not be bridged.

7.4.2 Working on machinery or machine equipment

Pay attention to the following when working on machinery or machine equipment.

1. Wear personal protective equipment.
2. Before starting any maintenance work, switch off the mains connection switch and protect it against unauthorized or accidental reconnection to the power supply by locking it with a padlock.
3. Ensure that the chain hoist is switched off, checked that it is de-energized and, in special cases, isolated.

4. Only carry out maintenance work on the chain hoist when the load has been removed.
5. Ensure that there is sufficient freedom of movement. Keep the operating area clean and tidy. Loose parts or tools left lying around can cause accidents.
6. Stop all moving parts and ensure that they cannot start moving while maintenance work is being carried out.
7. Observe the relevant accident prevention regulations, instructions concerning appropriate use and statutory regulations for operation and maintenance.
8. Observe the relevant safety regulations (for example, VDE regulations) when repairing electric equipment.
9. Reinstall safety devices as required by relevant regulations and check them for correct operation after finishing maintenance work.

Maintenance work which is not possible from the ground may only be carried out from work stands or platforms. The danger zone below the chain hoist must be fenced off if there is a risk of falling objects.

7.4.3 Instructions for maintenance work in the course of operation

If maintenance work has to be carried out on the chain hoist in operation, special safety precautions must be taken depending on the operating situation. In each individual case, the owner or the person who is assigned by him must check whether the maintenance work may be carried out during operation without risk of personal injury and, taking into account the local conditions, must implement all necessary safety precautions.

Damaged or deformed spring clip fasteners and spring sleeves must be replaced.

Defective bolted connections must be replaced.

Make sure that operating and auxiliary materials and replaced parts are disposed of in an environmentally friendly manner.

7.4.4 After finishing maintenance work

Safety devices must be reinstalled as required by relevant regulations and checked for correct operation when maintenance work is finished.

NOTE ***Carry out a test run at partial load after the chain hoist has been fully reassembled. Make sure that the chain runs smoothly during the test run.***

7.5 Maintenance schedule

Activity	Section	Before first putting into operation	Before starting work	During the annual inspection
Check continuity of the PE conductor connection.	–	X		
Check emergency stop button.	–		X	X
Check directions of motion.	"Mains connection"	X		
Check 7-segment display.	"7-segment display for operating status and fault display" and "Display of software version, operating hours, number of cycles"	X	X	
Check chain lubrication (under arduous conditions, the chain must be lubricated more frequently).	"Available chains" and "Lubricating the chain"	X	X	X
Check operation of the **lifting-motion** operating limit switch.	"Checking the operating limit switches"	X	X	X
Check operation of the **lowering-motion** operating limit switch.	"Checking the operating limit switches"	X		X

Activity	Section	Before first putting into operation	Before starting work	During the annual inspection
Check cut-off buffer and cut-off spring or operating limit switch actuator.	"Checking the cut-off buffers and cut-off springs" and "Checking the operating limit switch actuator"	X	X	X
Check cable and controller housing for damage.	–	X	X	X
Check operation of the brake.	–	X	X	X
Check hook and hook safety latch.	"Load hook dimensions and wear"	X	X	X
Read switching cycles C	"Service life of the contactor"			X
Read operating hours to determine the remaining duration of service.	"7-segment display for operating status and fault display", "Measures for achieving safe working periods in Germany" and/or "Measures for achieving safe working periods according to ISO 12482"			X
Check electric switchgear and wiring.	-			X
Check operation of the slipping clutch.	"Checking the slipping clutch"			X
Check adjustment of the slipping clutch.	"Adjustment of the slipping clutch"	Every 10 years [3]		
Check brake wear.	"Brake"	Every 10 years [2] [3]		
Grease brake V seal ring.				X
Check suspension, suspension bracket, and securing elements (clip and so on).	"Maintaining the suspension"			X
Check fastening bolts on hook assembly or bottom block.	-			X
Check the hook for cracks, deformation and wear.	"Load hook dimensions and wear"			X
Check hook safety latch for deformation.	-			X
Check hook bearing for wear.	-			X
Check chain sprocket of chain guide, chain sprocket of bottom block, chain guide, guide plate.	"Chain drive"			X
Check that the chain is properly secured.	-			X
Check the chain collector and suspension for external damage (for example, cracks, stress whitening, weld seams on metal collectorbuckets, threads on chain collector bags, rivets and clips), Remove the service cover.	"Removing the chain collector box"			X
Check the chain for deformation, damage, cracks, pitting, reduction in the thickness of the links or increase in pitch due to wear, elongation caused by deformation.	"Checking the chain wear"			X
Check securing elements (clips, bolts and so on) for tight fit and corrosion.	-			X
Check and apply or add corrosion protection, as required.	-			X
Check the electric enclosure and gearbox for leakage.	-			X
Check trolley, crossbar and condition of buffers.	"Checking the cut-off buffers and cut-off springs"			X
Oil change	"Changing the gear oil"	Every 10 years [3]		
The small parts (screws, washers and so on) to be replaced when maintenance and assembly work is carried out are not listed separately.				
1) Every ten years for DC-Pro II used according to FEM classification; during the annual inspection for DC-Com II. 2) Every 5 years for DC-II 10 3) For use according to FEM classification				

General overhaul	
The general overhaul should coincide with the annual inspection.	When 90% of the theoretical duration of service is reached. For more information, see "Measures for achieving safe working periods in Germany" and/or "Measures for achieving safe working periods according to ISO 12482".
Fit chain hoist-specific GO set	X
The small parts (screws, washers ...) to be replaced when maintenance and assembly work is carried out are not listed separately. The checks and work specified in the inspection and maintenance schedule must be carried out during the general overhaul.	

7.5.1 Routine inspections

7.5.1.1 Required tests and inspections

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Failure to maintain the product regularly and properly can cause death, serious injury, or property damage.

Required tests and inspections must be done every 12 months. Only personnel who are authorized and properly trained may do the required tests and inspections.

Always follow the instructions when you inspect, adjust, and maintain the product. For more information, see "Maintenance schedule."

The product must be inspected by an experienced service technician at least once a year. Regular inspections mainly consist of visual inspections and inspections of functions. Inspections should include an inspection to determine the condition of components and equipment regarding damage, wear, corrosion, or other alterations. An inspection to determine the integrity and efficiency of safety devices should also be included.

Regular inspections must be carried out in accordance with national regulations.

It may be necessary to remove parts to inspect wearing parts. Defective parts and components and parts close to failure must be replaced.

Load-bearing media and suspensions must be inspected along their entire length, including those parts which cannot normally be seen. A function and brake test with a load (test load that is close to the maximum permissible load capacity) must be carried out.

For more information, see "Measures for achieving safe working periods in Germany", "Measures for achieving safe working periods according to ISO 12482", and "Maintenance schedule."

NOTICE **All inspections must be arranged and documented in the log book by the owner.**

7.5.1.2 Special operating conditions

⚠ WARNING

FALLING LOAD HAZARD

Premature wear of the chain can lead to failure of the chain and a dropping load. Failure of the chain and a dropping load can cause death, serious injury, or property damage.

Special operating conditions can shorten the required maintenance and inspection intervals of the product. If, for example, the chain hoist always brakes heavily at the same position and with a heavy load, the wear on the chain links may increase. The increased wear occurs on the chain links that are in the area of the chain sprocket or return sprocket when the brake is applied.

7.5.1.3 Service life of the contactor

The switchgear is subject to wear when the chain hoist is operated. The service life has been rated for the specified loading group. Premature wear can occur, if the equipment is frequently started and stopped.

Chain hoist size	Motor size	Display value C for U_{nom} 380–575 V	Display value C for U_{nom} 220–240 V
DC-II 1	ZNC 63 B 8/2	80	80
DC-II 2		80	60
DC-II 5	ZNC 80 B 8/2	60	50
DC-II 10	ZNC 100 A 8/2	50	20
	ZNC 100 B 8/2	20	–

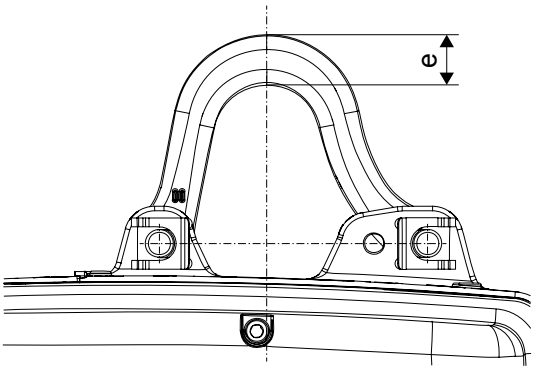
Display value C specifies the expected service life of the contactor that is multiplied by 100000. This value was determined under normal operating conditions. For other conditions, the service life of the contactor can be shorter or longer. For more information, see "Display of software version, operating hours, number of cycles".

We recommend that the contactor or the control module be replaced when the relevant display value has been reached. For more information, see "Replacing the contactor on the control board".

7.6 Maintaining the suspension

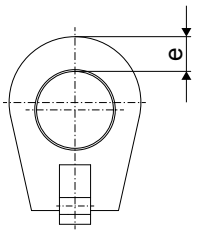
If a check or inspection reveals that these components are worn beyond the specified dimensions or if cracks can be seen in these parts, they must be replaced at once.

Suspension bracket



Chain hoist		DC-II 1–DC-II 5		DC-II 10	
Suspension bracket		short	long	short	long
Min. dimension e for suspension bracket	[mm]	21.5	21.5	28	27

Suspension ring



Chain hoist		DC-II 1–DC-II 5	DC-II 10
Min. dimension e for suspension ring turned 90° (chain hoist parallel to girder)	[mm]	19.5	27

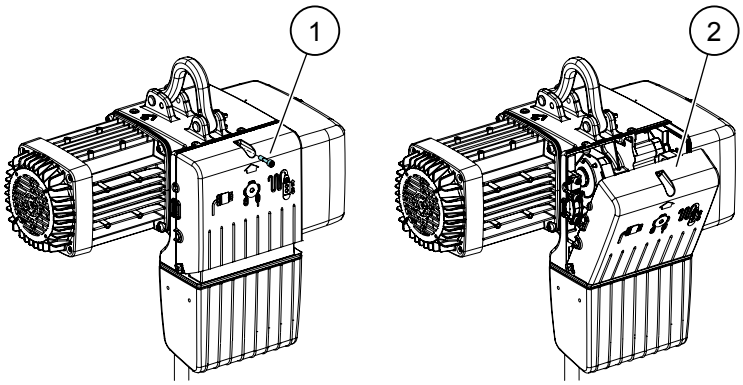
7.7 Maintaining the electric equipment cover

The electric equipment cover must be held in place when it is opened. Do not allow the electric equipment cover to fall against its retainer.

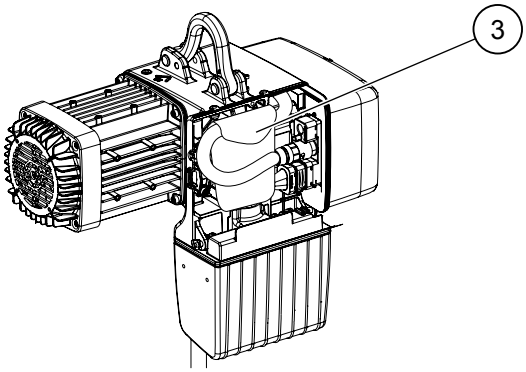
When the electric equipment cover is closed again, ensure that the retainer does not snag and does not block the inspection window.

7.8 Removing the chain collector box

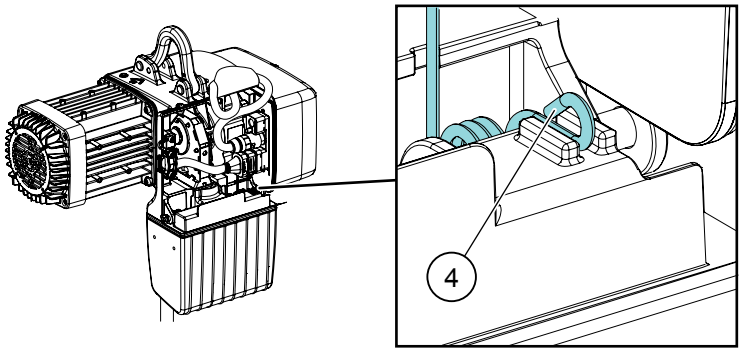
1. To remove the service cover (2), remove the screw (1).



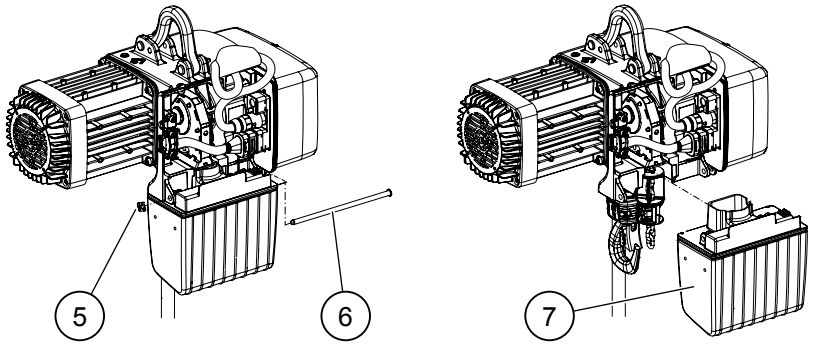
2. Place the bag (3) with the control cable on top of the chain hoist.



3. Disconnect the spring (4).
   Place the spring in the recess in the chain collector box.



4. To remove the pin (6), remove the retaining spring (5) from the pin. When you remove the pin, hold the chain collector box (7).



5. Place the chain collector box (7) on the ground.

7.9 Maintaining the limit switches

7.9.1 Checking the operating limit switches

DANGER

FALLING LOAD HAZARD

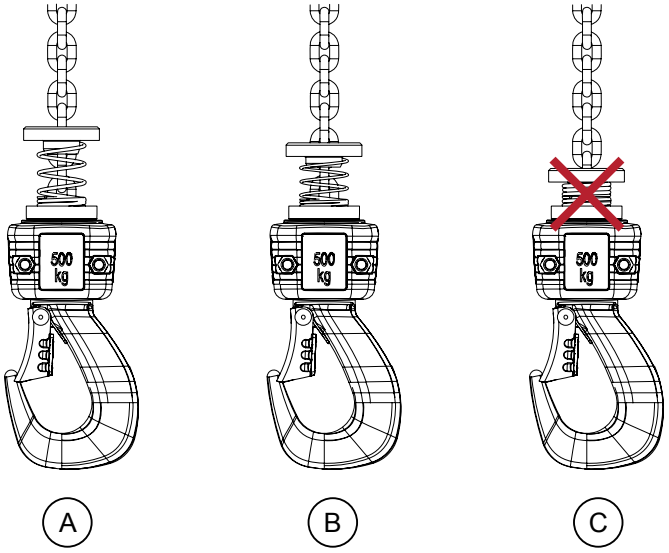
If the emergency limit position limiter is frequently approached, this action will lead to failure of the chain and a dropping load. Failure of the chain and a dropping load will cause death, serious injury, or property damage.

The slipping clutch provides the emergency limit position limiter function for chain hoists that do not have an operating limit switch or have a defective operating limit switch. The emergency limit position limiter may only be approached in exceptional cases. The emergency limit position limiter must not be approached not in normal operation. High extra loads occur in the chain when the slipping clutch is tripped.

The operating limit switch for lifting function must be checked every day. For more information, see "Checking the operating limit switch for lifting."

If an operating limit switch is defective, the hoisting motor is switched off when the electronic speed monitoring function of the slipping clutch is tripped. For this reason, cut-off in the highest hook position is not a reliable indicator for correct operation of the operating limit switch. If cut-off by the operating limit switch fails, a warning message is output, for more information, see "Warning messages".

7.9.2 Checking the operating limit switch for lifting



A = Not compressed

B = Compressed with slow lifting speed reaching end stop

C = Compressed with full lifting speed reaching end stop

1. Raise the hook assembly or the bottom block until it is approximately 10 cm below the highest hook position.
2. Raise the hook assembly or the bottom block at creep lifting speed until the chain hoist automatically switches off.
   - **1/1 reeving:**
     It must only be possible to compress the buffer or the cut-off springs on the hook assembly by a small amount after the unit has switched off.
   - **2/1 reeving:**
     It must only be possible to compress the upper part of a bottom block with internal cut-off springs onto the lower part by a small amount so that approx. 20 mm of the black part of the bottom block remains visible.

     It must also only be possible to compress the springs on a bottom block with external cut-off springs by a small amount after the unit has switched off.

NOTICE

If the buffer or cut-off springs are compressed, it may be assumed that the hoist motor will not be switched off by the operating limit switch, but by the speed-monitoring function of the slipping clutch. This can cause the chain to break if the limit position is frequently approached.

7.9.3 Checking the operating limit switch for lowering

The "Operating limit switch for lowering" must be checked at least once for each year. Proceed as follows:

1. Remove chain collector box. For more information, see "Remove chain collector box".
2. Check as described in preceding section for the "Operating limit switch for lifting".

7.9.4 Optional geared limit switch

If an optional geared limit switch is fitted, the hoist unit must be switched off before the bottom block or hook assembly come into contact with the chain hoist guide plate.
To check the function of optional geared limit switch:

1. Without a load, lift the hook with high lifting speed to approach highest hook position.
   When the hoist unit has been switched off, there must be a minimum distance of at least 20 mm between the bottom block or hook assembly and the chain hoist guide plate.

7.9.5 Checking the operating limit switch actuator

Check the operating limit switch actuator for any external damage, for example, a bent actuator plate.

7.10 Maintaining the chain drive

7.10.1 Checking the chain sprocket

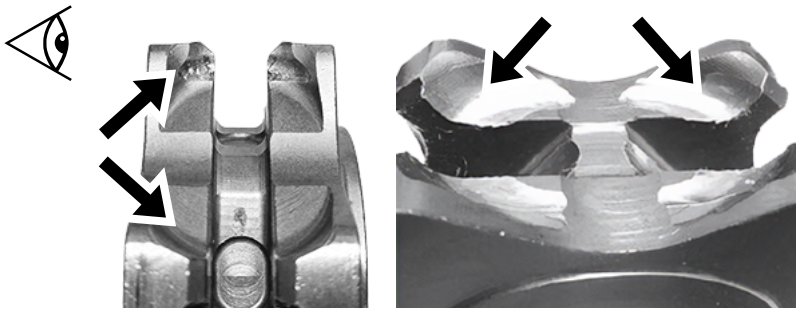


Figure 15. Examples: chain sprocket wear (left) and return sprocket wear (right)

Since the chain sprocket is replaced together with the chain set, no further inspection is necessary under normal conditions. However, if you notice any uneven or harsh running in the chain drive mechanism, such findings can indicate wear.

1. Remove the chain guide and degrease it, to inspect the chain sprocket properly.
2. If the chain sprocket shows signs of wear from the chain or chipping on its sides, replace immediately.
   Replace the chain, the chain sprocket, and the chain guide.

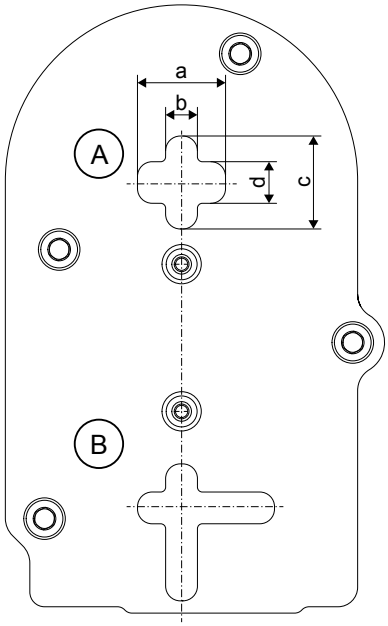
7.10.2 Checking the chain guide

The chain drive can move easily on the output shaft, that is, lateral play of approx. ±2 mm is normal. A defective chain guide must be replaced immediately:

1. Open the service cover.
2. Check the chain guide for any damage, for example, ruptured guide section halves or loose bolts.

7.10.3 Checking the guide plate or the chain entry plate

1. Measure the guide plate.
   If the guide plate is worn more than the specified dimensions or if there are visible cracks, replace the guide plate.



Dimension	a	b	c	d
Frame size	[mm]	[mm]	[mm]	[mm]
DC-II 1 DC-II 2	16.0	5.5	16.8	6.8
DC-II 5	19.4	6.8	21.0	8.9
DC-II 10	26.7	9.4	28.8	12.0

A = Load hook side

B = Chain collector box side

NOTE ***Attaching and removing the bolts that attach the guide plate can damage the threads in the aluminum housing.***

If the threads are damaged, tight fit of the bolts can no longer be ensured. For this purpose, a set of guide plate accessories (part no. 717 830 45) is available.

7.10.4 Checking the chain wear

NOTICE

In addition to selecting the correct hoist unit for the given application, owners of chain hoists are obliged by relevant regulations, such as DIN 685 part 5 to check the round-section steel chain continuously in operation to ensure optimum operating safety and, therefore, to avoid any accidents.

For single-shift operation, operation according to FEM classification and for chain hoist operating conditions according to "Operating conditions", the chain must be checked once for each year (see inspection and maintenance schedule).

If routine maintenance reveals that the maintenance intervals are too long, they must be adapted to the specific operating conditions.

7.10.4.1 Inspecting the chain visually

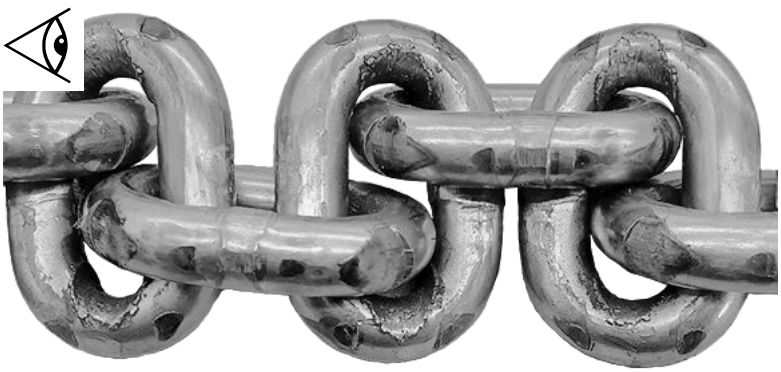


Figure 16. Example: chain wear

1. Carry out a visual inspection of the chain before starting work.

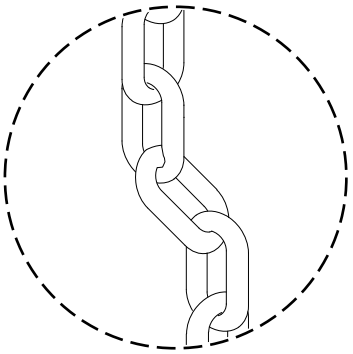
If the chain displays deformation, damage, cracks, pitting from corrosion, reduction in the link thickness or increase in pitch dimension due to wear or elongation as a result of plastic deformation, the chain must be replaced immediately.

7.10.4.2 Measuring chain wear or deformation

Two methods can be used to measure wear or deformation of the original chain:

- Measuring with a caliper gauge:
  - Wear of a single chain link. For more information, see "Measuring wear of a single chain link with a caliper gauge".
  - Over 11 chain links. For more information, see "Measuring wear over 11 chain links with a caliper gauge".
- Measuring with a chain gauge:
  - Over 11 chain links. For more information, see "Measuring wear over 11 chain links with a chain gauge".

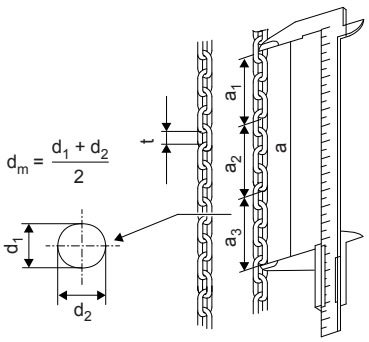
7.10.4.3 Measuring wear of a single chain link with a caliper gauge



1. The chain link contact areas must be visually checked for traces of wear.
   If the chain, hangs at an angle when no load is attached to it, for example, this usually indicates wear of an individual chain link.
2. Measure the diameter of the chain link material in the chain link contact area using a caliper gauge, if necessary.
   For minimum link diameter values, see table from "Measuring wear over 11 chain links with a caliper gauge".

7.10.4.4 Measuring wear over 11 chain links with a caliper gauge

1. Attach a partial load to the load hook.
2. Take the measurements in steps of 2 x 3 and 1 x 5 chain links.
   The total of the three readings taken, that is, $a_1 + a_2 + a_3$ must not exceed the specified limit a. Otherwise the chain must be replaced.



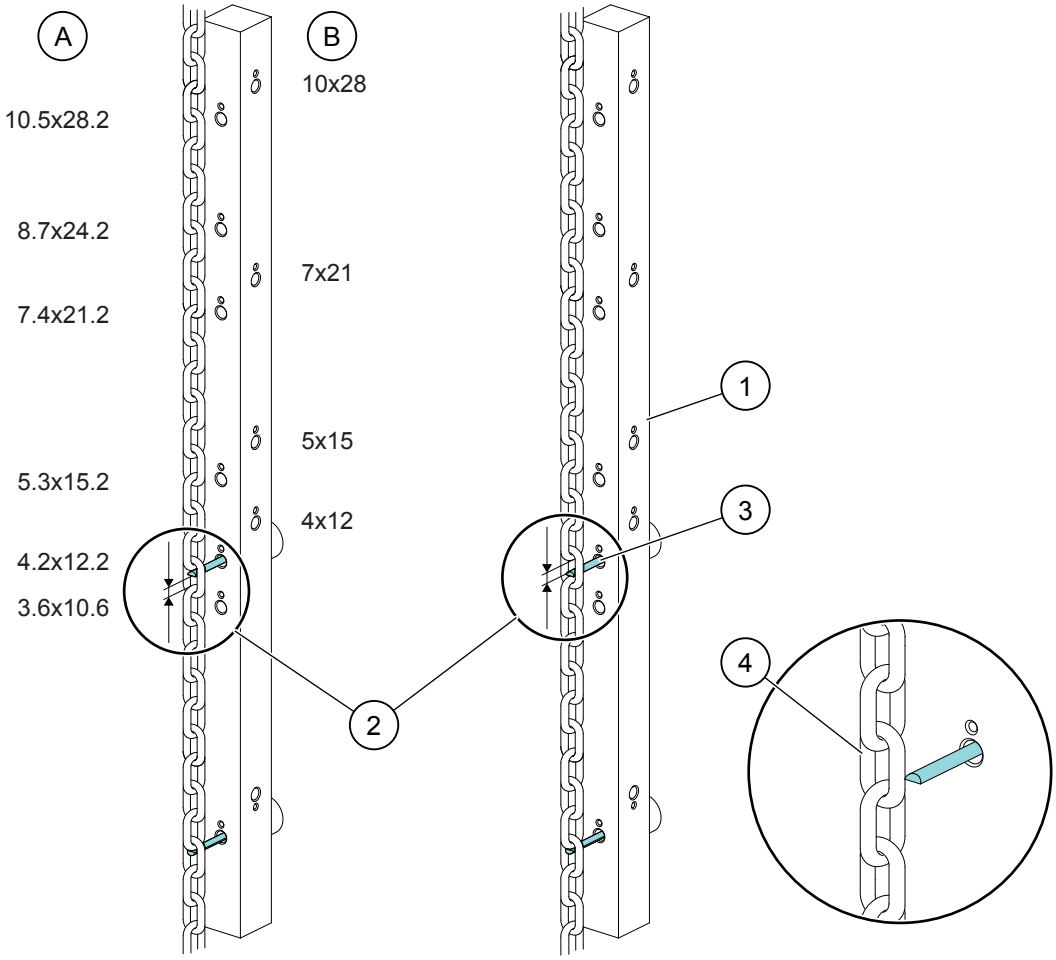
NOTE ***Demag is stamped on every 12th link of genuine Demag chains. We strongly recommend that you use genuine Demag chains to ensure that the safety and the service life of the chain hoist are guaranteed.***

If the chain does not run smoothly over the chain drive mechanism after fitting a new chain, contact after-sales service.

Chain hoist		DC-II 1 DC-II 2	DC-II 5	DC-II 10
Chain designation (d x t)	**[mm]**	**4.2 x 12.2**	**5.3 x 15.2**	**7.4 x 21.2**
Limit dimensions according to DIN 685 part 5				
Measurement over the outside of 11 chain links, maximum dimension $a = a_1 + a_2 + a_3$	[mm]	144.7	180.3	253
Overall length of 1 chain link measured on the inside, max. dimension t	[mm]	12.8	15.9	22.4
Measurement of the chain link diameter, minimum dimension $d_m = 0.9 \times d$	[mm]	3.8	4.8	6.7

NOTE ***The limit dimensions apply to all chains listed in "Available chains."***

7.10.4.5 Measuring wear over 11 chain links with a chain gauge



A = DC/DK/PK new chain

B = PK old chain

1. Chain gauge, part no. 836 025 44
2. The chain must not yet be discarded. The chain only needs to be replaced if the measuring pin can no longer be inserted into the 11th chain link.
3. Measuring pin
4. 11th chain link: the chain is ready to be discarded. The chain must be replaced.

NOTE ***A partial load must be suspended from the load hook when the chain is measured over 11 chain links.***

7.10.5 Chain set scope of supply

⚠ WARNING

FALLING LOAD HAZARD

If a lifted load is dropped, the falling load can cause death, serious injury, or property damage.

When the chain is replaced in DC-II 10 units that have 2/1 reeving, the chain anchorage must also always be replaced. The relevant parts are included in the chain sets. If a single chain is purchased by the meter, the chain anchorage must be separately ordered and installed. For more information, see "Spare part manual."

The chain must be replaced when the permissible chain wear limit is reached. For more information, see "Checking the chain wear". A chain set is always supplied when a new standard RDC/TDK chain is ordered. The chain set includes the listed parts.

- Chain sprocket
- Chain guide with plate and cap
- Chain guide plate
- Buffers for upper and lower hook positions
- Tube of chain grease
- Retaining ring
- Chain anchorage — for 2/1 reeving only

The chain guide is preassembled. The chain is already fitted in the chain guide.

7.10.6 Available chains

Genuine chain is a round-section steel chain. The chain is tested to EN 818-7 and is subject to the regulations and test criteria issued for round-section steel chains used in hoist applications. The chain is also subject to the inspection regulations to DIN 685 part 5 of Nov. 1981 and the rules and regulations of the German Social Accident Insurance (DGUV).

NOTE ***Pay attention to reduced load capacities. For non-standard operating conditions, the following listed special chains are available for special ambient conditions.***

	Chain hoist size	Max. load capacity for reeving		Dimension	Stamp, Chain grade	Weight per meter	Production test force	Minimum breaking force	Minimum elongation at rupture
		1/1	1/2						
		[kg]	[kg]	[mm]		[kg]	[kN]	[kN]	[%]
Demag DAT standard chain, high-strength									
	DC-II 1 DC-II 2	250	-	4.2 x 12.2	DAT RDC/TDK	0.38	13.8	22	10
	DC-II 5	500	-	5.3 x 15.2		0.62	22	35	
	DC-II 10	1250	2500	7.4 x 21.2		1.20	43	70	
Properties	High-strength ageing-resistant material with a high degree of surface hardening, galvanized with extra surface treatment, color: DC-II1-10 golden.								
Material	Ni-Mo special chain steel to EN 818-7, part 5.3.1								
Lubrication	GP00H-30REN.SO-GFB grease								
Chain DAT (Corrud), with high corrosion protection, high-strength									
Application, for example, Galvanizing, electro plating facilities, pickling plants	DC-II 1	125	-	4.2 x 12.2	DAT RDC/TDK	0.38	13.8	22	10
	DC-II 2	250							
	DC-II 5	500	-	5.3 x 15.2		0.62	22	35	
	DC-II 10	1250	2500	7.4 x 21.2		1.20	43	70	
Properties	Ageing-resistant, corrosion-free, "Corrud DS" micro-layer corrosion protection, black-coated, color: black, Stabylan 2001								
Material	Ni-Mo special chain steel to EN 818-7, part 5.3.1								
Lubrication	Acid-resistant chain grease, for example, Ceplattyn BL white paste (part no. 665 023 44)								
Chain HS7, with deeper surface hardening									
Application, for example, foundry, dust, emery, blasting	DC-II 1 DC-II 2	160	-	4.2 x 12.2	RSX/DS	0.38	12.5	19.3	5
	DC-II 5	400	-	5.3 x 15.2		0.62	19.8	30.8	
	DC-II 10	800	1600	7.4 x 21.2		1.20	38.7	60	
Properties	Ageing-resistant, color: silver, with deeper surface hardening								
Material	Material Ni-Mo special chain steel to EN 818-7, part 5.3.1								
Lubrication	Dry or with dry lubricant, for example, Ceplattyn 300 paste (part no. 665 022 44)								
Chain RS6, stainless steel, not hardened									
Application, for example, foodstuffs sector	DC-II 1 DC-II 2	125[1)]–160[2)]	-	4.2 x 12.2	RSA/S	0.38	10	16	15
	DC-II 5	200[1)]–250[2)]	-	5.3 x 15.2		0.62	16	25	
	DC-II 10	400[1)]–500[2)]	800[3)]–1000[4)]	7.4 x 21.2		1.20	32	50	
Properties	Non-rusting chain, not hardened, bright								
Material	Stainless steel AISI 316 (V4A) 1.4401								
Lubrication	Food-safe lubricant, e.g. Berusynth CB 180 H1 oil (part no. 678 645 39)								

1) For max. 25–50 cycles per day
2) For max. 10 cycles per day
3) For max. 12–25 cycles per day
4) For max. 5 cycles per day

NOTE ***Use of HS7 special chain in foundries, fettling shops, or other environments with high dust levels: It is recommended to lubricate the chain with a dry lubricant, for example, Ceplattyn 300 Paste (part no. 665 022 44).***

The chain can also be used dry. Without any lubrication, however, greatly increased wear and louder operating noise in the chain drive must be expected. The chain must not be lubricated with normal grease in environments with high dust levels. Grease will form clumps and chain wear will not be visible.

7.10.7 Replacing the chain set

⚠ WARNING

FALLING LOAD HAZARD

If a lifted load is dropped, the falling load can cause death, serious injury, or property damage.

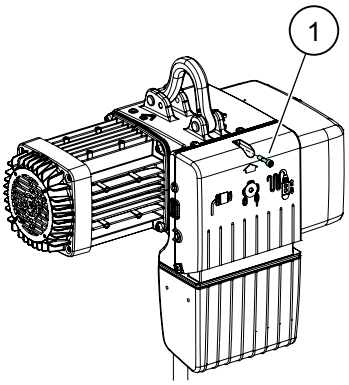
When the chain is replaced in DC-II 10 units that have 2/1 reeving, the chain anchorage must also always be replaced. The relevant parts are included in the chain sets. If a single chain is purchased by the meter, the chain anchorage must be separately ordered and installed. For more information, see "Spare part manual."

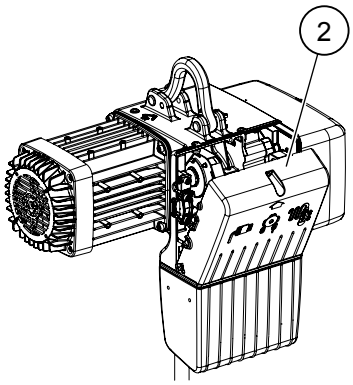
NOTICE

There are different chain guide variants. The images only show examples. The method to replace the chain set is, however, largely the same regardless of the variant. For more information on the different chain guide variants, see "Chain guides."

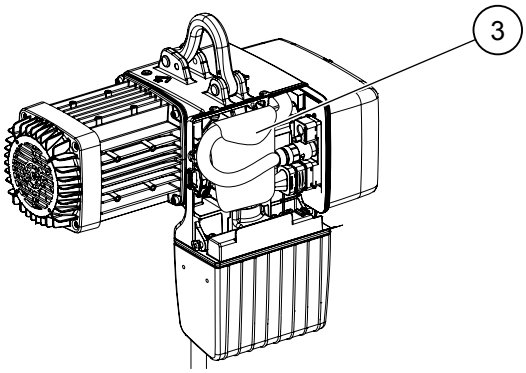
Before starting any maintenance work, switch off the chain hoist and secure it against reconnection to the power supply. To replace the chain set, follow the instructions.

1. To remove the service cover (2), remove the screw (1).

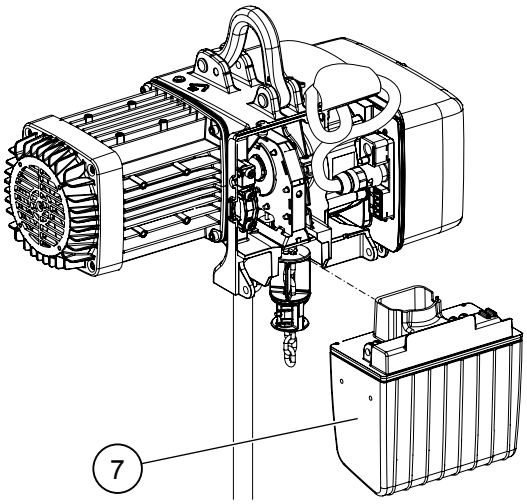




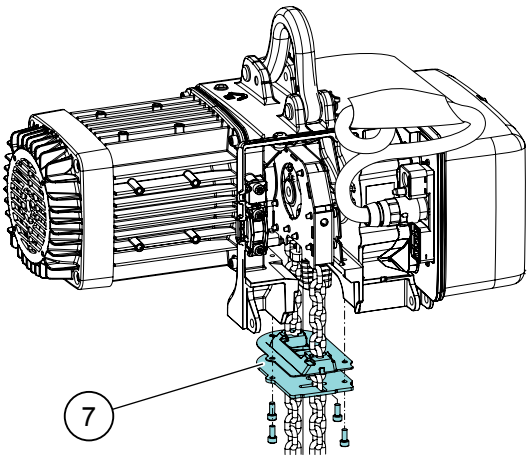
2. Place the bag (3) with the control cable on top of the chain hoist.
   Pull out the mains cable union with fitted mains cable, and place to one side. If a travel drive is fitted, remove the connecting cable from the strain relief arrangement.



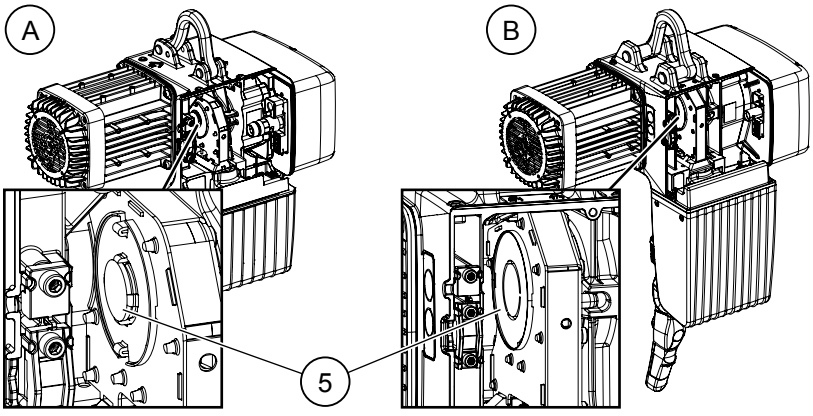
3. Remove the chain collector box (7). Place the chain collector box down. For more information, see "Removing the chain collector box."



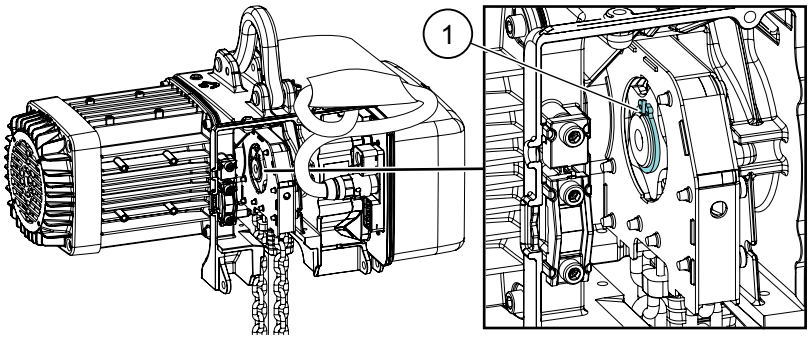
4. Remove the guide plate (7).
With 2/1 reeving, also remove the oval chain anchorage pin.



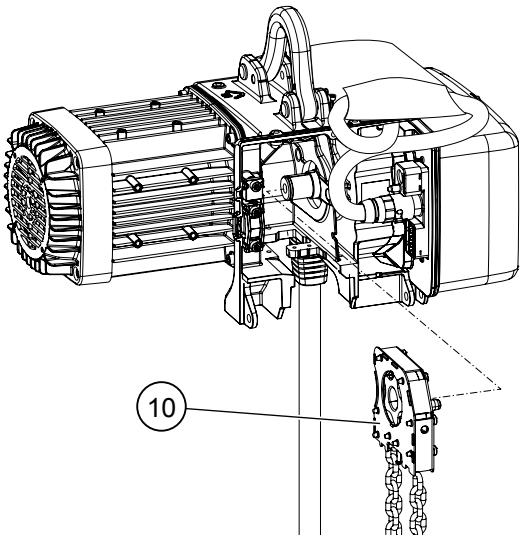
5. Loosen the cap (5) with a screwdriver.
The letters A and B in the image refer to different designs of different chain hoist sizes.



6. Remove the retaining ring (1) using ring pliers.
Use either straight or offset pliers. Access through the opening in the gearbox housing on the side of the motor or from the service enclosure.



7. Remove the chain guide (10) with the chain sprocket from the output shaft.
   To remove the chain guide, slide the complete subassembly in the direction of the motor until the chain sprocket is free. Then, the worn chain set can be removed from the service enclosure.



Proceed in reverse order to install the new chain set. The correct tightening torques for the installation are in the table at the end of this section.

NOTE ***When you install a new chain set, the orientation of the chain welds does not matter.***

For more information, see the listed sections.

- Chain hoist with geared limit switch
- Fitting the retaining ring
- Fitting the chain anchorage for 2/1 reeving in DC-II 10
- Fitting the limit stop
- Steps after replacing the chain set

Tightening torques [Nm]	DC-II 1 DC-II 2	DC-II 5	DC-II 10	
Reeving	**1/1**		**1/1**	**2/1**
Service cover	10.0			
Limit stop	2.9		4.3	
Guide plate	6.0		10.0	

7.10.7.1 Chain hoist with geared limit switch

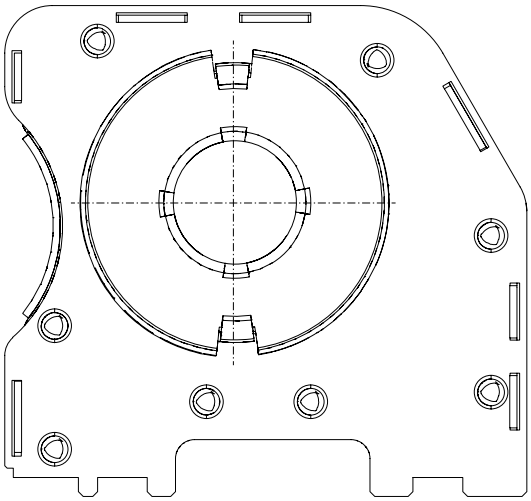


Figure 17. Chain guide for DC-II 10 without geared limit switch

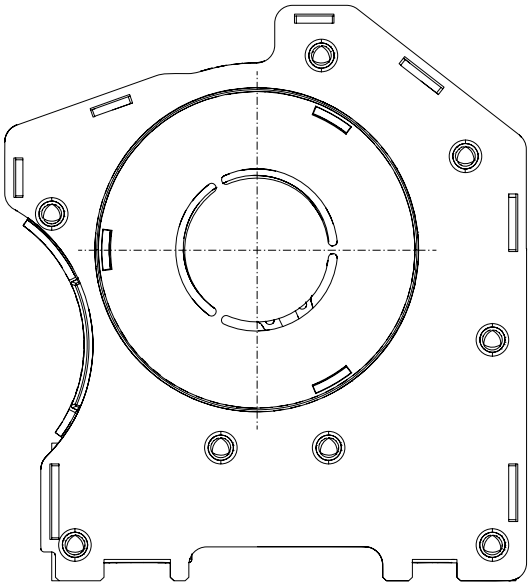
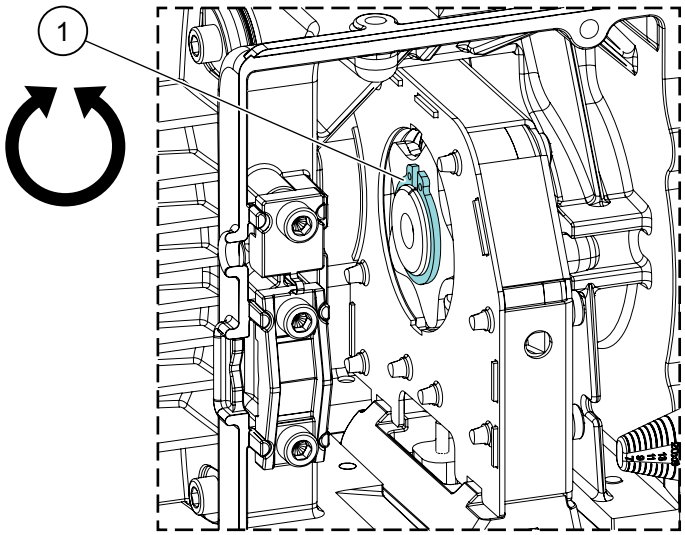


Figure 18. Chain guide for DC-II 10 with geared limit switch

The chain guide for DC-II 10 has a larger opening on chain hoists that are equipped with a geared limit switch. For more information, see "Spare part manual."

7.10.7.2 Fitting the retaining ring

DANGER	
	**FALLING LOAD HAZARD** **An incorrectly installed chain will result in a broken chain and a falling load. A broken chain and a falling load will cause death, serious injury, or property damage.** **When the chain is installed, make sure that it is introduced in the same position and with the same alignment. The chain must operate without any twist.**



1. The stamped burr of the retaining ring (1) must face the motor.
   The retaining ring is correctly installed, if the retaining ring can be easily turned on the output shaft after assembly.

7.10.7.3 Fitting the chain anchorage for 2/1 reeving in DC-II 10

⚠ WARNING

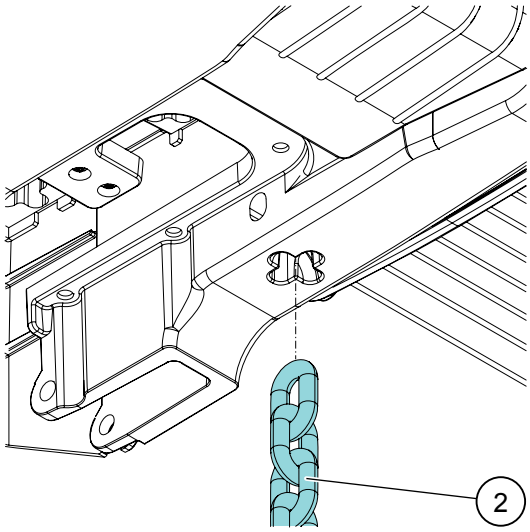
FALLING LOAD HAZARD

If a lifted load is dropped, the falling load can cause death, serious injury, or property damage.

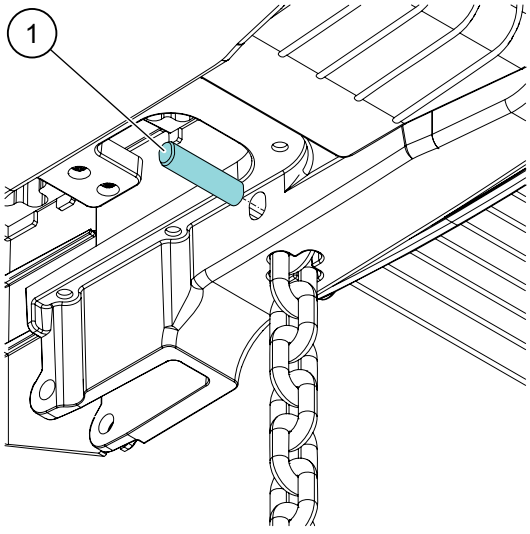
When the chain is replaced in DC-II 10 units that have 2/1 reeving, the chain anchorage must also always be replaced. The relevant parts are included in the chain sets. If a single chain is purchased by the meter, the chain anchorage must be separately ordered and installed. For more information, see "Spare part manual."

NOTE ***Fit the chain anchorage before you fit the guide plate.***

1. Insert the chain (2) into the opening of the gearbox housing.



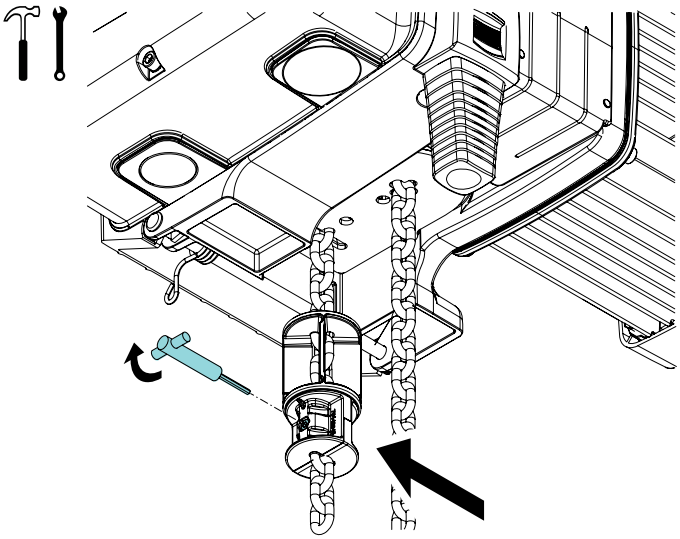
2. Insert the oval pin (1) into the hole through a chain link.



The chain anchorage is now fitted. The chain anchorage is properly fixed when the chain guide is in place.

To remove the chain anchorage, you follow the instructions in reverse order. You push the oval pin out from the side of the hoisting motor.

7.10.7.4 Fitting the limit stop



1. Attach the limit stop to the fifth chain link at the dead (unloaded) end of the chain.

NOTE ***Pay attention to the tightening torque. For more information, see "Recommended tightening torques."***

NOTE ***If the chain hoist is operated with a replacement chain that is longer than suitable for the standard capacity of the chain collector, you must fit an extra limit stop to the chain. The extra limit stop is fitted between the hook assembly and the buffer plate.***

NOTE ***The limit stop must be fitted so that the extra length of chain is positioned between the hook assembly and the limit stop. In this case, a geared limit switch is required for DC-II 10 units with 2/1 reeving.***

7.10.7.5 Steps after replacing the chain set

NOTICE

If the chain has to be replaced because it has reached its wear limit, the return sprockets are also worn and have to be replaced. For this reason, the condition of the return sprockets must be checked when the chain is replaced. We recommend that the return sprocket should be replaced no later than every second time the chain is replaced.

1. Fit the hook assembly and bottom block, for more information, see "Load hook."
2. Lubricate the chain. For more information, see "Available chains" and "Lubricating the chain."
3. Adjust the bottom hook position, if necessary, for more information, see "Adjusting the lower hook position."
4. Fit the chain collector box, for more information, see "Removing the chain collector box."
5. If the chain hoist has an optional geared limit switch, re-adjust the geared limit switch.

7.10.8 Chain guides

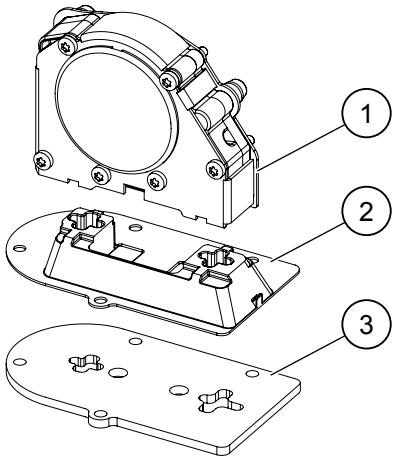


Figure 19. DC-II 1–DC-II 2 chain guide

1. Chain guide
2. Upper chain entry plate
3. Lower chain entry plate

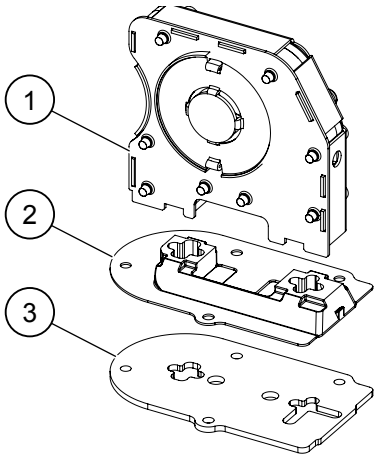


Figure 20. DC-II 5 chain guide

1. Chain guide
2. Upper chain entry plate
3. Lower chain entry plate

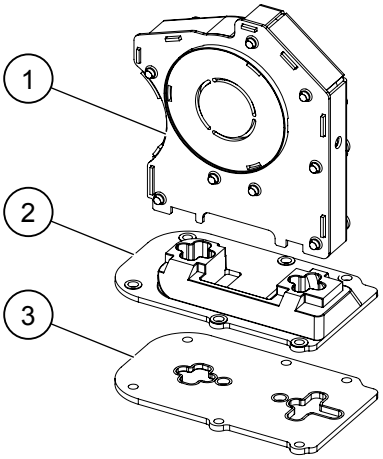


Figure 21. DC-II 10 chain guide

1. Chain guide
2. Upper chain entry plate
3. Lower chain entry plate

7.10.9 Lubricating the chain

⚠ WARNING

MOVING MACHINERY HAZARD

Contact with moving parts of the chain hoist, such as the chain or hook, can cause serious injury or death.

When you operate the chain hoist, watch out for any moving components.

⚠ WARNING

IRRITATING SUBSTANCE HAZARD

The machine contains several chemical substances, which can cause skin irritation and allergies. Risk of injury when in prolonged contact with skin.

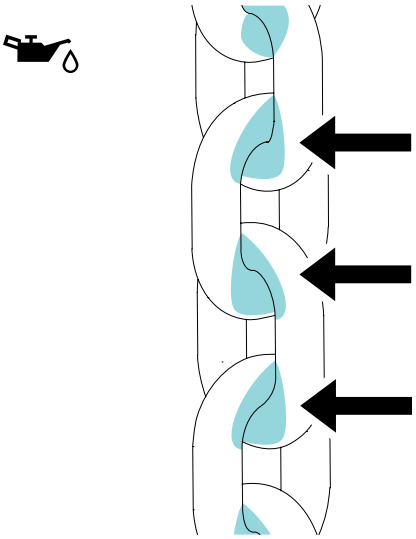
When you handle lubricants and oils, avoid direct contact with the skin. Use safety gloves. Immediately wash skin that comes in contact with chemical substances.

NOTICE

Lubricate the contact surfaces between the chain links after fitting the chain, before taking the chain hoist into use. Lubricate the chain only when no load is attached. Use grease, part no. 665 009 44.

1. Lubricate the chain carefully before the first run, during the commissioning of the chain hoist.
   To extend the lifetime of the chain, continue to lubricate the chain regularly. The lubrication interval varies from a minimum of one week to one year, depending on the usage.

   In environments with abrasives, for example, sand, preferably use a dry film lubricant (lubricating varnish). For more information about non-standard lubrication, see "Available chains."



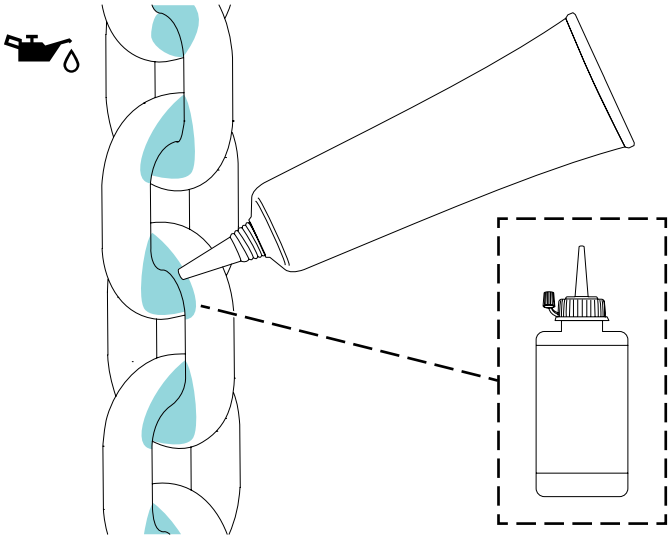
7.10.9.1 Lubricating the chain with a grease tube

The target of the lubrication of the chain is to have enough lubricant between the chain links. The lubricant must be applied on the contact surfaces between the chain links. Make sure that you add the new layer of lubrication always on a clean surface.

1. Drive the hook down until the chain collector box is empty.
   If a load is attached to the hook, remove the load.
2. Cut off the tip of the grease tube.
3. Insert the grease tube at the lubrication point.

4. Lubricate the chain.
   Start applying the lubricant on the chain from the top, close to the chain hoist. Then proceed from top to bottom of the chain.

   Apply a substantial amount of lubricant over the full length of the chain. Make sure that the chain is lubricated all over its surface and links, especially on all contact areas between the chain links.



5. After lubrication, drive the hook up and down three to four times over the full length of the chain.
   The lubricant spreads evenly throughout the chain.

NOTE ***Do not attach any load to the hook.***

Type	Trade name and number	Quantity
Grease (standard lubricant)	RENOLIT special chain grease 55395066	As required
Oil (optional food industry lubricant)	67864539 - Berusynth CB 180 H1	

WARNING! SLIPPING HAZARD

Lubricants or oils on the floor can cause slipping, which can cause serious injury.

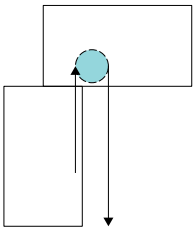
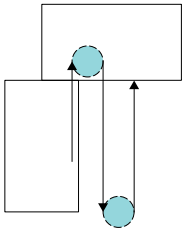
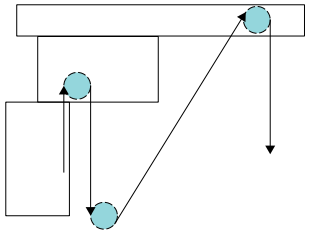
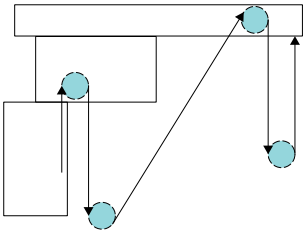
If there is lubricant or oil on the floor after lubrication, clean the area immediately. Use sawdust or an absorbent to absorb the lubricant or oil, if needed. Dispose of the cleaned lubricant or oil in accordance with environmental protection requirements.

7.10.9.2 Lubrication intervals of the chain

Defining the required maintenance interval for the chain depends on the use of the product, and must be determined case-by-case. To fully optimize the lifetime of the components, define the exact maintenance interval for each hoist application individually.
The following conditions are examples of operating conditions that have an influence on the required chain maintenance:

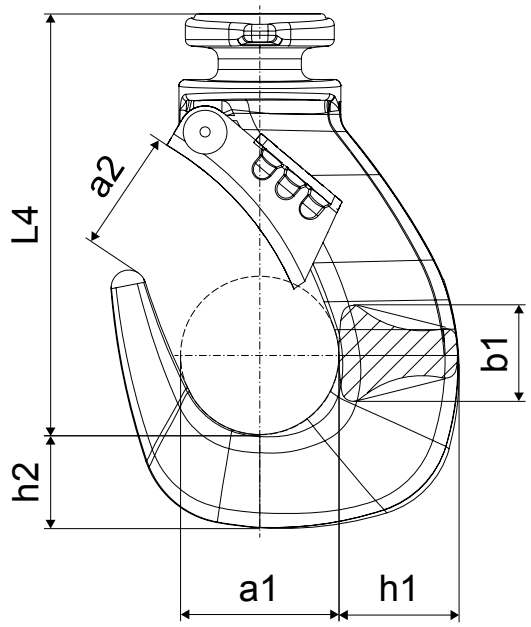
- Environment (clean or dusty, cold or hot, indoor or outdoor use)
- Use of the chain hoist (light or full loads, high process cycles, or low maintenance use)
- Construction of the chain hoist (number of chain sprockets)

Evaluate the condition of the chain visually. Combine the visual checks with regular measurements. For more information, see chapter Inspecting the chain wear.
The following table describes the suggested lubrication intervals of the chain. The data is based on use of the chain hoist as an industrial indoor application. It is assumed that the chain hoist is operated under conditions where there are no external particles and where the hoist is in continuous use with full load.

Chain lubrication intervals				
Nbr of sprockets	**1**	**2**	**3**	**4**
Falls	1-fall	2-falls	1-fall LH [2]	2-fall LH [2]
Hoist type				
Grease [cycles] [1]	12000	6000	4000	3000
[1] Cycle = One work cycle, from pick-up to release of the load.				
[2] LH = Low headroom hoist.				

7.11 Load hook

7.11.1 Load hook dimensions and wear



Chain hoist			DC-II 1–DC-II 10			DC-II 1–DC-II 10				DC-II 1–DC-II 10		
Hook type			Standard hook			Self-locking hook				Stainless steel hook		
Load Capacity		[kg]	315	630	1250	2600			4000	400	630	1300
Size			1–2	5	10	2	5	10	10	1–2	5	10
Reeving			1/1			1/1			2/1	1/1		
Load hook		Type	V-I	V-II	V-III	BKT-7/8-10			BKT-13/8-10	CWHF 40	CWHF 50	CWHF 70
Dimension	a1	[mm]	30	36	43	45			70	23	23	36
	$a2_{Nom}$ 1)	[mm]	23.5	26.7	36	37			55	20	20	30
	$a2_{Max}$	[mm]	25.6	29.6	39.6	-			-	-	-	-
	b1	[mm]	13	19	22	24			37	16	16	22
	h1	[mm]	22	27.5	33.5	30			48.5	18.5	18.5	27.6
	$h2_{Nom}$ 2)	[mm]	18	21.5	26	26			39	15.3	15.3	24
	$h2_{min}$	[mm]	17.1	20.4	24.7	-			-	-	-	-
	L2	[mm]	14	14	20	47			77	21	21	29.8
	L4	[mm]	84	95	115	111			160	83	83	123
Max. test force		[kN]	8	16	25	-			-	-	-	-

1) Permissible difference +10%
2) Permissible difference -5%

7.11.2 DC-Pro II hook safety latch

If the hook safety latch must be replaced, turn the nut on the bolt until at least two turns of the thread can be seen on the other side of the nut. The bolted joint must only be tightened enough to allow the hook safety latch to move freely.

7.11.3 Checking the return sprocket in the hook block

The return sprocket must be checked every month to ensure that it turns easily.

1. Remove any load bars attached to the bottom block.
2. Check to ensure that the bottom block moves easily during lifting and lowering motions. Abrupt movements of the bottom block indicate wear.
   We recommend that the return sprocket should be replaced every second time that the chain is replaced.

7.11.4 Replacing DC-II 1–DC-II 10 hook assembly

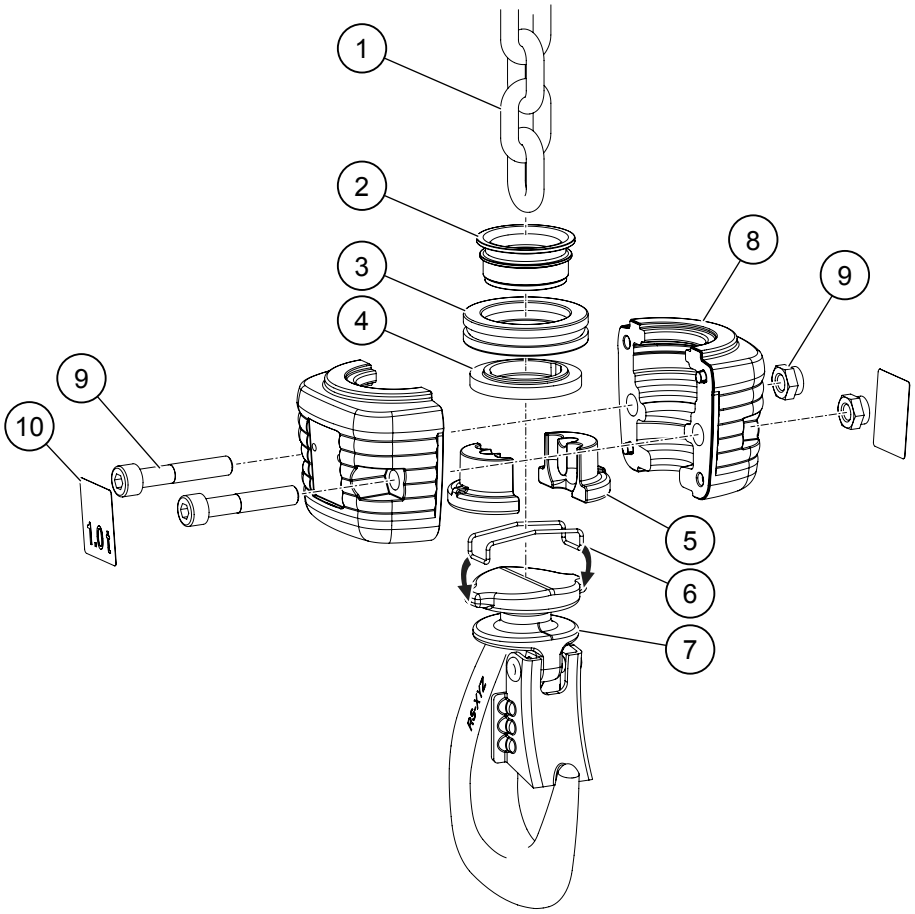
DANGER

FALLING LOAD HAZARD

Incorrect assembling of the hook assembly will cause loads to drop. A dropping load will cause death, serious injury, or property damage.

Make sure that you install the parts in the right order and orientation.

NOTE ***Pay attention to the non-standard lubrication instructions for special ambient conditions or special chains, for example, stainless steel chain or foodstuffs sector. For more information, see "Available chains."***



1. Chain
2. Hook assembly sleeve
3. Ball thrust bearing
4. Supporting washer
5. Chain link anchorage section
6. O-ring
7. Load hook
8. Hook assembly half
9. Hook assembly bolted joint
10. Capacity plate

1. Lubricate the ball thrust bearing (3).
2. Thread the hook assembly sleeve (2), the ball thrust bearing (3), and the supporting washer (4) onto the chain (1).
   Pay attention to the correct order of installation and the correct orientation of the parts.
3. Grease the end of the chain with the enclosed grease.
4. Place the last chain link of the chain (1) between the chain link anchorage sections (5).
   Place the chain link anchorage sections with their tabs in the recesses of supporting washer (4).

5. Install the O-ring (6) over the tabs at the top of the load hook (7). The O-ring acts as a shock absorber.
6. Fill one hook assembly half (8) with the enclosed grease.
7. Place the chain (1) with the hook assembly sleeve (2), the ball thrust bearing (3), the supporting washer (4), and the chain link anchorage sections (5) into the hook assembly half (8).
8. Position the load hook (7) with the O-ring (6) under parts 1, 2, 3, 4, and 5.
9. Fit the hook assembly bolted joint (9). Tighten the bolted joint to the correct tightening torque.

Tightening torques [Nm]	DC-II 1	DC-II 2	DC-II 5	DC-II 10
Hook assembly	11.5			25.0

7.11.5 Replacing the bottom block with external cut-off springs, 2/1 reeving

⚠ DANGER

FALLING LOAD HAZARD

Incorrect assembling of the hook assembly will cause loads to drop. A dropping load will cause death, serious injury, or property damage.

Make sure that you install the parts in the right order and orientation.

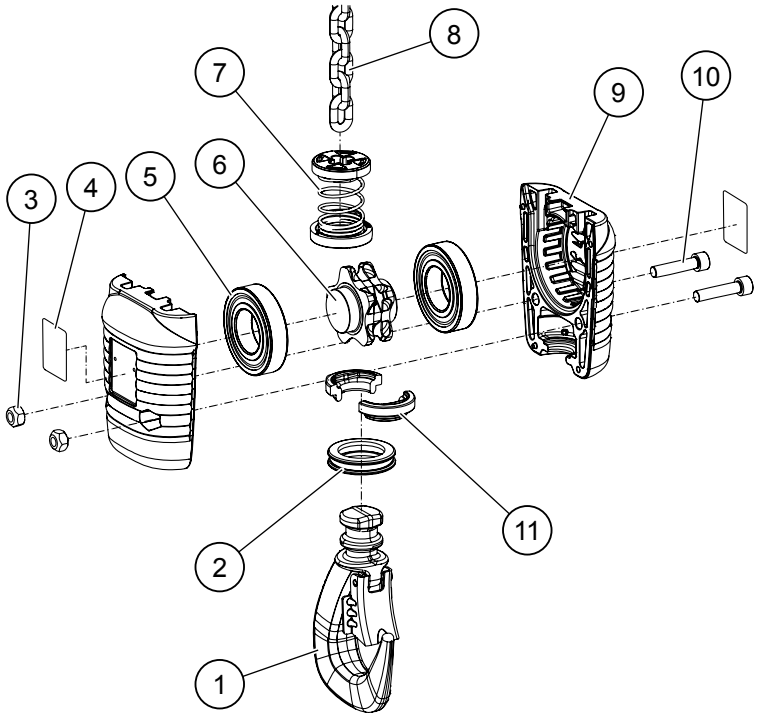
⚠ WARNING

FALLING LOAD HAZARD

A twisted chain can get stuck in the bottom block. A twisted chain stuck in the bottom block can overload the hoist and the chain. This situation can lead to failure of the chain and a dropping load. Failure of the chain and a dropping load can cause death, serious injury, or property damage.

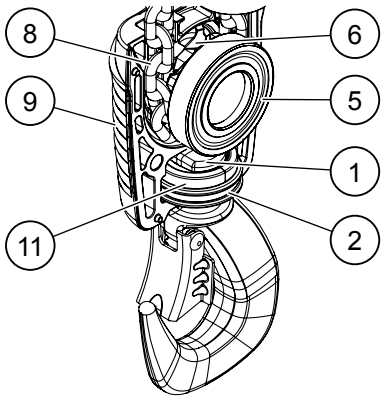
Make sure that the chain between the hook and the hoist is not twisted.

NOTE ***For instructions on removing and installing the chain, see "Replacing the chain."***



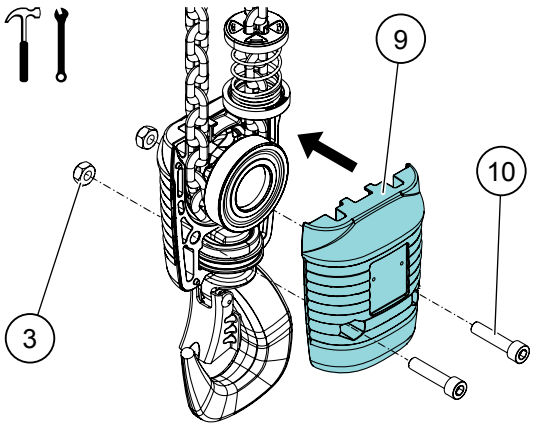
1. Hook
2. Ball thrust bearing
3. Nut
4. Rated capacity plate
5. Bearing
6. Return sprocket
7. Cut-off spring
8. Chain
9. Hook assembly cover
10. Bolt
11. Hook retaining ring

1. Lubricate the ball thrust bearing (2).
2. Assemble the hook (1) with the thrust ball bearing (2) and the assembled hook retaining ring (11). Place the assembled parts into the lower cavity of one of the hook assembly covers (9).
   Pay attention to the correct order of installation and the correct orientation of the parts.



3. Assemble the return sprocket (6) and the bearings (5). Place the assembled parts with the chain (8) into the upper cavity of one of the hook assembly covers (9).
   Pay attention to the correct order of installation and the correct orientation of the parts. The cut-off spring (7) must be on the side on which the chain goes into the chain guide. If the cut-off spring is on the wrong side, the cut-off function does not work.

4. Assemble the hook assembly covers (9) with two bolts (10) and two nuts (3). Tighten to the correct tightening torque.

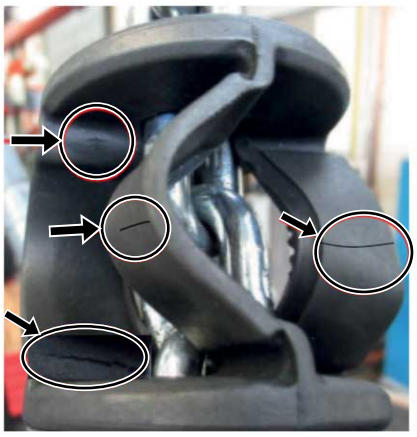


Tightening torques [Nm]	DC-II 10
Bottom block with external cut-off springs	52.0

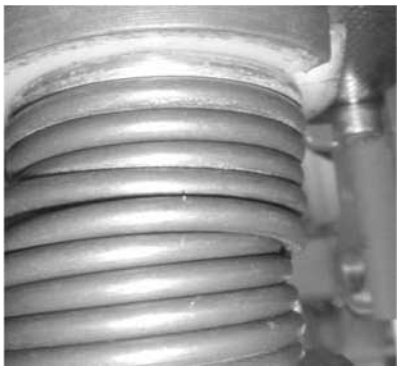
7.12 Buffers and cut-off springs

7.12.1 Checking the cut-off buffers and cut-off springs

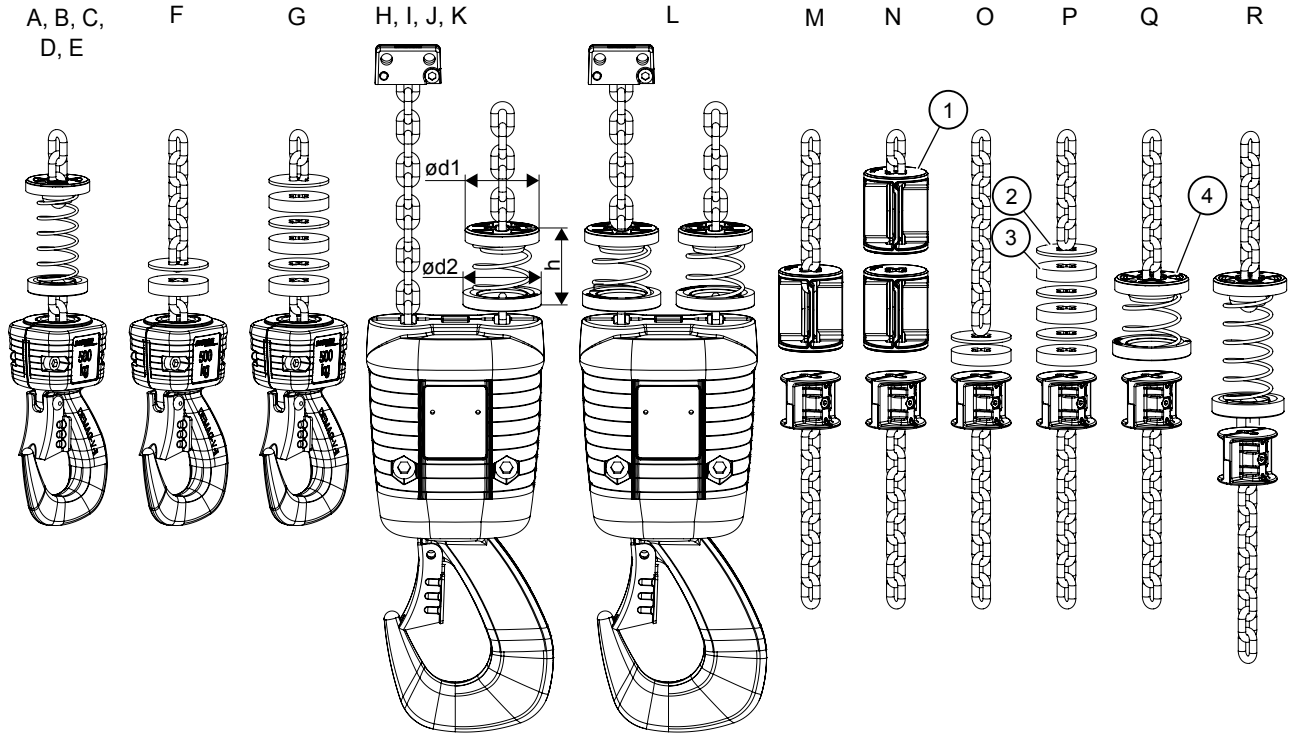
1. Visually check the buffers during the annual inspection. Check for damage, cracks, and tears.



2. Make sure that the component parts are installed in the right order when new buffers are installed.
   For more information, see "Buffer and cut-off spring arrangement." A missing buffer plate, for example, will result in premature wear of buffers.
3. Visually check the external cut-off springs during the annual inspection. Check the sleeves of the springs for cracks and damage.
   The individual windings of the spring must not cross over each other.



7.12.2 Buffer and cut-off spring arrangement



1. Cut-off buffer
2. Buffer plate
3. Damping plate
4. Cut-off spring

NOTE ***The cut-off springs must be replaced on 60-Hz chain hoists that have operating limit switches:***

- ***V8 spring ➔ V16 spring***
- ***V6 spring ➔ V12 spring***

Product range [1]	Size	Reeving	Lifting speed [2]	Switch equipment [3]	Plate dia. d1/ dia. d2	Height h	Load hook side		Chain collector box side	
			[m/min]		[mm]	[mm]	Fig.	Ident. no.	Fig.	Ident. no.
DC-Pro II/DC-ProCC	1+2	1/1	V8	1BES	45/42	45	A	718 225 45	M	751 253 45
	2		V16			80	B	718 256 45	N	
DCM-Pro	1+2		V8	1BES	-	-	R	718 260 45	M	
	2		V16		-	-			N	

Product range [1]	Size	Reeving	Lifting speed [2]	Switch equipment [3]	Plate dia. d1/ dia. d2	Height h	Load hook side		Chain collector box side	
			[m/min]		[mm]	[mm]	Fig.	Ident. no.	Fig.	Ident. no.
DC-Com II	1	1/1	V8	0BES	-	-	F	717 534 45	O	717 534 45
	2		V6		-	-				
	1		V8	1BES	45/42	45	A	718 255 45	M	751 253 45
	2		V6							
DCS-Pro	1		VS30							
	2		VS16							
DCMS-Pro/DCRS-Pro	1		VS30	1BES	-	-	R	718 260 45		
	2		VS16		-	-				
DC-ProFC	1+2	1/1	VS16	0BES	-	-	G	717 534 45	P	717 534 45
				GGS	-	-	-	-	O	
DC-ProDC	1+2		V8	0BGS	-	-	G	717 534 45		
				1BES	45/45	79.5	E	717 250 45		
				GGS	-	-	-	-		
	2		V16	0BES	-	-	G	717 534 45		
				1BES	45/45	79.5	E	717 250 45		
				GGS	-	-	-	-		
DC-Pro II/DC-ProCC	5	1/1	V8	1BES	45/42	45	A	718 255 45	M	751 253 45
DC-Pro II/DC-ProCC			V16			80	B	718 256 45	N	
			V24			130	C	718 249 45	M	
DCM-Pro			V16	1BES	-	-	R	718 260 45	N	
			V24		45/42	130			M	
DC-Com			V4,5	0BES	-	-	F	718 534 45	O	718 534 45
				1BES	45/42	45	A	718 255 45	M	751 253 45
DCS-Pro			VS8	1BES						
DC-ProFC	5	1/1	VS8	0BES	-	-	G	718 534 45	P	718 534 45
				GGS	-	-	-	-	O	
DC-ProDC			V8/V16	0BES	-	55	G	718 534 45		
				1BES	45/45	79.5	E	718 250 45		
				GGS	-	-	-	-		
			V24	0BES/ 1BES	45/42	130	C	718 249 45	M	751 253 45
				GGS	-	-	-	-	O	718 534 45
DC-Pro II K/ DCS-Pro II K	5	1/1	V8/VS8	1BES	45/42	45	A	718 255 45	M	751 253 45
DC-Pro II K			V16			80	B	718 256 45	N	
DC-Com II K			V4,5			45	A	718 255 45	M	
DC-Pro II K/ DCS-Pro II K		2/1	V4/VS4			80	B	718 256 45	N	
DC-Pro II/DC-ProCC	10	1/1	V6	1BES	52/55	43	D	715 260 45	M	752 253 45
			V8			55	A	715 254 45		
			V12			74	B	715 255 45	N	
			V24			125	C	715 249 45	O	715 534 45
DC-Com II			V4	0BES	-	-	F	715 534 45		
				1BES	52/55	43	D	715 260 45	M	752 253 45
DCS-Pro			VS4/VS6/VS12	1BES	52/55	55	A	715 254 45		

Product range [1]	Size	Reeving	Lifting speed [2]	Switch equipment [3]	Plate dia. d1/ dia. d2	Height h	Load hook side		Chain collector box side	
			[m/min]		[mm]	[mm]	Fig.	Ident. no.	Fig.	Ident. no.
DC-ProFC	10	1/1	VS4/VS6/VS12	0BES	-	-	G	715 534 45	P	715 534 45
				GGS	-	-	-	-	O	
DC-ProDC			V6/V8/V12/V24	0BES	-	-	G	715 534 45		
				GGS	-	-	-	-		
			V6/V8/V12	1BES	52/55	81.2	E	715 074 45		
			V24	1BES			2 x E	715 074 45		
DC-Pro II K	10	1/1	V6	1BES	52/55	43	D	715 260 45	M	752 253 45
			V12			55	A	715 254 45		
DC-Com II K			V4		52/55	43	D	715 260 45	M	752 253 45
DCS-Pro II K			VS6/VS12							
DC-Pro II, DC-ProCC, DC-Com II	10	2/1	V4		52/55	55	K	715 254 45	M	
DC-Pro II/DC-ProCC			V6			74		715 255 45	N	
DCS-Pro			VS4			55	H	715 254 45	M	
			VS6			74	I	715 255 45	N	
DC-ProFC			VS4/VS6	0BES		81.2	J	715 074 45	P	715 534 45
				GGS	-	-	-	-	O	
DC-ProDC			V4/V6	GGS	-	55	H	715 254 45	O	715 534 45
				0BES/ 1BES	62/55	81.2	J	715 074 45		
DC-Pro II K/ DCS-Pro II K			V6/VS6	1BES		74	I	715 255 45	N	752 253 45
DC-Com II K			V4			55	H	715 254 45	M	
DC-Pro II/DC-ProCC	16	1/1	V8	1BES	62/55	55	A	721 753 45	Q	721 753 45
		2/1	V4				L			
DCS-Pro		1/1	VS8				A			
DC-ProFC			VS8	0BES						
				GGS	-	-	-	-		
DCS-Pro		2/1	VS4	1BES	62/55	55	L	721 753 45		
DC-ProFC			VS4	0BES						
				GGS	-	-	-	-		
DC-ProDC	16	1/1	V8	GGS	-	-	-	-	2 x Q	721 753 45
				0BES/ 1BES	62/55	55	2 x A	721 753 45		
		2/1	V4	GGS	-	-	-	-		
				0BES/ 1BES	62/55	55	L	721 753 45		

1) LDC: Buffers as for DC, KLDC: Buffers as for KDC, KLDC-ProDC: No buffers, since always fitted with geared limit switch.

2) Lifting speed: V = 2-stage speed for 50 Hz, VS = Variable speed at vs_{nenn}.

3) 0BES = No operating limit switch, 1BES = Fitted with operating limit switch, GGS = Fitted with geared limit switch.

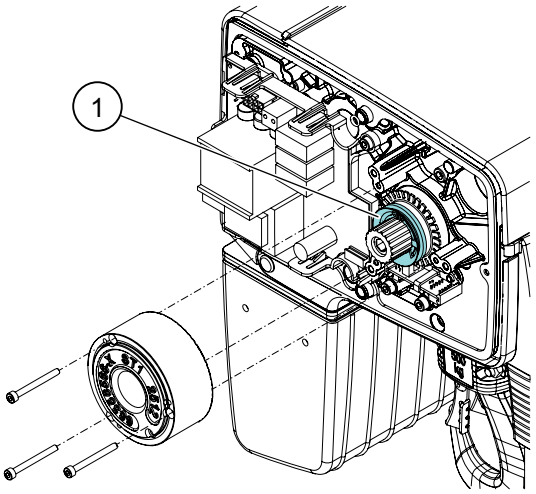
7.13 Brake

7.13.1 Maintaining the brake

NOTICE **During the annual inspection, the V seal ring of the brake must be greased.**

1. If a load is attached to the hook, remove it.

2. Disconnect the chain hoist from the main power supply network.
3. Open the electric equipment cover.
4. Detach the brake. For more information, see "Replacing the brake."
   Take notes or a photograph of the orientation of the brake. You must install the brake in the same orientation.
5. Apply anti-friction grease without any solid lubricant to the V seal ring (1).
   Make sure that the area of V seal ring (1) on the brake base is lightly greased.



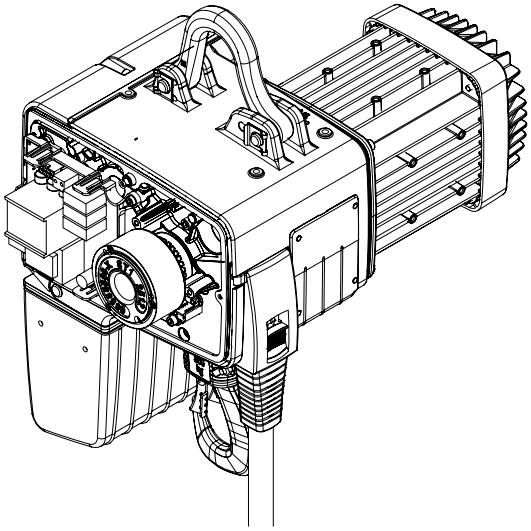
6. Install the brake in the same orientation as before detaching the brake. For more information, see "Replacing the brake."

NOTE ***Make sure that no grease penetrates inside the brake.***

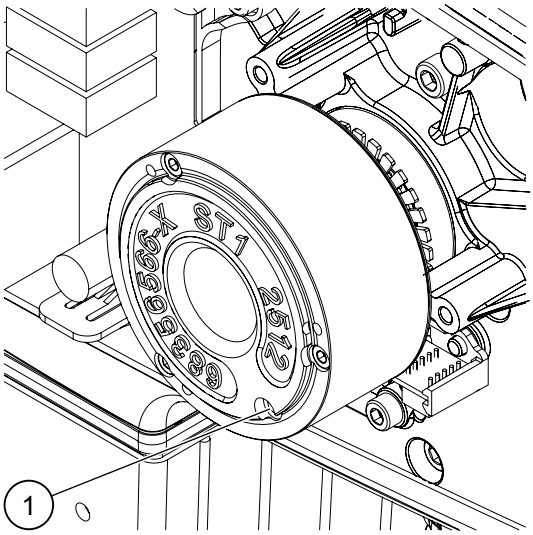
7. Inspect that the lip of the V seal ring (1) is in full contact with the back of the brake.
8. Install the electric equipment cover.
   Tighten the screws of the electric equipment cover to the correct tightening torque. For more information, see "Recommended tightening torques."

7.13.2 Checking the brake wear

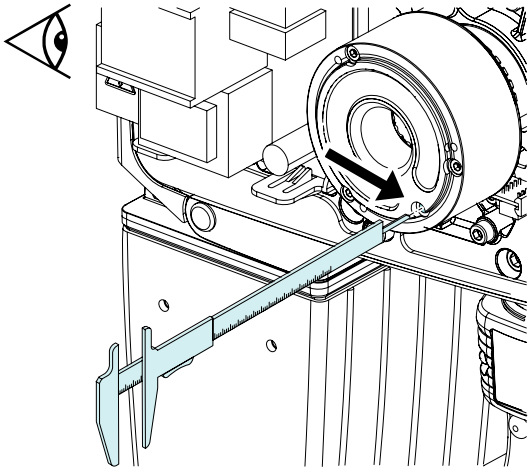
1. If a load is attached to the hook, remove the load.
2. Disconnect the chain hoist from the main power supply network.
3. Open the electric equipment cover.



4. Locate the brake check hole (1) in the brake assembly.



5. Measure the depth of the brake check hole gap with a caliper.



6. Compare the measured brake wear value with the maximum value for brake wear. You can find the value on the brake.

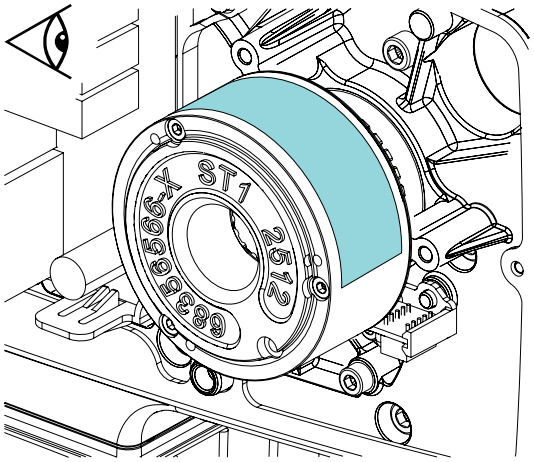
NOTE ***Do not exceed the maximum value for brake wear.***

7. If the brake has worn more than the maximum value for brake wear, replace the brake.

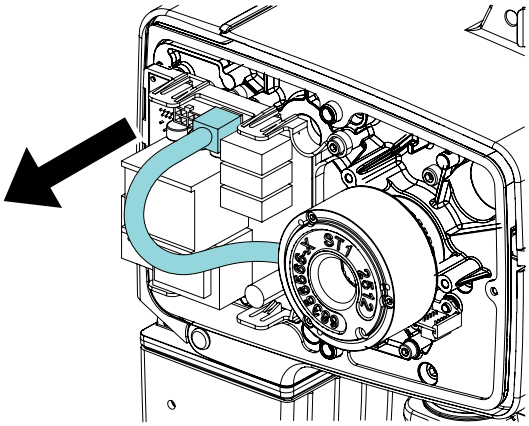
7.13.3 Replacing the brake

1. If a load is attached to the hook, remove it.
2. Disconnect the chain hoist from the main power supply network.
3. Open the electric equipment cover.

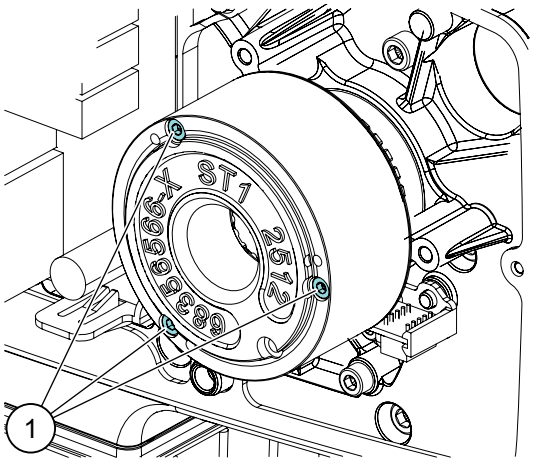
4. Check that the brake data of the replacement brake matches with the data of the original brake.
   You can find the brake data on the brake.



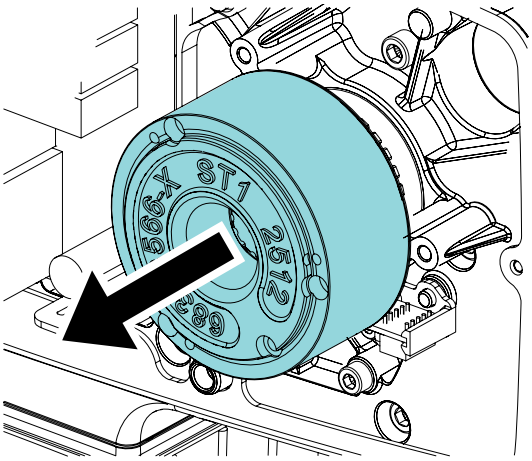
5. Unplug the brake cable from the control board.



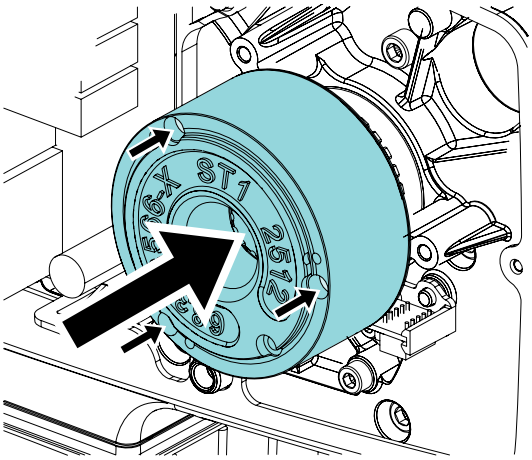
6. Remove the screws (1) that hold the brake in place.
   Take notes or a photograph of the orientation of the brake. You must install a new brake in the same orientation.



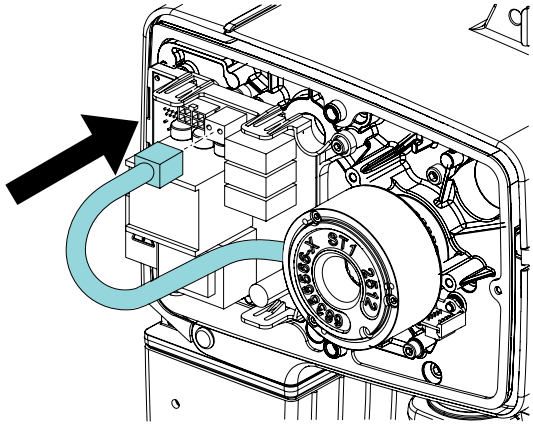
7. Remove the brake carefully.



8. Install the new brake on the shaft in the same orientation as the removed brake. Attach the brake with the three screws.



9. Plug in the brake cable.

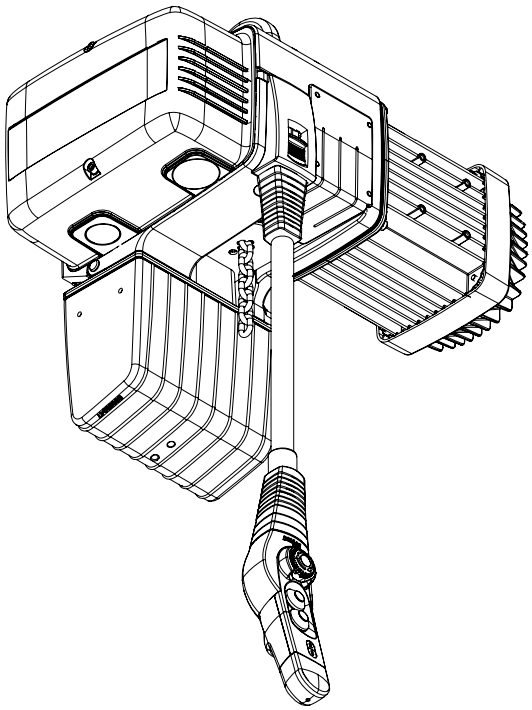


10. Install the electric equipment cover.
    Tighten the screws of the electric equipment cover to the correct tightening torque. For more information, see "Recommended tightening torques."
11. Turn on the power to the chain hoist.
12. Check that the brake works normally.
    1. First test the brake without any load.
    2. Test the brake with a dynamic test load of 110% (EUR) or 125% (US) of the rated capacity. Size of the dynamic test load depends on the country regulations.
    3. In the European countries, test the brake also with a static test load of 125% of the rated capacity.

7.14 Slipping clutch

7.14.1 Checking the slipping clutch

The slipping clutch provides the function of an emergency limit stop device and overload protection for the chain hoist. The slipping clutch is initially adjusted in the factory. Under normal operating conditions, the slipping clutch does not need to be readjusted. The slipping clutch is maintenance-free for up to ten years. The slipping clutch must be checked as part of the annual inspection. The slipping clutch may only be adjusted by authorized specialist personnel. An increase of the tripping torque which exceeds the default setting is not permitted.



Check operation of the slipping clutch as follows:

1. Disconnect the chain collector to remove the limit stop, for more information, see "Removing the chain collector box".
2. Remove the limit stop from the section of chain which is not under load and fit it above the hook assembly.
3. Run the limit stop against the guide plate at creep lifting speed.
   Do not actuate the operating limit switches while this is being done.
   If the slipping clutch is working correctly, the following will be observed:
   - Hoist motor fan is still turning while there is no lifting motion;
   - 7-segment display shows the SLIP LIFTING V1 warning message, for more information, see "Warning messages".

   When the slipping clutch function has been checked, the limit stop must be fitted again to the section of chain which is not under load.

7.14.2 Adjusting the slipping clutch

⚠ WARNING

MOVING MACHINERY HAZARD

When you adjust the slipping clutch, the motor must not run. Contact with the moving parts of the motor can lead to death, serious injury, or property damage.

Always turn off the power to the chain hoist before starting to work with the clutch adjustment tools.

⚠ WARNING

MOVING MACHINERY HAZARD

When you adjust the slipping clutch, make sure that you do not touch any of the moving components. Touching the moving components during the adjustment of the slipping clutch can cause death or serious injury.

Always turn off the power to the chain hoist before starting to adjust the slipping clutch.

Overload protection must be provided for chain hoists with a rated capacity of 1000 kg or more. All DC-II chain hoists have the overload protection. The setting that is made in the factory installation meets the requirements of EN 14492-2 (direct acting rated capacity limiters) for slipping clutches that are used as overload protection.

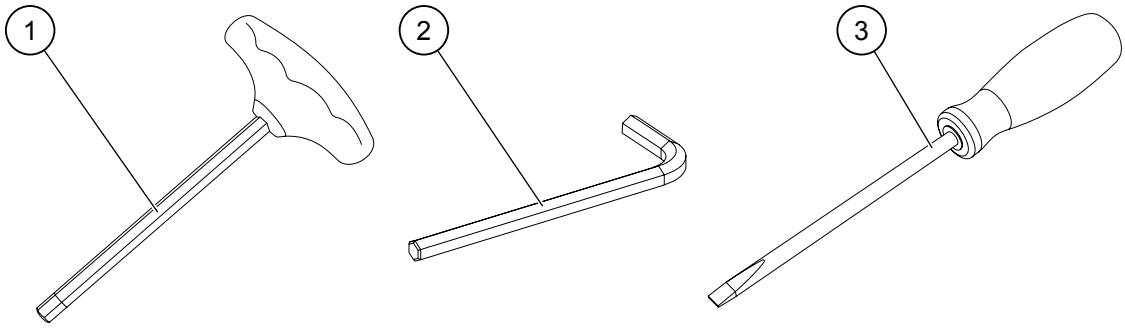
In an acceptance test of the chain hoist installation, a load of 110% of the rated capacity must be lifted without adjusting the slipping clutch. A load of 160% of the rated capacity or more must not be lifted.

The slipping clutch is protected against overload by slip monitoring, which means that it does not have to be readjusted until a general overhaul is carried out. If the adjustment must be checked because of the operating conditions or malfunctions, a friction force checking device (part no. 836 708 44) must be used. Inspection and adjustment may only be carried out by an experienced technician in compliance with the "Friction force checking device" document.

If adjusting the slipping clutch is necessary, follow these instructions:

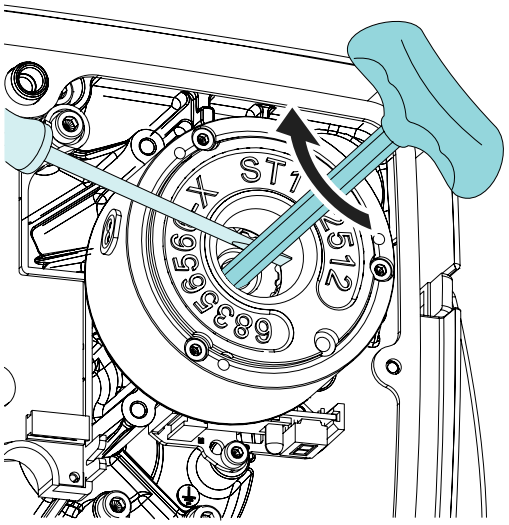
1. Turn off the power to the chain hoist.
2. Remove the electric equipment cover.
3. To adjust the slipping clutch, turn the adjusting screw at the center of the brake with an adjustment tool.

NOTE ***Use a T-handle key (1) or an Allen wrench (2) as an adjustment tool. For more information, see steps 5 and 6.***



NOTE ***If the whole brake hub turns when you turn the adjustment tool in the adjusting screw, use a slotted screwdriver (3) to prevent rotation.***

4. To tighten the slipping clutch and to increase torque, turn the adjustment tool clockwise in the adjusting screw.

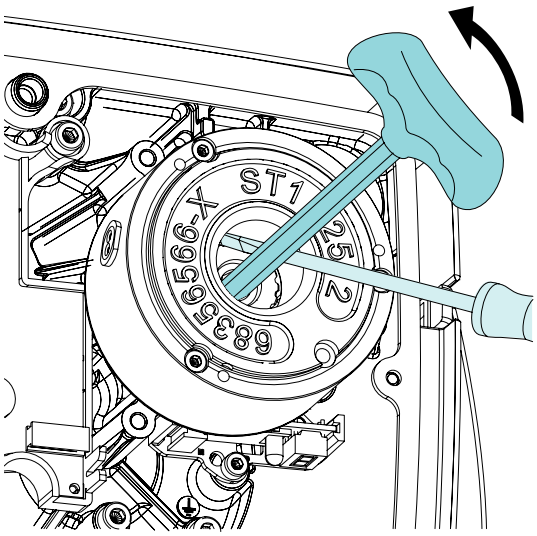


NOTE ***Make sure that you do not over-tighten the adjusting screw. Over-tightening the adjusting screw can damage the springs of the slipping clutch.***

NOTE ***If the whole brake hub turns when you turn the adjustment tool, use a slotted screwdriver to prevent rotation.***

Place the screwdriver on the left-hand side of the adjustment tool. Place the tip of the screwdriver in one of the splines of the brake. Press the screwdriver against the adjustment tool while you turn the adjustment tool.

5. To loosen the clutch and to decrease torque, turn the adjustment tool counterclockwise in the adjusting screw.



NOTE ***If the whole brake hub turns when you turn the adjustment tool, use a slotted screwdriver to prevent rotation.***

Place the screwdriver on the right-hand side of the adjustment tool. Place the tip of the screwdriver in one of the splines of the brake. Press the screwdriver against the adjustment tool while you turn the adjustment tool.

6. Test the slipping clutch.
   6.1 Turn on the power to the chain hoist.
   6.2 Test the slipping clutch again with the friction force checking device.
7. Turn off the power to the chain hoist.
8. Install the electric equipment cover.
   Tighten the screws of electric equipment cover to the correct tightening torque. For more information, see "Recommended tightening torques."

7.15 Maintaining the gearbox

7.15.1 Gear oil

Chain hoist size			DC-II 1 DC-II 2	DC-II 5	DC-II 10
Oil quantities		[l]	0.3	0.35	0.90
Tightening torques	Gearbox cover	[Nm]	10.0		
	Drain plug	[Nm]	35.0		
	Service cover	[Nm]	10.0		

NOTE ***Dispose of waste oil in accordance with environmental protection requirements.***

Oil lubrication

Under normal operating conditions, the lubricant must be changed at least every ten years. Under exceptional conditions, for example, increased ambient temperatures, we recommend that oil changes are adapted to suit these operating conditions.

Oil grade

Shell Donax TD 10W-30 universal gear oil with wear-minimizing additives, range of viscosity 10W-30.

WARNING! MACHINE MALFUNCTION HAZARD

If oils that are not approved are used, malfunctions of the slipping clutch can occur. Malfunctions of the slipping clutch can cause death, serious injury, or property damage.

Only use oils that are approved.

Product range		DC-Pro II DC-Com II	Viscosity range	Part no.
Frequency [Hz]		50/60		
Application, for example	Standard	1	-	*
		-	10W-30	664 020 44
	Foodstuffs sector	3	-	180 003 98
* For more information, see "Spare part manual."				
Numbers 1, 2, and 3 refer to the oil type that is, for example, "O:1" in the data plate.				

7.15.2 Changing the gear oil

⚠ WARNING

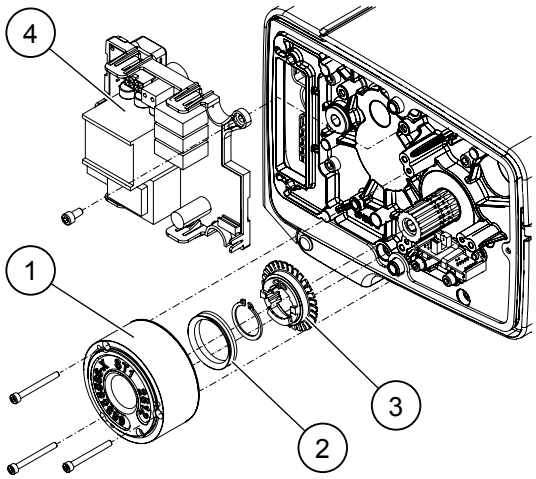
IRRITATING SUBSTANCE HAZARD

The machine contains several chemical substances, which can cause skin irritation and allergies. Risk of injury when in prolonged contact with skin.

When you handle lubricants and oils, avoid direct contact with the skin. Use safety gloves. Immediately wash skin that comes in contact with chemical substances.

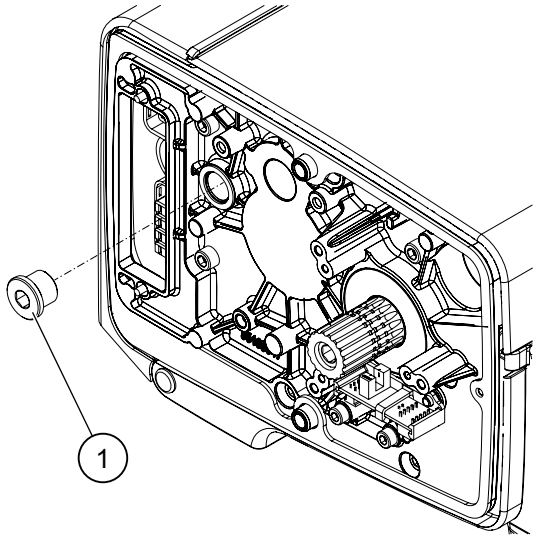
NOTICE **Dispose of waste oil in accordance with environmental protection requirements.**

1. If a load is attached to the hook, remove the load.
2. Disconnect the chain hoist from the main power supply network.
3. Open the electric equipment cover and the service cover.
4. Remove the chain collector box. For more information, see "Removing the chain collector box."
5. Unplug the brake cable from the control board. Remove the brake (1). For more information, see "Replacing the brake." Also remove the V seal ring (2), the pulse wheel (3), and the control board (4).



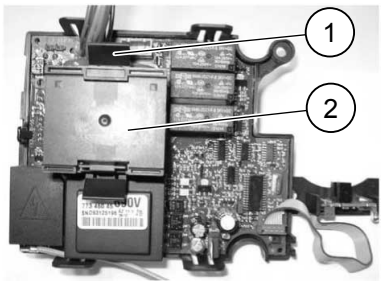
6. Remove the drain plug (1).

NOTE ***Place a container under the gearbox for collecting the old oil before you drain the old oil.***



7. To drain the oil, turn the gearbox on its side so that the hole of the drain plug is down. Drain old oil at operating temperature.
8. Fill the gearbox with flushing oil when the gearbox is back in upright position.
   The flushing oil must have a viscosity of 46–68 mm^2/s at rated temperature. The quantity of flushing oil is twice that specified for lubrication. For more information on the required oil quantities, see "Gear oil."
9. Install the parts removed in steps 4–6.
10. Switch on the chain hoist and run the hook the length of the hook path several times.
11. Disconnect power to the chain hoist and drain the flushing oil as described in steps 2–7.
12. Refill the gearbox with new oil. For more information on the required oil quantities, see "Gear oil."
13. Install the parts removed in steps 4–6.
14. Install the electric equipment cover and the service cover.

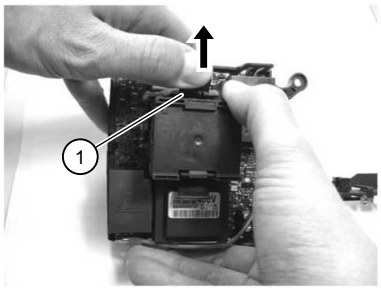
7.16 Replacing the contactor on the control board



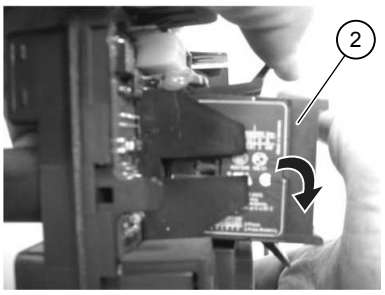
1. Locking tab

2. Contactor

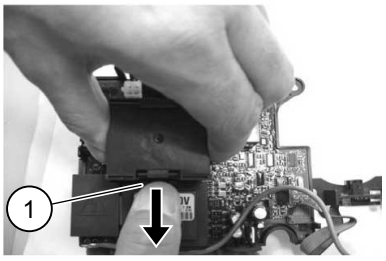
1. Unclip the contactor retaining mechanism by pressing the locking tab (1) with your thumb. Carefully bend the locking tab (1) away from the contactor.



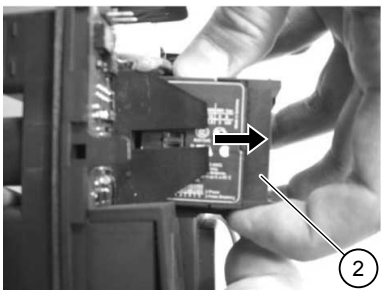
2. Turn the contactor (2) using your other hand until the contactor retaining mechanism no longer holds the contactor.



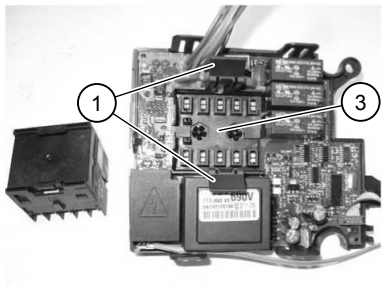
3. Unclip the second locking tab (1) on the opposite side as described in step 1.



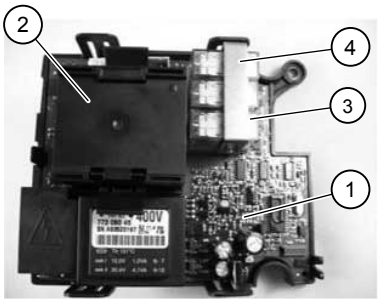
4. Using your other hand, remove the contactor (2) by pulling it away from the control board.



5. You can insert the replacement contactor into the socket in one position only. Push the contactor into the contactor socket (3) until both locking tabs (1) click into position.

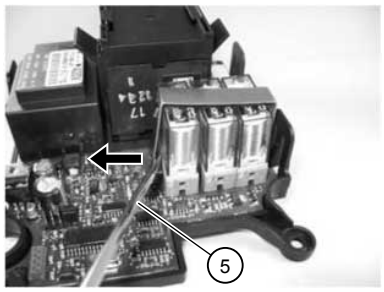


7.17 Replacing the relay on the control board

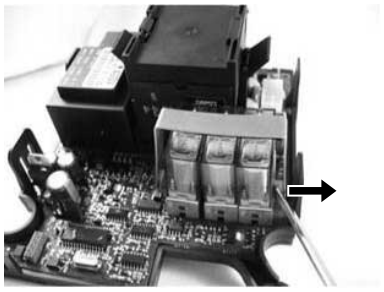


1. Control board
2. Contactor
3. Relay
4. Spring clip

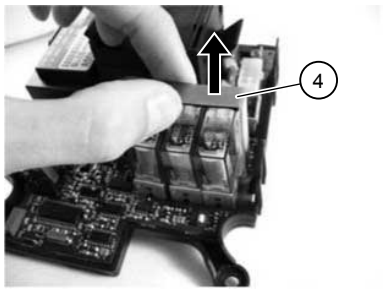
1. Use a screwdriver (5) to lever one side of the spring clip (4) out of its retaining bracket.



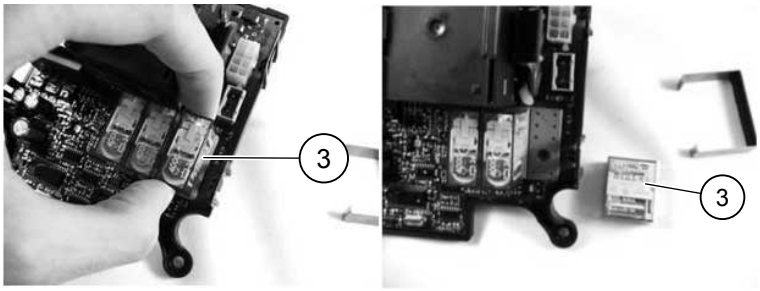
2. Unclip the spring clip (4) on the other side.



3. Lift the spring clip (4) up and off the relays (3).



4. Remove the relays (3) from their bases.

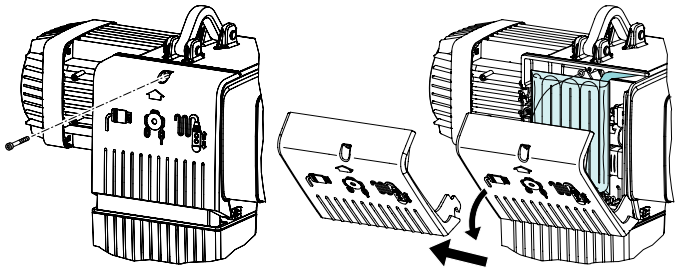


NOTE ***If relays must be replaced, note the following:***

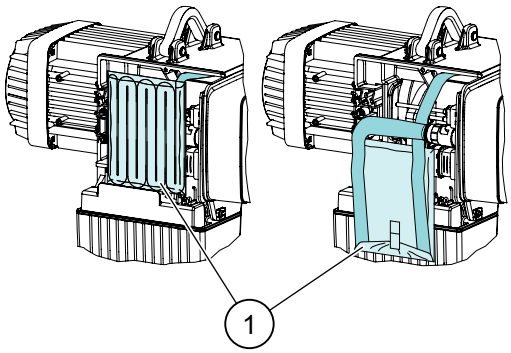
- ***Contact pins of the new relays must not be bent.***
- ***When new relays have been fitted on the control board, the spring clip must be installed from above. The tabs of the spring clip must clip back into the correct position on the relay base. The spring clip must sit tight. There must be no play between the top edge of the relays and the spring clip.***

7.18 Replacing the control cable

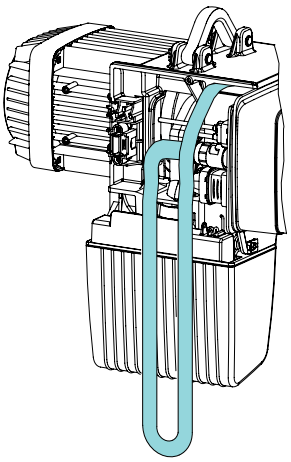
1. Disconnect the chain hoist from the power supply (mains connection switch) and secure it against switching on again. Open and disconnect the service cover.



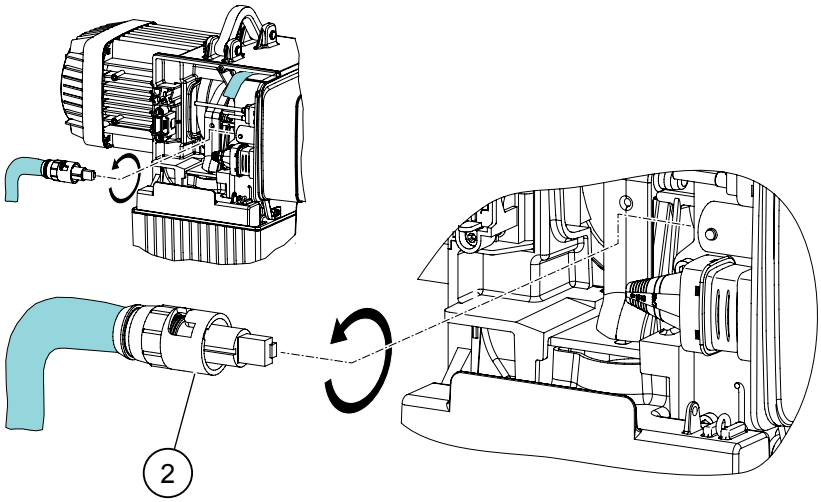
2. Remove and open bag (1) with the control cable.



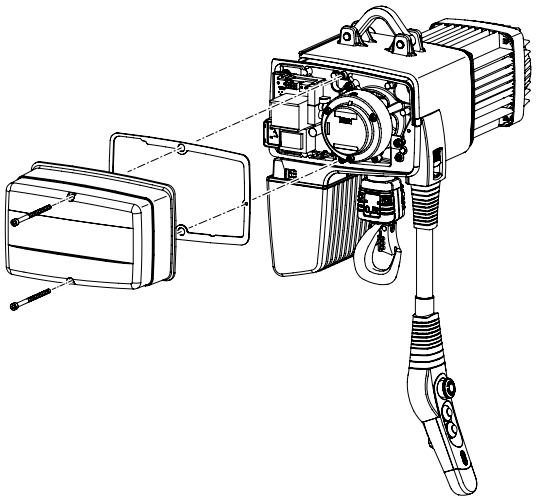
3. Take the control cable out of the bag.



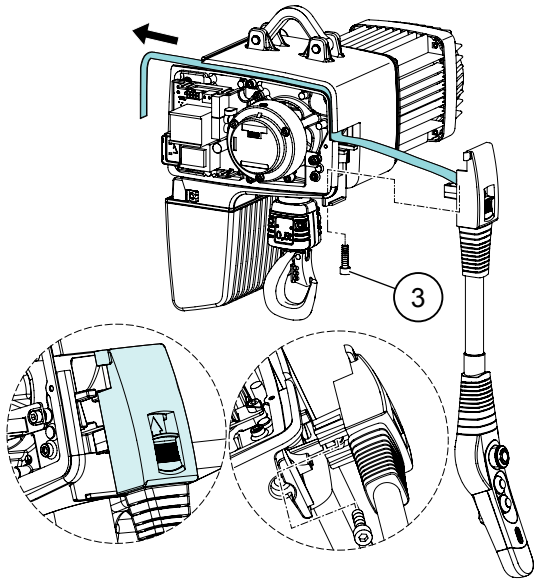
4. Turn and disconnect bayonet lock (2) and remove the control cable plug connector.



5. Unscrew the electric equipment cover, and let the cover hang down on the suspension wires. Do not remove the suspension wires.



6. Loosen screw (3) on the control cable locking mechanism and remove the locking mechanism. Remove the control cable.



Install the new control cable in reverse order. Make sure that:

- The groove on the connector fitting lines up with the swivel lock in the electric enclosure and
- The two pins on the electric enclosure line up with the bayonet lock.

Assemble the pendant controller. For more information, see "Connecting the controller."

Adjust the height of the pendant controller. For more information, see "Pendant controller height adjustment."

7. Reassemble the electric equipment cover and the service cover in reverse order.

Tightening torques [Nm]	DC-II 1	DC-II 2	DC-II 5	DC-II 10
Electric equipment cover	10.0			
Service cover	10.0			
Control cable locking mechanism	10.5			

7.19 Finishing maintenance

Make sure that you leave the site in a safe condition.

1. Make sure that the work area is clean.
2. Remove all locks and tags from switches.
3. Restore safety devices to operational status. If you have bypassed safety devices for test purposes, restore them to full operational status before you allow the product to be used for normal operation.
4. Test that the product functions normally.
5. Inform the site responsible that you have finished the work.

8 Troubleshooting

8.1 Safety during troubleshooting

⚠ DANGER

ELECTRIC SHOCK HAZARD

Incompetent electrical work will be unsafe or cause unsafe and unreliable operation of the product that will result in death, serious injury, or property damage.

Work on electric equipment must be done by qualified specialist personnel in compliance with the safety regulations. For more information, see "Definition of personnel."

Switch off the electric power supply before starting work. Lock out and tag out the power source. For more information, see "Lockout-tagout-tryout procedure."

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Incompetent troubleshooting can be unsafe or cause unsafe and unreliable operation of the product that can cause death, serious injury, or property damage.

Troubleshooting must be done by authorized, trained specialist personnel in compliance with the safety regulations. For more information, see "Definition of personnel."

⚠ WARNING

BURN HAZARD

The chain hoist has hot surfaces when the chain hoist has been in operation. Hot surfaces can cause serious injury.

Do not touch hot motor housings. If you must touch a motor, allow the motor to cool down before eliminating the fault.

Conduct when malfunctions occur

1. If malfunctions occur that result in an immediate danger of personal injury, damage, or an operating hazard, stop the machine immediately. Actuate the emergency stop without delay.
2. Switch off the chain hoist at the mains connection or the isolating switch, and secure it against switching on again.
3. Inform the person responsible at the operating location about the malfunction.
4. Have the faults and causes of faults determined and rectified by authorized specialist personnel. After a short circuit, experts must ensure that the built-in electrical components do not have any contact welds or other faults. Continued operation without checking is not permitted.

Conduct after a fault is eliminated

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Improperly fitted safety devices can cause death, serious injury, or property damage.

Make sure that the malfuction and the cause of malfunction are eliminated before you reconnect the power supply. Make sure that all safety devices are fitted properly and that they are in perfect condition and working order.

Make sure that nobody is present in the danger zone of the equipment.

8.2 7-segment display

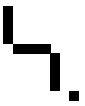
NOTE

The symbols are shown one after the other.

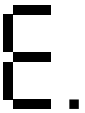
- ***Contact after-sales service if the cause of the fault cannot be eliminated with the given measures.***

The 7-segment display is located on the underside of the chain hoist behind a window.

Warning messages start with a lightning symbol. Movement in the opposite direction is possible, the warning message does not need to be acknowledged using the emergency stop.



Error messages start with an "E" for error. Before any further movement is possible, the error message must be acknowledged using the emergency stop.



Safety function failure

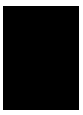
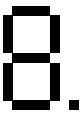
If a safety function fails, the equipment must not be operated until it is repaired.

8.2.1 Troubleshooting when the display indicates malfunction

The chain hoist can only function when it is correctly connected to the power supply. Malfunctions can also be caused by incorrect transmission of commands from the controller. Therefore, if a malfunction occurs check the following.

1. Check cables, strain relief, and power supply connections.
2. Check the pendant controller and the control cable for damage and the plug-in connector on the controller and in the service enclosure for correct fit.

8.3 Operating statuses and general messages

Display	Malfunction or event	Possible cause	Solution
	No lifting, no lowering	No power supply **(display is dark)**	Check mains connection and fuse link; check connection cable for interruption; check mains connector in the service enclosure. Check PE phase for correct connection.
	No lifting, no lowering	Emergency stop actuated.	Unlock emergency stop by turning it.
		Connecting cables that are not connected or defective.	Check and replace connections, as required.
		Plug connections that are not connected or defective.	Check and replace plug connections, as required.
	No lifting, no lowering	When the voltage is switched on or the emergency stop is unlocked, a button is already actuated.	Release button and actuate it again.
		Control cable interrupted.	Check connections of the control cable on the controller and in the service enclosure. Check control cable for continuity.
	–	–	Operating status: Lifting V1

Display	Malfunction or event	Possible cause	Solution
	–	–	Operating status: Lowering V1
	–	–	Operating status: Lifting V2
	–	–	Operating status: Lowering V2
	–	–	Operating status: Lifting start-up
	–	–	Operating status: Lowering start-up
	Upper limit position reached, no lifting	Upper limit switch actuated.	Limit position reached. Lower.
	Lower limit position reached, no lowering	Lower limit switch actuated.	Limit position reached. Lift.
		Button lock	
	No travel	"Left" and "Right" buttons that are actuated simultaneously.	Release buttons and press only one.
		Invalid controller signals.	Strong electric interference.

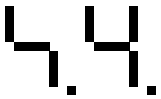
8.4 Warning messages

In general, all warning messages are generated by comparison of the actual and theoretical speed. There may be various causes for differences in speed:

- incorrectly adjusted slipping clutch;
- binding brake or
- dirty or defective speed sensor.

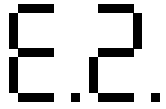
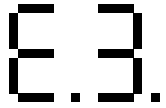
These causes may result in frequent warning messages. Various measures must be taken to eliminate the warning messages:

- clean the speed sensor with compressed air (for example, dirt accumulation on the photo cell);
- check and, if necessary, adjust the slipping clutch;
- check and, if necessary, adjust the brake air gap.

Display	Malfunction or event	Possible cause	Solution
	SLIP LIFTING start-up: No lifting. No lifting with load.	A mains phase is missing or the motor is blocked.	Check mains connection and fuse link; check connection cable for interruption; check mains connector in the service enclosure.
		Chain hoist that is overloaded or undervoltage.	Reduce load to the permissible load capacity. Ensure appropriate supply voltage.
	SLIP LIFTING V1: Cut-out in the upper limit position.	Limit switch contact is no longer actuated.	(-.) is displayed when the limit switches function correctly. The slipping clutch acts as an emergency limit stop device if there is a malfunction. Connection and operation of the limit switch contact must be inspected by an experienced technician.
	SLIP LIFTING V2: Cut-out in the upper limit position. Fast lifting with load is switched off.	Limit switch contact is no longer actuated.	(-.) is displayed when the limit switches function correctly. The slipping clutch acts as an emergency limit stop device if there is a malfunction. Connection and operation of the limit switch contact must be inspected by an experienced technician.
		Chain hoist overloaded.	Reduce load to the permissible load capacity.
	Defective internal data memory.	Defective control system.	Replace control system.
	No speed information.	Hardware monitoring malfunction.	Repeat lifting process; if the load does not move, have the brake and control system that is checked by an experienced technician.
	SLIP LOWERING start-up: No lowering.	A mains phase is missing or the motor is blocked.	Check mains connection and fuse link; check connection cable for interruption; check mains connector in the service enclosure.
	SLIP LOWERING V1: Lowering is switched off, lower limit position is not reached. Cut-out in the lower limit position.	Chain blocked.	Check chain entry point, replace chain, if necessary.
		Limit switch contact is no longer actuated.	(-.) is displayed when the limit switches function correctly. The slipping clutch acts as an emergency limit stop device if there is a malfunction. Connection and operation of the limit switch contact must be inspected by an experienced technician.
	SLIP LOWERING V2: Lowering is switched off, lower limit position is not reached. Cut-out in the lower limit position.	Chain blocked.	Check chain entry point, replace chain, if necessary.
		Limit switch contact is no longer actuated.	(-.) is displayed when the limit switches function correctly. The slipping clutch acts as an emergency limit stop device if there is a malfunction. Connection and operation of the limit switch contact must be inspected by an experienced technician.

8.5 Error messages

Display	Malfunction or event	Possible cause	Solution
	Chain hoist is blocked.	Hardware error of control system.	Check error message by actuating and unlocking the emergency stop. Then actuate Lowering. If necessary, remove suspended load.
		One phase is missing.	Check the phases.
		Defective electronic monitoring	Replace hoist control system.
		Defective “On/off” contactor	Replace contactor, see "Replacing the contactor on the control board".
		Contact wear	

Display	Malfunction or event	Possible cause	Solution
	Chain hoist is blocked.	Drive blocked	Check error message by actuating and unlocking the emergency stop. Then actuate Lowering. If necessary, remove suspended load.
		Brake blocked	Check and, if necessary, replace the brake.
		Speed measurement failure.	Replace hoist control system.
	Hoist unit: Overspeed or load cannot be held. Lowering with load is switched off.	Lowering speed too high.	Reduce load to the permissible load capacity. Check mains connection and fuse link; check connection cable for interruption; check mains connector in the service enclosure.
	Chain hoist is blocked.	Hardware error of control system.	Check error message by actuating and unlocking the emergency stop. Then actuate Lowering. If necessary, remove suspended load.
		K1 contactor sticking.	Check and, if necessary, replace the K1 contactor.
		Defective electronic monitoring.	Replace hoist control system.
	Chain hoist is blocked.	Hardware error of control system.	Check error message by actuating and unlocking the emergency stop. Then actuate Lowering. If necessary, remove suspended load.
		Defective electronic monitoring.	Replace hoist control system.
	Hoist unit: incorrect direction of rotation; chain hoist is blocked.	Direction of hoist unit cannot be switched.	Check error message by actuating and unlocking the emergency stop. Then actuate Lowering. If necessary, remove suspended load.
	Lifting is switched off.	Brake defective or slipping clutch that is incorrectly adjusted.	Check brake and slipping clutch.
			If there is no fault, replace electronics.
	Chain hoist is blocked.	Emergency stop circuit of control system defective.	Check error message by actuating and unlocking the emergency stop. Then actuate Lowering. If necessary, remove suspended load.
			Replace hoist control system.

NOTE ***Hardware faults are displayed with two characters by software version 1.60 and higher.***

9 Transportation, storage and dismantling

9.1 Transporting the product

When transporting the product or its components, take the following precautions:

- Load and transport the product with caution and using appropriate methods, making proper preparations and taking appropriate caution.
- Do not load or transport products if your alertness or working ability is impaired, for example, by medication, illness, or injury.
- Fasten the load securely for transportation.
- During loading and transportation, do not tip the product or turn it upside down. This could cause lubricants to leak.

NOTE ***If transported improperly, essential parts of the product can become damaged. Defects or faults which are due to improper transportation are not covered by the product warranty.***

9.2 Transport inspection

- Check that the delivery is complete and check it for any transport damage immediately on receipt.
- If any transport damage is visible from the outside, do not accept the delivery or only on condition. Note the scope of damage in the shipping documents and delivery note of the forwarding company. Lodge a claim.
- Lodge a claim for any defects when they are detected, since claims for damages can only be asserted within the relevant claim notification periods.

Scope of delivery

If special designs or other options are ordered or the latest technical modifications are incorporated, the actual scope of supply may differ from the data, information and from the illustrations described here. If you have any questions, please contact the manufacturer.

9.3 Packaging

Chain hoists, the accessories, and the trolleys are shipped in cardboard packing.

If no agreement has been made on the return of the packing material, separate the materials according to type and size and make them available for further use or recycling.

NOTE ***Always dispose of packing materials in an environmentally compatible way and according to locally applicable disposal regulations. If necessary, utilize the services of a recycling company.***

9.4 Storing the product

Until installation, the equipment and accessories must be kept closed and may only be stored under the following conditions:

- Do not store outdoors.
- Store in dry and dust-free places, relative air humidity, max. 60%.
- Do not expose to aggressive media.
- Protect against direct sunlight.
- Avoid mechanical vibrations.
- Storage temperature -25°C...+70°C.
- Avoid strong temperature fluctuations (condensation).

- Oil all bare machine parts (rust protection).
- Check the general condition of all parts of the packing at regular intervals. If necessary, refresh or renew rust protection.
- If stored in a damp location, the installation parts must be packed tight and protected against corrosion (desiccant).

NOTE ***If stored improperly, essential parts of the product can become damaged. Defects or faults which are due to improper storage are not covered by the product warranty.***

NOTE ***The product must not be stored for more than one year. If the product is stored for more than one year, the product must be connected to a power supply for at least one hour within one year. After the product has been connected to a power supply for at least one hour, the product can be stored for another year.***

9.5 Returning the product to use

Store the product correctly. For more information, see "Storing the product."

When taking the product into use after a long period, proper commissioning must be done according to chapter "Commissioning".

9.6 Dismantling the product

If the product must be dismantled, follow these safety instructions:

- Follow the safety precautions for dismantling the product. For example, when working at heights, follow the fall protection procedures. Only experienced service personnel are permitted to dismantle the product.
- Owner shall nominate a person responsible for the dismantling process. This person shall give instructions and monitor the process.
- All controls must be placed in the OFF position, safety switches must be opened, and the main isolator switch must be turned off. The product must be electrically isolated before dismantling starts.
- Make sure that all personnel involved are aware that the product will be dismantled before dismantling starts.
- Owner must prevent unauthorized persons and bystanders from walking on or below the work site. Ensure that the secured area is spacious enough to prevent injuries which could occur as a result of falling components or tools.
- Only use safe tools and machinery for dismantling.
- Make sure that removed fastenings and components will not fall.
- Pay attention to the environmental conditions. For example, do not disassemble the product if the prevailing weather could compromise safety.
- Disassembly sequence is completed in the reverse order to the assembly sequence. Refer to installation and assembly instructions for correct sequence.
- After the product has been dismantled, the owner or person responsible for dismantling can return the working area back to normal use.

If you need more detailed dismantling instructions, contact the manufacturer of the product.

APPENDIX I: Recommended tightening torques

⚠ WARNING

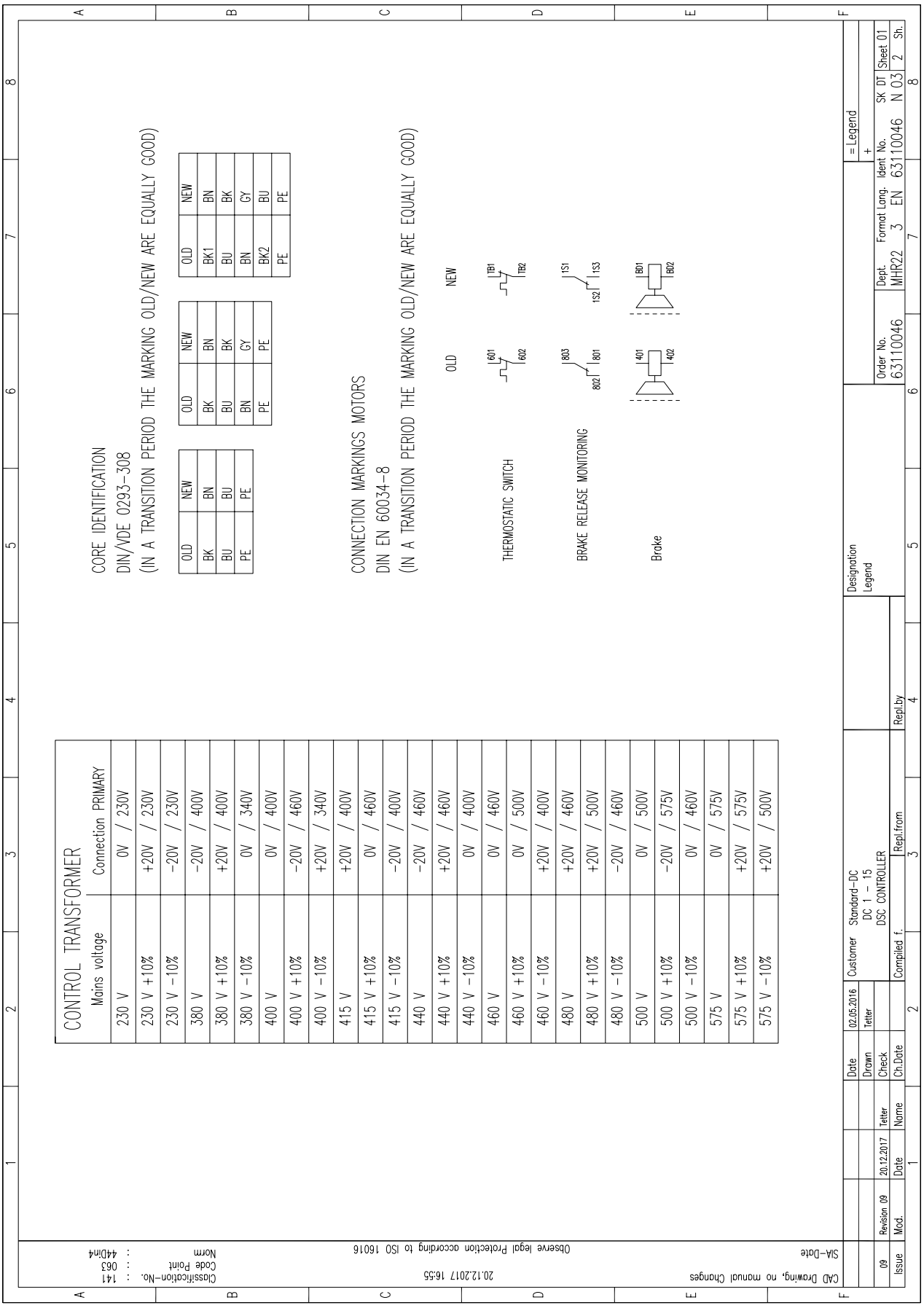
FALLING LOAD HAZARD

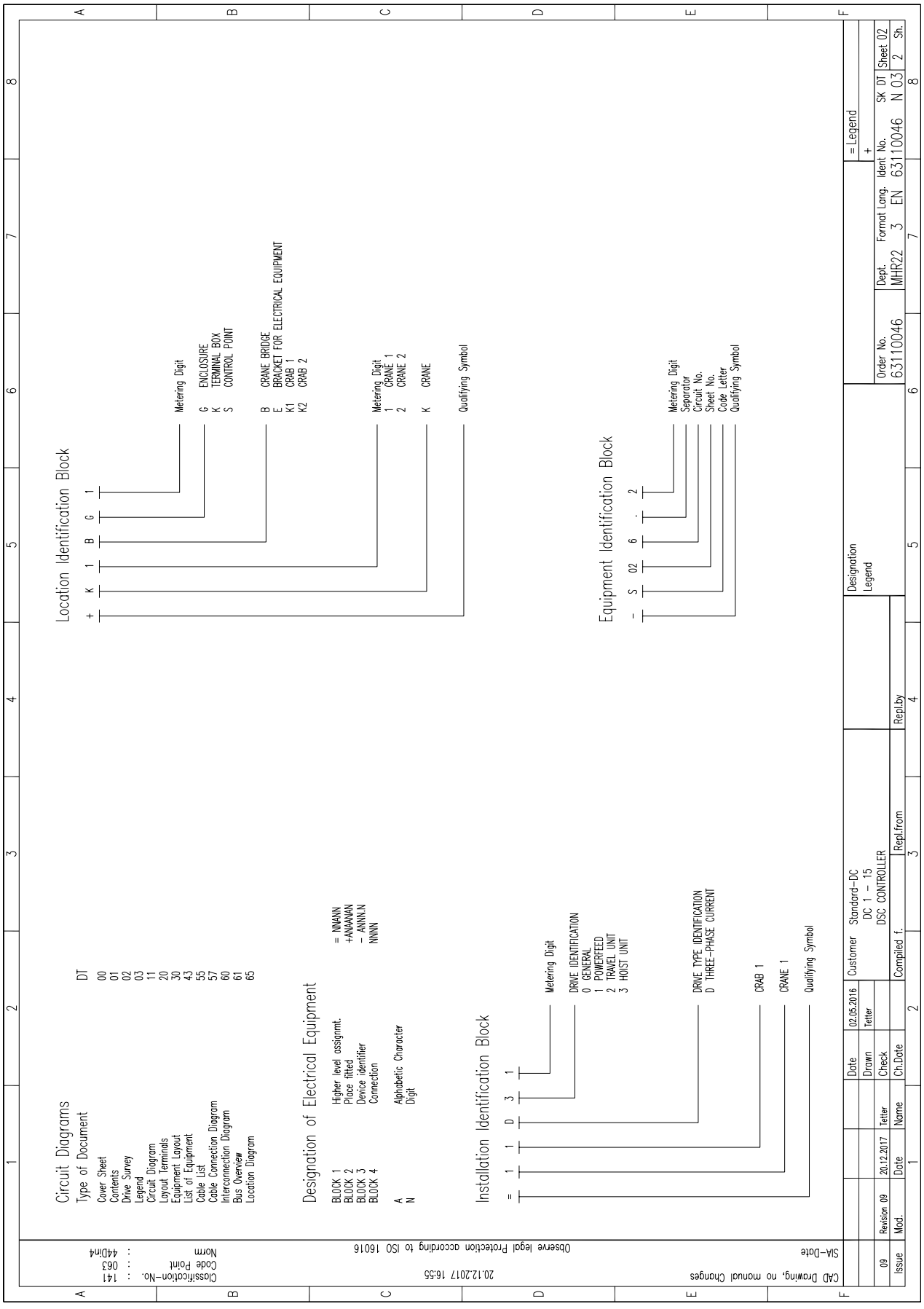
Improper attachment and loose connections can cause death, serious injury, or property damage.

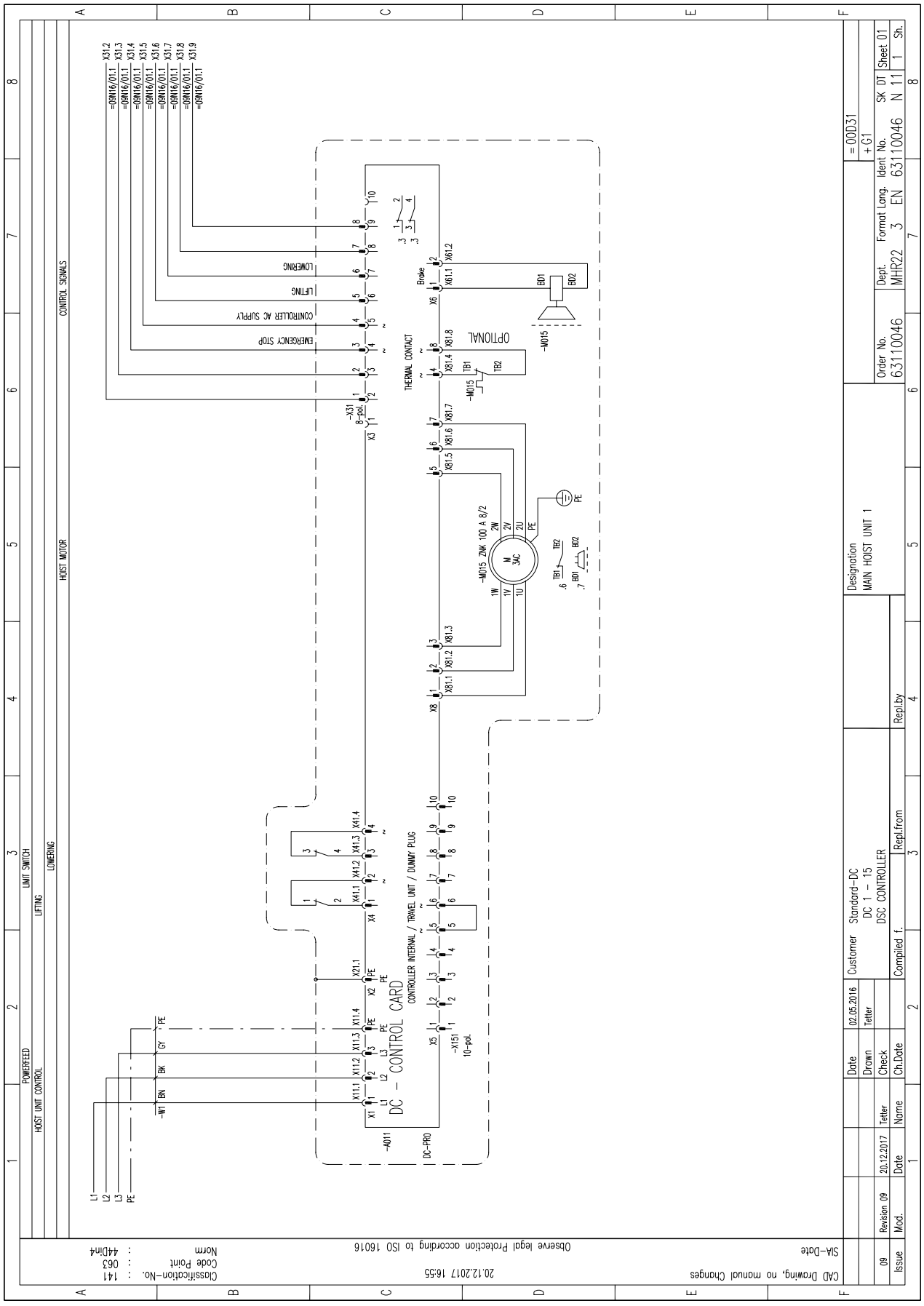
Mainly metal nuts with a locking element, self-locking nuts, are used for chain hoists. Do not replace self-locking nuts with normal nuts.

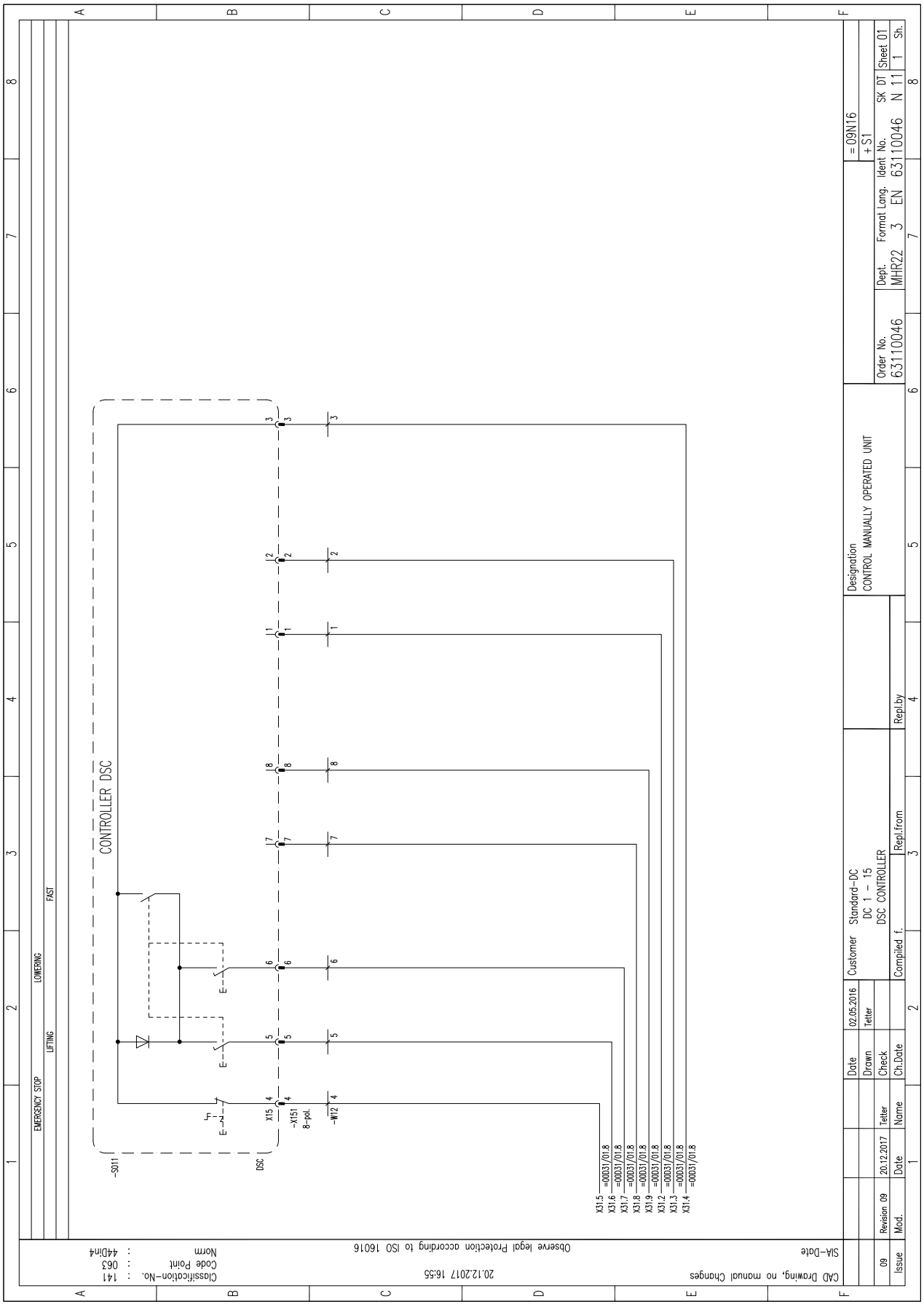
	Tightening torques [Nm]				
Size	**DC-II 1**	**DC-II 2**	**DC-II 5**	**DC-II 10**	
Reeving	**1/1**			**1/1**	**2/1**
Motor	9.5			25.0	
Fan cover	6.0				
Gearbox cover	10				
Drain plug in gearbox	35				
Brake	3.9			5.5	
Operating limit switches	1.5			3.0	
Control set (Ejot screw)	1.0				
Control set (metric screw)	6.0				
Encoder	3.0				
Electric equipment cover	10.0				
Suspension wires of electric equipment cover	6.0				
Service cover	10.0				
Limit stop	2.9			4.3	
Guide plate	6.0			10	
Hook assembly	11.5			25.0	-
Bottom block	-				52.0
Control cable locking mechanism	10.5				
Chain guide	4.5–5.0			8.0	
Pin-fixing screw	-				3.0
Strain relief	6.0				

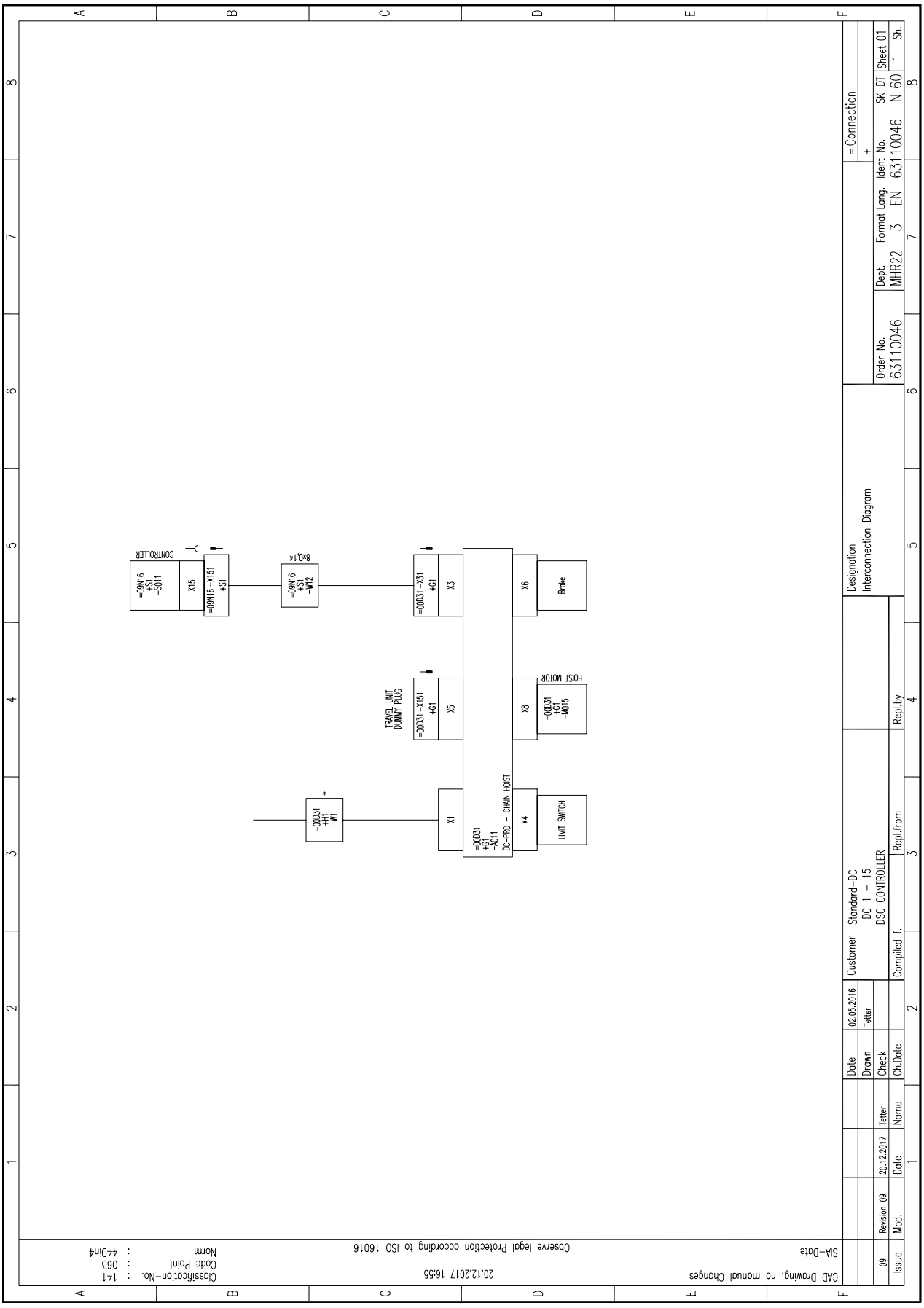
APPENDIX II: DC-II 1–DC-II 10 solo hoist circuit diagram











ORIGINAL INSTRUCTIONS
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