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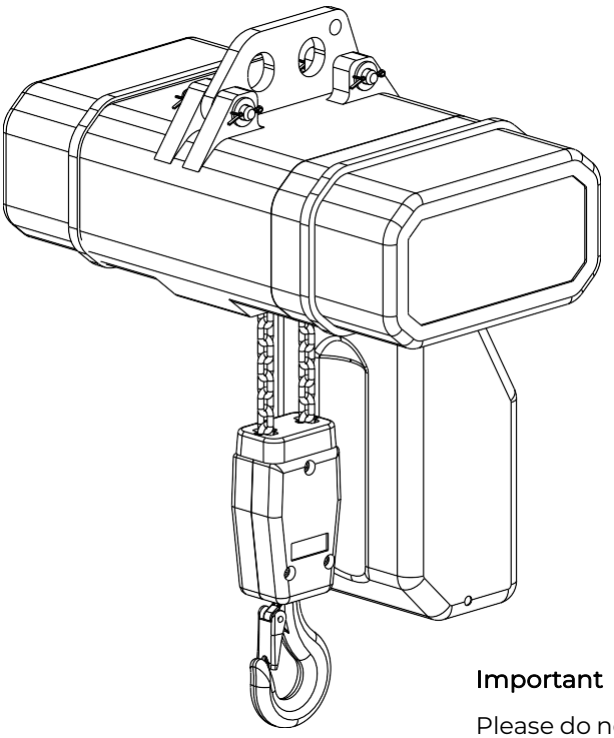
Version 2.3

OPERATING INSTRUCTIONS

D8, D8 Plus, C1 ELECTRIC CHAIN HOIST

Product range ECOlite, PLUS, PLUSlite, UPplus, Plus-C, Prostage, LMK und OMK with fixed-speed and VMK with variable speed

- translated from the original German -



Important

Please do not use the electric chain hoist before all operators have carefully read and understood this manual and signed the form on the rear cover.

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1. General

You have purchased an excellent product that is remarkable for its high quality, reliability and safety. MOVEKET products have been specially developed for use in the events, production and stage sectors and boast features and components that have been tried and tested in practice.

This operating instructions contain information and recommendations necessary to the safe and reliable use of the devices concerned. For this reason, before doing anything it is absolutely essential to read this manual through carefully and take note of the information and safety advice it contains.

The manual is aimed at competent and proficient persons in accordance with the BG guidelines as well as trained staff employed by the operator. The contents describe the correct and proper handling, maintenance, repair and testing of the devices. Please pay special attention to the safety instructions.

If you have any questions, your nearest MOVEKET dealer or the manufacturer will be happy to answer them.

1.1. Disclaimer

This manual, the technical specifications and other documentation have been prepared with the utmost diligence, based on the facts at the time of publication. Content changes may be made at any time without notice, whether to stay abreast of technological developments or to correct technical, grammatical or typographic errors.

Due to our policy of continuous development, it is possible that minor discrepancies may arise between the manual and the actual products or their features. No claim is made that the products as supplied correspond to the descriptions, technical illustrations or other information contained in this manual.

Warranty and liability claims deriving from products supplied, these operating instructions or the technical documentation provided shall be governed exclusively, to the exclusion of all other claims, by the principles contained in the General Terms and Conditions of the manufacturer.

1.2. Warranty

For devices and components manufactured by us, we offer a warranty following our general terms and conditions commencing with the date of delivery: during such time we will repair defects of which we are informed in writing and that are substantiated or else provide suitable replacements according to our choice. In the case of certain devices, the possibility exists of extending the warranty period in the context of a maintenance agreement. Here, the product-specific fundamentals must be borne in mind.

No claims under the warranty shall exist in respect of damage caused by inappropriate use, improper handling, testing or maintenance, the use of excessive force, induction or undervoltage, alterations or repairs conducted by the operator or user, or any other external influences.

For claims under the warranty, the device is to be returned unopened in the original packaging to the address given below, accompanied by a description of the defect. A copy of the purchase invoice must be enclosed!

Wear attributable to normal operation, parts subject to wear, and expendables are not covered by this warranty.

In principle, liability is excluded in respect of personal injury or damage to property if any of the following points are applicable.

The manufacturer accepts no liability for damage and disruption caused by:

- improper use
- inappropriate use
- operating errors
- improper transport, installation or commissioning
- unauthorized modifications made to hardware or software
- modification of safety or protective equipment
- improper maintenance and recommissioning
- use of non-original parts or accessories
- failure to respect the prescribed test intervals and procedures
- failure to respect the prescribed maintenance intervals and procedures
- failure to follow the operating instructions
- failure to observe the guidelines, standards or regulations in force or sound engineering practice
- extraneous events (e.g. natural disasters, external factors, force majeure)

1.3. Intellectual property /copyright

These operating instructions as well as all related technical documentation and materials are protected by copyright and may only be used for the operation, maintenance, commissioning and testing of the devices concerned by the operator or personnel authorized by the operator.

The disclosure to third parties, reproduction, dissemination or other use or exploitation of the material or extracts thereof is prohibited in the absence of the express permission in writing of the manufacturer. Violations will give rise to criminal prosecution as well as civil claims.

1.4. Safety symbols

Symbols are appended to certain paragraphs in this manual where they contain warnings, safety instructions or handling recommendations that must be observed. In addition to these, all generally applicable national regulations in respect of health and safety at work must be obeyed.

1.4.1. Warning signs

Warning signs draw attention through self-explanatory symbols to hazardous situations and health risks. When notice is paid to them, they make a notable contribution to safety and reduce the risk of accidents at the workplace. Failing to observe such warnings could result in serious injury or even death as well as considerable damage to the devices themselves.

Warning of general danger in the handling of the device

Warning of dangerous electrical voltage levels

Warning of danger due to suspended loads

Warning of the danger of objects falling

Warning of a crushing hazard

Warning of the risk of hand injuries

Warning that hands could be injured by the chain or being dragged into the mechanism

Warning of risk to the hand posed by rotating parts

1.4.2. Mandatory signs

Mandatory signs in the form of safety symbols serve to reduce the risk of accidents and prescribe a certain form of behaviour according to DGUV V9 (former BGV A8). Failing to observe such prescriptions could result in serious injury or even death.

Wear gloves

Wear safety/protective footwear

Wear a safety helmet

Wear PPE (personal protective equipment)

Disconnect device from mains before opening

Before working on the device, de-energize it and safeguard against its being switched back on

1.5. Advisory signs

Advisory signs draw attention to important information regarding the way the chain hoist should be handled by the operator/user. Failing to observe such advice could result in serious injury or even death as well as considerable damage to the devices themselves.

Special information and instructions for the handling of the chain hoist

2. Labelling of the chain hoists

D8 electric chain hoist – complies with the requirements of DGUV V54 (former BGV D8) for the operation of industrial hoisting equipment but must not be used to suspend loads above people. A D8 hoist may only be used in event and production setups for the hoisting of loads during setting-up and dismantling operations. If loads are to be suspended above human beings, a secondary safety component is required. In their standard configuration, MOVECAT D8 hoists are equipped with one brake, however for export a special version (DB) with dual brakes is available.

D8 Plus electric chain hoist – is designed and dimensioned to permit the movement of loads provided that people do not remain beneath them. It may be used in event and production setups for the raising and suspension of loads during setting-up and dismantling operations. Once movement has ceased, the use of the secondary safety component can be dispensed with.

C1 electric chain hoist – satisfies the requirements of DGUV V17 (former BGV C1) and is therefore approved for the suspension and movement of loads above people. Depending upon the application and the hazard assessment based thereon, the control system may need to satisfy additional requirements not covered by the basic configuration. See Section 8.7.3

Note:
These symbols, whether placed alongside particular paragraphs or used within the text itself (D8, D8 Plus, C1), are used in this manual to indicate that the content at that point refers specifically to the corresponding chain hoist varieties: D8, D8 Plus or C1.

The designations D8, D8 Plus and C1 as applied to electric chain hoists are based on the stipulations of the DGUV (German Social Accident Insurance).

Also, the DGUV has changed the numbering of the regulations in the last years. We will stick to the old numbering in this manual as they become trademarks in the business.

3. Definitions

3.1. Competent person

A competent person is one who can point at the very least to the following qualifications (indicative of aptitude, competence and technical accomplishment):

- the successful completion of a technical training course
- the possession by virtue of his or her professional activities and training of adequate knowledge and at least one year's experience in the testing of electrical chain hoists used the events and entertainment sector
- adequate knowledge of:
  - the legal fundamentals (state occupational health and safety regulations, decrees and technical rules)
  - the regulations, rules and findings of the statutory accident insurance institutions
  - current technical standards (e.g. EN, DIN and VDE standards)
  - the information provided by the manufacturer of the machinery to be tested
  - all hazard assessments relating to the machinery to be tested
  - knowledge and experience in the use of the requisite testing equipment
  - the capacity to make an informed judgement based on the current state of the technology as to the safety or otherwise of the machinery and summarize this assessment in a standardized test report (check list).

These are service technicians employed by the manufacturer or qualified employees trained and authorized by the manufacturer.

3.2. Expert

An authorized expert is someone who has, inter alia, completed a course of studies in engineering at a university or college of science and technology and possesses at least three years' experience in the design, construction or testing of machinery as well as having been granted authorization by the accident insurance carriers as stipulated by § 36 BGV C 1 / GUV – V C 1. Depending upon their qualifications, experts are authorized to conduct pre-tests, structural testing and acceptance tests and/or acceptance and periodic testing.

3.3. Qualified electricians

Qualified electricians are persons who, as a result of their professional training and experience, possess adequate knowledge in the field of electrical engineering and are sufficiently familiar with the relevant provisions, accident insurance regulations and generally recognized rules of practice involved as to be able to assess the work with which they are entrusted, carry it out in a professional manner and recognize the possible hazards involved.

3.4. Operators

Operators are persons or companies who operate, make available, hire out or otherwise bring into circulation the devices and integral systems in accordance with the instructions contained in this user manual.

3.5. Users

Users are persons who have been instructed in the correct handling of the devices and entire systems as described in these operating instructions and employ the devices and entire systems accordingly.

4. Safety instructions

Employees must be familiarized with the equipment used in the technical areas of production facilities, stages and studios and instructed as to the hazards involved in the use of such equipment (DGUV V54, DGUV V17, DGUV I215-313, igvw SQ P2). They must be shown the operating instructions supplied.

Please note the following:

No use may be made of the electric chain hoist until all the operating personnel have read these operating instructions through carefully and filled in the form on the last page to indicate that they have done so.

4.1. Intended use

Electric chain hoists are intended to be used for the vertical raising and lowering, as well as the horizontal movement of loads (with optional trolleys), in event and production setups. Any other use and in particular the non-observance of the usage and operational prohibitions set out in Section 8.11 is to be considered improper use such as could lead to danger to life or limb. The manufacturer accepts no responsibility for any harm resulting therefrom, the risk being entirely that of the operator/user.

The transportation of persons by whatever means is not permitted!

C1 hoists may optionally be used in manned airframes or for the direct scenic conveyance of perso For these applications, a separate pre-test, structural test and acceptance test of the appliance or the C1 hoist by an authorized expert is required. (See Section 9.4)

The modern design of MOVEKET's electric chain hoists series B1 to B8 in MB and SB versions guarantees safe and economical use when they are operated correctly.

To protect against overload, a patented safety friction clutch is located between the drive and the brakes. The brakes act directly upon the load via a form-fitted connection in the transmission without loading the safety clutch. The attached loads are securely held whatever the operating scenario.

Prior to use, make sure that all the electrical connections have been properly established, that no cables are damaged and that the system can be de-energized by means of a mains disconnector switch. The operator must also ensure that the attachment points of the electric chain hoist are such as to ensure that the forces applied to them incl. possible breakdown stresses can be safely absorbed.

In the selection and dimensioning of all the bearing elements (e.g. suspension points, girder clamps, shackles, steel wire, roundslings, trusses etc.) found in the load path, both the loads and the hazards involved in each case must also be taken into account. (see also BGI 810-3)

For the safe operation of the electric chain hoists, a safety system controller for three-phase motors suitable for the application in question in accordance with DIN EN 60204-32 is required. If on the basis of the risk analysis or application, additional safety tasks are assigned to the controller or the hardware and possibly also the software, the provisions of DIN EN ISO 13849-1 as well as DIN EN 61508 must be respected. In combination with a MOVEKET controller and MOVEKET connector cables appropriate to the demands, the relevant hoists form an integrated system suitable for the vertical raising and lowering, as well as in some cases the horizontal movement and suspension, of such loads in event and production setups and are CE compliant.

In the case of hoists supplied without connector cables, as well as custom or incomplete versions of the hoists to complete integral systems, we supply these with a declaration of incorporation.

If the operator employs incomplete hoists or some other controller and connection cable, he must conduct an independent risk assessment for the functional integral system, create independent documentation and a certificate of conformity based upon it, and keep it with the integral system being used.

Work on the electric chain hoist may only be carried out by trained personnel ('competent persons') having previously shut down the system and either locked the main switch or else unplugged the power cable and sealed off the working area.

Electrical work on the electric chain hoist, the control components or the connector cable may only be carried out by trained electricians.

The electric chain hoist may only be operated by trained personnel instructed and adjudged capable by the operator who have read the manual and to whom it is available for consultation at all times.

The employer specifies the required skills by means of a risk assessment for the use of work equipment for holding overhead loads in place. This specification must take into account the requirements set out for such persons' qualifications in the appropriate regulations and technica rules (see Section 4.2).

The electric chain hoist can then only be operated when it has been installed in accordance with the regulations, it has been established that all parts are functional and that it has no discernible defects, and that the outgoing chain strand for the hoisting movement in question is capable of exiting the chain hoist safely, due to its own mass, as well as entering the chain container.

Before using the lifting apparatus in an aggressive environment or with/in aggressive mediums, the permission of the manufacturer must be obtained. It may be that the partial use of special components is necessary.

Modifications to the hoists, accessories or control components subsequent to delivery, other than such adjustments to the safety equipment as are required by the application and described in this manual, may only be carried out after these have been cleared with the manufacturer and if original parts approved by the manufacturer are used. Modifications must be entered in the test log. Unauthorized modifications result in the forfeiture of the warranty and loss of CE conformity!

The operator must ensure that the maintenance and test intervals are respected and that maintenance and testing is carried out in properly. The requisite organizational measures must be taken. Any repairs carried out, the replacement of safety-relevant components, the tests conducted and the remaining useful life of the hoist must all be entered in the test log (e.g. adjustment of the brakes or clutch, replacement of the chain, conversion to dual-chainfall operation, etc.).

The electric chain hoist should not be used until all the operating personnel have studied the operating instructions in full and completed and signed the form at the end of this manual to affirm that they have done so.

The manual must be available at all times, complete and in a fully legible condition, at the point of use.

The user instructions foster correct safety practices and the safe operation of the electric chain hoist. The safety instructions outlined below must be followed at all times.

No claim is made, however, that these safety instructions are in any sense comprehensive. If you have any queries or problems, please consult your dealer or distributor.

The manufacturer's approval must be obtained for any use of the device other than the intended use as defined above.

4.2. Guidelines, regulations, norms, standards, technical information

The fundamental principles governing the proper installation, commissioning, use, testing and maintenance of the electric chain hoists within Germany and the rest of the European Union are set out in their essentials in the current versions of the following guidelines, standards, regulations and rules as well as the instructions contained in this manual. When the devices are used in other countries, the corresponding national regulations must be observed though the instructions contained in this manual remain fully applicable. No claim is made that this list is in any way comprehensive.

European Regulations	
2006/42/EG	EG-Machine directive
2004/108/EG	EG-Directive relating to electromagnetic compatibility
2006/95/EG	EG-Electrical equipment designed for use within certain voltage limits

National ordinances	
BetrSichV	Ordinance governing the health and safety aspects of the provision and use of materials at work, the operation of equipment requiring supervision and the organisation of internal occupational health and safety precautions.

Trad association regulations (UVV)	
DGUV V1 (BGV A1)	Principles of Prevention
DGUV V3 (BGV A3)	Electrical facilities and recources
DGUV V52 (BGV D6)	Cranes
DGUV V54 (BGV D8)	Winches, Lifting and Pulling Devices
DGUV V17 (BGV C1)	Accident Prevention Regulation for Staging and Production Facilities
DGUV R100-500 (BGR 500)	Load-bearing equipment in lifting appliances
BGV B3 (VBG 121)	Noise
DGUV G309-001 (BGG 905)	Principles of inspections of cranes
DGUV G315-390 (BGG 912)	Fundamentals of inspections of machinery at stages and studios

Harmonized regulations	
EN ISO 12100-1	Safety of machinery; Basic terminology, methodology
EN ISO 12100-2	Safety of machinery; Technical principles and specifications
DIN EN 14492-2	Cranes - Power driven winches and hoists
EN 818-7	Short link chain for lifting purposes; Fine tolerance hoist chain, Grade T
EN ISO 13849-1	Safety of machinery - Safety-related parts of control systems; General principles for design
EN 60034-1	Rotating electrical machines; Rating and performance
EN 60034-5	Rotating electrical machines; Degrees of protection provided by the integral design of rotating electrical machines
EN 60204-32	Electrical equipment of machines; Requirements for hoisting machines

EN 60529	Degrees of protection provided by enclosures (IP-Code)
EN 60947-1	Low-voltage switchgear and control gear
EN 61000-6-2	Electromagnetic compatibility, Immunity for industrial environments
EN 61000-6-3	Electromagnetic compatibility, Emission standard for residential, commercial and light-industrial environments
EN 61000-6-4	Electromagnetic compatibility, Emission standard for industrial environments

Regulations and technical specifications	
FEM 9.511	Rules for the design of series lifting equipment; Classification of mechanisms
FEM 9.683	Series lifting equipment; Selection of hoisting and travelling motors
FEM 9.751	Series lifting equipment; Power driven series hoist mechanisms; Safety
FEM 9.755	Serial hoist units; Measures for achieving safe working periods
DIN 56950-1:2012-05	Entertainment technology - Machinery installations - Part 1: Safety requirements and inspections
DIN VDE 0701/0702	Inspection after repair, modification of electrical appliances – Periodic inspection on electrical appliances

Technical standards	
IGVW SQ P2	Electric chain hoists – supply and use of electric chain hoists in the setup of productions and events

Information provided by the professional trade associations	
DGUV I215-310 (BGI 810)	Safety during productions and events – introduction
DGUV I215-313 (BGI 810-3)	Safety during productions and events – loads over people
BGI 813	Safety during productions and events – Inspections of electrical systems and devices

Please also note the operating instructions in Section 8 and the operating prohibitions in Section 8.11.

5. Technical overview

5.1. Comparison chart

In this manual it is mostly referred to the version and not to the product name of the chainhoist.

You find the version of the hoist on the product label.

Name	Version
PLUS/PLUSlite 500	SB 4.1/12J
ECOlite 1000	MB 4.3/20T
PLUS/Pluslite 125/160	SB 1.1/16B
ECOlite 250/320	MB 1.1/25B
UpPLUS 250/320	SK 030/10
PLUS/Pluslite 1000	SB 6.1/17P
PLUS/Pluslite 1250	SB 8.2/10U
Prostage 1000	SK 070/76
Plus-C 250/320	SB 030/10
ECOlite 2000	MB 4.2/22M
ECOlite 1600	MB 6.1/22P
OMK 1000	SB 6.1/17P
OMK 1250	SB 8.2/10U
OMK 500	SB 4.1/12J
VMK 125	SB 2/13D
VMK 250-33	SB 4.2/14M
VMK 500-15	SB 4.2/10M
VMK 500-24	SB 6.1/12P
VMK 1250	SB 8.3/10V
VMK 2500	SB 8.3/10V

5.2. Assembly possibilities

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

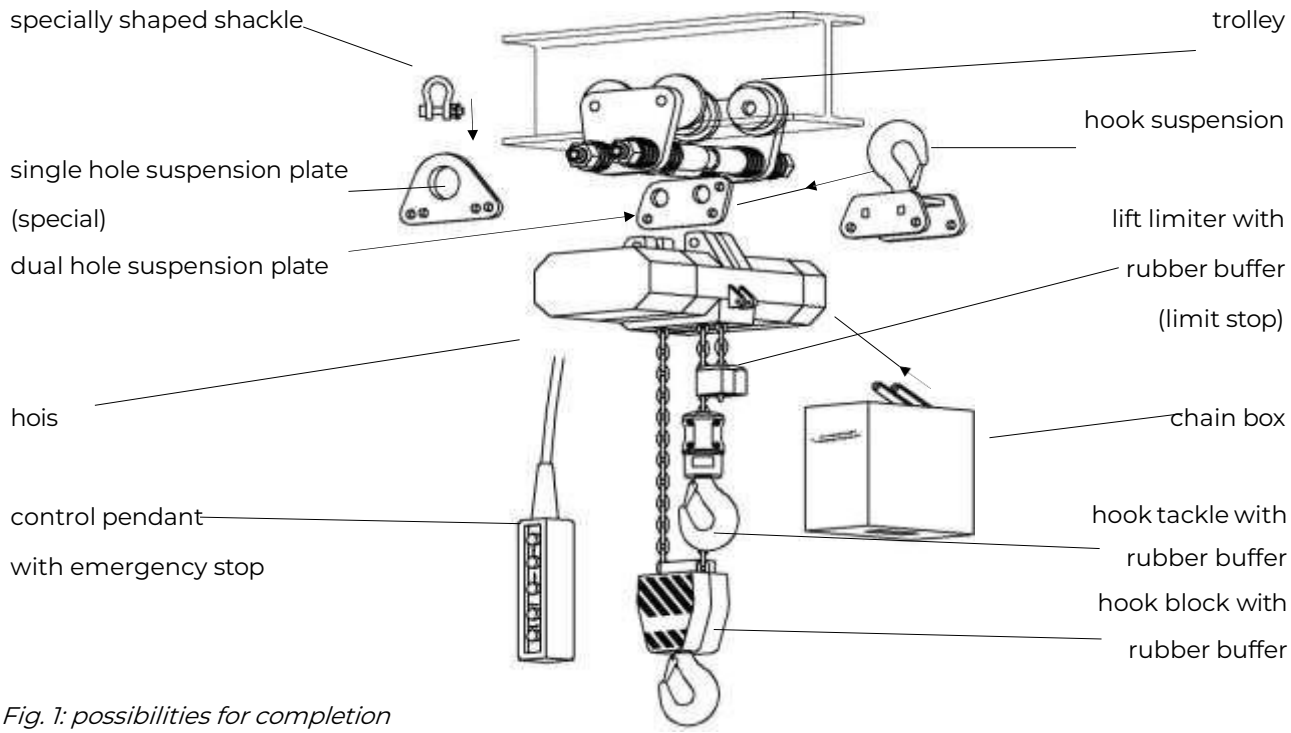


Fig. 1: possibilities for completion

5.3. Explanation of type designation

Example: *Version 7.1*
type 3200 / 2 - 3 / 0,75

slow lifting speed in m/min
main lifting speed in m/min
number of falls
capacity in kg

According to the Machine directive 2006/42/EG you will find all the technical data in the technical documentation attached to each hoist.

5.4. Sectional view of versions MB / SB / SK (without SB 030)

part no.	designation	part no.	designation
1	brake cover	13	clutch hollow shaft
2	casing	14	
3	gear cover	15	wheel IV
4	gear cap	16	pinion shaft V
5	magnet for DC brake	17	wheel VI
6	motor pinion shaft	18	drive shaft
7	clutch compression spring	19	load chain
8	pressure nut	20	retainer
9	retaining plate	21	hook tackle complete
10	brake disk	22	chain box
11	clutch disk	23	control cable
12	rotor	24	terminal strip for mains cable

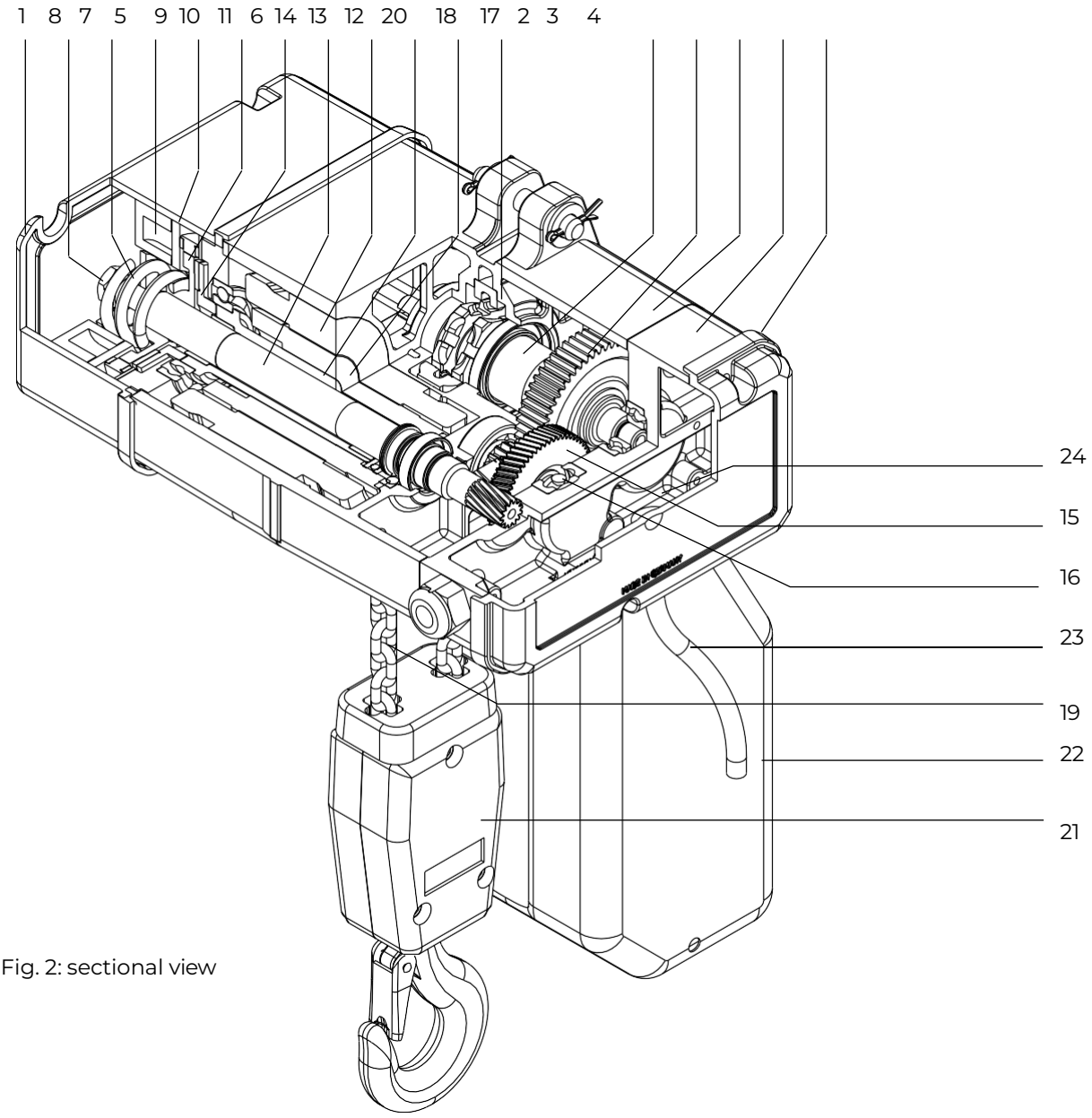


Fig. 2: sectional view

5.4.1. Features of type SK 070 (Prostage)

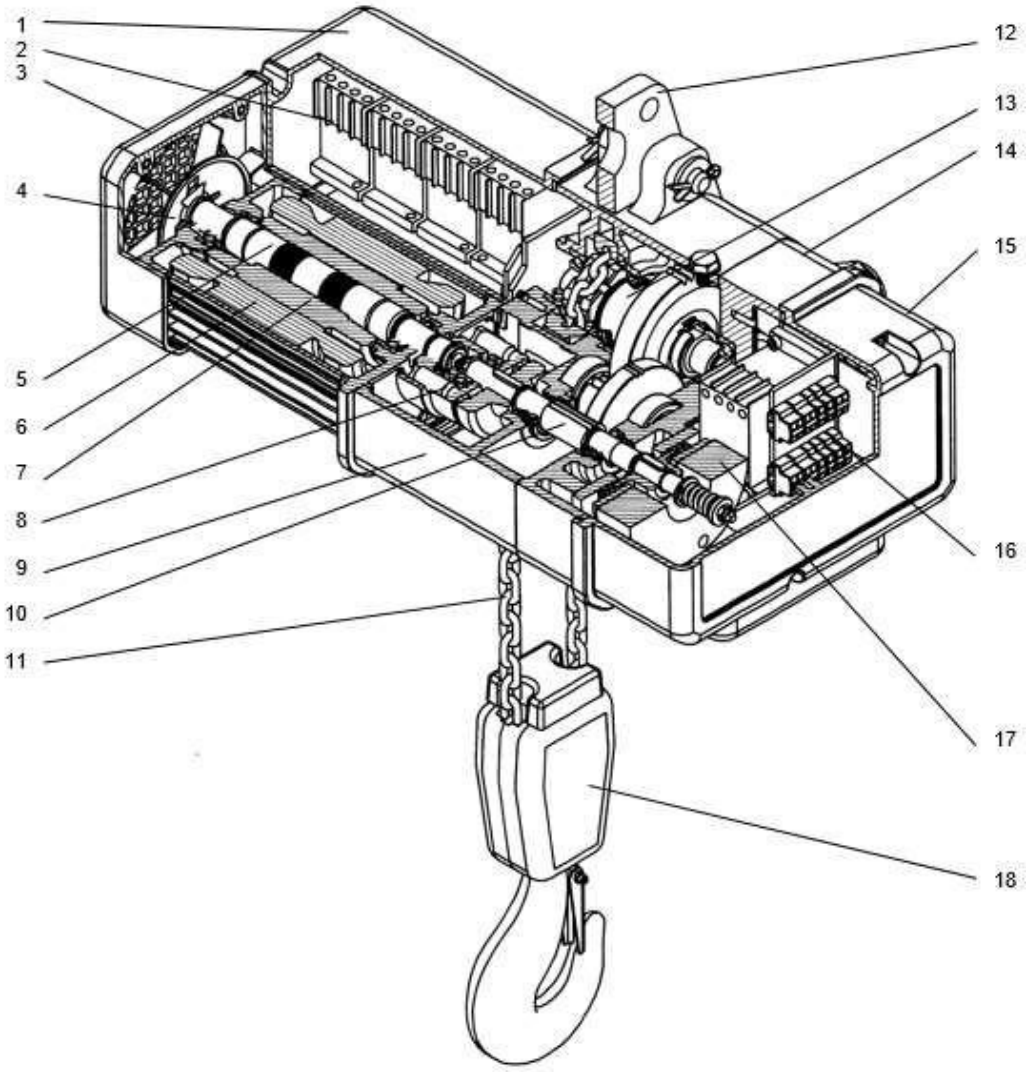
The Prostage chainhoist do not have separate compartments for electronics and brakes! The gear-cap is fixed with eight screws and is not to be opened! Underneath the cap there is direct access to the gearbox. Loosening of the scews leads to oil drain immediately!

All connections, brakes and electronical, are beneath the housing cap of the brake side!

5.5. Sectional view of type SB 030

no.	designation
1	Cap for control
2	Control
3	Cap for fan
4	Fan
5	Motor pinion shaft
6	Stator
7	Rotor
8	Clutch unit
9	Hoist body

no.	Designation
10	Pinion 1
11	Load chain
12	Suspension eye
13	Sprocket wheel
14	Gear cover
15	Cap for gear cover
16	Terminal block board for power supply, pendant control and motorized trolley
17	Brake unit
18	Double fall hook



6. Chain hoists - basic version

6.1. Implementation with single hole suspension plate

Assembly : The suspension plate with a single hole, which forms part of the standard delivery, must be inserted into the specially provided suspension holes on the electric chain hoist and pinned into place with the two bolts. The holes to be used differ depending upon the number of chain falls and are indicated by symbols on the triangular suspension plate

Caution! The marker arrow on the single hole suspension plate must be on the same side as the chain box.

For use with single-bolt trolleys, special single hole suspension plates are available.

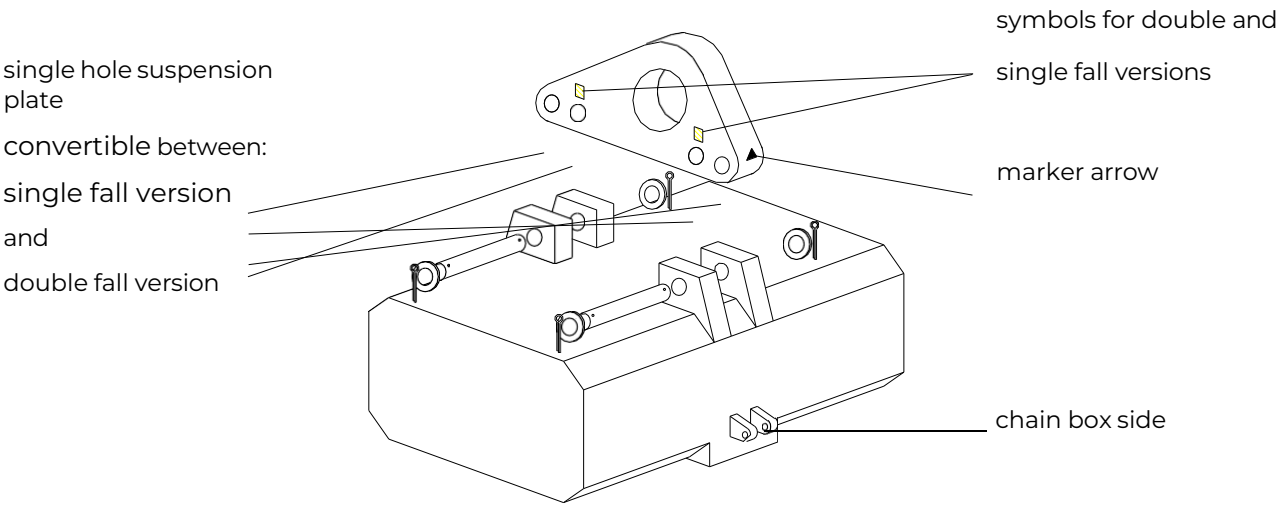


Fig. 3: Single hole suspension plate

6.2. Implementation with dual hole suspension plate

The dual hole suspension plate is designed exclusively for use with a two-bolt trolley

Assembly : The suspension plate with two holes, which forms part of the standard delivery, must be inserted into the specially provided suspension holes on the electric chain hoist and pinned into place with the two bolts. Use washers with the lock bolts and secure position with eyebolts.

Caution! The hole for the tandem trolley of the suspension plate must be on the same side as the chain box.

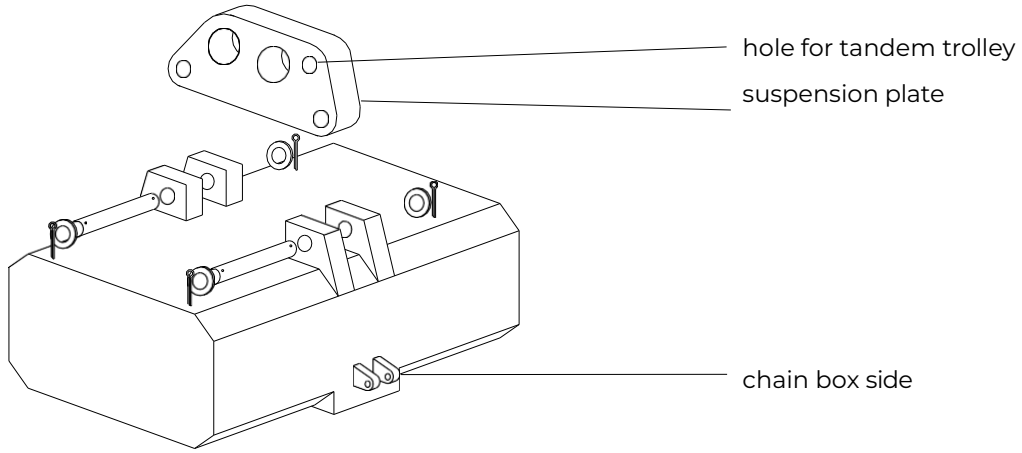


Fig. 4: Dual hole suspension plate

6.3. Implementation with hook suspension

Assembly : The hook suspension must be inserted into the specially provided suspension holes on the electric chain hoist and pinned into place with two bolts. Use washers with the lock bolts and secure position with eyebolts. The assembly or conversion should be done as follows:

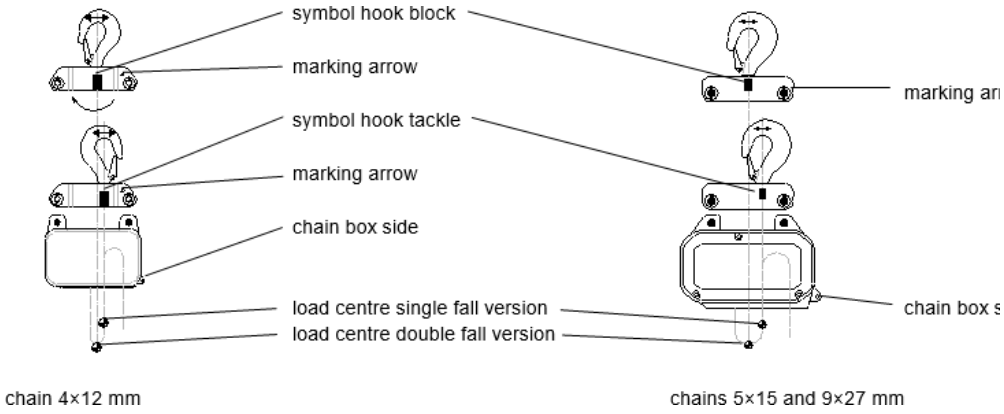


Fig. 5: Conversion of hook suspensions for chains 4×12, 5×15 and 9×27 mm

When converting the hoist with hook suspension (for chains 4×12, 5×15 and 9×27 mm) from one fall number to the other, the hook must be fixed into the hole on the truss provided with the respective

symbol. To do this, pull out the grooved pin, loosen the notch pin from the nut, put the hook into the other hole and screw in the nut again. The grooved pin must then be punched into the hole to secure the bolt. Please take care that the pin is put in safely, that it cannot fall out and that the body of the hoist prevents the pin from falling out after the hook suspension has been assembled. If the pin could become loose please use a new one.

Caution ! For changing the hook suspension of **hoist versions B1-B1.3 (chain 4×12 mm)** for the different numbers of falls the truss of the suspension has to be turned additionally by 180° degrees. The marker arrow of the respective symbol for hook tackle or hook block must be at the same position as the chain box of the hoist.

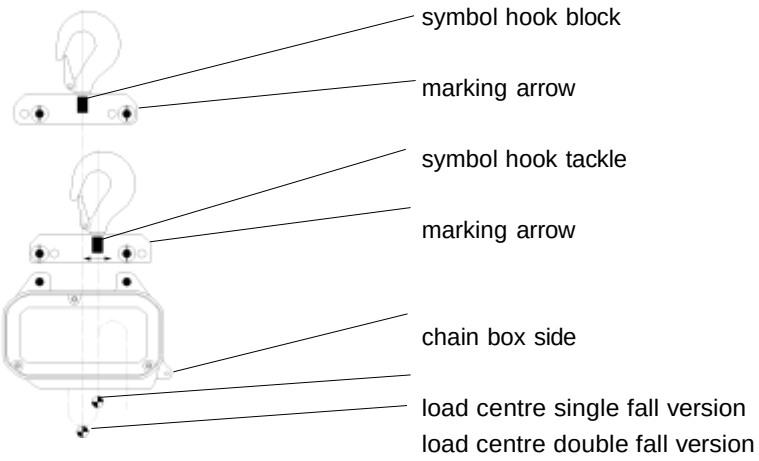
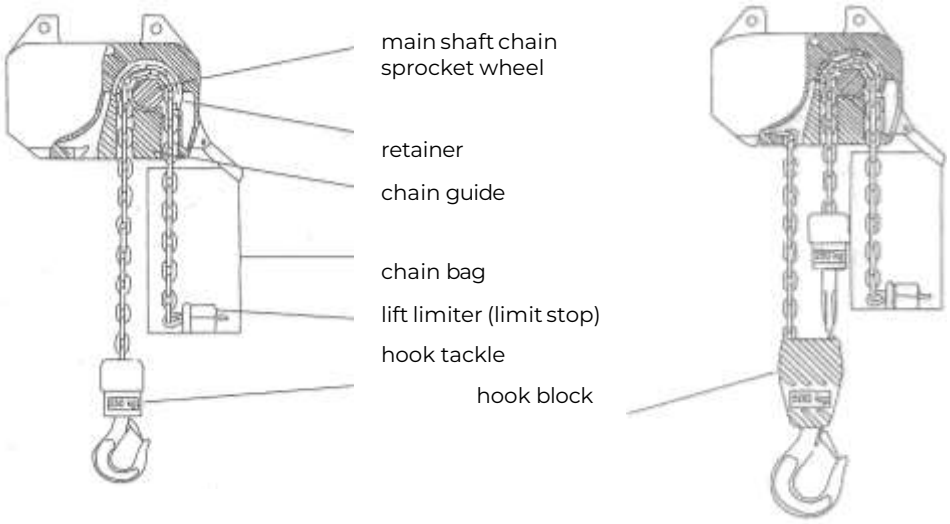


Fig. 6: Conversion of hook suspension for chains 7×22, 11×31 and 11.3×31 mm

It has to be observed during changing of fall numbers or assembly, that the marker arrow of the hook suspension is situated on the same side as the chain box of the hoist. A change from single fall to double fall version can be done by putting the two bolts into the relevant holes at the hoist casing, marked with a symbol for single fall or double fall version. The bolts have to be secured with washers and eyebolts.

6.4. Schematic sketch of the load chain configuration

Use manufacturer's original parts only, as these meet the high stress and service life standards required.



7.1 single fall version

7.2 double fall version

Fig. 7: Load chain configuration

6.4.1. Load chain

Before the chain can be fitted or replaced, the chain hoist must be operational and connected to a controller. Hoist limiters must be removed and limit switches adjusted to allow the chain to extend and retract freely.

Once the chain has been fitted or replaced, the lift limiters must be reinstalled, the limit switches reset and their correct functioning tested.

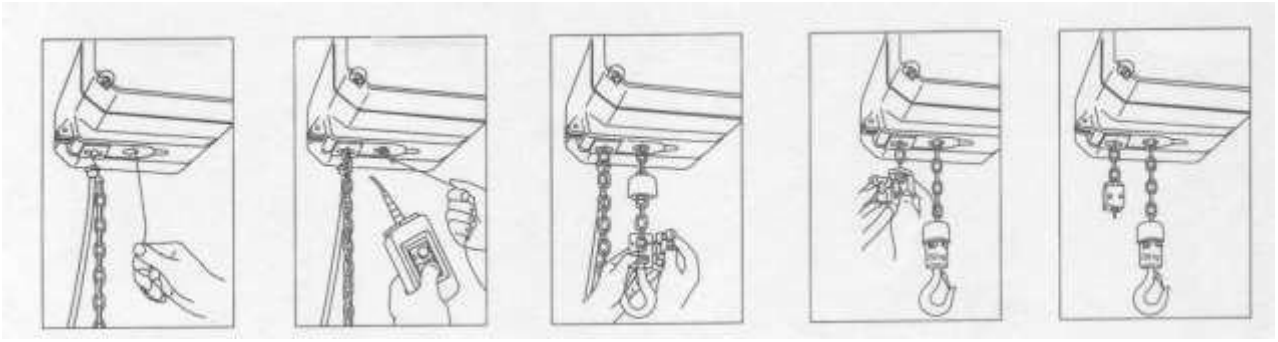
6.4.2. Fitting the load chain - single fall version

1. Push the pull-in wire (special tool) into and through the chain guide cross plate shown in Fig. .1 until the wire hook is pushed out on the opposite side.
2. Starting with the flat chain link (see Fig. .1), hang chain end into the wire hook (always lead in from the chain box side) and pull chain with wire hook into the chain pocket.
3. Allow chain to be fed in using inching control on push button (Fig. 8.2).
4. Attach rubber limit stop onto the other chain end and assemble load hook (Fig. 8.3).
5. Lower the load hook to leave approx. 50 cm of the dead end of the load chain at the dead end side.
6. Press the rubber buffer for lift limiter, included in delivery, onto the chain.
7. Fix lift limiter* before the chain end (Fig. 8.4 / Table 1).
8. Mount chain box as described in chapter (Fig. 6.8)
9. Lubricate chain well and let it run into the chain bag.

Let the dead end of chain run into the chain box by pressing the up button and using the hoist motor to prevent knots inside the chain box. Allow filling of the chain box only by running the chain through the hoist by using the motor. To prevent knots inside the chain box do not put the chain in the box directly.

*** Lift limiter**

The lift limiter is designed to prevent the dead end of chain running out of the hoist. It is used as an emergency stop and cannot be used regularly as a lower limit switch.
If the lift limiter has a metal washer, then this should be mounted towards the electric chain hoist body.



8.1 8.2 8.3 8.4 8.5

Fig. 8: fitting the load chain in single fall version (except version B6.1 and B8.1)

Warning! In the case of models B6.1 and B8.1, prior to this procedure the clutch must be slackened by loosening the pressure nut (the part numbered '8' in Fig. 2 above). After replacing the hold-down, this must be set again as described in Section 11.8

In climbing mode, the lift limiter must be placed a minimum number of links from the end of the chain.

Chain in mm	Minimum number of links from the lift limiter
4x12	26
5x15 and 5,2x15	20
7x22 and 7,4x21,1	14
9x27	11
11x31	10

Table 1: Minimum number of chain links before the lift limiter in climbing mode

6.4.3. Fitting the load chain in case of delivery with preassembled piece of load chain - single fall version

A short piece of chain is already fitted in these models by the manufacturer.

1. Always hang the connecting piece, included in the delivery, into the inserted chain fitted by the manufacturer on the chain box side and then attach the load chain to be drawn in.
2. Continue as described in 6.4.2.

Caution! When changing the load chain and converting to other numbers of falls, never allow the chain to come out of the casing completely, always pull in new chain or a short piece of chain with the connecting piece. (See Section 6.4.5). After having mounted the new load chain remove the short piece of chain and connecting piece (See Section 6.4.5).

6.4.4. Fitting the load chain - double fall version

It must be pointed out, that not for any chainhost a double fall operation is permitted!

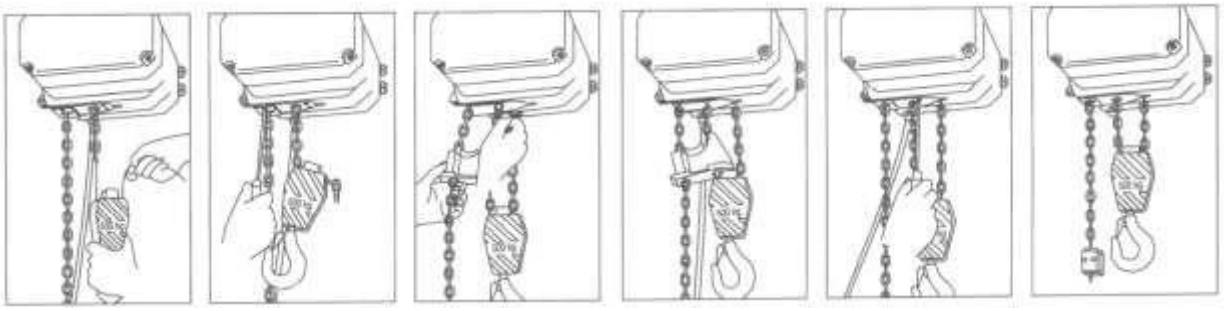
You will find at section 2.7 of the logbook (and on the label of the hoist) the allowed amount of falls!

1. First insert the load chain into the basic hoist casing as described in chapter 6.4.2 depending on version.
2. Pull the chain through the hook block using the pull-in wire (special tool) as shown in Fig. 9.1.

Caution! Never allow the chain to be twisted between the chain outlet and the hook block!

If an assembly with an untwisted chain according to Fig. 9.2 or Fig. 9.3 is not possible one chain link has to be cut and removed to allow correct assembly. Do not turn or swivel the hook block around the horizontal axis between the two chain falls.

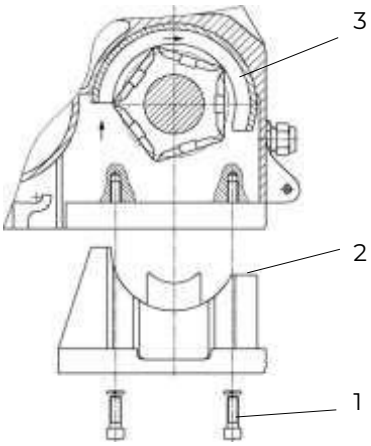
3. Release the 4 bolts of the chain guide (part no. 1 in fig. 10 and lower the chain guide (Fig. 9.2).
4. The chain end which has been pulled out of the hook block must be laid flat into the chain hoist casing pocket as shown in Fig. 7.2 or Fig. 9.3.
5. Fix chain guide onto casing again (Fig. 9.5).
6. Again make sure that chain is not twisted (Fig. 9.6).
7. Lubricate the chain well over the full length.



9.1 *9.2* *9.3* *9.4* *9.5* *9.6*

Fig. 9: fitting the load chain in double fall version

6.4.5. Replacing the load chain and retainer



The chain guide and the retainer must also be changed when load chain is being replaced.

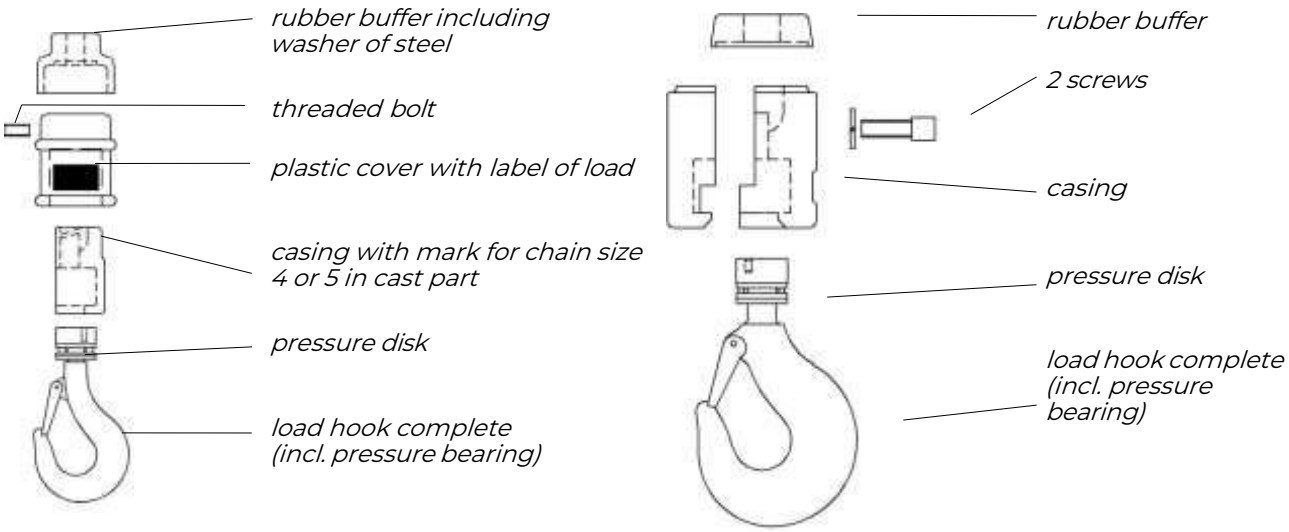
1. Let worn chain move out.
2. Loosen 4 bolts (1).
3. Take out chain guide (2).
4. Press retainer (3)), using the screwdriver (arrow in Fig. 10).
5. When inserting the new retainer (3), take care that the chamfered end shows in the direction of the chain box.
6. Push in the chain guide and screw tight.
7. Fit the load chain like described in the preceding chapters depending on version.

Fig. 10: replacing the load chain, the chain guide and the retainer

Caution! For hoist versions B6.1 and B8.1 the clutch must be relieved of stress by loosening the pressure nut (see part no. 8 in

6.5. Hook tackle

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

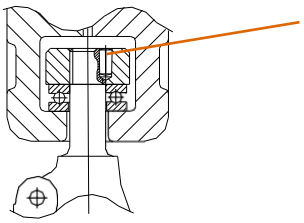


hook tackle for chains 4×12 - 5,2×15 mm

hook tackle for chains 7×22mm and bigger

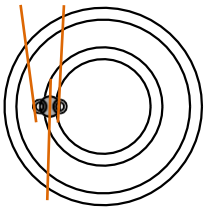
Fig. 11: assembly of hook tackles

During maintenance work the condition of the load hook has to be checked (wear and centre punch spacing, on page hook certificate). For the hook tackles of the chains 4×12 mm to 5,2×15 mm the plastic cover (see Fig. 11) has to be checked additionally and changed if worn. Furthermore the condition of the pin, which secures the hook nut, the pressure bearing and the safety latch have to be checked. If required the axial bearing has to be cleaned and greased.



Securing through grooved pin (grooved pin secured against loosening by two prick punches)

Prick punches



Grooved pin

Fig. 12: Securing the hook nut

For the assembly of the hook tackles please tighten the connection screws with the following torques:

Hook tackle designation	Max. load capacity (kg) D8/D8 Plus + C1)	Screw dimensions	Qty	Torque (Nm)
Hook tackle for chain 4×12 mm	250 / 125	-	-	-
Hook tackle for chain 5×15 mm	250 / 125	-	-	-
Hook tackle for chain 7×22 mm	1000 / 500	M10×40 DIN 912	2	35
Hook tackle for chain 7,4x21,1 mm	- / 1000	M10×40 DIN 912	2	35
Hook tackle for chain 9×27 mm	1600 / 800 (1000*)	M12×30 DIN 912	2	50
Hook tackle for chain 11×31 mm	2500 /1250	M12×35 DIN 912	2	50
Hook tackle for chain 11.3×31 mm	3200 / 1600	M12×35 DIN 912	2	50

Table 2: tightening torques of connection screws for hook tackles

(*Load bearing capacity in accordance with DIN 56950:2012-05 dynamic safety factor: 8)

6.6. Hook block

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

At all maintenance work the condition of all the parts has to be checked (see Section 11)

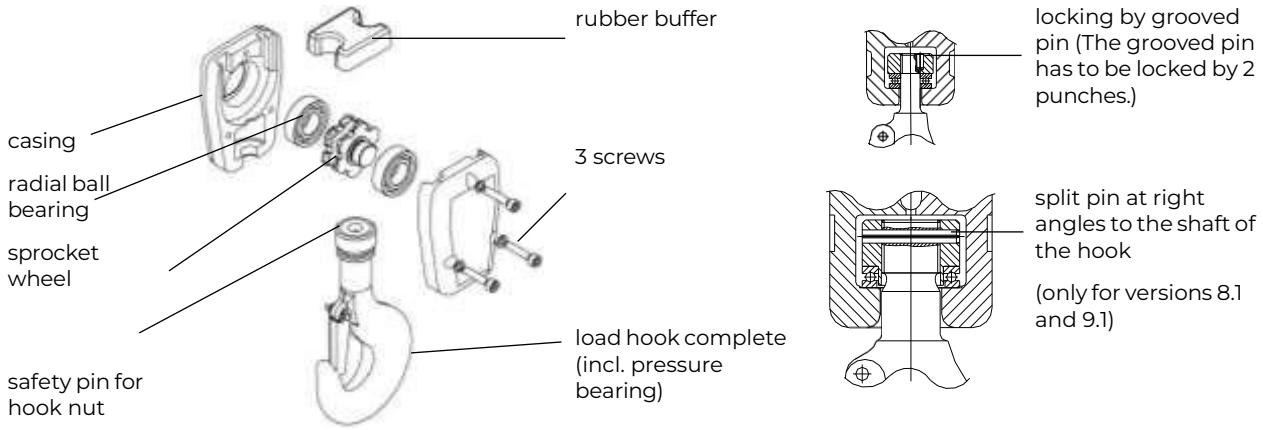


Fig. 13: assembly of hook block

For the assembly of the hook blocks please tighten the connection screws with the following torques:

Hook block designation	Max. load capacity (kg) D8/D8 Plus + C1	Screw dimensions	Qty	Torque (Nm)
hook block for chain 4×12 mm	500/250	M5×35 DIN 912	2/1	6/4*
hook block for chain 5×15 mm	500/250	M6×35 DIN 912	2/1	10/6*
hook block for chain 7×22 mm	2000/1000	M8×50 DIN 912	2/1	20/10
hook block for chain 9×27 mm	3200/1600 (2000²)	M10×50 DIN 912	2/1	35/20*
hook block for chain 11×31 mm	5000/2500	M12×60 DIN 912	3	35
hook block for chain 11.3×31 mm	6300/3200	M12×60 DIN 912	3	35

* The marked tightening torques apply to the screw near the rubber buffer. This one screw has to be locked into the threaded bore hole with a registered screw locking paste.
(*Load bearing capacity in accordance with DIN 56950:2012-05 dynamic safety factor: 8)
Table 3: tightening torques of connection screws for hook blocks
In the course of maintenance work, the condition of the hook (deterioriaton, prick punch spacing) and of the rubber buffer should be examined. The condition of the chain sprocket wheel (check for wear as described in Section 11) and the roller bearings, the safety cover (latch) and the hook nut lock should be checked.The container may also require to be cleaned and relubricated.

6.7. Chain guide plate

The chain guide plate is made from a special plastic and ensures the safe guidance of the chain as well as minimizing the risk of the chain jamming.

The inlet and outlet of the chain should be checked regularly for signs of wear or damage. Severe deterioration can lead to the chain inlet/outlet becoming blocked and the chain then jamming, which can cause both the chain and the chain hoist drive to suffer permanent damage. In the event of such damage, the chain guide plate must be replaced immediately. Minor damage not interfering with the functioning of the device (such as the formation of burr) can be removed with a file or a sharp knife. Electric chain hoists (D8 and D8 Plus) employed as self-climbers. The shape or dimensions of the guide (chain cross) must not be significantly deformed or enlarged as otherwise the reliability of the feed can no longer be assured.

When operating without a load, the chain strands must be kept taut (especially the free end). Failure to observe this instruction can lead to the chain sticking or becoming congested at/in the chain guide and therefore to the chain and the lifting gear sustaining damage.

6.8. Chain box

6.8.1. Mounting of the chain box

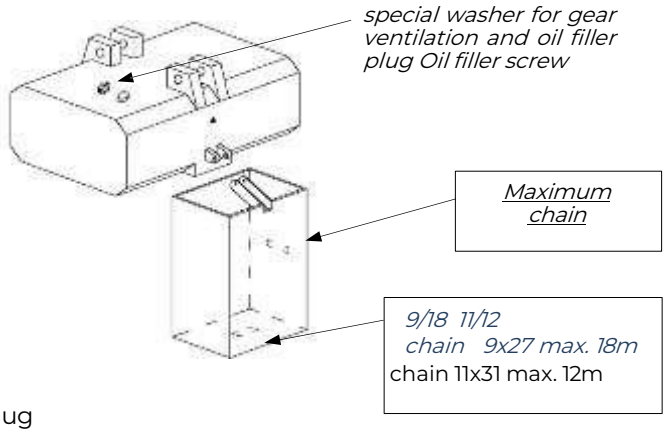


Fig. 14: mounting of the chain box and oil filler plug

Fig. 14 illustrates how the chain box is mounted with screw and nylock nut. The nylock nut has to be securely screwed. The nylock nut has to be replaced after repeated use when the nylon becomes noticeably worn.

Important! Ensure that the chain box is sufficient for the amount of chain you are using. The chain dimension and capacity is shown on the base of the canvas chain box or at the side of the plastic one. Insert the chain end with lift limiter and its rubber bumper loosely into the chain box. After running the entire chain length through the hoist into the chain box, check that the box is not overloaded (see capacity mark at the chain box).

Do not overload the chain box!

It is also important to bear in mind that different types of chain container are available for stationary and mobile hoists.

6.8.2. Oversize chain box

If the chain weight is more than 25 kg the strain of the chain box has to be relieved with a special textile strap.

For mobile use, special chain container relief frames plate are available as well as mechanically reinforced versions of the chain container. Standard chain containers should not be used.

When fitting the chain box to the suspension the customer must correctly adjust its position using the ratchet strap with a load of app. 10 kg inside the bag.

The suspension point of this strap for a stationary suspended hoist has to be provided by the buyer (see Fig. 15), as the prevailing conditions are unknown.

If the hoist is fitted to a trolley the producer provides a dual trolley to fit the chain box strainer strap (special fittings - see Fig. 16). Please take care that the strainer strap has to be tightened in accordance with this manual and inspected in regular intervals and corrected if necessarily.

The use of oversized chain containers without additional relief frames or straps is not permissible! The strainer strap should be protected at the fixed end by the supplied edge protector (see Fig. 15/16).

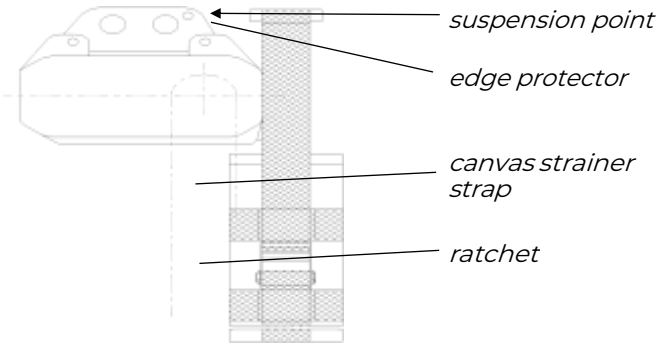


Fig. 15: stationary suspended electric chain hoist. The suspension point for the strainer strap has to be provided by the user.

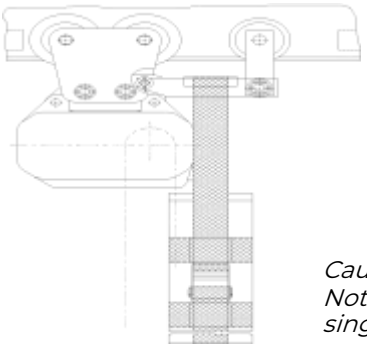


Fig. 16: electric chain hoist with chain box suspended at the tandem trolley (Not suitable for curved beams. In special cases ask the producer.)

The end of the strainer strap has to be fixed and tightened with the strainer strap and the ratchet as shown in Fig. .

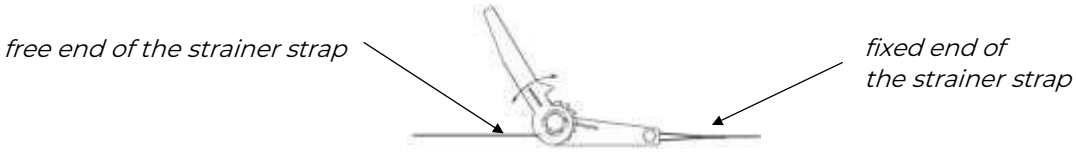


Fig. 17: strainer strap with ratchet

6.9. Electric chain hoists (D8 and D8 Plus) – use options

D8 and D8 Plus electric chain hoists can be delivered for inverted use. It is possible to convert the hoist to this mode of use after having bought it.

(The necessary parts can be supplied by the producer!)

If the hoist is used in inverted mode in open air it is necessary to protect the hoist from rainwater. On request the producer can prepare the hoist with a water hole in the retainer and in the gear cover.

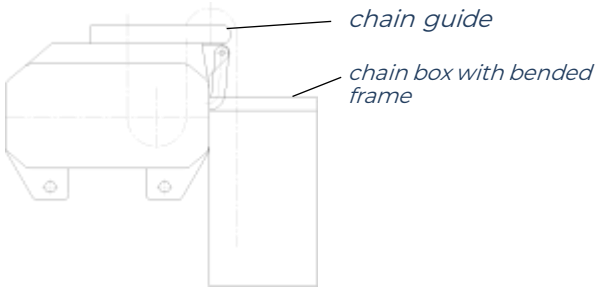


Fig. 18: electric chain hoist for inverted use

Warning! User information in accordance with EN ISO 12100-2 Paragraph 5

If the electric chain hoist is used as a climbing hoist, i.e. with the chain outlets pointing upwards, when operated without a load the outgoing chain strand must always be kept taut.

Failing to observe this warning leads to chain congestion in the chain guide and in consequence to the chain and hoist sustaining damage.

6.10. Electric chain hoists (C1) – use options

BGV C1 electric chain hoists are designed to function as point hoists in the standard installation position (ceiling mounted) but can also be used as climbing hoists.

Special parts are required for this conversion

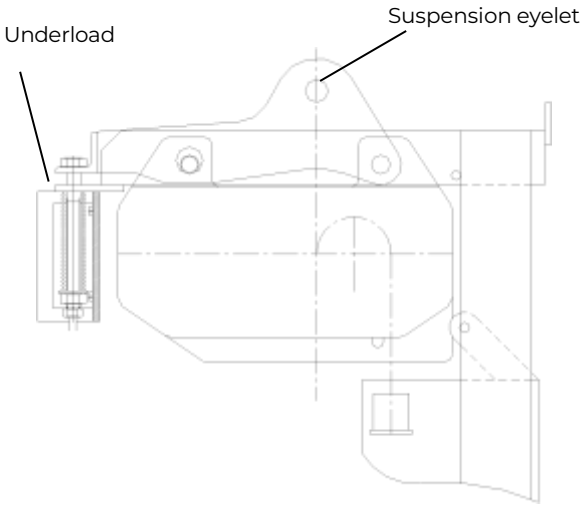


Fig. 19: MOVEKET electric chain hoist in standard installation position

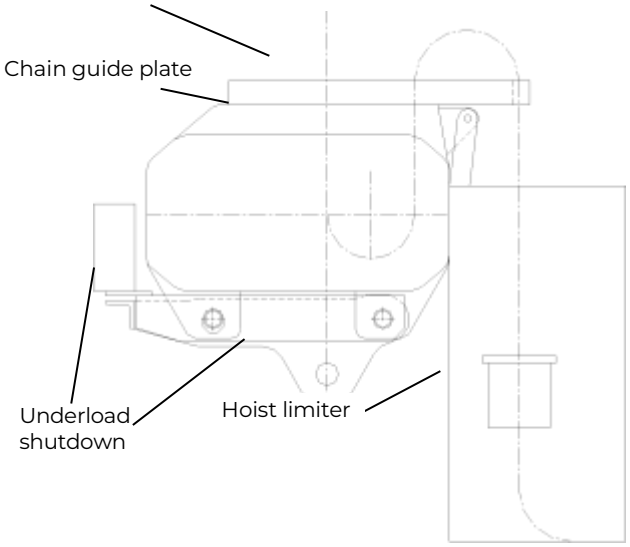


Fig. 20: MOVECAT electric chain hoist in self-climbing format

6.11. Electrical connections

The electrical installation must conform to the regulations in force in the country of use!

Work on the electrical installation may only be performed by qualified engineers. Before commencing any connection or repair work, de-energize the system and safeguard against its being switched back on. Make sure that the device really is de-energized

When supplied without a connector cable or plug, the electronic connection of the chain hoist must be performed by the operator or a qualified electrician on his behalf.

Details of the electrical equipment of the chain hoists, its connection and functionality are shown in the circuit diagram. The electrical equipment complies with the currently applicable standard DIN EN 60204-32.

Once the installation of the system is complete, the tests outlined in Paragraph 19 of DIN EN 60204-32 must be carried out.

Pressing the emergency Stop button is not a substitute for switching off the system using the mains switch upon completion of work.

Prior to use, make sure that all the electrical connections have been properly established, that no cables are damaged and that the system can be de-energized by means of a mains disconnector switch.

In the event of an error or the termination of normal operation, the entire system should be shut down using the emergency Stop button or by turning of the main switch. If a fault arises, the system should not be used again until it has been examined and the problem remedied by a competent person or, in the case of an electrical fault, by a qualified electrician.

Extension cables should be selected according to the intended use and length; according to the VDE guidelines, care should be taken to ensure that such cables are of sufficient diameter bearing in mind the performance data and operational length.

For certain applications, e.g. data transfer from actuators such as incremental and absolute encoders and load measurement devices, special MOVEKET cables are required to ensure reliable data transfer. These take the form either of individual cables (DC-4, DC-6 and DC-8 for D8 and D8 Plus applications) or of hybrid cables (PMC-HF for C1 hoists).

When laying cables, attention must be paid to the minimum bending radius of each cable and to ensure they are safeguarded from damage and tensile stress. Vertical, free-hanging cables should be secured with attachment lines.

Connectors (plugs) in the 400V power range should never be plugged in or unplugged in live operation. Always de-energize the devices first. The exceptions here are CEE connectors up to 63 A, although even in their case de-energization and disconnection are still always recommended.

6.11.1. Operating voltages

The electric chain hoists in their standard configuration are designed for a 400V, 3-phase, 50 Hz power supply and suitable for operation in the voltage range 380 - 415V (220 - 240V). Other voltages or frequencies are available as options.

When used in Europe, the hoists are powered in accordance with IEC 60038 by a three-phase supply with a phase-to-phase voltage of 400 V / 50 Hz and a clockwise rotating field. When they are used in other countries, attention should be paid to the voltage (V=volt) and frequency (Hz=Hertz) values on the specification plate of the hoist. The actual voltage values must not deviate from the nominal values by more than +/-5%.

For the operation of the MOVEKET motor controllers, a neutral conductor is required. The electric motors of the hoists are as a rule only supplied by the three phases. (Please respect the basic principles of circuitry)

For the operation of the controllers, the star voltage (phase-to-neutral) with 230V may be required, in which case a neutral conductor is required. (Please respect the basic principles of circuitry)

In the immediate vicinity, operating systems and installations must comply with the provisions of IEC 61000-6-2 (Immunity for industrial environments) and IEC 61000-6-4 (Emission standard for industrial environments)

To protect the user and third parties, the use of an RCD personal safety switch with a 30 mA tripping point in the power supply is recommended.

6.11.2. Mains supply

The mains current supply (main incoming line conductor) must be able to be disconnected at all poles by means of a main switch (in accordance with EN 60 204-32 section 5.3).

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

In order to ensure the proper functionality of the hoist, the power must be connected to a clockwise (CW)–turning 3 phase AC supply. Connection has to be corrected if deviations occur. Power connection is correct, when the hoist button for lifting the load is pressed and the chain hoist moves the load upwards.

Check if the mains voltage agrees with that specified on the rating plate.

Connect mains current supply lines and control line in accordance with wiring diagram.

The L1, L2, L3 and PE terminals for the mains connection are located under the gear cap. Line 3 + PE (minimum cross section 1.5 mm^2) are necessary for the connection.

After connecting, press button for lift. If the load moves downwards, interchange the L1 and L2 supply cores. (Disconnect mains supply before!).

For the protection of the electric chain hoists, motor protection circuit breakers are recommended. To provide the connector cable and motors with ideal protection, the tripping values set should correspond to the nominal current of the motors (see specification plate) + max.20%.

Fuses (slowly blowing) at 400 V (3 phase) in front of main switch:

fuse (slowly blowing)	model
4 A	1 / 1.1 / 1.3
6 A	2 / 3 / 4 / 4.1
10 A	4.2 / 5 / 5.1 / 6 / 6.1 / 7 / 7.1 / 7.2 / 8.1 / 9.1

Table 4: fuses at 400 V

6.11.3. Direct control (DC), chain hoists D8 und D8 Plus

The DC versions of the D8 and D8 Plus chain hoists are designed for operation with MOVECAT phase-changing controllers (400 V/50 Hz/3-phase/right-handed rotary field) in accordance with EN 60204-32. The run directions 'Lift' and 'Lower' are implemented by switching the rotary field. The external controller must, as required by EN 60204 Part 32, be equipped with an Emergency Stop switch/button located in the immediate vicinity of the run activation (GO) button on the controller.

In their standard configuration, the chain hoists are supplied with a H07RNF connector cable and a 4-pin CEE 16 A plug. When supplied without a connector cable or plug, the electronic connection of the chain hoist must be performed by the operator or a qualified electrician on his behalf.

.

The terminal strip then is located under the housing lid, where you will also find the brake rectifier and the brake auxiliary contactor. In most models, however, the brake rectifier and the brake auxiliary contactor are located under the housing lid on the brake side directly next to the brake(s).

Operation with a 5-pin CEE plug is absolutely forbidden, as in that case, if it is inadvertently inserted in a standard CEE socket, a run will be triggered automatically!

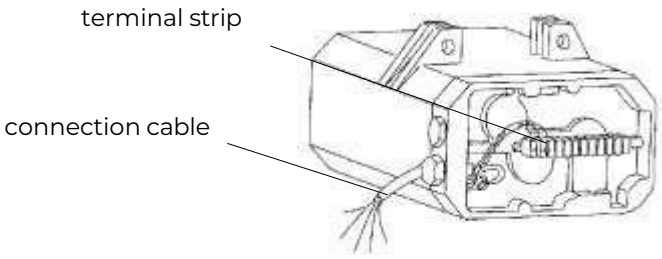


Fig. 21: direct control

6.11.4. Remote control (RC) low voltage, chain hoists D8 and D8 Plus

The RC (low-voltage control) versions of the D8 and D8 Plus chain hoists are designed for operation with MOVEKET RC controllers in accordance with EN 60204-32. The hoists are equipped with an internal 24 V D DC power supply that is supplied by two phases (L1and L2) of the motor voltages and generates the control voltage for the internal phase change control. The run directions 'Lift' and 'Lower' are achieved by switching the rotary field. The external controller should be equipped with selectors for Lift and Lower and an Emergency Stop switch/button in accordance with EN 60204 Part 32; this must be located in the immediate vicinity of the run activation (GO = release of the operating voltage) and switch off the operating voltage (400 V AC).

The RC hoists can be delivered with three connector cable solutions (see Section 18.2). When it is supplied without a connector cable or plug, the electronic connection of the chain hoist must be performed by the operator or a qualified electrician on his behalf.

All components such as the power supply, phase change protector and brake rectifier are housed on the circuit board beneath the housing lid. RC hoists are designed for installation and the evaluation of a two-track geared limit switch to limit the run path (BeO and BeU).

In the case of the D8 Plus hoists belonging to the series B2 to B8, a device for the independent testing of the brakes is contained on the circuit board.

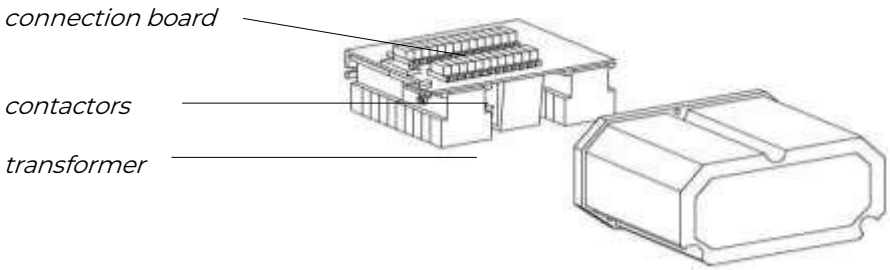


Fig. 22: low voltage control

6.11.5. Low voltage control chain hoists C1 (LMK)

This mode of control is available as an option.

Control occurs in the control circuit, which receives 24 Volts through a safety transformer. If the control is fitted out with an “emergency stop” in accordance with EN 60204 section 32, a main contactor is also located in the switching area and the “emergency stop” button is on the control pendant.

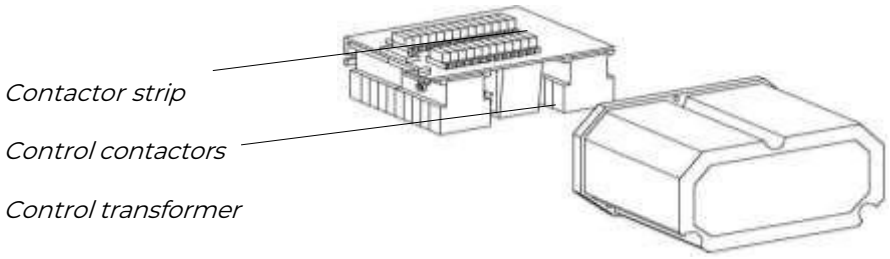


Fig. 23: Low voltage controller

6.11.6. Remote control, chain hoists C1 (VMK + OMK)

This is the standard type of control for C1 hoists in the OMK/VMK series in connection with an external MOVEKET BGV C1 system controller in accordance with DIN EN 60204-32, BGV C1 and EN 13849-1. The external system controller takes over the phase change control for Lift and Lower, the safety-related control of the brakes and the evaluation of the integrated safety devices and actuators.

In their standard configuration, the chain hoists are supplied with a MOVEKET PMC HF/HV hybrid connector cable and a multi-contact plug in a hybrid implementation. The PMC cable contains the supply wires for the motor windings (400V/3 Ph./50 Hz) and the brake control (400 V/3 Ph./50 Hz and 208 V DC) as well as the supply wires for the safety devices (e.g. geared limit switch) and actuators (e.g. I-encoder).

When supplied without a connector cable or plug, the electronic connection of the chain hoist must be performed by the operator or a qualified electrician on his behalf. The connector strip is beneath the lid of the housing.

OMK/VMK hoists are equipped with an internal status and test board that displays the operating status and is helpful for testing and in the event of faults.

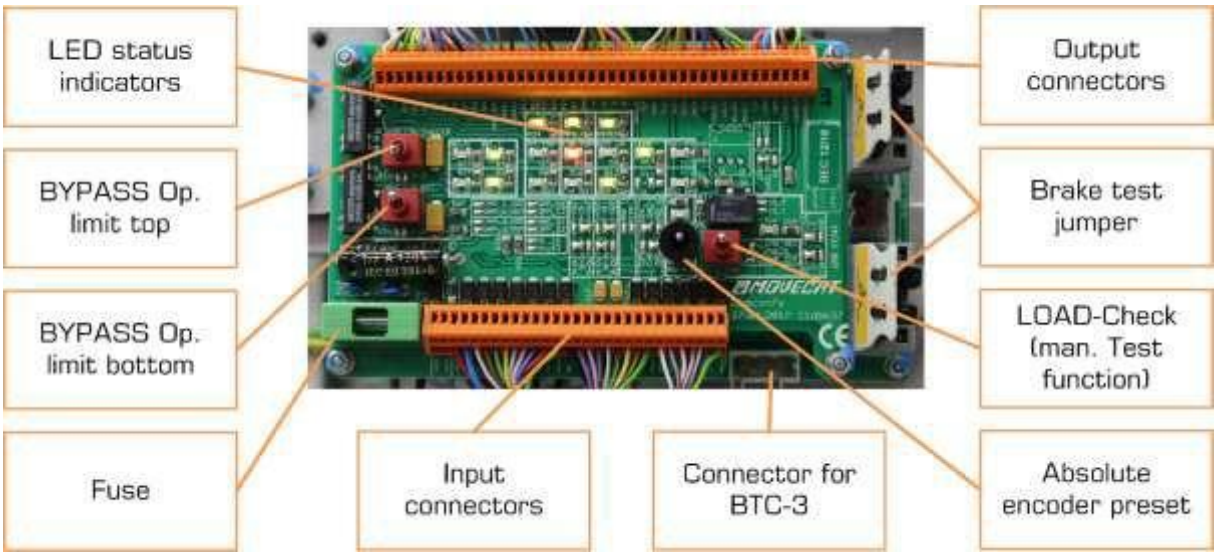


Fig. 24: *Status board*

In addition, it performs the following functions::

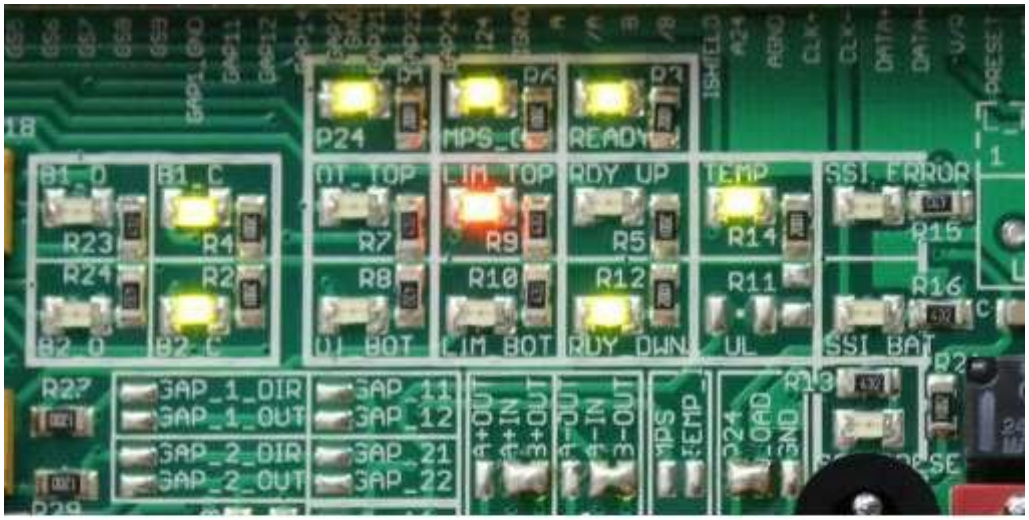
- Bypass function for the deliberate overriding of the operation limit switch shutdown points, for the testing and setting of the emergency limit switch
- Test function for the LME/LMS load measuring systems (optional)
- Preset function (optional and VMK) for the SSI absolute value encoder for the adjustment of the "0 metres" position (Warning: pressing this button sets the '0-metre' position to the current position!)

BYPASS operation limit, top	Manual bridging of the operation limit switch and lift enabling, for the setting and testing of the upper emergency limit shutdown point
BYPASS operation limit, bottom	Manual bridging of the operation limit switch and lower enabling, for the setting and testing of the lower emergency limit shutdown point
Absolute encoder preset	Setting of the preset value "100.000" of the absolute value encoder. = chain extended - 0-metre position (only implemented if equipped with absolute value encoder)
LOAD check	Manual adjustment of the load measuring bolt for a lift of + 4 mA as a test function (only implemented when equipped with LMS/LME System)

6.11.6.1. LED status indicators

Fig. 25: Status board – LED indicators for the display of operating statuses

P24	24V DC supply voltage for I & A encoders, LMS system



MPS_ON	24V DC supply voltage for geared limit switch
READY	Output of the NC contacts of the emergency limit switch wired in series (enabling)
OT_TOP	Emergency limit switch, top signal
OT_BOT	Emergency limit switch, bottom signal
LIM TOP	Operation limit switch, top signal
LIM BOT	Operation limit switch, bottom signal
RDY_UP	Lift release (output of the NC contact of the upper operation limit switch)
RDY_DWN	Lower release (output of the NC contact of the lower operation limit switch)
TEMP	Motor temperature (green = OK) (option available if motor is equipped accordingly)
UL	Underload signal (green = OK) (only when mechanical underload system is present)
SSI_ERROR	Error absolute encoder (option only available when equipped with absolute value encoder)
SSI_BAT	Error / undervoltage of the backup battery of the absolute encoder (option only available when equipped with absolute value encoder)

	Not implemented on OMK hoists:
B1_O	Brake 1 open (only if brake gap monitoring present)
B1_C	Brake 1 closed (only if brake gap monitoring present)
B1_O	Brake 2 open (only if brake gap monitoring present)
B1_C	Brake 2 closed (only if brake gap monitoring present)

6.12. Strainer relief for the control cable

On chains with directly mounted control pendants, care must be taken that no tensile stress is applied to the control lead. For this purpose, at the bottom of the motor (standard installation position) an eyelet is provided in the enclosure for the attachment of a strain relief (chain or wire).

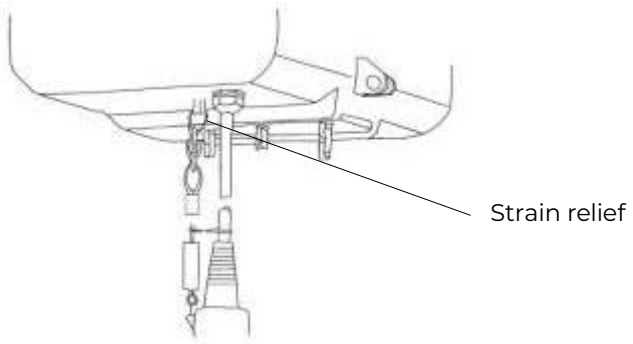


Fig. 26: assembly of the strainer clamp

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

6.13. Electric chain hoist with trolley

Only trolleys suitable for operation with electric chain hoists should be used; these must have been inspected and be suitable for the load to be carried. In the case of larger lifting heights, the unladed weight of the hoists as well as that of the chain must be considered separately.

When operating electric chain hoists in combination with trolleys, the system must be set up in such a way that collision or contact with fixtures or other loads is impossible.

Manual trolleys should be equipped with distance buffers and run path limiters. These must be arranged by the operator in such a way as to ensure that the run movement is halted before any contact between the trolleys and loads can take place or the trolleys or loads approach the limits. If an unwanted horizontal movement is necessary, manual trolleys should be equipped with locking devices.

Electric trolleys should be equipped with limit switches. The corresponding tripping devices must be arranged by the operator in such a way as to ensure that the run movement is halted before any contact between the trolleys and loads can take place or the trolleys or loads approach the limits.

If two or more hoists are used on the same girder to move the same load, the trolleys must be connected mechanically with coupling rods. These guarantee that the distance between them remains constant and prevent the trolleys colliding as well as any ensuing sideways traction.

In the case of operation with MOVEKET trolleys, please read the separate manual "Trolleys".

6.14. Operation and emergency limit switches

6.14.1. Geared limit switches

Geared limit switches are safety devices that serve to limit the extent of runs. They are form-locked directly to the chain outlet via a bored hole in the motor housing and driven by the chain sprocket wheel. On D8 and D8 Plus hoists, this bored hole can be ordered as an option (but cannot be integrated subsequently).

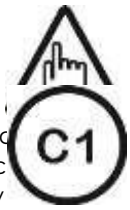
In the case of D8 and D8 Plus hoists, operation limit switches are required when no visual supervision of the end point of the run is possible. For hoists capable of lifting at speeds in excess of 8 m/min, geared limit switches are generally to be recommended, as they offer a safe means of limiting the hoist range.

The ON/OFF position of the individual tracks can be set individually. The shutdown functions for the emergency lifting and lowering limits, as well as for the operational lifting and lowering limits, are evaluated selectively and indicated by LEDs on the status board of the geared limit switch.

If a two-track geared limit switch is integrated, one track each is assigned to Lift and Lower for the evaluation of the Upper Operation Limit (BeO) and Lower Operation Limit (BeU), these being indicated by orange and yellow LEDs respectively.

If a four-track geared limit switch is integrated, one track each is assigned to Lift and Lower for the operation limit switches (BeO and BeU) (LED indicator orange/yellow) and the other two to the emergency limit switches Upper Emergency Limit (NeO) and Lower Emergency Limit (NeU) (LED indicator red). On the status board of C1 hoists (see Section 6.11.6) there are two Bypass buttons that allow the two tracks of the operation end-position limit switches to be bypassed by a competent person for setting and testing purposes. This makes it possible to set and test the functionality of the emergency limit switches in accordance with DIN 56950 without having to readjust in each case the preceding operation limit switch.

If the operation limit switch of a C1 hoist fails during a performance or production, the machinery may continue to be operated, with special care, until the end of said performance or production, on the basis of the operator's view or instruction (BGV C1). A competent person must investigate and document the cause of the failure of the operation limit switch. Further operation after failure of an operation limit switch and the subsequent encroachment on an emergency limit switch is only allowed when performed by a competent person using the bypass function of the control system. The same goes for the annual testing of the individual shutdown functions. (Please also pay attention to the user manual of the control system!)



In the case of six-track geared limit switches, two additional tracks are available for project-specific special purposes e.g. ceiling entry runs. The setting procedure is the same as for two- and four-track versions, whilst the evaluation of the function is dependent upon the parent controller. Please pay attention here to the complementary control or project documentation.

At the works, the operation and emergency limit switches are set to the maximum safe lifting range, which depends upon the length of chain available. Based upon his own application-specific hazard evaluation and risk assessment, the operator must determine the safe run range and, if necessary, limit it.

6.14.2. Geared limit switches, operation and emergency shutdown

Here, the number of revolutions of the drive shaft is evaluated by the geared limit switch.

The switching points are continuously adjustable.

Setting:

- NeO, BeO: Distance from the hook to the housing increases
- NeU, BeU: Distance from the lift limiter to the housing increases
- Block adjustment of the entire setting range is only available as an option

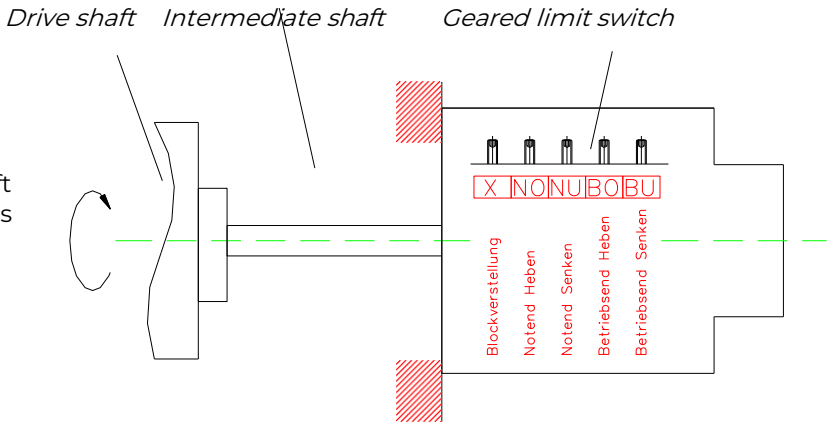


Fig. 27: Emergency and operating limit switches implemented through the use of a four-level geared limit switch

6.14.3. Adjusting the geared limit switch

Lift (Ne), BeO): Turn the adjuster screw to the right → highest hook position is raised

Lower (NeU, BeU): Turn the adjuster screw to the left → lowest hook position is lowered

6.14.4. Setting the limits of the operation limit switch

The operation limit switches should be set in such a way as to ensure that in normal operation the permissible run range admits of no hazards. The load must not encounter any obstacles.

During a lifting run, the suspended load or chain hook/block must not lift the chain container.

6.14.5. Emergency limit switch setting limits

The emergency limit switches come after the operation limit switch points and should be set in such a way that, even if one of the operation limit switches should fail, no hazardous situation would arise. The load must not encounter any obstacles and must be securely arrested and held

In the case of a stop produced by the upper emergency limit switch (stopping an upward run), neither the suspended load nor the hook block/tackle should lift the chain container or touch the housing of the chain hoist.

In the case of a stop produced by the lower emergency limit switch (stopping a downward run), the suspended load must encounter no obstacle and be arrested and held safely. Furthermore the chain end limiters should not touch the chain hoist housing bringing the hoist to a stop.

In practice, minimum values of 10 to 15 cm of chain length have proved satisfactory as the distance between the shutdown points between the operation and emergency shutdown positions as well as between the emergency shutdown position and contact with the chain hoist housing.

6.15. Underload shutdown (C1)

6.15.1. Structure and functioning of the spring-loaded underload shutdown

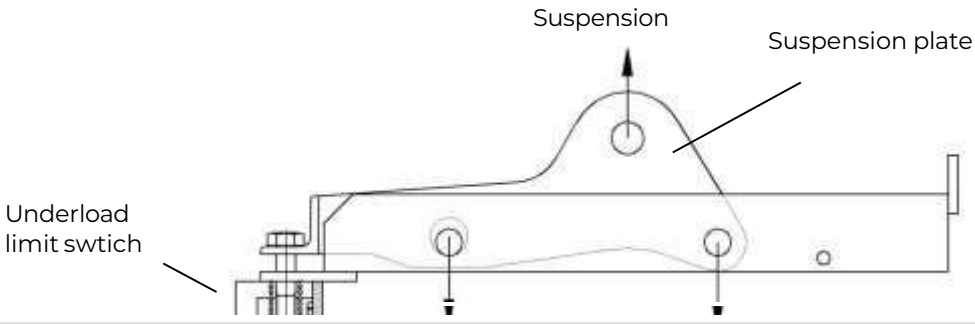


Fig. 28: Spring-loaded underload shutdown

The suspension plate is attached to the electric chain hoist. It has a rotation point and a movable point.

The springs are adjusted using the self-locking nut. When the actual value falls below that of the set value, the suspension plate moves about the rotation point and the underload limit switch interrupts the circuit for lowering.

At the factory, the underload shutdown for slack-chain monitoring is set to c. 5% of the nominal load. In normal operation, the underload shutdown point should be set to c. -15 to -20% of the suspended load. That means that in the case of a load of 200 kg, to give one example, the trigger point for underload detection would be between 160 and 170 kg. This ensures safe protection even in the event of collision with obstacles.

The risk assessment may under certain circumstances call for lower settings.

After the underload limit has been triggered, the only control function that remains possible is 'Lift'.

When group supervision and parent controllers are in use, a more extensive evaluation may be necessary and take place. The requisite safety functions should be determined on the basis of the risk assessment. Here, the system configuration and type of application must be borne in mind. (Please pay attention to the user manual of the control system and the project documentation!)

6.15.2. Underload bypass

To perform a further lowering run after the underload shutdown has been triggered for setting-up or servicing operations, select the functions 'Lower' and 'Bypass' on the control unit simultaneously. When the device is used as a point hoist, a lifting run is also possible after the underload shutdown has been triggered.

Warning! It is only permissible to press the Bypass button during setting-up operations!

When used with parent controllers with group monitoring, a more extensive evaluation may take place. Here attention should be paid to the operating instructions and the system configuration of the application on the basis of a risk analysis.

(Please pay attention to the user manual of the control system and the project documentation!)

7. Electric chain hoists – additional equipment

7.1. Incremental or absolute encoders

These assemblies can be integrated or added to MOVEKET hoists with drive shafts designed to accommodate them or geared limit switches with extended shafts (optional), regardless of whether they are operated in the standard installation position or as climbing hoists. When combined with a suitable controller, such actuators allow freely programmable operation end points, exact positioning and (depending upon the controller used) the targeted monitoring of run direction and speed. For complex group or stage runs, this can be necessary depending upon the application-specific risk assessment.

7.2. Incremental encoders

A two-channel incremental encoder emits a defined number of impulses that corresponds to the number of revolutions of the drive shaft and their direction and can be evaluated by an external control device (e.g. a MOVEKET MPC I-Series controller). Since it is only a question here of impulses per revolution, a reference run to determine the position and an evaluation for each application are generally necessary. For this, please consult the manual of the controller employed.

In the case of D8 and D8 Plus hoists (extended shaft option necessary - not retrofittable) and in combination with a geared limit switch with an extended shaft, the incremental encoder can be integrated.

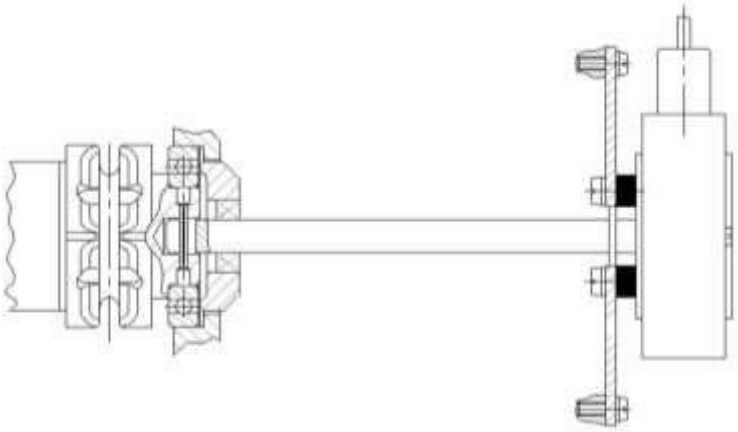


Fig. 29: Incremental encoder on an extended drive shaft

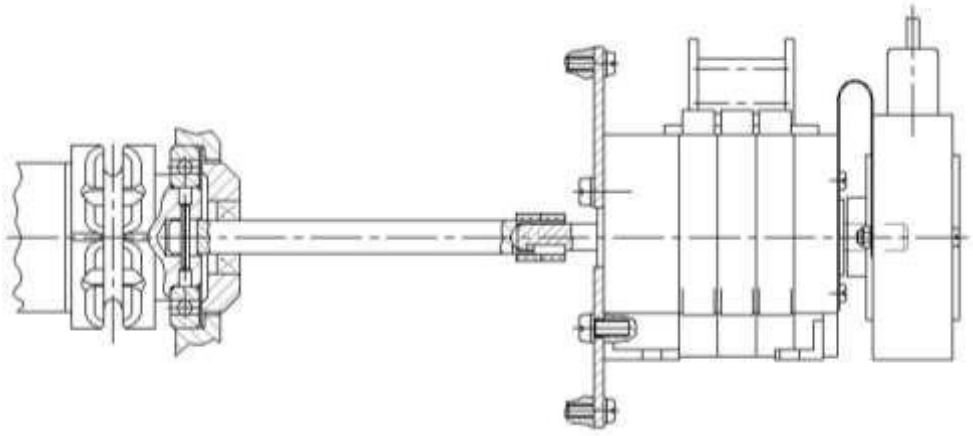


Fig. 30: Incremental encoder on the geared limit switch of the drive shaft

7.3. Absolute encoders

These assemblies can be integrated or added to the hoists (extended shaft option necessary – not retrofittable) and in combination with a geared limit switch with an extended shaft (optional – not retrofittable).

Based on the number of revolutions of the drive shaft and their direction, the absolute encoder transmits absolute digital positional data that can be evaluated by an external control device (e.g. a MOVEKET MPC I-Series controller). The absolute positional data is relative to a defined chain position and non volatile, which means you can unplug and plug in the electric chain hoist as often as you like and the controller will always detect immediately the actual position of the suspended load. No reference run is required. The "0-metre" (zero) position of the chain must be defined once (see Section 6.11.6 Status board - A encoder preset).

7.4. Electronic overload and underload shutdown (LME/LMS)

MOVEKET chain hoists can be equipped optionally with dynamic MOVECAT load-measuring devices (LME/LMS). These systems that work on the strain-gauge principle determine the effective load on the chain hoist and can be used for the evaluation of underload and overload conditions in conjunction with a suitably equipped controller. When combined with a suitable controller, they replace the underload shutdown (Section 6.10). In addition, they transmit permanent data relating to the suspended load and make it possible for the effective load to be evaluated and displayed as a percentage or kilogram value by the controller.

The LME version directly replaces the standard single hole; the LMS-I version replaces the suspension bolt on the engine block and works on the shear-force principle; the LMS-M version is mounted between the single hole and the ceiling attachment (standard installation position) or the load (climbing mode) with standard shackles, and operates in the longitudinal direction of force as a tension rod.

MOVEKET LME/LMS systems are equipped with an integrated test system capable, in combination with a suitable controller, of testing the functionality of the load measuring unit each time the system is switched on, independently of the load attached.

LME/LMS systems should never be subjected to more than 150% of the nominal load; otherwise the load sensing/measuring device could be irreparably deformed, requiring the immediate replacement of the entire LME/LMS module. Jolts, impacts and mechanical strain outside the scope of normal operation should be avoided.

In the case of LME/LMS systems, attention must be paid to their position in the load strand, as in the standard installation position the unladen weight of the hoist is measured along with that of the suspended load, whereas in climbing mode, only the latter is measured. The overload and underload switching points should be adapted to the type of use. Values that have proven themselves here are +/- 15 to +/- 20 % of the nominal load. The maximum overload switching threshold should not however exceed 130% in the case of the D8 hoists, and 120% in the case of the D8 Plus and C1 hoists, of the nominal load.

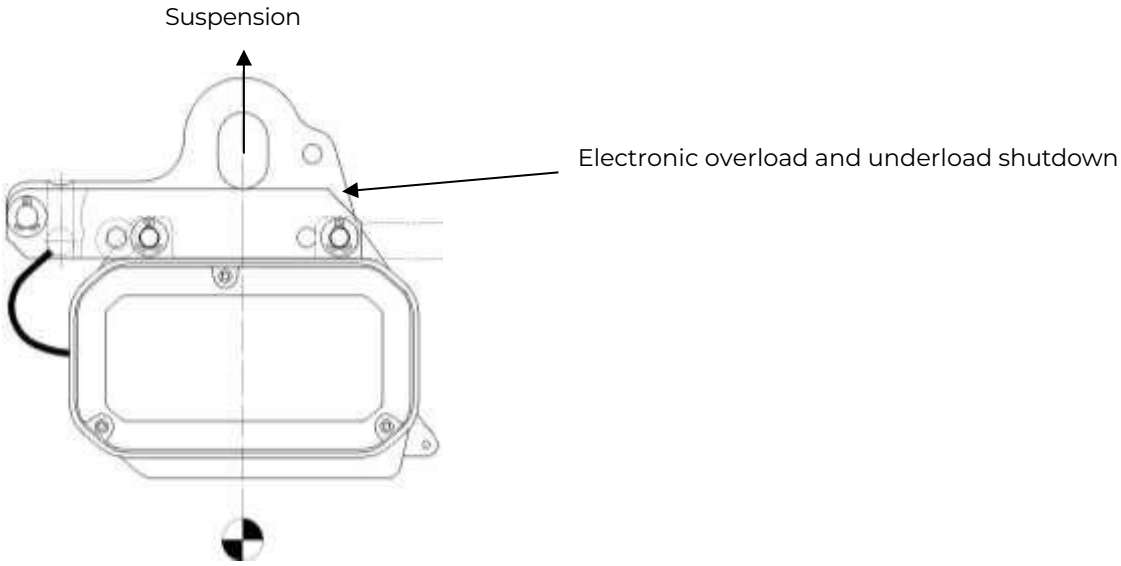


Fig. 31: Electronic overload and underload shutdown

7.5. Motor coil temperature monitor

As an option, a temperature monitor can be integrated (but not retrofitted) to protect the hoist motor from the overheating in the motor coil. This intervenes as soon as the maximum permissible motor temperature is exceeded and, when combined with a suitable controller, protects it from overload and damage. After a cooling off period, the switch resets itself; the evaluation is performed by the external parent controller.

8. Preparation and use

The choice of chain hoist should be based on the anticipated hazards and the specific conditions of use.

For stationary systems installed in events and entertainment venues, due to the manner of operation and hazards to be expected, as a general rule electric chain hoists compliant with BGV C1 / GUV - VC1 should be supplied. This requirement should only be waived if it can firmly be established, based on an assessment of the risks, that other technical solutions would be sufficiently safe.

It should be noted that if the devices are to be operated by non specialists (e.g. caretakers or third parties), it is all the more important that the system used be intrinsically safe i.e. BGV C1 / GUV - VC1 compliant!

If for fixed installations or special applications D8 Plus or D8 system solutions are being considered, it is advisable to draw up an application description and a risk assessment based upon it and discuss the results as well as the proper choice of hoist with an expert.

Type / Use	D8	D8 with secondary safety system	D8 Plus	C1
Suspension of loads	prohibited	permissible	permissible	permissible
Setting-up/dismantling operations Installation work	prohibited	probibited	Probibited	permissible
Onstage movement	prohibited	prohibited	prohibited	permissible
Complex onstage movement	prohibited	prohibited	prohibited	permissible

(1 Depending upon the application, if circumstances require, additional measures and additional demands on the control system)

(2 In the course of the run, no persons should be present beneath the suspended load)

Table 5: Selection of chain hoists for various uses

8.1. Preparation

- The choice of chain hoist should be based upon an assessment of the risks associated with the specific conditions of use..
- BGV D8 electric chain hoists may only be used for the suspension of statically determinate loads in connection with a secondary safety component. The presence of persons beneath the suspended load and use during performances are prohibited.

- D8 Plus electric hoists may only be used for the suspension of statically determinate loads. A secondary safety component is not required. The presence of persons beneath the moving load and use during performances are prohibited.

- BGV C1 electric hoists may be used to suspend and move loads over people. Depending upon the application, there may be additional requirements in terms of hoist equipment and the type of controller to be used.

- The devices may be used in either climbing or standard installation positions.
- Only chain hoists of the same type may be combined to form a system.
- If the stopping positions of the chain hoists are out of sight, giving rise to additional risks, operation limit switches should be used.

- If the application involves the risk of collisions with other chain hoists, trolleys or fixtures, these should be avoided by equipping the hoist with run range limiters and by control measures.
- If multiple chain hoists are moving a load together, the control system should provide for group operation and the group transcending functioning of safety relevant functions such as Emergency Stop and run enabling.
- In the case of statically indeterminate systems, a load measuring/overload monitoring system is required if there is any risk of overloading individual components of the load system or the attachment points.

- A load measuring/overload monitoring system is required if there is a danger of overloading individual elements (e.g. attachment points, suspension points, electric chain hoists, load-bearing elements) e.g. in the case of:
  - line loads on more than two electric chain hoists
  - loads distributed between more than three electric chain hoists
  - guided loads

8.2. Use

"Use" means the operation, transport, storage, maintenance and inspection of working equipment.

Prior to using electric chain hoists, a hazard assessment must be conducted to determine all the measures required to guarantee safe usage. These measures must be such as to ensure the workplace health and safety of everyone involved, as well as preventing damage to buildings, furnishings and working equipment. The evaluation of possible risks must take into account the on-site circumstances, all operating conditions, (foreseeable) accidents and the behaviour of the persons involved.

- The device may be used exclusively by qualified and trained personnel.
- The tasks of the responsible persons involved must be determined and delimited. The responsibility of the operators of the events locations or venues involved remains unaffected.
- The qualifications required for the planning, setting-up and dismantling work involved, as well as for the operation of the hoist itself, depend upon the degree of risk involved. Further information concerning the necessary qualifications is to be found in the igvw Standard SQ Q2 "Competence in Event Rigging".
- It is the supervisor who must approve the electric chain hoists for use. This approval should not be given until the tests described in Section 9 have been carried out. Any handing over to another user must be documented in writing.

8.3. Hazard assessment

The safe operation of electric chain hoists in the event industry can only be effected with proper consideration of all components and influences and the resulting safety-related measures.

Only in this way can suitable working procedures be determined and suitable working materials, in terms of type and dimensioning, chosen, along with the measures necessary to assure their safe use.

The assessment of risks is conducted during the planning phase and from the very start takes all exigencies into account.

These include specifically:

- the presence of persons beneath the load

  the type of loads to be lifted
- the type of operation
- dynamic factors

- factors arising from errors
- the time framework
- the external framework

- All the measures described in the following paragraphs are to be derived from the results of the risk assessment.

8.4. Dynamic factors

- During the planning stage, consideration must be given, in addition to the unladen weight of the equipment, to dynamic forces, potential loads caused by failures and additional loads during operation, assembly and dismantling. For instance, additional forces can develop due to diagonal rigging as well as the acceleration or abrupt stopping o loads.
- The possibility of additional loads through service use e.g. lighting fixtures, the exchanging of fixed technical devices etc. should also be considered.
- When determining the forces that occur when moving loads are involved, the dynamic forces (acceleration and deceleration of the load) must also be taken into account.

8.4.1. Jolt factors and fixed-speed chain hoists

As a reference value for these dynamic forces that emerge during operation, an extra allowance of at least 20% has proved useful.

- Factor 1.25 for hoists up to 4 m/min
- Factor 1.40 for hoists with 8 m/min
- Factor 1.60 for hoists with 10 m/min
- Factor 1.80 for hoists with 12 m/min

The loads moved must be multiplied by the factor in question. In the case of climbing hoists, the unladen weight of the hoist must be included in the weight to be moved.

8.5. Operation as climbing hoist

- In the case of the climbing version of the chain hoist, the chain inlet and outlet is on the upper part of the housing.
- To facilitate mobile use, the top of the housing is furnished with two robust handles.
- To mount the MOVECAT electric chain hoist, the hook tackle/block on the end of the load strand is attached to the ceiling / suspension point, so that the chain hoist 'climbs' up the chain.
- A chain diversion plate is mounted on the chain guide to ensure the controlled flow of the chain into the chain container and to prevent the chain jamming.

- The hoist limiter should be mounted a certain minimum number of links from the end of the chain (26 links in the case of a 4x12 chain, 20 links in the case of 5x15 and 5.2 x 15 chains, 13 links in the case of a 7x22 chain, 11 links in the case of a 9x27 chain and 10 links in the case of an 11x31 chain). This ensures that the weight of chain is sufficient to assure the entry of the chain into the chain container, even when the chain hoist has reached its lower end position. The end of the chain should be fastened to the housing of the chain hoist.

- When operating without a load, the chain strands must be kept taut (especially the free end). Failure to respect this warning causes chain congestion at/in the chain guide and therefore to the chain and the lifting gear sustaining damage.

Warning: Risk of crushed fingers

- Only suitably equipped hoists at speeds up to 8m/min may be used in climbing mode.
- Maintenance work on the electric chain hoist does not need to be performed on a catwalk as the electric chain hoist can be lowered as far as the lowest load position. The inspection of the load chain hook at the suspension point must be conducted at ceiling height and the inspection and lubrication of the chain over its entire length

8.6. Operation in the standard installation position

- When a MOVEKET electric chain hoist is employed in the standard installation position (ceiling-mounted), the inlet and outlet of the chain point downwards.
- The chain hoist is attached directly to the ceiling/suspension point by the motor chain hook or the single hole suspension block and the load is hoisted by the load chain.
- When shackles are delivered loose, the cotter-pin must be mounted correctly in the bolt.

8.7. Instructions for the safe use and operation of electric chain hoists

- The supervisor in charge must work out a set of instructions on the basis of the assessment of risks in order to regulate conduct during set-up and dismantling as well as during the operation of electric chain hoists; these instructions apply for the specific job and are to be distributed to the staff.
- The use of electric chain hoists, especially when handled improperly, can give rise to the following hazards:
  - moving loads and objects
  - loads and objects falling about or down
  - In the immediate working vicinity of the electric chain hoist, the chain and the loads, there exists the danger of injury through:

  - being crushed
  - shearing
  - being dragged into the machinery
- When the risk of workplace injuries and damage to health cannot be excluded through technical and organisational safety measures, use must be made of suitable personal protective equipment (PPE). e.g. safety or protective footwear, work gloves, head protection, possibly a warning jacket and PPE against falling.

- The operator of a building is responsible for the type, load bearing capacity and quality of the attachment points within the building that are provided by him. He must provide suitable documentation (for instance a load capacity plan) about these.
- Attachment/suspension points. When choosing attachment points within the building, the unladed weight of the hoists and dynamic load components (e.g. impact coefficients) as well as possible accident loadings must be included in all calculations.
- In the selection and dimensioning of all the bearing elements (e.g. suspension points, girder clamps, shackles, steel wire, roundslings, trusses etc.) found in the load path, the loads and hazards involved in each case must also be taken into account. (see BGI 810-3)

- The choice of electric chain hoists with regard to their lifting capacity must be made in such a way that no overload can occur. It is not sensible to load electric chain hoist to the limits of their capacity.
- Loads may only be lifted by the chain hoist by means of the defined attachment points and load-bearing elements.
- If damage to the load carrying structure through an overload due to differences in synchronised speed of the electric chain hoists cannot be excluded, electric chain hoists must be fitted with an overload protection system. C 1 electric chain hoists must be fitted with a control unit of the type designed for synchronous group runs with the stipulated fault tolerance. The group shutdown function must be operational in either direction.
- Hoists may be stored in ambient temperatures from -20° to +60° C.
- The stated duty cycle of the electric chain hoists is based upon the assumption that they will operate in ambient temperatures ranging from –10° C to +40° C. At higher environmental temperatures, the duty cycle should be correspondingly reduced.
- Temperatures outside the storage and operating ranges can bring about changes in the properties and functioning of the materials, which in turn can lead to malfunctions and damage.
- If the devices are exposed to large temperature differences between storage and operation (e.g. in touring applications) sufficient acclimatisation time must be allowed prior to their use to prevent irreparable damage being caused by condensation.
- In the case of operation below 0° C or wide variation between operating and storage temperatures (e.g. touring use), a suitable acclimatisation period should be observed prior to commissioning, to obviate the risk of iced condensation or frost leading to malfunctions (e.g. frozen brake or clutch linings) or irreparable damage.
- The relative humidity should not exceed 50% (non-condensing)
- The motors belong to thermal resistance class F.
- The protection rating of the standard version is IP 54.
- When operated outdoors, the hoists should be shielded from adverse weather effects (e.g. by a MOVEKET rain cover or a canopy. The chains here should be kept especially well lubricated in order to avoid corrosion. The maintenance intervals should be shortened:
- Before using the hoist in an aggressive environment or with/in aggressive mediums, the permission of the manufacturer must be obtained. It may be that the partial use of special components is necessary.
- Prior to use, make sure that the instructions regarding all electrical connections have been complied with and that the movement directions correspond to the symbols on the control unit.
- Coupling components of load-bearing elements (e.g. the bolts of shackles) and loadbearing structures (e.g. bolts of trusses) should be prevented from working loose.
- Pay attention to the permissible load of the chain hoist, possible load transfers and breakdown factors (note the information on the specification plate and chain hook/swivel adaptor).
- The nominal load-bearing capacity of the trolley must be the same as, or greater than, that of the load-bearing equipment of the hoisting gear.
- When operating electric chain hoists in combination with trolleys, systems must be set up in such a way that collision or contact with fixtures or other loads is impossible.
- Operation with a twisted chain during dual chainfall operation due to the chain block in the chain strand being flipped over or a twisted mounting of the fixed strand.

- For the fastening of the 2nd chainfall in the housing of the hoist, only the original chain buckle can be used.
- The chain container and its mounts must be checked regularly and replaced at once if any damage is detected.
- In the case of chain links, the minimum permissible diversion radius and angle should be observed.
- The chain should not pass over edges; damage to the chain must be avoided
- When moving loads, a minimum distance of 50 cm from neighbouring devices and structural components must be observed
- When operating the hoist with trolleys in arm's reach i.e. where the height of the girder is less than 2.5 m, hands should be kept clear of the run area.
- When the emergency limit switch is triggered either by the load hook or by the hoist limiter, the system must be removed from service and not operated again until the operation limit switch in question has been examined by a competent person. This does not apply to C1 hoists, see Section 8.7.3

- Whenever the emergency stop button is pressed, the root problem must be ascertained and resolved by a competent person. Only then may the resetting of the button take place.
- Only trained personnel (competent persons) may work upon the electric chain hoist and only after the system has been shut down and the working area sealed off.
- Repairs must only be performed by persons possessing the requisite expertise, with the mains power switch locked in the Off position and with no load attached
- When hoists are operated in conjunction with other devices, the operating instructions and advice pertaining to these must also be adhered to.

8.7.1. Additional measures for the safe use of D8 electric chain hoists

- When people are beneath the load, the drives and brakes should be de-energized
- When the hoist is not operational, loads should always be set down or else safeguarded against falling (secondary safety component) and the working area at risk sealed off.

- The secondary safety components used must be such as to prevent the load falling any distance
- Additional safety equipment, such as operation limit switches and overload monitoring systems, must be adapted to the application-specific circumstances.

8.7.2. Additional measures for the safe use of D8 Plus electric chain hoists

- If people are beneath the load, the drives and brakes should be de-energized

- Additional safety equipment, such as operation limit switches and overload monitoring systems, must be adapted to the application-specific circumstances.

8.7.3. Additional measures for the safe use of C1electric chain hoists

- No first use of electric chain hoists and systems according to BCV C1 is permitted until an acceptance inspection has been conducted by an authorized expert. The test prior to first use must according to §14, BGV C1 be conducted by an authorized expert in accordance with BGG/GUV-G 912 at the behest of the operator..

- For the movement and suspension of loads above people, controllers used with C1 electric chain hoists must, in addition to their basic configuration and depending upon the application in question, satisfy the requirements of IGVW SQ P2 Section 4.1.4. The control unit must monitor movement and if necessary shut it down, in order to eliminate the possibility of a collision of the loads being moved, including all rigged objects or decorations, as well as the overloading of individual components of the load system or the attachment points. The control unit must comply with the requirements of DIN EN 60204-32, and if electronic or electronically programmable control systems are used, their safety-relevant functions must satisfy the requirements of DIN EN 62061 (DIN VDE 0113-50), DIN EN ISO 13849 or DIN EN 61508. The determination of the requisite performance or SIL level for the design of the controller must be based upon a risk assessment.

- In particular the risks and consequent demands upon the controller in the following operating modes must be borne in mind:

  - line loads
  - distributed loads
  - guided loads
  - stage runs
  - complex stage runs
  - mutually dependent movements

- movements involving the risk of collision
- systems running automatically

- Where hazards are posed by stage runs, everyone involved must be informed and exhaustive test runs conducted under realistic performance conditions with all participants in attendance. In the case of dangerous stage procedures that require particular conduct and diligence on the part of those involved, they must be instructed again prior to each use and if necessary supported through rehearsals.

- For stage runs as well as installation work with area loads or guided loads using C 1 electric chain hoists, the overload (OL) and underload (UL) cut-off values must be such as to represent a suitable ratio to the actual load. Experience has shown values approximately +/- 15 to +/- 20% of the actual weight to be optimal.
- In the case of stage runs that are to execute automatically (e.g. at discotheques, trade fairs and exhibitions), the lifting path must be removed from areas to which the public has access.
- The area around the run must be sealed off with safety equipment. This operation requires supervision and control by a suitable controller and no danger whatever should arise from any normal operation possible.
- No one may remain beneath BGV C1electric chain hoists with or without loads attached, if the load or parts thereof are lowered to a height of less than 2.5 m above a firm platform, unless the performance calls for it. The loads lowered must be out of reach of persons. In stage use involving lowering to beneath the abovementioned minimum height, complimentary organizational measures based on an examination, analysis and assessment of the risks involved must be conducted.
- Where installed C1 systems are used by non-specialists (e.g. discotheque, trade fair and exhibition applications), the hoisting path must be beyond the reach of, and inaccessible to, all persons. The area around the run must be sealed off with safety equipment. This operation requires supervision and control by a suitable controller and no danger whatever should arise from normal operation.
- The safety equipment: emergency and operation limit switches, as well as in some cases overload monitoring systems, must be adapted to the specific circumstances.

- If the operation limit switch of a C1 hoist fails during a performance or production, the machinery may continue to be operated, provided special care is taken, until the end of the performance or production, if such be the view or instructions of the operator (BGV C1). A competent person must investigate and document the cause of the failure of the operation limit switch. Further operation after failure of an operation limit switch and the subsequent encroachment on an emergency limit switch is only allowed when performed by a competent person using the bypass function of the control system. The same goes for the annual testing of the individual shutdown functions. (Please also pay attention to the user manual of the control system!)

8.7.4. Additional instructions for the safe use and operation of mobile electric chain hoists

- Wear personal protective equipment: protective or safety footwear, working gloves, head protection, if need be a warning vest and PPE against falling (e.g. when working high up).

- Before every set-up, it is essential to check that the attachment points in the building are in a proper condition; this can be done with a visual inspection and comparison with the data in the operator's documentation.
- Ensure that the devices are given sufficient time to acclimatize.
- Before setting up and use, electric chains hoists and all the parts required for their operation, such as cables, controllers, load-bearing elements, auxiliary and work aids, should be subjected to a visual inspection for signs of damage and wear as well as a test of all safety relevant functions.

- The chain, chain hook, motor suspension, chain container and chain guide in particular should be examined for signs of deterioration. In the case of the chain guide, unobstructed entry and outflow of the chain must be guaranteed!
- Prior to each commissioning, the individual hoists and controller must be subjected to a function test. The functions concerned are: Lift, Lower, Emergency Stop (brake functions) and also the functionality of complementary application-specific safety equipment if present. The function test must also be conducted after long intervals between use as well as after setting up and dismantling in mobile applications (e.g. during the setting-up and dismantling of stage equipment).
- Safety devices such as run extent limiters (limit switches), overload and underload devices and group functions must be adapted to the current application.
- Electric chain hoists are to be hung in such a way that the chain does not come into contact with other objects and cannot become twisted when wound. In particular, the attachment of a load (e.g. a truss structure) to more than one electric chain hoist must not be allowed to cause the chain to become twisted.
- Cables and wires should be laid in such a way that they do not run over sharp edges, get pinched or become subjected to strain.
- When used with ground support systems, the circumference of the pulley must be at least ten times the pitch length of the size of chain in use. The load must only be transferred to the pulley via the flat chain links.

8.8. Operating instructions

- Check load capacity of all components!
- Check for free lifting area
- A run may only take place when it poses no threat whatsoever to persons, devices, supporting structures, suspended loads or building structures

- The movement of the electric chain hoist and the load must be supervised by the operator. Instructions for the starting of movement processes must be given by the operator clearly and unequivocally.
- At all times maintain visual contact with all the hoists in movement as well as the loads attached to them. If the operator's own view is obstructed, or the area of use is too large or if there are too many hoists for this to be possible, the safety of the run must be assured by other trained observers (safety assistants). Each safety assistant must have direct access to an emergency stop switch.

- Whenever a run has been completed and the control unit has been put down, as well as outside working hours, the system should be shut down (through activation of the emergency stop and main switches) and safeguarded against unauthorized use.
- Prior to lifting, position the load directly beneath the electric chain hoist
- Before lifting, first apply tension to slack load-bearing mediums
- When operating without a load, the chain strands must be kept taut
- Never touch the chain in the course of a run
- Always lift hoists vertically at the lowest available speed
- Avoid diagonal runs as well as pendulum-like swinging or swaying
- Do not snap or drag loads loose
- Never lower the hook tackle or block to such an extent that the chain becomes slack
- Move an electric chain hoist attached to a trolley only by pulling the load, hook block or hook tackle
- When not in use, the system should be switched off and secured against unauthorized use.

8.9. Actions to be taken when faults occur

- If, in the course of operating or testing the electric chain hoist, damage is detected that could expose the user or third parties to danger, the hoist and any components linked to it should at once be removed from service.
- The fault must be reported to the operator who must take the necessary measures to eliminate it.
- Recommissioning is only permissible after proper repairs and testing have been carried out and approval given by an expert.

8.10. Storage and transport

- Hoists, accessories and control components should all be handled with care. They must not be subjected to violent jolts or impacts. External parts such as connector cables and plugs should not be subjected to damaging tensile forces.
- The hoists may be stored in ambient temperatures from -20° to +60° C.
- Mobile devices must be transported in suitable containers (e.g. MOVECAT cases). Care must be taken when transporting the electric chain hoist or its peripherals (cables, plugs, chains, chain hooks etc.) that nothing is damaged. Transport containers must be stored in such a way as to ensure they the do not tip over, slip, fall down, slide or roll away.
- For chain hoists stored in the open, protection against harsh weather and perhaps adverse temperatures must be provided.
- When mobile chain hoists have been used outdoors (e.g. concert stages) in rainy or humid conditions, they must be allowed to dry out prior to being transported or placed in storage.

8.11. Prohibited uses and operations

- Transportation of persons (in the absence of C1 hoists/systems approved by an authorized expert)
- movement of loads in excess of the stated safe working load
- the diagonal pulling, towing or cutting loose of loads

- movement of loads without visual supervision (except in the case of specially designed C1 integral systems with appropriate control)
- movement of loads above people using D8 and D8 Plus chain hoists
- suspension of loads over people with D8 chain hoists without secondary safety component
- tipping
- failure to pause between lifting and lowering
- encroachment under normal operating conditions on the chain end limiters/friction clutch (emergency limits)
- use of the emergency limit switch as an operation limit switch (§26 (6), BGV C1)
- operation with improper or not fully functional safety and protective equipment
- operation with inexistent or illegible warning and safety symbols or use designation of the hoists
- chain hoist or trolley movements effected by pulling the control cable, even when this is equipped with a strain relief
- touching the chain during operation in the immediate vicinity of the chain inlet and outlet
- fastening and slinging loads with the hoist chain
- operation with a twisted chain e.g. as a result of the hook block in the chain strand being flipped over or the twisted mounting of the fixed chain strand
- use with greater chain lengths than provided for by the chain container
- operation without, or with worn-out, chain containers, rubber buffers on the chain hooks, hook blocks and lift limiters
- operation with unsuitable connector and extension cables
- attachment of the fixed strand of the chain using parts other than the original chain buckle
- exceeding the permissible duty cycle
- remaining for longer than is necessary beneath the load (§19, BGV C1)
- endangering of persons (§§19, 26, BGV C1)
- operation by unauthorized persons
- the performance of repairs without the requisite specialist knowledge
- the performance of repairs in an insufficiently stable environment and/or without switching off the power
- operation when the device is overdue for periodic testing
- commissioning prior to testing and approval by a specialist (D8 and D8 Plus) or authorized expert (C1).
- operation when the annual UVV inspection by a competent person has not been carried out
- operation when the 4-yearly expert UVV inspection (D8 Plus and C1) has not been carried out
- operation after the theoretical service life has been reached

8.12. Action in case of accident

As a general rule, the schematic of the rescue chain for first aid should be respected, so those providing aid must always attend first of all to their own personal safety. Here, it is important, among other things to:

- halt the operation immediately

- secure the scene of the accident
- halt the operation of the system and ensure it cannot be switched back on; use the Emergency Stop and main power switches
- secure unsecured and self-moving loads
- in the case of electric shock, de-energize the system, ensure it cannot be switched back on and check that the scene of the accident is at zero potential before attempting to provide first aid
- call the emergency services and commence first aid
- assess the extent of the accident and if necessary call for rescue services (giving as detailed information as possible over the number of injured as well as the type and extent of their injuries)
- report the accident to the supervisor and operator

9. Inspections

Electric chain hoists are to be inspected according to the type and frequency of their use, so that defects and damage can be detected and eliminated in proper time.

In the case of integral systems, the content of the inspections must be determined on the basis of the risk assessment and the safety-relevant functions of the control components should be taken into consideration (e.g. group shutdown, load measuring, run direction and speed monitoring, etc.)

If, as a result of the inspection, doubts arise about the safe operation of an electric chain hoist, the hoist in question may not be put into use until the defects have been rectified and a second inspection has shown the electric chain hoist to be safe.

Inspections are to be conducted:

- prior to first use
- during use
- depending upon the application (D8, D8 Plus, C1) as well as the operational and environmental influences at periodic intervals
- after any significant modifications have been made (the replacement of parts by others of the same type does not constitute a significant modification)
- in the event of damage
- after safety-relevant repairs and servicing (e.g. of broken load-bearing parts, brakes etc.)
- after several years of disuse

The inspection of the electric chain hoists may be governed by:

- UVV "Winches, hoisting and traction devices" BGV D8
- UVV "Cranes" BGV D6
- BGG 912 "Basic principles for the testing of mechanical equipment for use on stages and in studios"
- Safety during productions and events – testing of electrical systems and devices, BG1 813

The nature of the requisite inspections, which must be initiated by the operator, depends upon the application. It is his responsibility to decide whom he will engage, whether as a competent person or as an expert, to conduct the inspection; here he must satisfy himself that the person chosen meets the requirements set out in Section 3.

The results are to be documented in writing in the test log of the chain hoist or as an appendix thereto and kept available at the company.

Inspections of, and work on, electric chain hoists may only be carried out by trained personnel (competent persons) after they have switched off the power and made the working area safe.

The dynamic and static as well as the electrical tests required by the EC Machinery Directive have been conducted by the manufacturer.

The manufacturer recommends, in view of the specific use of the hoist in the direct vicinity of, or above, human beings, that all testing and maintenance work be performed by a specialist approved by MOVEKET.

9.1. Testing for use in accordance with BGV D8

- The hoists must be inspected by a specialist prior to first use and after any significant modifications in accordance with BGV D8 §23.
- The lifting gear and brake functions should be tested with from 1.1 to 1.3 times the nominal load.
- The overload devices should be tested with 1.3 times the nominal load.

9.2. Testing for use in accordance with BGV D6 (cranes)

- Cranes must be inspected by an authorized expert prior to first use and after any significant modifications in accordance with BGV C1 §34 corresponding to BGG 912.
- The lifting gear and brake functions should be tested individually with from 1.1 to 1.3 times the nominal load.
- The overload devices should be tested with 1.3 times the nominal load.

9.3. Testing for use in accordance with D8 Plus - IGVW SQ P2

- D8 Plus hoists must be inspected by a specialist prior to first use as well as after any significant modifications and at least once every four years by an authorized expert in accordance with IGVW SQ P2 corresponding to BGG 912. In the case of use in fixed installations, should the risk assessment reveal the existence of some special hazard, it may be necessary for an authorized expert in accordance with IGVW SQ P2 corresponding to BGG 912 to conduct an inspection prior to commissioning.
- The lifting gear and brake functions should be tested individually with 1.25 times the nominal load.
- The overload devices should be tested with 1.2 times the nominal load.

9.4. Testing for use in accordance with BGV C1

- C1 hoists must be inspected by an authorized expert prior to first use, after any significant modifications and at least every four years in accordance with BGV C1 §34 corresponding to BGG 912.
- The electric chain hoists should be tested in accordance with the accident prevention protocol set out in BGV C1 "Stages and studios" and BGG 912.
- The lifting gear and brake functions should be tested with 1.25 times the nominal load.
- The overload devices should be tested with 1.2 times the nominal load.

9.4.1. Additional instructions for the testing of BGV C1 electric chain hoists

During inspections, particular attention must be paid to the following parts and assemblies:

- test the run range, the functionality and settings of the operation and emergency limit switches For the functioning of the operation and emergency limit switches see Section 6.9.

- Testing of the underload shutdown below c. 15 - 20% of the nominal load: checking that the cable is undamaged
- Testing of the electronic overload and underload shutdowns*
- Testing of the incremental* and absolute* encoders

(*optional equipment)

9.5. Testing at useage

The safe status of the electric chain hoist should be sustained during use.

Prior to any use, the operator must conduct a full assessment of the hazards involved. In this connection he must determine and evaluate the influences that cause damage, taking into account the different kinds of operating mode, and then devise and implement suitable measures to counteract them.

As a result, it is the operator who must decide upon the type and extent of inspections after set-up and dismantling and after any unusual occurrences, as well as on the deadlines for recurring inspections and the qualifications demanded of persons entrusted to carry them out.

9.6. Periodic inspection during setting up and use

During setting-up (on-site erection) and each time before use the safe condition of the electric chain hoist must be established with a visual inspection and a functionality test.

The visual and functional inspection involves:

- checking for external damage and wear (chain, hooks, load-bearing components, connector cable, plugs etc.)
- taking special environment conditions into account
- checking whether the periodic inspections are up to date and were conducted at the scheduled intervals

The qualification of the person making the inspection depends on the job for which the electric chain hoist is being used and the amount of risk involved.

9.7. Periodic inspections

Hoists, cranes and bearing structures should be tested by a competent person at least once a year. In the case of severe conditions of use e.g. frequent operation with a full load, a dusty or aggressive environment, outdoor use, frequent switching, long duty cycles, sustained use, the inspection intervals should be reduced.

The manufacturer recommends in view of the particular use of the hoists in the direct vicinity of or above human beings, that all testing and maintenance work be performed by a specialist approved by MOVEKET.

You will find a checklist of recommended items for inspection in igvw SQ P2 Appendix IV.

In any case, all safety-relevant components and their application specific safety functions should be tested individually. Especially important are the service and safety brakes, the limit switches, the load measuring equipment, the path and speed measurement equipment, such as incremental and absolute encoders, as well as the parent functions of the control system. Depending upon the application, further inspections may be necessary.

Testing and measurement of wear must be performed in accordance with the instructions set out in Section 11 "Testing and maintenance"

In the course of the inspection, it must be determined whether load-bearing parts are still serviceable. Any load-bearing part that is damaged must be replaced. The serviceability of the load chain is evaluated on the basis of DIN 685 Part 5 and DIN EN 818-7.

Every year, an assessment must be made of how much of the theoretical service life of the electric chain hoist has been used up. For instructions as to how to do this, see the test log of the electric chain hoist.

Mobile voltage-driven devices must be tested at least once a year in accordance with BGV A3 corresponding to VDE 0701/0702.

9.8. Electrical tests

Stationary hoists and systems must be tested by a qualified electrician in accordance with VDE 0105-100

Mobile voltage-driven devices must be tested in accordance with VDE 0701/0702. The testing may be performed by a qualified electrician using suitable measuring and testing devices and also by persons with an electro-engineering training.

The tests should be performed prior to first use and in the case of mobile devices once a year thereafter. The national legislation and regulations in force in the country of use must also be observed.

The electrical tests to be performed in the case of mobile devices are the following:

- the effectiveness of the protections against indirect contact
- isolation resistance
- functioning of the safety circuitry
- general condition of the electrical equipment
- documentation of the inspection results

10. Visible damages

If in the course of operating or testing the electric chain hoist damage is detected that could expose the user or third parties to danger, the hoist and any components linked to it should at once be removed from service.

Recommissioning is only permissible after proper repairs and testing have been carried out and approval given by an expert.

If a load-bearing part breaks, the operator must ensure that a C1 electric chain hoist is inspected by an expert subsequent to the repair and prior to its reuse.

11. Inspection and maintenance

- The inspection includes a visual check for deformities and cracks as well as the dimensional examination for deterioration and the tightness of screw connections.
- Load chain (see Section 11.9)
- Attachment of the chain to the housing, the securing of the hook/latch and that of the hook nut to the load hook
- Once the inspection is complete, the hook tackle or hook block must be remounted in the proper manner.
- The rubber buffers on the lift limiter and at the hook tackle or hook block should be replaced if worn.

- Testing the hoisting height. The load chain should be of sufficient length to allow the load hook or the eyelet/motor hook of the chain hoist to be lowered at least to the ground. (except C1 hoists)
- Chain container including maximum filling capacity, attachment, security and integrity of the textile material and the bracket
- Chain guide plate (see Section 7)
- Visual inspection of the control cable with strain-relief and screw-attachment of the cable to the housing of the electric chain hoist

11.1. Inspection and maintenance work

- Inspection, maintenance and repair work should never be performed without making sure first that no unintentional, hazardous movements could be triggered.
- No maintenance work may be performed by anyone other than competent persons.

- In the maintenance Table (Table 4), the parts and functions needing to be tested and the maintenance work needing to be performed are listed. Defects must be reported at once in writing to the operator whose responsibility it is then to entrust to a competent person the task of remedying the said defects.

- All maintenance work must be performed when the electric chain hoist is in an unloaded state and has been de-energized using the mains connector switch.

11.2. Testing and maintenance work

Please note section 4.2.
The following intervals are references values that must be shortened in case of severe operating conditions (e.g. sustained operation, constant application of the nominal load, dust, an aggressive environment or outdoor use), the maintenance state or negative environmental influences.

		Check		
		daily	3 month	yearly
Visual check of the whole equipment				
Function check	of the brake of the lift limiter			
Maintenance or djustment	of the brake of the clutch			
Wear of the load chain (see chapter 11.9				
Lubrication of the load chain				
Wear of the rubber elements (visual check)				
Lubrication of hook block and hook tackle acc. to chapter 12.3./ check condition of the pin which prevent the hook nut from loosening and chisel punch marks				
Check condition of the hook safety latch				
		Check		
		daily	3 month	yearly
Universal checks of	all screws hold down, chain guide safety devices			
Check of the condition and safe positioning of the chain box and condition of the canvas material as well				
Check of the electric cable, power cable and control pendant				
Check of the trolleys and wheels				

Table 6: testing and maintenance work

11.3. Testing for wear

- Check the suspension hook and load hook for deformation (measure punch-mark spacing) and the formation of rust or cracks as well as their overall condition.
- The chain nut of the hook block should be replaced when the depth of wear on the contact surface is c. 1mm.
- Worn rubber buffers must be replaced!

11.4. Maintenance and adjustment of the DC disk brake (D8)

The DC disk brake needs only low maintenance.

11.4.1. Construction of the brake

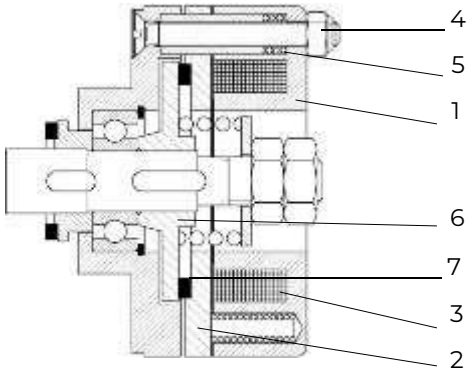


Fig. 32.1: construction of the brake for version B1

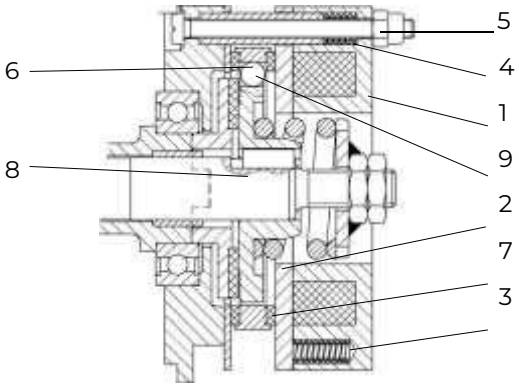


Fig. 32.2: A construction of the brake for B2-B8.1

Fig. 32: Construction of the DC disk brakes

The DC disk brake consists of the magnetic coil (1), the plate (2), brake pressure springs (3), the 3 positioning springs (4), the 3 nylock nuts (5) and the brake disk (6) with the brake lining (7).

The DC disk brake consists of the magnetic coil (1), the plate (2), brake pressure springs (3), the 3 positioning springs (4), the 3 nylock nuts (5), and the brake ring (6) with the 2 pieces of brake lining (7), the brake disk (8), which is connected by 3 balls with the brake ring.

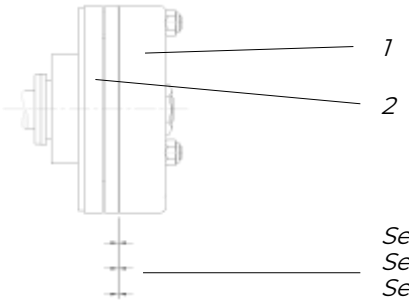
11.4.2. Adjusting the DC disk brake

Work on brakes should only be performed by authorized specialists!

Caution! If, after a long period of use (about 500,000 brake operations), the air gap between the magnetic coil (1) and anchor plate (2) has increased to approx. 0.8 mm, the brake must be adjusted as follows:

1. Put thickness gauge between magnetic coil (1) and anchor plate (2) (do not insert more than 10 mm).

2. Tighten the 3 self locking nuts until the air gap between magnetic coil and anchor plate reaches the dimension as defined in fig. 33.
3. Finally check the right thickness and regularity of the air gap with thickness gauge.
4. After repeated adjustment of the brake, the 3 self locking nuts must be replaced as their locking function becomes ineffective.



Sensing element 0.4 mm for models B1-B1.3
Sensing element 0.5 mm for models B2-B5.1
Sensing element 0.6 mm for models B6-B9.1

Fig. 33: Setting the brake

11.4.3. Replacing the brake lining

For version B1 - B5.1 the brake lining (7) has to be replaced, when the thickness of it is less than 2.0 mm.

For version B6 – B8.1 the brake lining (7) has to be replaced, when the thickness of it is less than 3.0 mm.

11.4.4. Electric control of brake - function

The DC disk brake is supplied through a rectifier circuit. It operates according to the fail safe principle. If there is a power failure, the brake acts automatically so that the load is held securely in every position. To shorten the braking distance the brake is operated in a DC circuit. The different methods of connection in direct control and low voltage control can be seen in the respective wiring diagram.

11.4.5. Checking brake functioning

When braking the nominal load during the lowering process, the load should be braked after approx. two chain link lengths and the load should not be braked in a jerking manner.

11.5. DC disc brake: Working and safety brake (DB, D8 Plus and C1)

The service and safety brakes operate completely independently of one another. They are arranged in sequence on the motor pinion shaft. The brake on the motor side is the service brake; the one on the lid side is the safety brake. Both brakes are DC spring-applied disc brakes operating on the closed-circuit principle.

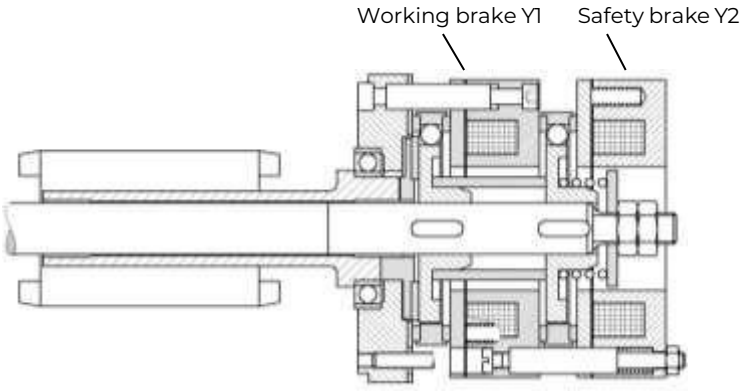


Fig. 34: Configuration of the service and the safety brakes

11.5.1. Working brake

In the case of the service brake, the brake magnet is supplied via a rectifier. The direct current in the case of the C1 hoists is switched via direction contactors in the external controller and in the case of the D8 Plus and D8 DB hoists via the internal brake auxiliary contactors.

11.5.2. Structure of the service brake

The service brake consists of the magnet body (1) with the magnetic coil, the anchor plate (2), the three locking screws (5) (hidden), the three magnetic attachment screws (4), the brake ring (6) with the 2 pieces of brake lining (7) and the brake hub (8), which is form-fitted and connected by 3 balls to the brake ring.

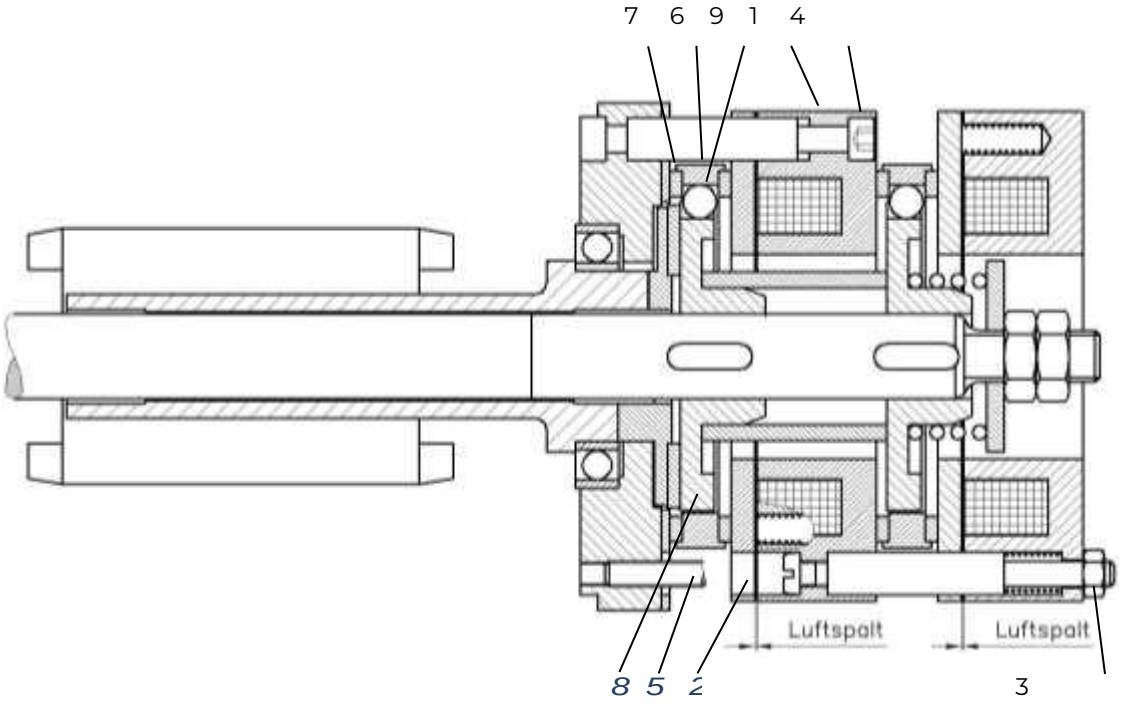


Fig. 35: Structure of the service brake

The service brake is supplied via phases L1 and L2 with 400V and the brake magnet via a rectifier with direct current. The direct current is switched via an integrated (D8 DB, D8 Plus) auxiliary brake relay/contact and in the case of C1 hoists via the auxiliary contacts of the direction contactors or brake contactors in the controller. This leads to the direct, unmediated opening and closing of the service brake.

11.5.3. Safety brake

The brake magnet of the safety brake, like that of the service brake, is powered via a rectifier circuit. The rectifier of the C1 hoists is switched via the direction contactors in the controller, whilst that of the D8 Plus and D8 DB hoists directly via L2 and L3 on the AC side.

Because of the AC-sided circuitry, the intervention time and braking distance are longer than those of the service brake and the intervention of the safety brake is therefore momentarily delayed. Thanks to this delay, there is no increase in the coefficient of impact, nor is the safety brake in normal operation subject to wear, as it functions as a pure stop brake.

11.5.4. Structure of the safety brake

For the structure of the DC spring-applied disc brake see Section 11.4.1 "Maintenance and setting of the DC disc brake (D8)"

11.6. DC disk brake: Setting the air gap of the working and safety brakes

Work on brakes should only be performed by authorized specialists!

If after an extended period of service (c. 500,000 applications of the brake) the air gap between the magnet body and the anchor place has increased by as much as c. 0.8 mm, the brakes must be adjusted.

The size of the air gap to be set depends upon the mode (not for VMK)I:

Model SB 1.1	0.4 - 0.5 mm
Model SB 2 to SB 5	0.5 mm
Model SB 6 to SB 8.1	0.6 mm

For the type VMK the airgap has to be at 0.3mm!

It is to be noted that the air gap of the service brake must be set first and that of the safety brake only afterwards.

The correct size of air gap for the service and safety brakes is identical.

11.6.1. Setting the air gap of the working brake

1. Loosen the three locking screws (5) by turning them clockwise; the locking screws move towards the housing loosening the body of the service brake magnet.
2. Tighten the three magnetic mounting screws (4) to reduce the size of the air gap between the magnet body of the service brake (1) and the anchor plate to the desired value as listed above. Do this by inserting a measuring sensor between the magnet body and the anchor plate of the service brake (max. c. 10 mm deep)
3. The 3 locking screws (5) should be turned anti-clockwise until the magnet body of the service brake (1) is locked tight.
4. Retighten the magnetic mounting screws (4)
5. Test the uniformity of the air gap again

11.6.2. Setting the air gap of the safety brake

1. Turn the three nylock nuts clockwise to reduce the size of the air gap between the magnet body of the safety brake (1) and the anchor plate (2) to the desired value as listed above. Do this by inserting a measuring sensor between the magnet body and the anchor plate of the safety brake (max. c. 10 mm deep)
2. This setting procedure may be repeated a maximum of 5 times before the nylock nuts must be replaced.
3. Next, check the uniformity of the air gap using the measuring sensor.

11.7. Low-Maintenance brake (newer ECOlite)
11.7.1. Construction of the brake

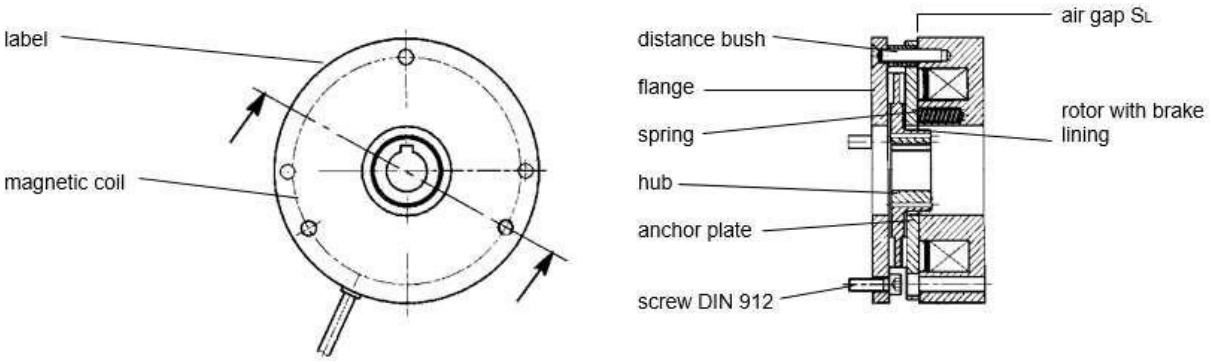


Fig: construction of the brake

11.7.2. Replacement

Caution! All assembly and disassembly works should be done without load.

The electric chain hoist should be completely disconnected from power (Power off).

1. Loose screws of cap for gear cover.
2. Remove cap for gear cover.
3. Disconnect brake cables.
4. Loose screws of cap for brake cover.
5. Remove cap for brake cover.
6. Loose the three fastening screws of brake unit.
7. Remove worn out brake unit.
8. Fit new brake unit onto the motor shaft.
9. Fit the brake unit using the three cylindrical screws, which are scope of supply of the brake unit.
10. Tighten the screws with tightening torque acc. to. table 'data of the brake'.
11. Connect brake cables according to wiring diagram.
12. Replace cap for gear cover..

Brake type	Screws DIN 912	Torque [Nm]	Coil resistance R20 nominal [Ω]	Air gap S_L nom [mm]	Air gap S_L max [mm]
BFK 457-06	3×M4	2,8	2101	0,2	0,5
BFK 457-08	3×M5	5,5	1681	0,2	0,5

Tabelle 1: data of the brake

For order of spare parts the complete model – no. and type has to be submitted

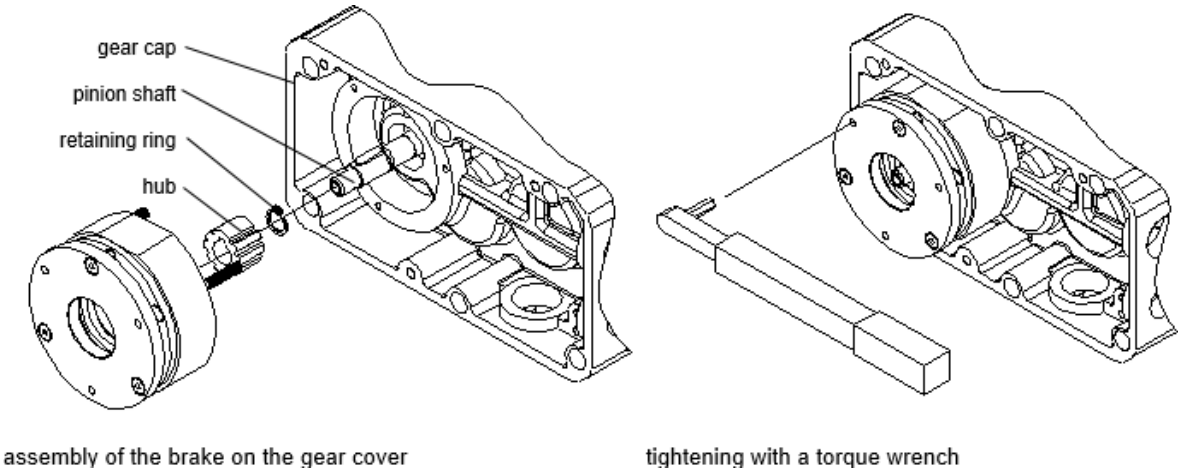


Bild 1: Assembly of the brake

11.8. Low-Maintenance brake (UP-Plus)

11.8.1. Construction of the brake

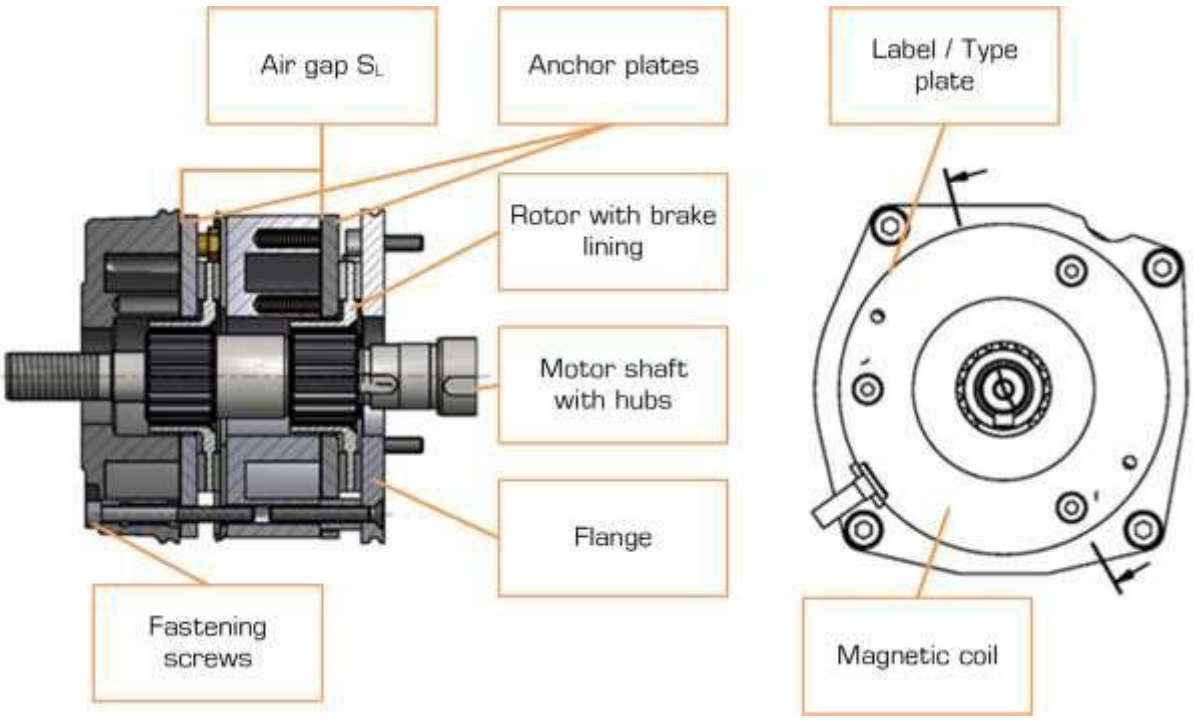


Bild 2: Construction of the brake

11.8.2. Replacement

Caution! All assembly and disassembly works should be done without load.

The electric chain hoist should be completely disconnected from power (Power off).

1. Loose screws of cap for gear cover.
2. Remove cap.
3. Disconnect brake cables.
4. Loose screws of cap for brake.
5. Remove cap for brake.
6. Loose the three fastening screws of brake unit.
7. Remove worn out brake unit from the hub.
8. Fit new double brake unit onto the motor shaft.
9. Fit the brake unit using the three cylindrical screws.
10. Tighten the screws evenly (tightening torques see table).
11. Connect brake cables according to wiring diagram.
12. Replace cap for gear cover and cap for brake

Type	Operation brake	Emergency brake	Screws DIN 912	Tightening torque [Nm]	Coil resistance R20 nominal [Ω]	Air gap S_L nominal [mm]	Air gap S_L maximal [mm]
SK03..	BFK 457-06	BFK 458-06	3×M4	2,8	2101	0,2	0,5

Table 2: Data of the brkae

Caution! For order of spare parts the complete type of the electric chain hoist has to be submitted.

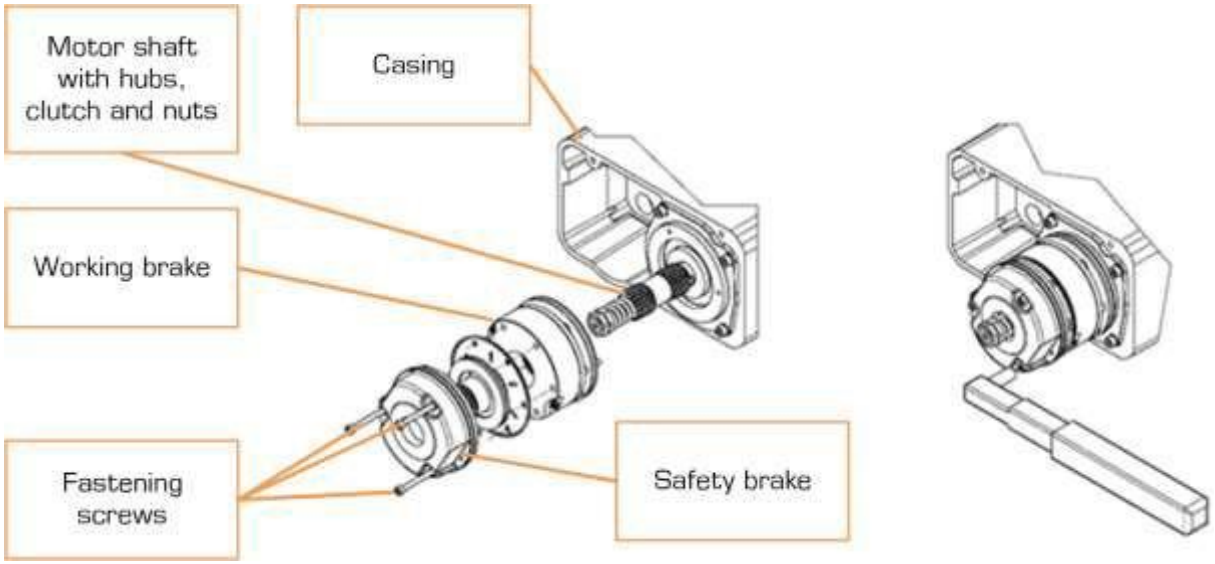


Bild 3: Assembly of the brake

11.9. Low-Maintenance Double-brake (Prostage and Plus-C)

11.9.1. Description of the double-brake

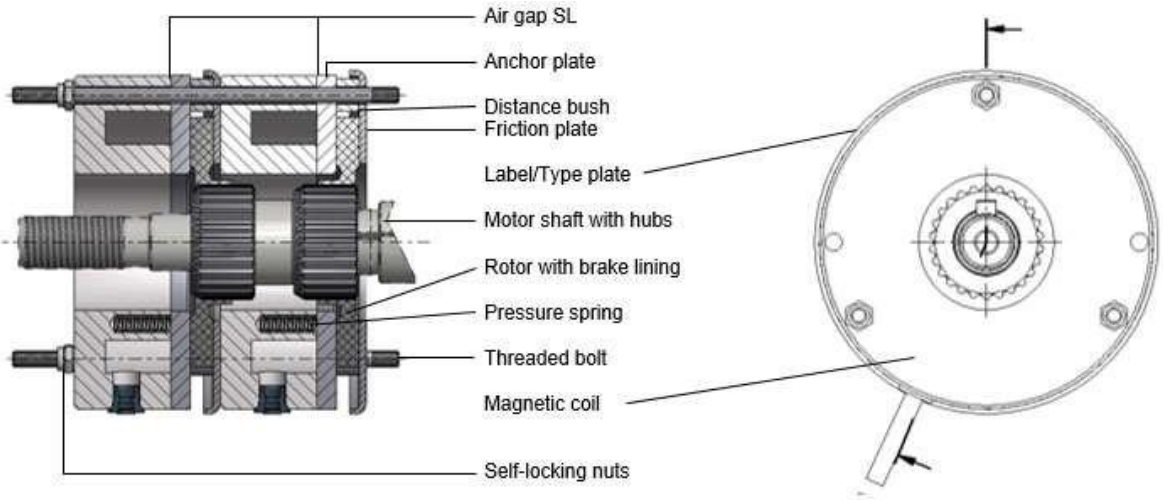


Bild 4: Construction of the brake

11.9.2. Replacement of the brake

Caution! All assembly and disassembly works should be done without load.

The electric chain hoist should be completely disconnected from power (Power off).

Low voltage control

1. Loose screws of cap for gear cover.
2. Remove cap.
3. Disconnect brake cables.
4. Loose screws of cap for brake.
5. Remove cap.
6. Pull the cables of brake out of the cable duct of casing.

Direct control

1. Loose screws of cap for brake.
2. Remove cap.
3. Disconnect brake cables.

Continue with point 7.

7. Loose the self-locking nuts of brake unit. The threaded bolts still remain in the motor cover.
8. Remove worn out brake unit.
9. Fit new double brake unit onto the motor shaft.
10. Fit the brake unit using the self-locking nuts.
11. Tighten the nuts evenly (tightening torques see table).
12. Connect brake cables according to wiring diagram.
13. Replace caps.

Type	Operation brake	Emergency brake	Self-locking nuts	Tightening torque [Nm]	Coil resistance R20 nominal [Ω]	Air gap S_L nominal [mm]	Air gap S_L maximal [mm]
SB030 SK070	BFK 457-08	BFK 457-08	3×M5	5,5	1681	0,2	0,5

Table 3: Data of the brake

Caution! For order of spare parts the complete type of the electric chain hoist has to be submitted.

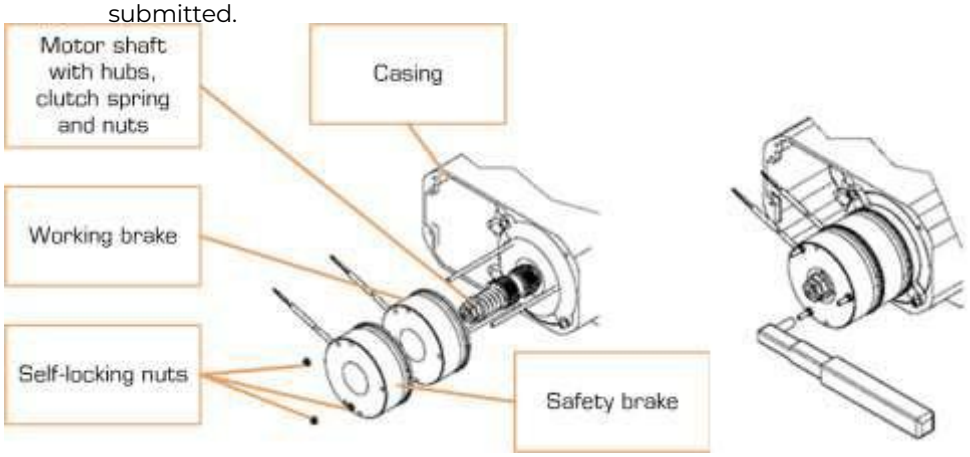


Figure 5: Assembly of the brake

11.10. Electric control of the brake

Mode of functioning

The disk brake is supplied through a rectifier circuit. It operates according to the fail-safe principle. If there is a power failure, the brake acts automatically so that the load is held securely in every position. To shorten the braking time the brake is operated in a DC circuit. The different methods of connection in direct control and low voltage control can be seen in the respective wiring diagram.

11.11. Troubleshooting on the brake

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

Table 4: Troubleshooting and fault elimination

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

11.12. Function check of the brake

When braking the nominal load during lowering the brake travel shall not exceed two chain link lengths. The load shall not be stopped jerkily.

11.12.1. Operation and emergency brake (double brake)

The operation and emergency brake operate independently. They are arranged in a row on the motor pinion shaft. The motor-sided brake is the operation brake Y1 and the cap-sided brake is the emergency brake Y2. Both brakes are DC-disk brakes acting according to the closed circuit current principle.

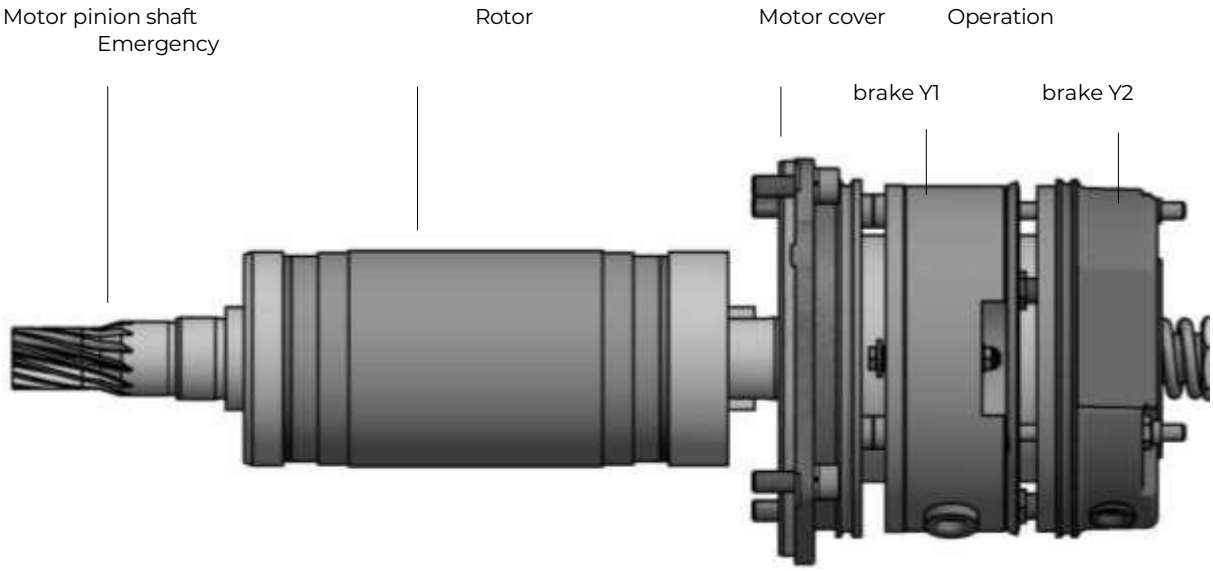


Figure 6: Configuration of the operation and emergency brake

Operation brake Y1

The magnet coil of the operation brake Y1 gets its power supply by the rectifier. The direct current (DC) is operated by the auxiliary contacts of the contactors K2 and K3.

Emergency brake Y2

The magnet coil of the emergency brake Y2 gets its power supply by the rectifier too.

The rectifier is supplied by alternating current (AC) out of the motor lines (U and V) 1L1 and 1L2.

Due to this AC – supply the incidence time of the emergency brake is longer than of the operation brake.

Separate test of the operation and emergency brake (DGUV V17 (BGV C1) only)

The DC – supply of both magnetic coils are equipped with a plug connector.

These connectors are marked with “1” for the operation brake Y1and “2” for the emergency brak

To check the brakes separately there is a special plug “P”. This plug is supplying DC power, whe electric chain hoist is ready for operation.

- Check the operation brake Y1:
  Open connector “2“ and connect this connector with the plug marked with “P”.
  The emergency brake will remain open and the proper function of the operation brake can be checked with nominal load. Reconnect connector “2” after this procedure.

- Check the emergency brake Y2:
  Carry out the same as above but connect “P“ with supply connector “1”.
  The operation brake will remain open. Now the function of the emergency brake can be checked

separately. The test has to be carried out with nominal load. The brake distance of the emergency brake is longer than the brake distance for the operation brake.

Caution! Reconnect the plug connectors 1 – 1 and 2 -2 after each test.

11.13. Separate, independent testing of the main and safety brakes (DB, D8 Plus and C1)

An independent inspection of the braking system is required to make sure the brakes are fully functional.

The following operations my only be performed by competent service technicians authorized by MOVEKET.

The DC current for the brake magnet is supplied via plug-in connectors. The connector on the brake side for the service brake is marked "1" and that of the safety brake "2".

Testing of the brakes has to be done with real weight. Testing the brakes using a clutch-testing-device or mounting the hoist between to fix points is prohibited!

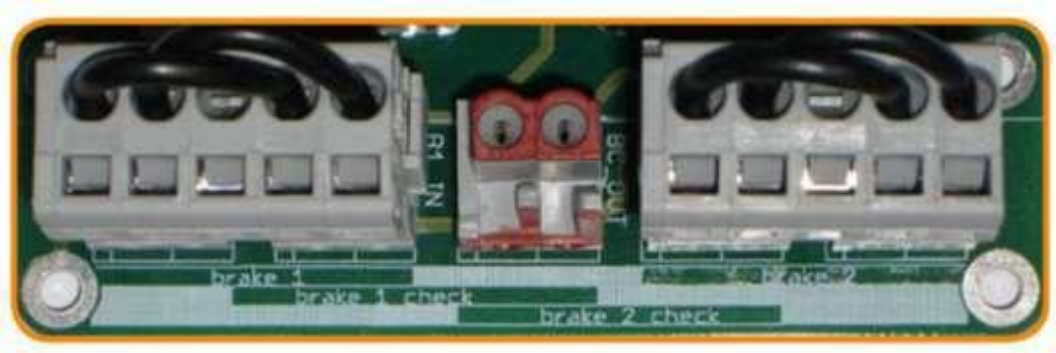
To check the brakes in the case of BGV C1 OMK hoists, the brake test rectifier with the accompanying brake test cable BTC1-3/C1 is fed via the 3-pin plug on the lower Motorprint with 230V AC.

Warning!

Live parts – do not touch!

The choice of the brake to be tested is determined by the relevant brake-test jumper. This can be inserted in such a way as to ensure that Brake 1 or Brake 2 is permanently open.

To maintain the brakes open, the bypass plug in each case must be removed from the outer position and reinserted in the middle position on the output of the test rectifier marked in red.



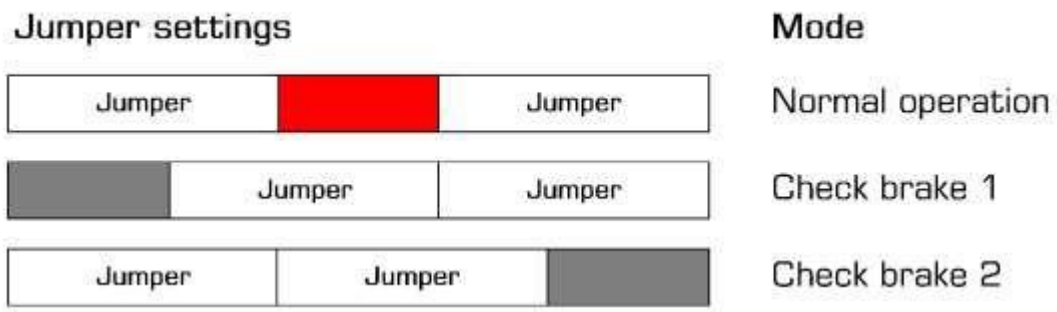


Fig. 36: Testing the brake

Alternatively, an external test device (e.g. BTRC-1 which can be ordered as an option) can be used.

In the case of C1 hoists for fixed installation with the corresponding MOVEKET controllers, a test plug (marked with a 'P') may be present on the brake side. If the chain hoist is ready for operation, c. 200 V DC is applied to this connector. With it, a brake can be kept open directly.

For the independent testing of the brakes of D8 Plus and D8 hoists in their DB version ("double brake", for export), an external test device (e.g. BTRC-1) is necessary, as the chain hoists have no power supply except when performing operational runs. The brakes are controlled in normal operation via the motor voltages. The testing device generates the 200V DC voltage required for the permanent opening of a brake and has a compatible output connector.

With all test procedures the same rule applies: before touching a plug, always de-energize the hoist and the test device.

In the case of project-specific custom versions, the brake tester can be implemented controller. In such cases, follow the instructions in the operating manual of the controller.

11.13.1. Testing of the service brake (Brake Y1)

1. Set brake test jumper/test plug "Brake Y2" to "Open". Brake Y2 is now permanently open, so Brake Y1 can be tested.
2. Activate a downward and upward run with at least 125% of the nominal load – as soon as a stop is ordered, the run enable state is interrupted or the Emergency Stop button is pressed, a total stillstand must be reached in both run directions within a distance of two links of the chain. The arresting and suspension of the load under these circumstances is performed exclusively by the service brake!
3. When the test is complete, reinsert jumper/test plug "Brake Y2" for operation mode.

11.13.2. Testing of the safety brake (Brake Y2)

1. Set brake test jumper/test plug "Brake Y1" to "Open". Brake Y1 is now permanently open, so Brake Y2 can be tested.
2. Activate a downward and upward run with at least 125% of the nominal load – as soon as a stop is ordered, the run enable state is interrupted or the Emergency Stop button is pressed, in both run directions, the run must stop within at least 0.5 seconds. The arresting and suspension of the load under these circumstances is performed exclusively by the safety brake! Due to the delayed intervention of the safety brake, the load comes to a delayed stillstand in the range from 0 to 0.5 seconds. The load will therefore dip briefly but must under all circumstances come to a halt and remain securely held thereafter. The extended braking path can be between 15 to 30 cm depending upon the speed of the hoist. For the test procedure, it is essential to ensure there is plenty of free run space, so that the load does not encounters an obstacle if the braking process is retarded!
3. When the test is complete, reinsert jumper/test plug "Brake Y1" for operation mode.

Once each of the brakes has been tested individually, a further test run in both directions is required to ensure that both brakes are still fully functional, which is something that can be verified acoustically from the successive incursion of the two brakes.

11.14. Safety friction clutch

The patented safety friction clutch of MOVEKET hoists serves as a reliable overload device and protects the electric chain hoist, the suspension and the load chain including the load assembly against mechanical stress caused by overloading or technical failures such as a blocked chain strand. It should only be adjusted by a trained and competent person.

Increasing the load capacity by altering or increasing the settings of the safety friction clutch is impermissible.

The sliding clutch is located between the motor and the brake so that the power from the brake to the load is transmitted by gear parts in form-fitting connection. Even if the clutch is seriously worn, the load will not fall uncontrolled as the load can be held in every position by the brake.

The friction clutch operates as a dry clutch.

The sliding clutch operates as a dry clutch using a non-asbestos lining. The difference between the static and the sliding friction coefficients of the asbestos-free lining is so slight that it has no effect on the functional reliability.

The sliding clutch is an emergency stop and it is not allowed to use it permanently. That means it is not allowed to run the hook block or tackle or the lift limiter against the body of the hoist to limit the lifting movement for standard operation as they are emergency limits only.

The chainhoist of VMK series are not equipped with a friction clutch!

11.14.1. Mode of operation of the sliding clutch

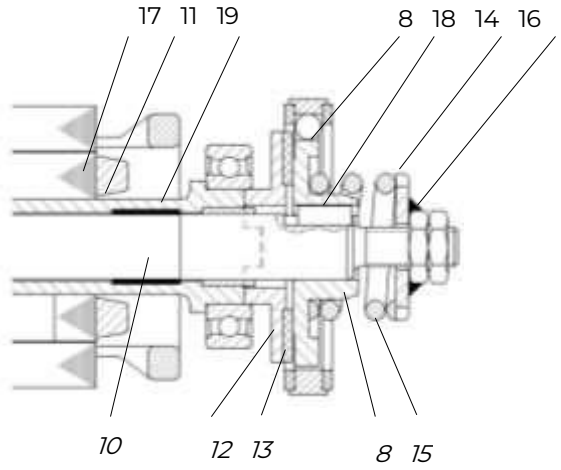


Fig. 37: mode of functioning of the sliding clutch for version B2-B8.1

The rotor (17) is tightly connected with the hollow shaft (11). The hollow shaft (11) is mounted with the bearing bushes, which do not require lubrication or maintenance, on the motor pinion shaft (10). The motor power is transmitted through the hollow shaft (11) with the coupling flange (12), through the asbestos-free clutch lining (13) to the brake hub (8). The brake hub (8) is rigidly connected with the motor pinion shaft (10) by means of a feather key (18) so that the driving force is conducted into the gear. The clutch torque for transmitting the force is set externally with the adjusting nut (16) on the spring collar (14) through the compression spring (15).

Caution! The sliding clutch of the versions B1-B1.3 is located on each side of the rotor.

Note: The clutch has to be adjusted in such a manner, that the nominal load can be lifted safely under all operating conditions. The sliding clutch acts as an direct actuated lifting load limiter acc. to EN 14492, part 5.2.2.2.1. With a suspended load, the clutch begins to slip at around 130% in the case of D8 hoists as well as a max. 120% of the nominal load in the case of D8 Plus and C1 hoists, so that the load can no longer be lifted from its rest position.

Normal operation over 100% of the nominal load is not permitted!

11.14.2. Adjusting the clutch

1. Turn the pressure nut with the welded-on spring collar (14) until the lock washer groove is in line with the magnetic groove (1).
2. Insert a bar (screwdriver) into the magnet groove (1) and hold the spring collar (14) in place with the pressure nut. Then loosen the lock nut (16).
3. Tighten the compression spring (15) with the pressure nut (14) sensitively to exactly the point where the test load is raised.
4. Secure the pressure nut (14) again with the lock nut (16) with torque wrench, values as listed below:

clutch version B1-B1.3	hex. nut M12×1.5 DIN 936	torque 30 Nm
clutch version B2-B5.1	hex. nut M12×1.5 DIN 936	torque 30 Nm
clutch version B6-B9.1	hex. nut M16×1.5 DIN 936	torque 75 Nm

5. Test the clutch setting once more by raising the nominal load to the uppermost load position and let the clutch slip. The clutch should not slip for longer than 2-3 seconds.

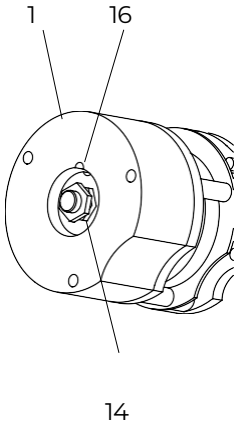


Fig. 38: adjusting nut for clutch power

11.14.3. Adjustment of the sliding clutch (Prostage, UP-Plus, Plus-C)

Caution! The adjustment works should be executed by trained personnel only.

1. Apply the test load =1.1 times the nominal/rated load onto the load hook or the clutch testing device.
2. Switch on the chain hoist by control pendant and check, that the test load can be lifted or the clutch testing device shows approximately 1.3 times the nominal load. The factor 1.3 is depending on the relevant hoisting speed.
3. Lower the test load to the floor.
4. Decrease or increase clutch torque until the test load is just lifted or the clutch testing device shows the required value.
5. Adjusting the clutch torque as follows:

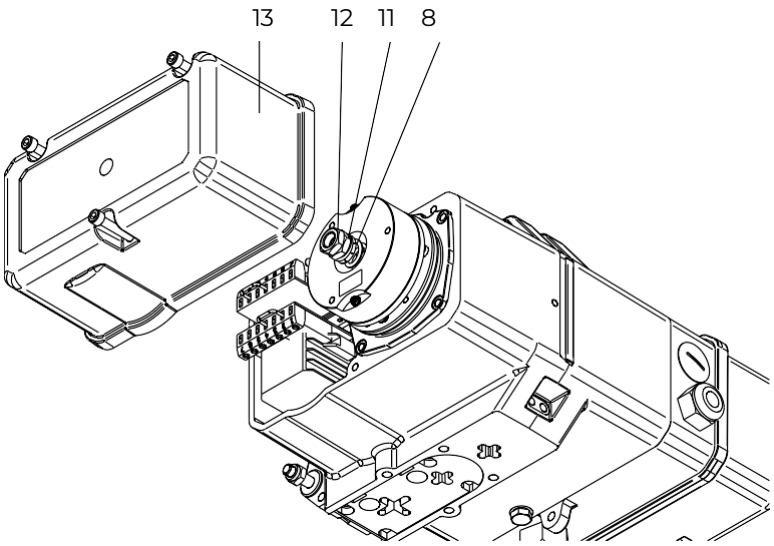
   a. Loosen and remove the cap for brake.
   b. Use two spanners to loosen the counter-tightening (12).
   c. Tighten (turn adjusting nut clockwise) or loosen (turn adjusting nut counter-clockwise) the pressure spring until the required test load is just lifted or the clutch testing device shows the required value. After adjustment use two spanners to counter-tighten the two hexagon nuts.

6. Finally: Recheck the clutch torque by lifting the test load.
   Record the adjusting value in the inspection book of the electric chain hoist..

Caution! When loosening the counter-tightening, it must be ensured that the clutch spring is always slightly pretensioned.

When dismantling the clutch spring, replacing parts or after the clutch spring has been completely released, the brake-clutch assembly must be assembled in vertical position.

If the clutch spring is inadvertently released completely, the brake-clutch assembly must be completely disassembled and then correctly reassembled as described in point



Tap on the magnetic coil of the brake:

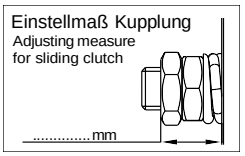


Bild: : Adjustment of friction torque of the sliding clutch

The sliding clutch is set with the test load by the manufacturer. After changing or replacing the brake-clutch-group, it is not necessary to reset the clutch. A test with nominal load is required only. The original distance between the counter nut and the magnetic coil of the brake is marked on the tag of the brake.

11.14.4. Assembly and disassembly of the brake-clutch assembly group

The brake-clutch assembly group is a separate functional unit.

Caution!

All assembly and disassembly works have to be done without load. The electric chain hoist must be switched off and disconnected from the grid.

The electric chain hoist must be put vertically before dismantling the brake/clutch assembly. Risk of oil loss! Disassembly of the brake-clutch assembly group

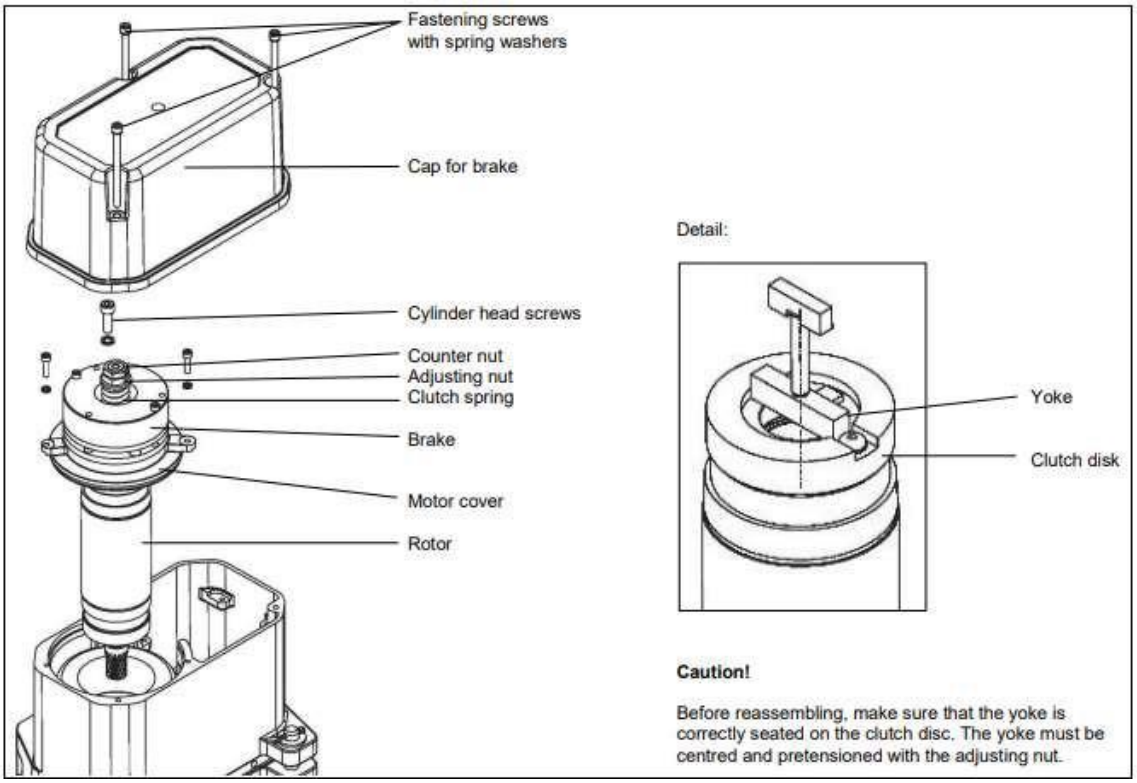


Figure: Brake-clutch assembly group

1. Loosen the fastening screws of the cap.
2. Remove the cap.
3. Disconnect the cable for the brake and pull it back.
4. Loosen the cylinder head screws on the motor cover.
5. Pull out the motor cover complete with brake-clutch assembly including rotor.

Caution! The assembly is carried out in reverse order. The clutch spring must not be released. After replacing the brake clutch assembly, the frictional torque of the clutch must be readjusted in accordance with point 1.

11.14.5. Brake replacement

When the brake is replaced, the clutch setting remains unchanged. The counter-tightening of the clutch adjusting nut must not be released.

11.15. Load chain

Hoist chains are load bearing mediums that require official approval. It is, therefore, important to observe the guidelines issued by the trade association's centre for accident prevention with regard to round steel chains in hoisting operation, the guidelines for general inspection and test specifications in accordance with DIN 685, section 5, Nov 1981, the accident prevention regulations in BGV D8 (VBG 8 of April 1980/1990) and in BGV D6 (VBG 9 of April 2001) or equivalent regulations in the respective country.

The chain is available as standard in silver (electrolytically galvanized) and optionally in black (black phosphatized). The black version, due to the processes involved, is markedly less corrosion-proof and must therefore be lubricated at more frequent intervals. The black chains are only of limited utility for outdoor use.

The black version also has an inferior glide characteristic, so with black chains it is advisable to use a chain container one size larger than the standard. The operational safety of the normal operation should be determined through test runs.

Warning! As a replacement chain, use only a genuine MOVECAT spare part.

11.15.1. Lubricating the load chain before starting and during operation

The links along the entire length of the load chain must be lubricated with a penetrating gear lubricant oil before starting operation for the first time and during unloaded operation. Subsequent lubrication, whereby the links must be cleaned first, depends on the degree of use and the operating conditions.

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

11.15.2. Testing the load chain for wear

The continuous monitoring of the load chain is compulsory according to DIN 685 section 5 and the accident prevention regulations in BGV D8, section 27 (VBG 8, section 27). The load chain must be tested before starting operation and after approx. 200 operating hours or 10,000 load cycles under normal conditions or more often under demanding and severe conditions. Testing must cover checking links, particularly at their points of contact, for wear, cracks, deformation and other damages.

The chain must be replaced:

- if the nominal thickness at the points of contact is reduced by 10%,
- if a chain link is elongated by 5%, or an eleven links piece of chain is elongated by 2%,
- if the links are rigid.
- The chain guide and retainer must also be replaced along with the chain.

Warning! As a replacement chain, use only a genuine MOVECAT spare part.

11.15.3. Measuring wear and replacing chain

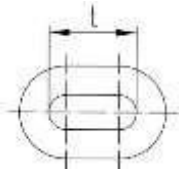
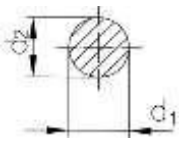
Chain dimensions mm	Link dimension	4×12	5×15	5,2x15	7×22	7,4x21,1	9×27	11×31	11,3×31
Measure 1 link inside Max. measurement t		12,6	15,8	15,8	23,1	22,1	28,4	32,6	32,6
11 chain links		134,6	168,3	168,3	246,8	236,7	302,9	347,8	347,8
Measure chain link diameter $d_m = \frac{d_1 + d_2}{2}$ Min. measurement d_m = 0.9d		3,6	4,5	4,7	6,3	6,6	8,1	9,9	10,2

Table 7 measurement of chain dimensions

See Section 6.4.1. and following for how to change the chain

11.15.4. Measuring wear and replacing load hook/eye

According to DIN 15401 part 1 load hooks have to be replaced if the length between the chisel punch marks (dimension Y) widened more than 10%. The permissible values are shown on the hook certificate in the 'Inspection book'.

Instead of load hooks, rotatable and tiltable chain-end eyelets with swivel adaptors are available as options.

In the case of the load hook, the functionality and mechanical integrity of the independent locking mechanism of the hook safety latch should be inspected.

The load hook or chain end eyelet should be replaced under the following circumstances:

- dimensional nominal values exceeded by 10% or more
- formation of cracks
- mechanical damage or deformation
- severe corrosion

12. Lubrication

12.1. Lubrication of the gear

The gear is already filled with oil by the manufacturer. The oil must be changed if the hoist is going to be overhauled. The oil has to be disposed in accordance with the law of environment protection.

Use oil for 220 mm^2/s at 40° C. The necessary amount of oil needed for the different versions of electric chain hoists is shown in the following tables:

Version (basic type)	Amount (litre)
1 / 1.1 / 1.3	0.2
2 / 3 / 4 / 4.1 / 4.2 / 5 / 5.1	0.25
6 / 6.1 / 7 / 7.1 / 7.2 / 8.1 / 9.1	0.5

Version (SK)	Menge in ml
030	175
070	350

Table 8: quantity of oil

Alternative oils are:

Supplier	Oil designation
Fuchs©	Renolin CLP 220
Castrol©	Alpha Zn 200
ESSO©	EP 220
Mobil©	Mobil gear 630
Shell©	Omala 220
ELF©	Reductelf SP 220
BP©	XP 220 BP Energol GR
Exxon Mobil©	Mobilux EP2

Fuchs©	Geralin SF 220

Table 9: alternative oils

12.2. Lubrication of the chain

The following products for the lubrication of the chain are recommended depending upon the operating conditions:

Producer	Designation
MOVEKET ©	CLS-NH-400

Table 10: Chain lubricants

12.3. Lubrication of the hook block and chain hook

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

Lubricants recommended for the container:

Producer	Designation
Fuchs ©	Renolith Duraplex EP3; NLGI - class 3
Fuchs ©	Lagermeister LX EP2

Table 11: Lubricants for the bearing

12.4. Auxiliary materials

Following threadlocking pastes are recommended for threadlocking of screws:

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

Table 12: locking pastes

13. Spare parts

Only original spare parts may be used. The producers guarantee is given for those spare parts only.

The producer cannot be held responsible for failures and breakdowns caused by use of not original or wrong spare parts.

14. Duty cycle of the electric chain hoist

14.1. Determining the theoretical service life

You will find information concerning the mechanism group, the resulting total service life as well as the fundamental principles for calculating the remaining service life in the test log of the chain hoist in question.

It is the responsibility of the operator to ensure that an appraisal of the remaining service life of the device is made in the course of the annual UVV inspection and that this is entered in the test log. If no appraisal is made, the chain hoist should after 10 years at the latest be subjected to a general overhaul or else disposed of in an ecologically responsible manner..

Caution ! The duty rate and the number of operating cycles in one hour must not be higher than as shown on the specification plate of the hoist or in a technical data table.

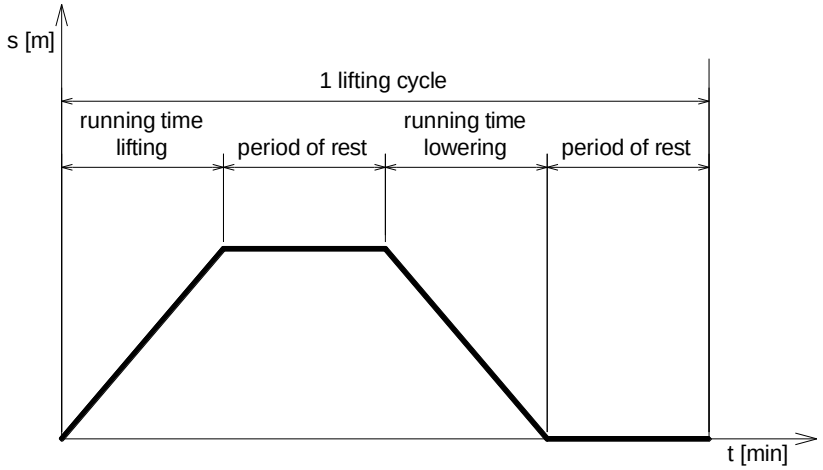
(European regulation FEM 9.683).

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

running time to running time + period of rest

Formula :

$$\text{c.d.f. \%} = \frac{\text{running time x 100\%}}{\text{running time + period of rest}}$$



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

14.2. Short time duty

This duty type is not permissible for the slower speed of precision hoisting motors. After having reached the maximum running time a break is required and the hoist can be further used in intermittent duty mode. The permissible operating periods without cooling interval when operation starts and with a motor temperature of approx. 20° C are following:

Duty group acc. to FEM 9.511	Duty group acc. to ISO 4301	Duty rate c.d.f.	Operating period * acc. to FEM 9.683 (t_B in min)
1 Bm	M 3	25 %	15
2 m	M 5	40 %	30

*** The operating periods t_B of the MOVEKET chain hoists are higher then required acc. to FEM 9.683.**

Table 13: duty rate for short time duty

14.3. Intermittent duty

Operation must be interrupted whenever the highest permissible operating time is reached. The following breaks are necessary depending on the duty rate c.d.f. of the electric chain hoist:

Duty rate c.d.f.	Break (min)
15 %	5 times running time
20 %	4 times running time
25 %	3 times running time
30 %	2.5 times running time
40 %	1.5 times running time
50 %	1 times running time
60 %	0.66 times running time

Table 14: intermittent duty

14.4. Example

The electric chain hoist type 1000/1-4 is to lift loads of 1000 kg to a height of 12 m.

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

Performance data:	load capacity	1000 kg	lifting speed	4 m/min
	duty rate	25 %	duty group of the hoist	1Bm

$c.d. = \frac{12\text{ m lifting} + 12\text{ m lowering}}{4m/\text{ min}\, lifting\ speed}$ = 6min for each lifting cycle

During the operation without break (short-time duty = max. 30 minutes without break acc. to FEM 9.683) max. 5 lifting cycles are possible.

After 30 minutes of operating time, 18 minutes break for each 6 minutes of operating time must be taken (i.e. 3 times the operating time). This break is usually necessary for slinging and taking off loads.

Caution! Cooling periods are imperative for extreme lifting heights (from 10 meters on). Low lifting speed should only be used for precise lowering and lifting. It is not suitable when greater lifting heights shall be driven through.

Option! To protect the lifting motor a thermal overload device is offered as an option (24 Volts low voltage control is required!).

15. Determining the theoretical service life

You will find information concerning the mechanism group, the resulting total service life as well as the fundamental principles for calculating the remaining service life in the test log of the chain hoist in question.

It is the responsibility of the operator to ensure that an appraisal of the remaining service life of the device is made in the course of the annual UVV inspection and that this is entered in the test log. If no appraisal is made, the chain hoist should after 10 years at the latest be subjected to a general overhaul or else disposed of in an ecologically responsible manner.

15.1. Measures to take at end of the service life

When the chain hoist reaches the end of its theoretical service life (max. 95%), it along with its components should be subjected to a general overhaul or else disposed of in an ecologically responsible manner.

The determining factor here is the assessment of the remaining service life of the device made ir the course of its annual UVV inspection and entered in the test log. If no appraisal and entry is made, the chain hoist should after 10 years at the latest be subjected to a general overhaul or else disposed of in an ecologically responsible manner.

The general overhaul may only be performed by a specialist workshop authorized by the manufacturer or else by the manufacturer itself.

To protect against the effects of age and wear, especially under aggravated operating conditions such as touring use, dry hire, outdoor use, sustained use with a permanent load, C1 operation over persons etc., we recommend the device be subjected to an extended service after 10 years and the replacement of the relevant wearing parts as well as safety-relevant components. Enquire about these from your local distributor or the manufacturer.

16. Working hour meter (Prostage and optional)

The integrated working hour meter ist located together with the brake rectifier on the same board. It consists of electronics, button, battery, display and LED.

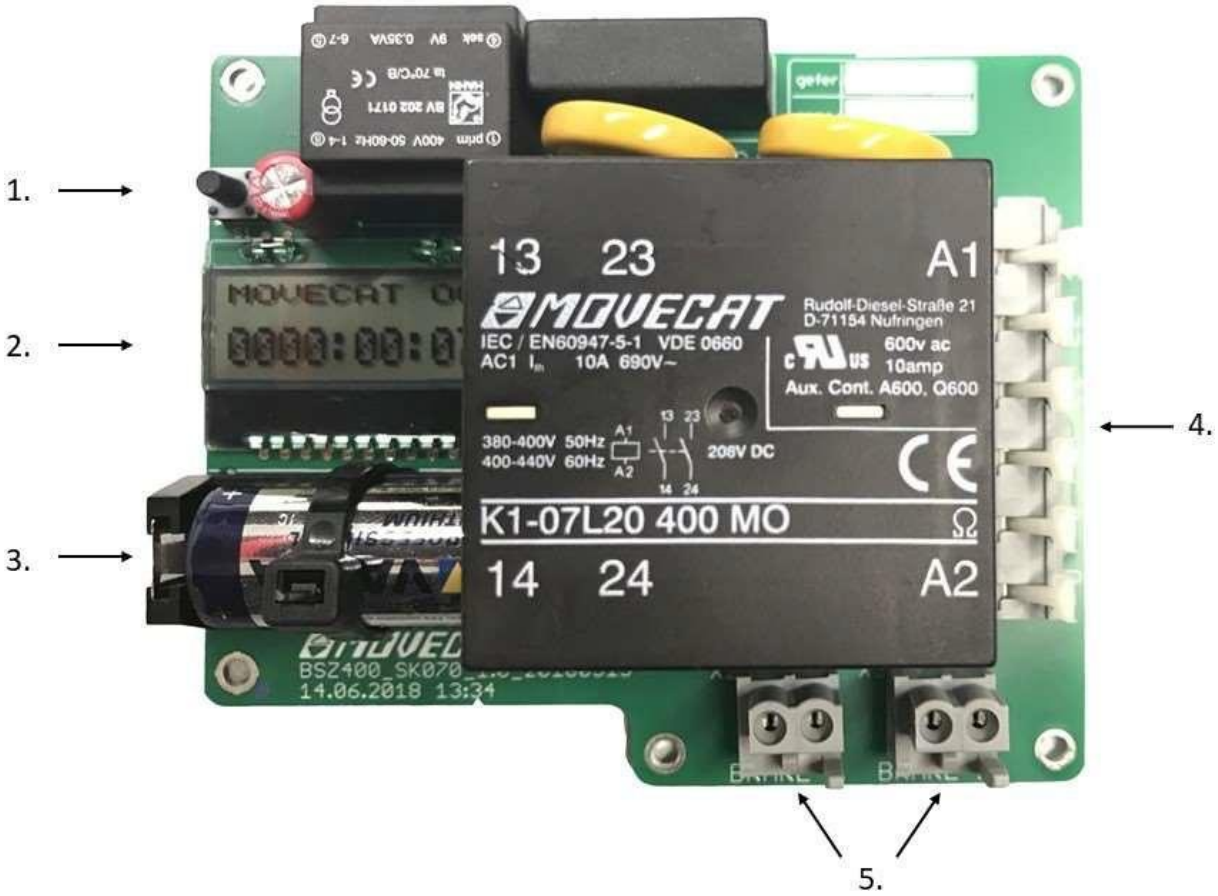


Figure: working hour meter board with brake rectifier

Platine Betriebsstundenzähler mit Bremsgleichrichter

1. Button
2. Display
3. Battery
4. Mains and hoist connection terminal
5. Brake connection terminal

The working hour meter mesuares the duration of all drives of the chainhost and sums them up to a total working count which stored in a non-volatile.

The usage of the display is only permitted in power-off mode oft he hoist!

16.1. Display

After pressing the button the total working hours are displayed.

Figure: Display with total working hours

One further press on the button shows the category of the mechanism group of the drive und the corresponding allowed maximum working hours.

Figure: Displaying the mechanism group

Further pressing of the button displays stepwise the remaining working hours for the hoist being under 100%, 75%, 50% and 25% of its maximum load.

This calculation is based on the displayed duty factor only!

The effective remaining working hours can be higher or lower and is depending on the individual usage. The displayed values are guiding values and do not discharge the owner to do a calculation of the remaining period of use according to FEM 9755 (please see the test log book for further information).

On the last page of the display the software version if the firmware is shown.

Figure: Displaying the software version

After that, the display starts again at the maximum working hours page.

After 15sec without a button press the display is shut down.

If you press the button while driving the hoist it shows a warning notice.

Figure: Warning notice

16.2. LED lifesign during time mesurement

While mesuring the LED of the working hour meter is blinking.

16.3. Battery

The battery is not necessary for the proper function of the device. It is only used for the display while the hoist is not powered. The lifespan of the battery is under normal environment conditions and

usage of the display at the annual inspection exceeds 10 years. That's why a replacement is intended to be done only at the 10 years general overhaul.

16.4. Accuracy of the 50 Hz-version

The device has a relative accuracy at operating insde the European interconnected systems of +/- 0,1 % over the whole lifecycle of the device.

If the mains are from a generator or the hoist is being used in countries with bad mains quality the accuracy may be worse.

Operation on a 60Hz system is not permitted!

16.5. Troubleshooting

16.5.1. Display is hard to read

A low contrast of the display indicates a low battery.

Please change the battery and tight it up with a new cable strap.

16.5.2. Display doesn’t show anything

Possibly the battery is empty:

Please check the battery (3V nominal volts)

Battery: MOVEKET item.-Nr. 113650

Battery inserted wrong:

Flip the battery

16.5.3. During a drive the LED doesn’t blink

Please contact the MOVEKET Service.

17. Disposal

Dispose of the packaging in an environmentally responsible manner, according to the materials of which it is composed, respecting local provisions.

Once the chain hoist has reached its maximum service life or is no longer in use, it should as far as possible be dismantled and the individual components separated according to their materials and recycled. Here both national and local regulations and legal provisions in force regarding disposal and recycling should be observed.

Dispose of the individual parts separately, depending upon their materials, in an ecologically sensitive manner:

- oil and grease as lubricants
- brake and clutch linings as special refuse
- electronic components as electronic waste
- cables, plugs and pendants as electrical waste
- metal parts such as housings, chain nuts, chain guides, chains, suspension yoke, gears and load hooks as scrap metal – sorted, if need be, by metal type
- rubber and plastic parts in accordance with the provisions and regulations in force locally

18. Technical data

The specific technical data for the various individual electric chain hoists can be obtained from the test log of the chain hoist in question.

19. Connector cable assignments

19.1. D8 and D8 PLUS hoists, DC version

CEE 4p male red	Function	Signal	Lead
L1	U	Motor	brown (1.5 mm²)
L2	V	Motor	black (1.5 mm²)
L3	W	Motor	grey (1.5 mm²)
PE	PE		green-yellow (1.5 mm²)

Table 15: Connector cable assignments D8 and D8 PLUS. DC version

19.2. D8 and D8 PLUS hoists, RC version

19.2.1. D8 and D8 PLUS hoists, RC with multi-pin

Harting pin male	***Function***	**Signal**	**Lead**
1	*U*	Motor	1 (1.5 mm²)
2	*V*	Motor	2 (1.5 mm²)
3	*W*	Motor	3 (1.5 mm²)
4	*P24*	+ 24 V DC (from motor PSU)	4 (1.5 mm²)
5	*UP*	Lift (input)	5 (1.5 mm²)
6	*DOWN*	Lower (input)	6 (1.5 mm²)
PE	*PE*		green-yellow (1.5 mm²)

Table 16: Connector cable assignments D8 and D8 PLUS. RC with multi-pin

19.2.2. D8 and D8 PLUS, RC with CEE 4P red/yellow

CEE 4p male red	***Function***	**Signal**	**Lead**
1	*U*	Motor	1 (1.5 mm²)
2	*V*	Motor	2 (1.5 mm²)
3	*W*	Motor	3 (1.5 mm²)
PE	*PE*		green-yellow (1.5 mm²)

CEE 4p female yellow	***Function***	**Signal**	**Lead**
1	*P24*	+ 24 V DC (from motor PSU)	1 (0.5 mm²)
2	*UP*	Lift (input)	2 (0.5 mm²)
3	*DOWN*	Lower (input)	3 (0.5 mm²)
PE	*PE*		green-yellow (1.5 mm²)

Table 17: Connector cable assignments D8 PLUS hoists. RC with CEE 4P red/yellow

19.2.3. D8 and D8 PLUS hoists, RC with CEE 4Pred and CX4P

CEE 4p male red	***Function***	**Signal**	**Lead**
1	*U*	Motor	1 (1.5 mm²)
2	*V*	Motor	2 (1.5 mm²)
3	*W*	Motor	3 (1.5 mm²)
PE	*PE*		green-yellow (1.5 mm²)

CX4F female yellow	***Function***	**Signal**	**Lead**
1	*P24*	+ 24 V DC (from motor PSU)	1 (0.5 mm²)
2	*UP*	Lift (input)	2 (0.5 mm²)
3	*DOWN*	Lower (input)	3 (0.5 mm²)
PE	*PE*		green-yellow (1.5 mm²)

Table 18: Connector cable assignments D8 and D8 PLUS. RC with CEE 4P red and CX4F

19.2.4. C1 hoists, OMK version (PMC-HF)

Harting pin	Function	Signal	Lead
1	U	Motor	brown (1.5 mm²)
2	V	Motor	black (1.5 mm²)
3	W	Motor	grey (1.5 mm²)
4	U	Brake rectifier 1	black 1 (0.5 mm²)
5	V	Brake rectifier 1 + 2	black 2 (0.5 mm²)
6	W	Brake rectifier 2	black 3 (0.5 mm²)
7	Brake 2 DC IN	Brake rectifier DC circuit	black 4 (0.5 mm²)
8	Brake 2 DC OUT	Brake rectifier DC circuit	black 5 (0.5 mm²)
PE	PE		green-yellow (1.5 mm²)
9	MPS_ON1	+ 24 V DC for Geared limit switch	white
10	BeO signal	Geared limit switch	brown
11	P24	+ 24 V DC power supply actuators	red (0.5 mm²)
12	GND	power supply	blue (0.5 mm²)
13	Ready	Enable	green
14	BeU signal	Geared limit switch	yellow
15	A1	*incremental encoder (optional)*	black
16	A1 inv.	*incremental encoder (optional)*	violet
17	UL	Underload (when used with LMS/LME n.c.)	grey
18	NeO signal	Geared limit switch	pink
19	B1	*incremental encoder (optional)*	grey-pink
20	B1 inv.	*incremental encoder (optional)*	red-blue
21	UP	Run enable Lift	blue
22	NeU signal	Geared limit switch	red
23	Clk+	*absolute encoder (optional)*	white-green
24	Clk-	*absolute encoder (optional)*	brown-green
25	DOWN	Run enable Lower	white-grey
26	Temp	*Motor overheating monitoring (optional)*	grey-brown
27	Data+	*absolute encoder (optional)*	white-yellow
28	Data-	*absolute encoder (optional)*	yellow-brown
29	Gap monitoring	*Brake gap monitoring 1 (optional)*	white-pink
30	Gap monitoring	*Brake gap monitoring 2 (optional)*	pink-brown
31	load signal	*LMS/LME load signal (optional)*	white-blue
32	Load test	*LMS/LME Load test (optional)*	brown-blue
PE	All cutoffs		

Table 19: Connector cable assignments C1 hoists OMK version

In the case of hoists for fixed installation, the connector cable can be adapted to the specific application; in such cases, take the assignment data from the project-specific documentation.

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19.2.5. C1 hoists, VMK version (PMC-HV)

Harting plug MX	Pin	Signal
1	brown (1,5mm²)	U (Motor)
2	black (1,5mm²)	V (Motor)
3	grey (1,5mm²)	W (Motor)
PE	Screen (only HV)	screen/PE
4	black 1 (0,5mm²)	U (brake rectifier)
5	black 2 (0,5mm²)	V (brake rectifier)
6	black 3 (0,5mm²)	W (brake rectifier)
7	black 4 (0,5mm²)	Br2DCin
8	black 5 (0,5mm²)	Br2DCout
PE	green-yellow (1,5mm²)	PE
9	white	MPS_ON1
10	brown	BEo signal
11	red (0,5mm²)	P24
12	blue (0,5mm²)	GND
13	green	Ready
14	yellow	BEu signal
15	black	A1
16	violett	A1 inv.
17	grey	UI Signal
18	pink	NEo signal
19	grey-pink	B1
20	red-blue	B1 inv.
21	blue	AUF ready
22	red	NEu signal
23	white / green	Clk+
24	brown / green	Clk-
25	white / grey	AB ready
26	grey / brown	Temp Signal
27	white / yellow	Data+
28	yellow / brown	Data-
29	white / pink	Brake gap control 2
30	rosa / brown	Brake gap control 1
31	white / blue	Load signal
32	brown / blue	Load check
	All screens	Screen/PE

20. Support and service

Your responsible MOVEKET service support centre, dealer or distributor as well as the manufacturer:

MOVEKET GmbH
Rudolf-Diesel-Straße 21
D-71154 Nufringen

Support: +49 7032-37117-70
E-Mail: support@moveket.de
Hotline : +49 9001-9851-77
E-Mail: hotline@moveket.de

www.moveket.de

21. Instruction of operating personnel

It is a requirement of the industrial health and safety regulations that hoists should only be used by qualified and instructed personnel.

The operator must therefore ensure that, before they begin work, the people charged with the handling, servicing, testing and maintenance of the devices concerned are trained in the performance of the tasks entrusted to them and therefore in a position to perform them safely and reliably.

The operators who have been instructed to use this hoist and have read the manual and especially the safety advice.		
Name, Surname	Date	Signature

This manual contains only the instructions required for the proper operation of the electric chain hoist in events and production setups by qualified personnel.

Information on other conceivable use variations cannot be considered here.

In the event of any deviation from normal operation (e.g. noises, vibrations, increased power consumption or repeated tripping of fuses), the device should be switched off and the load area secured as it must be assumed that functional disturbances capable of causing injury to the person or property damage are present.

The task of repairing the damage (correcting the malfunction) must be entrusted by the operator to a competent person.