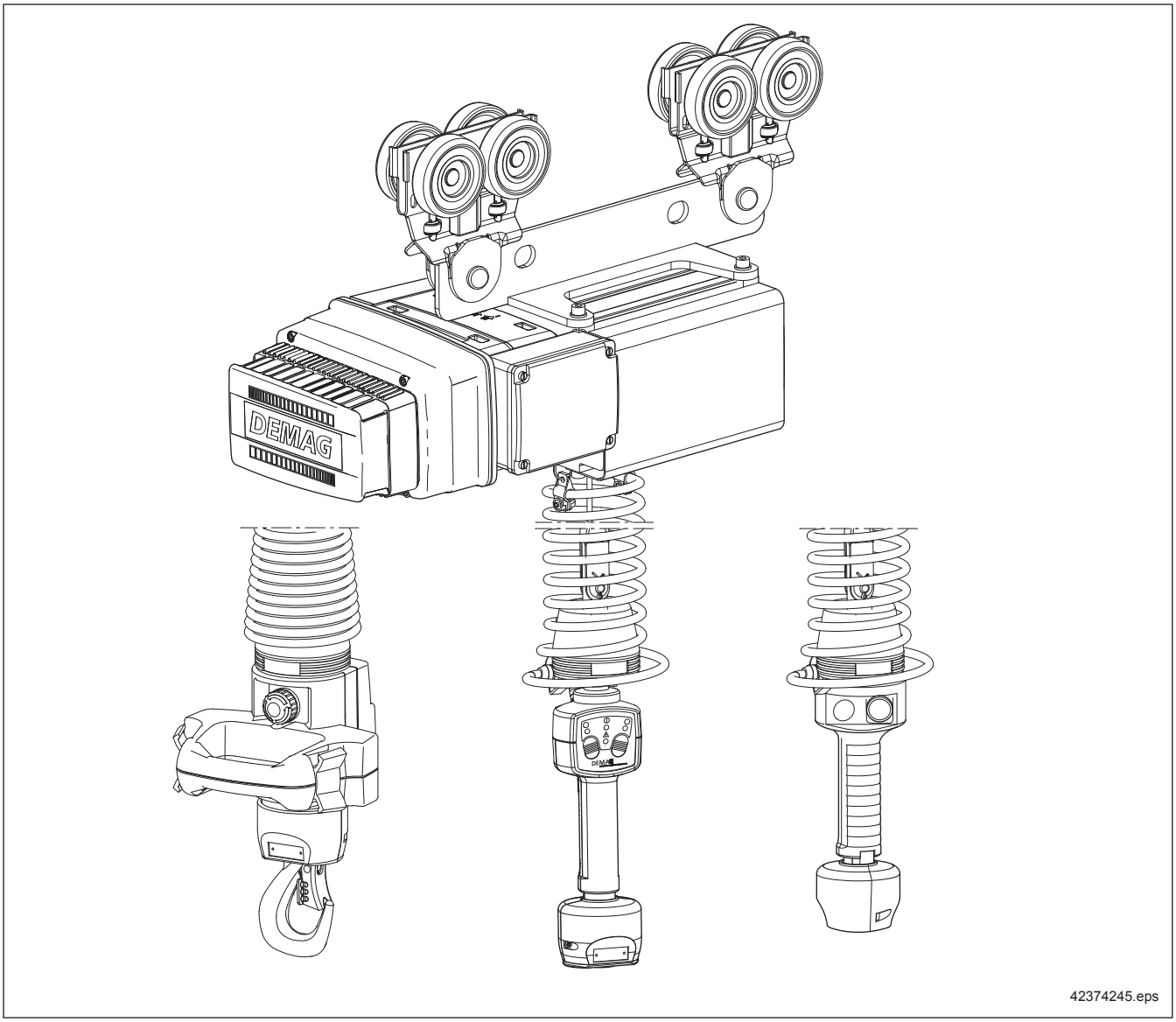
DEMAG
Cranes & Components

Operating instructions

Demag SpeedHoist D-SH



Translation of original operating instructions

Manufacturer

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Please fill in the following table before first putting the unit into service.

This provides you with a definitive documentation of your manipulator and important information if you ever have to contact the manufacturer or his representative.

Owner	
Where in use	
Size	
Serial number	
Ident. no.	

Contents

1	**General**	**6**
1.1	Information on the Demag Speedhoist D-SH	6
1.2	Information on the operating instructions	7
1.3	Symbol/signal words	8
1.4	Liability and warranty	8
1.5	Copyright	9
1.6	Spare parts	9
1.7	Terms and definitions	10
1.8	Test and inspection booklet	11
1.9	After-sales service	11
1.10	Disposal of machine parts	11
2	**Safety**	**12**
2.1	General	12
2.2	Appropriate use	12
2.3	Hazards that can be caused by the D-SH hoist	14
2.4	Responsibility of the owner	15
2.5	Operating personnel requirements	16
2.6	Personal protection equipment	16
2.7	Emergency stop device	17
2.8	Regular inspections	17
2.9	Inspection regulations	17
3	**Technical data**	**18**
3.1	Mechanical equipment	18
3.1.1	Design overview	18
3.1.2	Explanation of size designation	18
3.1.3	Dimensions	19
3.1.4	Selection table	22
3.1.5	Hoist motor data	22
3.2	Electronic components	23
3.2.1	Control board	23
3.2.1.1	D-SH with frequency inverter	24
3.2.2	EEPROM hardware protection	25
3.2.3	Digital output status	25
3.2.4	D-Grip connection assignment	27
3.2.4.1	Emergency stop	27
3.2.4.2	D-Grip interface	27

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3.2.5	Rocker switch connection assignment	28
3.2.5.1	Emergency stop	28
3.2.5.2	Rocker switch interface	28
3.2.6	Manulift handle connection assignment	29
3.2.6.1	Emergency stop	29
3.2.6.2	Interface of the DSM Manulift handle	29
3.3	Oil and grease filling of gearbox	30
3.4	Operating conditions	30
3.5	Noise emission	30
3.6	Paint finish	30
4	**Design and function**	**31**
4.1	Design	31
4.2	Drive	31
4.3	Gearbox	31
4.4	Rope reeving components	31
4.5	Limit switch	31
4.6	Frame	32
4.7	Electrical equipment	32
4.7.1	General description	32
4.7.2	Overview	32
4.7.3	Inverter	33
4.7.4	External emergency stop (only D-Grip)	33
4.7.5	Control board	33
4.7.6	Fan	33
4.7.7	Fast-to-slow limit switch function	33
4.7.8	Pulse generator	33
4.7.9	Brake	33
4.8	Trolley	34
4.8.1	Runways	34
5	**Transportation, packing, storage**	**35**
5.1	Safety instructions	35
5.2	Transport inspection	35
5.3	Packing	35
5.4	Storage	35
6	**Installation and putting into operation for the first time**	**36**
6.1	Safety instructions	36
6.2	Assembling the trolley	37
6.2.1	KBK I, KBK II, Aluline classic 120 and 180 trolleys	37
6.2.2	CF 5 trolley, flange width 50 – 91 mm with load bar	38
6.2.3	RU trolley, flange width 50 – 90 mm with load bar	39
6.3	Electrical connection	40
6.3.1	Mains connection	40
6.4	Putting into operation for the first time	42
6.4.1	Checks before putting the hoist into operation for the first time	42
6.4.1	Emergency stop connection Setup (D-grip)	43
6.4.2	Emergency limit switch	43
6.4.3	Adjustment of the emergency limit switch actuator	43
6.5	Inspection before putting the unit into operation	44
6.6	Instructions relating to safety at work	44
6.7	Putting the unit into operation	44
6.7.1	Putting into operation with a D-Grip	44
6.7.2	Putting into operation with a rocker switch	44

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6.7.3	Putting into operation with a DSM Manulift handle	44
6.8	Starting operation	44
6.9	Putting into operation	45
6.9.1	Grip height adjustment	45
6.9.2	Connecting the rope to the grip	45
6.9.3	Shortening the wire rope	46
6.9.4	Putting the unit into operation	46
6.10	D-Grip button assignment	46
6.11	Circuit diagrams	48
6.11.1	D-SH circuit diagram	48
6.11.1.1	D-SH with D-Grip	48
6.11.1.2	D-SH with rocker switch	50
6.11.1.3	D-SH with DSM Manulift	52
7	**Operation**	**54**
7.1	Safety instructions	54
7.2	Description of the control unit	56
7.2.1	Control switches D-Grip	56
7.2.1.1	Operation with the grip	56
7.2.2	Control switches Rocker switch	57
7.2.2.2	Operation with the rocker switch	57
7.2.3	Control switches DSM Manulift	58
7.2.3.1	DSM Manulift quick-change coupling	58
7.2.3.2	Operation with the handle	58
7.3	Switching on	59
7.3.1	Checks when starting work	59
7.3.3	Checking operation of the gearbox and slipping clutch	59
7.3.4	Checking the hook safety catch	59
7.4	Switching off	60
7.5	Stopping operation in the event of an emergency	60
7.6	Analogue PWM converter	61
7.6.1	Function	61
7.6.2	Diagnosis LEDs	63
7.6.3	D-SH hoist operation	63
7.7	Parameter setting set	64
7.7.1	Setting the parameters with the manual terminal	65
7.7.1.1	Cables and connection	66
7.7.1.2	Putting the manual operating terminal into operation	66
7.7.1.3	Navigating with the manual operating terminal	67
7.7.1.4	Diagnosis variables	67
7.7.1.5	Parameters	67
7.7.2	Setting the parameters with a laptop/PC (software terminal)	68
7.7.2.1	Cables and connection	68
7.7.2.2	Starting the program	68
7.7.2.3	Possible causes of missing communication	69
7.7.2.4	Menu structure and parameters	70
7.7.2.5	Setup	70
7.7.2.6	Diagnosis	71
7.7.2.7	Operating parameters	72
7.7.2.8	Device parameters	72

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7.7.3	Documentation of parameters	73
7.7.4	Control of the PLC	73
8	**Maintenance**	**75**
8.1	Safety instructions	75
8.2	Basic principles for maintenance	76
8.3	Routine inspections	77
8.3.1	Specified inspections	77
8.3.2	Service life of the contactor	78
8.4	Maintenance schedule	78
8.5	Display of operating hours / statuses	80
8.6	Wire rope	81
8.6.1	Construction, application and reeving of wire ropes	81
8.7	Discarding the wire rope	81
8.8	Removing/fitting the rope	83
8.8.1	Unwinding the rope	83
8.8.2	Removing the rope	83
8.8.3	Fitting the rope	86
8.9	Shortening the wire rope	89
8.10	Lubricating the wire rope	89
8.11	KDP 63 hoist motor brake	90
8.11.1	Measuring the brake displacement	90
8.11.2	Replacing the brake disc	91
8.12	Oil change	93
8.12.1	Safety instructions	93
8.12.2	Gearbox	93
8.13	Adjusting the slipping clutch	94
8.14	Load hook inspection	94
8.15	Replacing the helical cable on the D-SH	94
8.16	Replacing the helical cable on the DSM operating handle	95
8.17	General overhaul GO	96
9	**Measures for achieving safe working periods S.W.P.**	**97**
9.1	Calculating the actual duration of service S	98
9.1.1	Estimating the load spectrum factor k_{mi} (by the owner)	98
9.1.2	Calculating the number of hours of operation (operating time) T_i (by the owner)	98
9.1.3	Factor depending on the type of recording f	98
9.2	Example: D-SH – 80 in 1Am	99
10	**Fault finding and elimination**	**100**
10.1	Error messages	100
10.1.1	DSM fault messages	100
10.1.2	D-Grip error messages	101
10.1.3	Instructions for finding faults	101
10.2	Warning messages and error statuses	102
11	**Accessories**	**103**
	EG conformity declaration	**104**
12	**Spare parts**	**108**

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1 General

1.1 Information on the Demag Speedhoist D-SH

You have purchased a Demag product.

This Demag SpeedHoist D-SH was manufactured in accordance with the relevant European standards and regulations.

The Demag SpeedHoist D-SH complies with the statutory regulations e.g. EC machinery directive 2006/42/EC.

The D-SH is of modular design.

The main assemblies include:

- Gearbox
- Hoist motor
- Integrated electrics
- Rope reeving components
- D-Grip/rocker switch/DSM Manulift

These operating instructions are designed to provide the operator with appropriate instructions for safe and correct operation and for maintenance.

Every individual given the task of transporting, installing, commissioning, operating, maintaining and repairing the D-SH hoist and its additional equipment must have read and understood

- the operating instructions
- the safety regulations and
- the safety instructions in the individual chapters and sections.

The operating instructions must be available to the operating personnel at all times in order to prevent operating errors and to ensure smooth and trouble-free operation of our products.

With the D-SH hoist you have purchased a product which offers various benefits:

- Infinitely variable speed control,
- Precise positioning,
- Rocker switch and DSM Manulift with progressive characteristic,
- Smooth load pick-up and deposit,
- Smooth starting and braking,
- Low-vibration operation,
- Acceleration and braking ramps ensure low load sway,
- Direction of rotation monitoring via integrated speed feedback,
- Overload cut-off,
- Automatic switching-over to creep lifting speed before the upper / lower limit position is reached,
- Frequency-inverter control with 24 V control voltage integrated into the D-SH hoist electrical enclosure,
- Temperature monitoring,
- Phase insulation,
- Optimized guiding of load handling attachments with the D-Grip, rocker switch or Manulift handle,
- The D-Grip and the rocker switch can be fitted in a load handling attachment at a favourable ergonomic position,
- Further benefits, e.g.:
  - Elapsed operating time counter can be read from the outside,
  - Operating limit switch for highest and lowest hook position,
  - Slipping clutch with automatic cut-out by means of speed monitoring,
  - Diagnosis interface for service purposes.

D-SH hoists are supplied ready for operation.

In addition hoist speed, acceleration and braking ramp can be programmed to meet specific application requirements.

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1.2 Information on the operating instructions

These operating instructions are designed to provide the owner with appropriate instructions for safe and correct operation and for maintenance. These operating instructions are an integral part of the D-SH hoist.

Every individual given the task of transporting, installing, commissioning, operating, maintaining and repairing D-SH hoists and their additional equipment must have read and understood the items listed in the following:

- the operating instructions
- the safety regulations
- the safety instructions in the individual chapters and sections.

The operating instructions must be available to the operating personnel at all times in order to prevent operating errors and to ensure smooth and trouble-free operation of our products. They must be kept available in the immediate vicinity at all times.

The D-SH hoist may only be operated by personnel who are fully familiar with the operating instructions.

If special designs or additional options are ordered or the latest technical modifications are incorporated, the actual scope of supply may deviate from the data and information as well as from the illustrations described here. If you have any questions, please contact the manufacturer.

NOTE

Based on EC Machinery Directive 2006/42/EC, the D-SH hoist is also designated as a machine in the following in the sense of completed machinery. This always refers to all possible types of the D-SH hoist.

For a D-SH hoist delivered ready for operation in the sense of a complete machine, we confirm conformity with the requirements of the EC Machinery Directive 2006/42/EC by means of the attached EC declaration of conformity.

A declaration of incorporation is attached for partly completed D-SH hoists which are assembled with additional parts to create a machine ready for operation.

The declaration of incorporation refers to the scope of delivery of the partly completed or non-assembled machinery. Before putting the unit into operation, the user must take additional measures in order to fulfill the safety requirements for the machine and issue the declaration of conformity for the machine that is ready for operation.

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1.3 Symbol/signal words

Important safety information and instructions are marked by corresponding symbols and signal words.

The safety instructions must be followed. Please exercise particular caution to ensure that accidents, injuries and damage are avoided in such cases.

The relevant local accident prevention regulations for the application and general safety instructions must also be complied with.

The following symbols and instructions warn against possible personal injuries or damage to property and are intended to assist you in your work.

DANGER

This symbol indicates an immediate danger which results in serious injury or death.

WARNING

This symbol indicates a potentially dangerous situation which may result in serious injury or death.

CAUTION

This symbol indicates a possibly hazardous situation which might result in medium to light injury.

NOTE

Operating hazard for the machine

- This symbol indicates information on the appropriate use of the machine.
- Non-compliance may result in malfunctions, damage or pollution of the environment.

1.4 Liability and warranty

All information included in these operating instructions has been compiled on the basis of the relevant regulations, state-of-the-art engineering principles and our many years of experience.

NOTE

These operating instructions must be read carefully before starting any work on and with the machine, especially before the machine is put into service for the first time. The manufacturer assumes no liability for any damage which results from the following:

- Non-compliance with the operating instructions
- Inappropriate use of the machine
- Operation by insufficiently trained personnel
- Unauthorized conversions
- Any technical modifications

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Wearing parts are not subject to liability for defects.

We reserve the right to incorporate technical modifications within the scope of improving the operating characteristics and further development of the machine.

1.5 Copyright

These operating instructions must be treated confidentially. They are only intended to be used by people who work with or on the machine.

Any and all content, texts, drawings, images and any other information are protected within the sense of copyright law and are subject to further industrial rights. Any misuse is an offence.

No part of this documentation, in whole or in part, may be reproduced, distributed, shown in public or used in any other way without specific prior consent. Infringements are an offence resulting in obligatory compensatory damages. Further rights reserved.

All industrial rights reserved.

1.6 Spare parts

Only genuine Demag spare parts may be used.

CAUTION
Defective spare parts

Incorrect or defective spare parts may cause damage, malfunctions or complete failure of the machine.

Only use genuine spare parts or parts approved by Demag.

For safety-relevant wear parts, genuine Demag spare parts must always be used.

Safety-relevant wear parts are, for example, brake linings, ropes, etc.

The use of spare parts which have not been approved renders any claims for guarantee, service, damages or liability against the manufacturer or his appointed personnel, dealers and representatives null and void.

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1.7 Terms and definitions

Owner

Owners (employer, company) are defined as persons who own D-SH hoists and who use them appropriately or allow them to be operated by suitable persons.

Operating personnel/operator

Operating personnel or operators are defined as persons entrusted by the owner of the D-SH with operation and/or transportation of the equipment.

Specialist personnel

Specialist personnel are defined as persons assigned by the owner to carry out special tasks such as installation, setting-up, maintenance and fault elimination.

Qualified electrician

Qualified electricians are defined as persons who, owing to their technical training, knowledge and experience of electrical installations as well as knowledge of the relevant standards, codes of practice and regulations, are able to assess the tasks given to them and to identify and eliminate potential hazards.

Trained person

Trained persons are defined as persons who have been instructed and trained for the tasks assigned to them and on the possible hazards resulting from incorrect handling and who have been informed about the required protective devices, protective measures, relevant regulations, codes of practice, accident prevention regulations and operating conditions and who have proven their qualifications.

Experienced technician

Experienced technicians are defined as persons, who, owing to their technical training and experience, have sufficient knowledge of D-SH hoists and are familiar with the relevant national industrial safety regulations, codes of practice, accident prevention regulations, directives and generally accepted engineering standards enabling them to judge the safe operating condition of D-SH hoists.

Assigned expert engineer (in the Federal Republic of Germany according to BGV 8, § 23, for determining the S.W.P.)

An assigned expert engineer is defined as an experienced technician specifically assigned by the manufacturer to determine the remaining duration of service (service life) of the D-SH hoist (S.W.P. = safe working period) and to carry out a general overhaul of the D-SH hoist.

Authorized expert engineer (according to BGV D6, § 28 in Germany)

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

Demag SpeedHoist D-SH

D-SH hoists are systems used for lifting, lowering and moving loads. They can also be used in cranes, crabs and travelling hoist units, rail systems and other installations.

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1.8 Test and inspection booklet

A test and inspection booklet filled in with all details must be available for every D-SH hoist. The results of the regular tests and inspections must be entered into the test and inspection booklet and must be certified by the inspector. Test and inspection booklet order no.: see page 5 “Accompanying documents”.

1.9 After-sales service

Our after-sales service will provide you with technical information on the D-SH hoist, etc.

Please keep the serial or order number (see test and inspection booklet, load capacity plate on the crane) for any correspondence or spare part orders. Specifying this data ensures that you receive the correct information or the required spare parts.

The relevant after-sales service station of Demag is specified for example on the back page of the D-SH hoist test and inspection booklet.

Manufacturer’s address:

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1.10 Disposal of machine parts

Unless a return or disposal agreement has been concluded, recycle separated components after proper removal:

- Scrap any remaining metallic material
- Dispose of plastic elements for recycling
- Separate and dispose of any other components by material type

NOTE

Electric scrap, electronic components, lubricants and other auxiliary materials are subject to special disposal regulations and may only be disposed of by certified companies.

National disposal regulations must be considered regarding environmentally friendly disposal of the machine. Further information can be obtained from corresponding local authorities.

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2 Safety

2.1 General

The “Safety” chapter provides an overview of all important safety aspects for optimum protection of personnel as well as safe and trouble-free operation of the machine.

At the time of its development and manufacture, the machine was built according to generally accepted engineering standards and is considered to be safe to operate. The machine may still be a cause of danger if it is not used correctly or appropriately by trained personnel.

Knowledge of the contents of the operating instructions is one of the requirements necessary to protect personnel from hazards and to avoid malfunctions and, therefore, to operate the machine safely and reliably.

Any conversions, modifications and additions to the machine are prohibited unless approved in writing by Demag.

2.2 Appropriate use

D-SH hoists may only be used as intended and in compliance with the requirements for the owner resulting from these operating instructions and the following limitations. Any other use may result in a danger to life and limb and/or cause damage.

- D-SH hoists are only intended for lifting, lowering and moving loads and may be used as stationary or travelling units. The maximum safe working load is the load capacity specified on the capacity plate. This must not be exceeded. The maximum safe working load includes the lifted load and dead load (e.g. load handling attachments).
- D-SH hoists may only be installed, operated, maintained and removed when in perfect working order by trained personnel in accordance with the relevant safety and accident prevention regulations. The personnel must meet the requirements according to section 2.5 “Operating personnel requirements”.
- Appropriate use also includes compliance with the safety instructions as well as any other instructions for assembly/disassembly, putting into service, function/operation, maintenance/fault elimination. Furthermore, the instructions on safety devices, protection against hazards and any possible remaining hazards must be complied with.
- The D-SH must only be used in compliance with the permissible technical data, chapter 3 “Technical data”. In particular, the permissible useful load in accordance with these operating instructions must not be exceeded.
- The D-SH must be regularly maintained and inspected in accordance with section 8.3 “Maintenance schedule” in line with the deadlines and appropriately by adequately trained personnel. Wear parts must be replaced in good time in accordance with the frequency and intensity of use.
- Pulling loads at an angle, pulling or dragging loads or pulling free fixed loads is prohibited.
- Transporting people with or people riding on the machine is always prohibited, this does not apply to equipment specially designed for transporting people (see appropriate use of lifting equipment).
- The directives UVV/BGV D8 § 23 (2) and BGV D6 § (1) must not be ignored.

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DANGER
By electrical current.

Electrical energy may cause very severe injuries.

- Before carrying out maintenance, cleaning and repair work, switch off the unit and secure it against switching on again.
- Do not remove any safety equipment or render it inoperative by modifications.

The D-SH is industrial equipment to be used with a rated voltage (see type plate).

Power is fed via power supply lines (mobile cables, open or enclosed power conductor systems, cable drums). These systems are live up to the terminals of the main switch (mains connection switch, isolating switch).

The relevant main switches must be switched off and secured when carrying out maintenance/repair work. During operation or when the main switch is not switched off, electrical components inside enclosures, motors, switchgear cabinets, load handling attachments, terminal boxes, etc., carry dangerous voltages. This voltage may cause fatal injuries.

D-SH hoists with D-Grip, rocker switch or DSM Manulift must only be operated if a protective earth conductor is connected. In the event of damage to or interruption of the protective earth conductor connection, the D-SH hoist must be disconnected from the power supply without delay.

Fault-free operation with a current-operated e.l.c.b. (earth-leakage circuit-breaker) is ensured with a tripping current ≥ 30 mA, if residual-current-operated circuit breakers (type B to EN 50178, e.g. Siemens 5SZ3...G00) are used.

Serious personal injury or damage to property may occur in the event of:

- unauthorized removal of covers,
- inappropriate use of the D-SH hoist,
- incorrect operation,
- insufficient maintenance,
- exceeding the maximum permitted load. The rated safe working load is the maximum permitted load. Pay attention to the sum of the load to be lifted and the load handling attachment.
- working on live parts.

No liability for inappropriate use

The manufacturer is exempt from any liability for use other than the purpose which is technically possible and acceptable according to these operating instructions. In particular, the manufacturer assumes no liability for damage due to inappropriate or any other prohibited use of the machine in the sense of section 2.2 “Appropriate use”.

No liability for structural modifications

The manufacturer is not liable for unauthorized structural modifications of the owner which have not been agreed with Demag. This includes incorrect connection of the D-SH hoist to devices or equipment that do not belong to our scope of delivery, or the installation or use of accessories, equipment, sub-assemblies or third-party spare parts that are not approved by the manufacturer.

Depending on the type and scope of the D-SH hoist, it may be necessary to have an inspection carried out by an expert engineer prior to hand-over to the owner.

The D-SH hoist is designed for operation indoors and at temperatures ranging from – 10° to + 40° C. At extreme temperatures and in aggressive atmospheres, the owner must implement special measures after consulting Demag.

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Use of the control unit

Lifting and lowering motions are controlled by means of the corresponding control elements on the control unit. The slow speeds are intended for attaching the load, lifting it free and depositing it. Loads can be precisely positioned at slow speeds.

Short transport times can be achieved at higher speeds. They are suitable for motion sequences with a safely suspended load if no hazard can be caused by the faster motion sequences.

NOTE

Inching must be avoided at fast speeds, as it causes increased wear and load sway.

2.3 Hazards that can be caused by the D-SH hoist

The D-SH hoist has been subject to a risk analysis. The design and execution based on this analysis correspond to state-of-the-art engineering principles. However, residual risks remain.

The machine is operated with high electrical voltage.

DANGER
Live components

Danger to life and limb.

Electrical energy may cause very severe injuries. If the insulation or individual components are damaged, there is a danger to life caused by electrical current.

- Before carrying out maintenance, cleaning and repair work, switch off the machine and secure it against switching on again.
- Switch off the power supply before carrying out any work on the electrical equipment. Check to ensure that the components to be replaced are de-energized.
- Do not remove any safety equipment or render it inoperative by modifications.

WARNING
Crushing hazard

During lifting or lowering of loads, there is the danger of crushing parts of the body.

When working on the unit, make sure

- that during lifting or lowering no limbs are drawn-in between rope and rope guide.
- that there are no persons in the immediate danger zone.

WARNING
Suspended load. Falling parts.

Danger to life and limb, if lifted loads are dropped.

It is prohibited for persons to stay in the danger zone.

- Keep a sufficient safety distance.
- Never step under a suspended load.

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Certain work and practices are prohibited when using the D-SH hoist as they may involve danger to life and limb and result in lasting damage to the D-SH hoist, e.g.:

- Do not handle the load in an unsafe manner (e.g. swinging the load).
- Do not handle suspended loads above people.
- Do not pull or drag suspended loads at an angle.
- Do not pull free any fixed or obstructed loads.
- Do not exceed the maximum permitted load and permitted load dimensions.
- Do not leave suspended loads unsupervised.
- Do not allow ropes to run over edges.
- Do not use the rope as a load bearing sling.
- Only move a D-SH hoist fitted with push travel trolley by pushing on the D-grip, rocker switch or DSM Manulift – never pull on the helical cable.
- Do not allow loads to drop when the rope is in a slack condition.
- Do not subject the D-Grip to inappropriate mechanical loads.
- Transporting persons is not permissible.
- Do not tamper with or manipulate electrical equipment.

2.4 Responsibility of the owner

Information on safety at work refers to the regulations of the European Union that apply when the D-SH hoist is manufactured. The owner is obliged to ensure that the specified industrial safety measures comply with the latest rules and regulations and to observe new regulations during the entire service life of the D-SH hoist. Local industrial safety legislation and regional regulations and codes of practice applicable at the site of operation of the D-SH hoist must be observed outside the European Union.

General safety, accident prevention and environmental protection regulations that apply where the D-SH hoist is in operation must be observed and complied with in addition to the safety instructions contained in these operating instructions.

The owner and any personnel authorised by him are responsible for correct operation of the D-SH hoist and for clearly defining responsibilities for installation, operation, maintenance and cleaning.

The operating instructions must be followed in full and without any limitations.

Special local conditions or applications can lead to situations which are not considered in these operating instructions. In such cases, the required safety measures must be defined and implemented by the owner. Necessary measures may also relate, for example, to the handling of hazardous materials or tools and the provision/wearing of personal protection equipment. The operating instructions must, if required, be supplemented by the owner with instructions relating to the organization of work, working procedures, authorized personnel, supervising and reporting obligations, etc. Further information, see section 8.1 “Safety instruction”.

Furthermore, the owner must ensure that

- any further working and safety instructions resulting from the risk analysis of the D-SH hoist workplaces are specified in operating procedures.
- personnel who work with or on the D-SH hoist are provided with appropriate first-aid equipment. The personnel must be trained in the use of the first-aid equipment.
- the operating instructions are always kept available in the immediate vicinity of the D-SH hoist for installation, operating, maintenance and cleaning personnel.
- the personnel are trained in accordance with the work to be performed.
- the D-SH hoist is only operated when in safe and proper working order.

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- the safety devices are always kept freely accessible and are checked regularly.
- the national regulations for the use of the D-SH hoist are observed.
- the specified regular checks and inspections are carried out on time and are documented.
- the operating/travel area is adequately illuminated.
- suitable and tested load handling attachments are provided and used.

The owner is urged to develop procedures and guidelines to cover malfunction situations, to instruct users and to apply these instructions at a suitable place in a readily legible manner.

2.5 Operating personnel requirements

Only authorised and trained personnel may work on the D-SH hoist. The personnel must have received instruction on the D-SH hoist functions and any hazards that may occur.

Every individual given the task of working on or with the D-SH hoist must have read and understood the operating instructions before any work is started.

Persons under the influence of drugs, alcohol or medicines which affect their reactions must not work on or with the D-SH hoist.

Age and job-specific regulations relevant at the place where the D-SH hoist is operated must be observed for the selection of any personnel.

Personnel are obliged to report to the owner without delay any changes to the D-SH hoist that impair safety.

For independent operation (machine operator) or maintenance (maintenance fitter) of the D-SH hoist, the owner may only employ persons

- who are at least 18 years of age,
- who are mentally and physically suitable,
- who have been instructed in operation and maintenance of the D-SH hoist and who have proven their qualification to the owner in this respect.

2.6 Personal protection equipment

When work is carried out on or with the D-SH hoist, the following must always be worn:

- Protective clothing, closely-fitting working clothes (low tear strength, no loose sleeves, no rings or any other jewellery, etc.).
- Safety shoes to protect against falling parts and against slipping on slippery ground.
- Gloves for handling the wire rope.
- Safety helmet to be worn by everybody in the danger zone.

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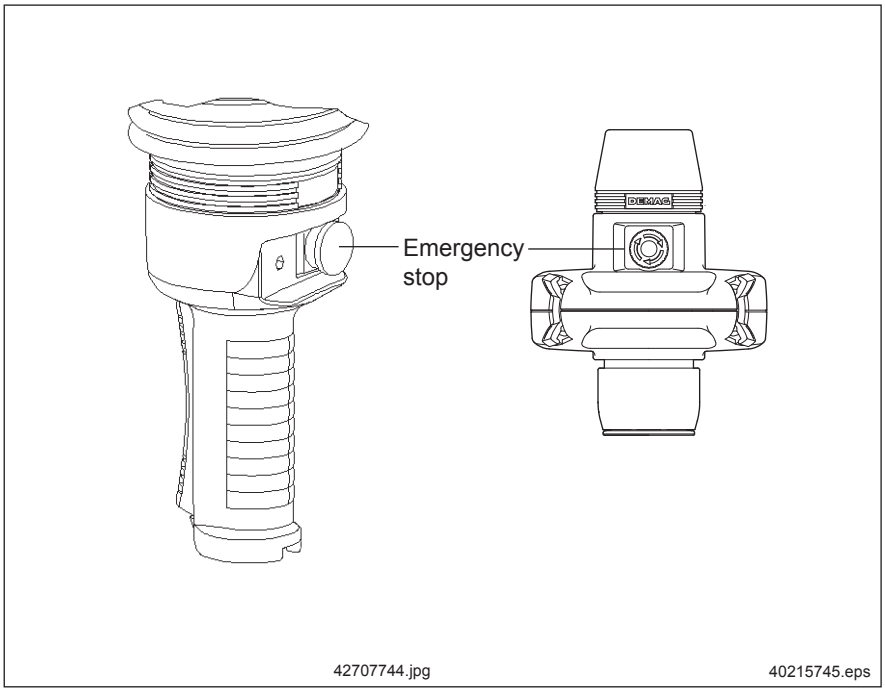
2.7 Emergency stop device



WARNING
Unauthorised, negligent or accidental switching-on.

Danger to life and limb.

Check to ensure that the reason for the emergency stop has been eliminated before the D-SH hoist is switched on again.

The emergency-stop device must not be used to switch the D-SH hoist off in normal operation.

To prevent damage and injuries, the D-SH hoist is fitted with an emergency-stop device. This is located on the control unit. The emergency-stop operating function must be checked regularly.

2.8 Regular inspections

The owner of the D-SH hoist may be obliged to carry out regular inspections by national industrial safety legislation and regional regulations. In Germany, this is specified by the accident prevention regulations for winches, hoists and towing devices (BGV D8) and the accident prevention regulations for cranes (BGV D6), for example. These specify that

- the D-SH hoist must be inspected before it is put into operation,
- the D-SH hoist must be inspected regularly,
- the elapsed share of the theoretical safe working period must be calculated,
- a record of tests and inspections must be kept.

The owner is obliged to ensure that the D-SH hoist complies with the latest rules and regulations and to observe new regulations at all times.

If no comparable inspection regulations or requirements apply at the place where the D-SH hoist is operated, we recommend compliance with the above-mentioned regulations.

2.9 Inspection regulations

Notes on inspections in accordance with

UVV Winches, lifting and towing devices	BGV D8
UVV Cranes	BGV D6

The EC machinery directive requirements are therefore also fulfilled.

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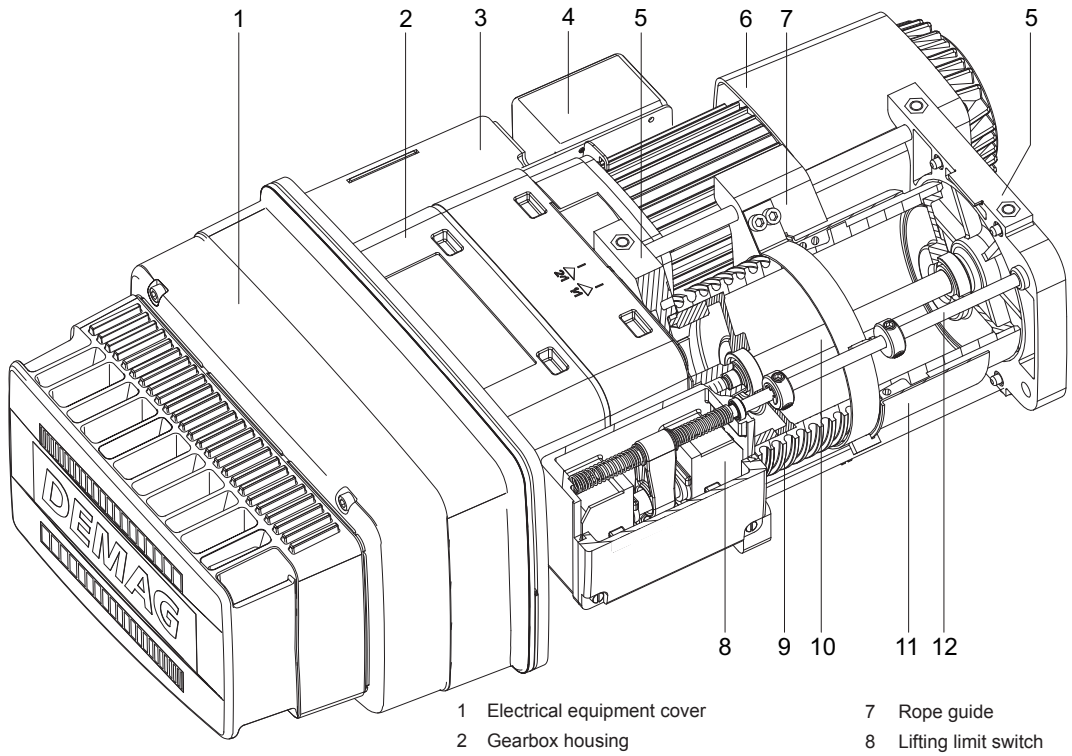
3 Technical data

3.1 Mechanical equipment

3.1.1 Design overview



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1	Electrical equipment cover	7	Rope guide
2	Gearbox housing	8	Lifting limit switch
3	Bracket	9	Rope drum
4	Analogue PWM converter	10	Drum axle
5	Frame	11	Cover plate
6	Fan cover	12	Switching rod

3.1.2 Explanation of size designation

D-SH 80

- 80 — SWL 80 kg or 160 kg
- Size — D-SH 80 / D-SH 160
- D-SH — Demag SpeedHoist

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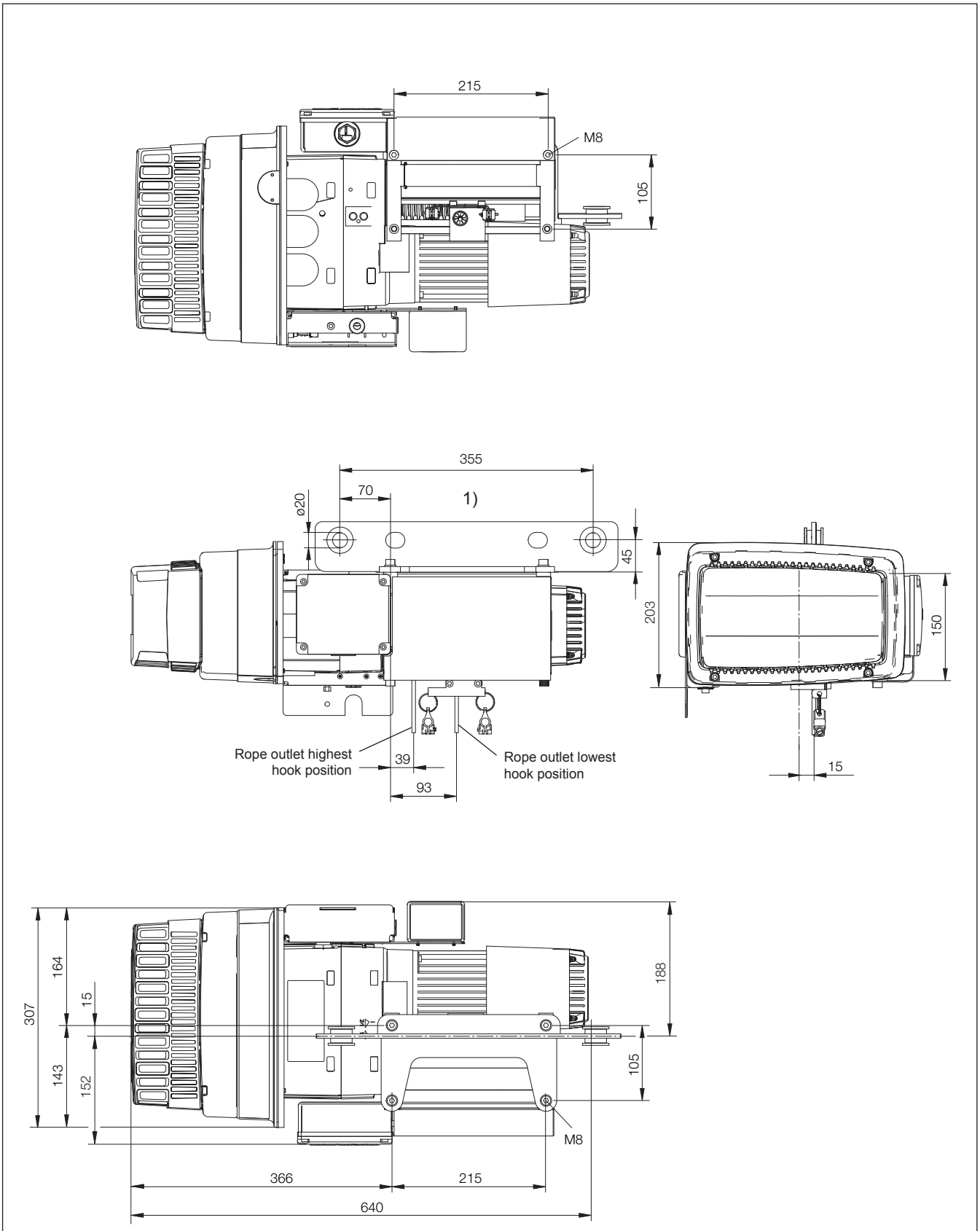
3.1.3 Dimensions



1) Load bar, optional, part no.: 851 195 44

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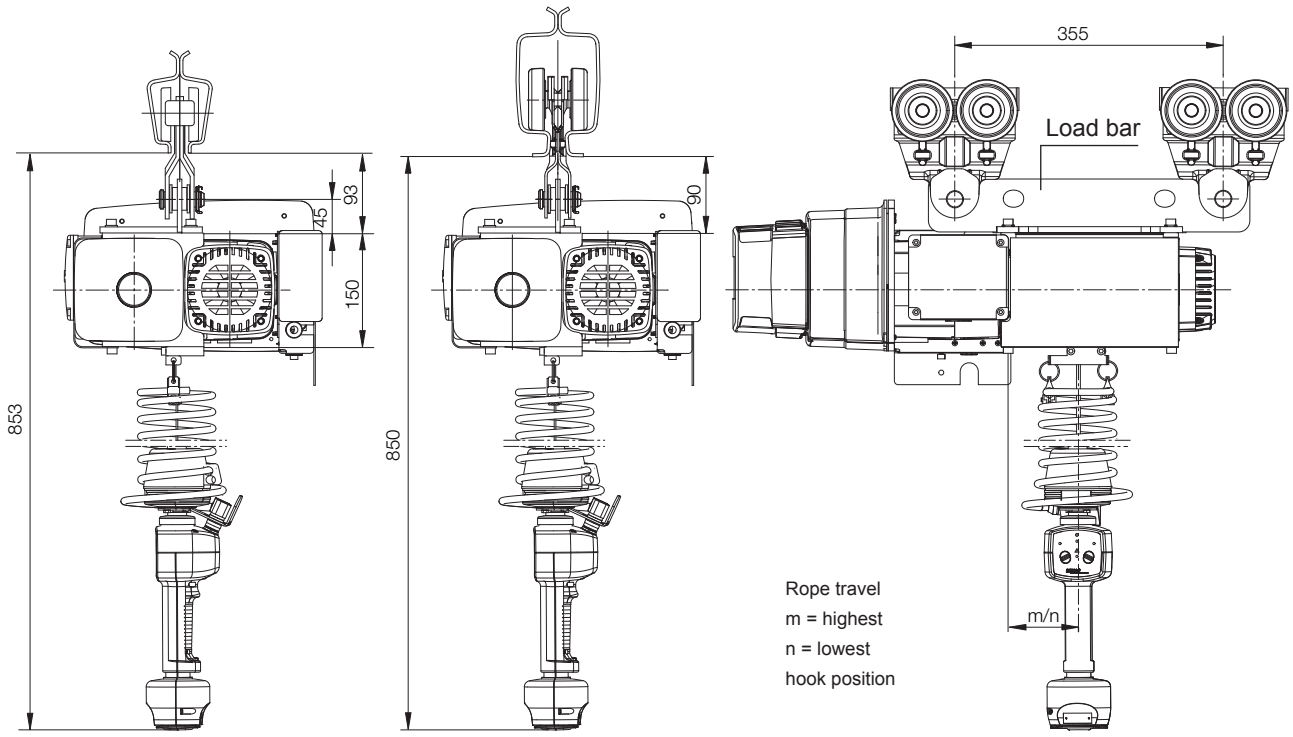
D-SH hoist with two KBK I or KBK II trolleys and manual force control
1/1 reeving
SWL 80 kg KBK I

Load bar, part no.: 851 195 44



Size	Reeving	Hook path	Foot hole distance	
			Highest hook position	Lowest hook position
		m	m	n
D-SH 80	1/1	2,2	39	93
D-SH 160				

Note:

The D-SH hoist with D-Grip should not be used in connection with a conductor line integrated in the KBK rail, since the manual force required for the D-SH hoist with D-Grip is lower than the force required for displacing the current collector.

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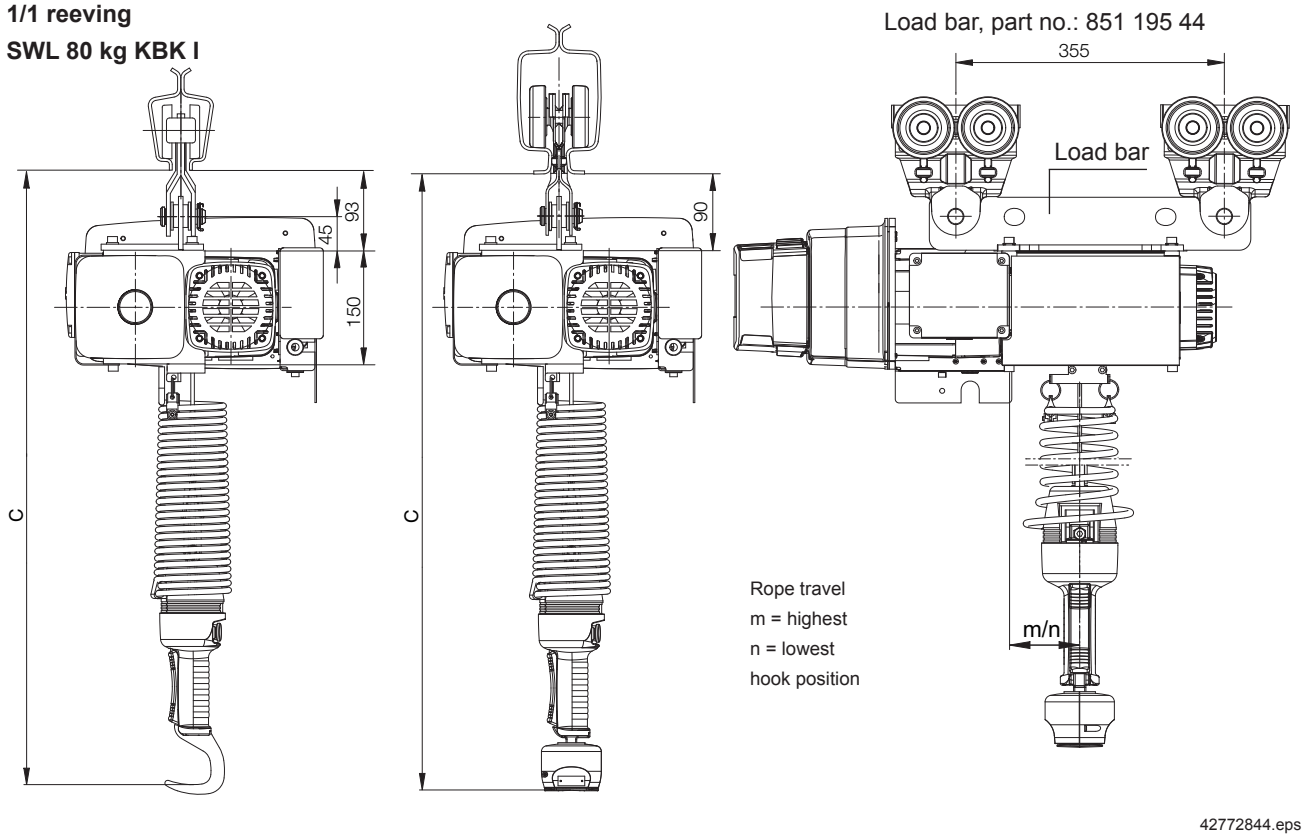
D-SH hoist with two KBK I or KBK II trolleys and rocker switch
1/1 reeving
SWL 80 kg KBK I



Helical cable	C (with C hook)
2,8 m	745 mm
4,3 m (Standard)	795 mm

Helical cable	C (with quick-change coupling)
2,8 m	770 mm
4,3 m (Standard)	820 mm

Size	Reeving	Hook path		Distance to foot hole	
		with helical cable 4,3 m	with helical cable 2,8 m	Highest hook position m	Lowest hook position n
D-SH 80	1/1	2,2 m	2,2 m	39	93
D-SH 160					

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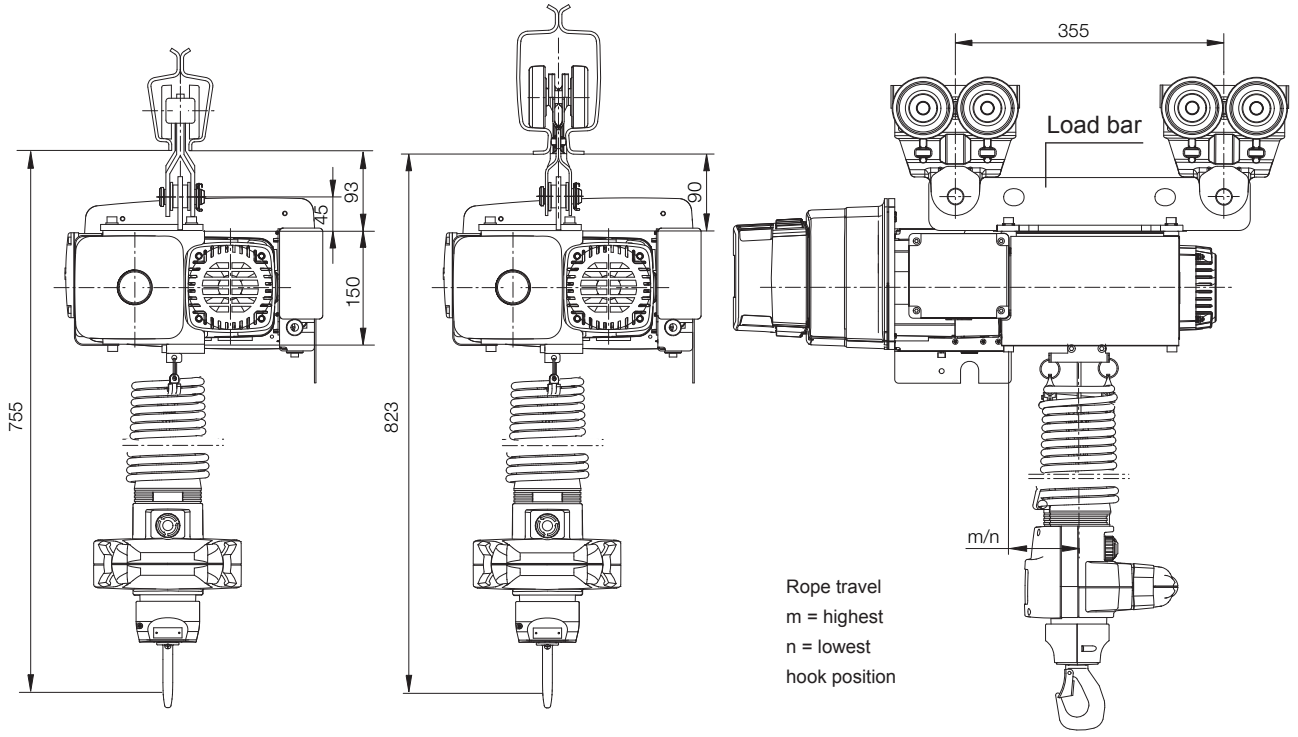
D-SH hoist with two KBK I or KBK II trolleys and DSM Manulift handle
1/1 reeving
SWL 80 kg KBK I

Load bar, part no.: 851 195 44



Size	Reeving	Hook path	Foot hole distance	
			Highest hook position	Lowest hook position
		m	m	n
D-SH 80	1/1	2,2	39	93
D-SH 160				

3.1.4 Selection table

Size	SWL	FEM	Hoist speed m/min	Motor size	Weight
	kg		V1		kg
D-SH 80	80	1 Am	max. 70	KDP 63 B 2	30
D-SH 160	160	1 Am	max. 35		

3.1.5 Hoist motor data

Required supply cable conductor cross sections and fuse links

Motor size	Group of mechanisms to FEM	Voltage CE/CSA 50/60 Hz	P kW	CDF %	n rpm	cos φ N
KDP 63 B 2	1 Am	380 - 480 V	0,94	30	4750	0,67

Rated current I_N and start-up current I_A for 50 Hz		cos	Mains connection delay fuse for 50 Hz	Supply cables for 5% voltage drop and start-up current I_A for 50 Hz 1)	
400 V DP		φ	400 V DP	400 V (ΔU 20 V)	
I_N (A)	I_A (A)		A	mm^2	m
4,2	up to 1,5 x I_N	0,67	10	1,5	153

1) The lengths of the supply lines are calculated on the basis of an earth-loop impedance of 200 mΩ.

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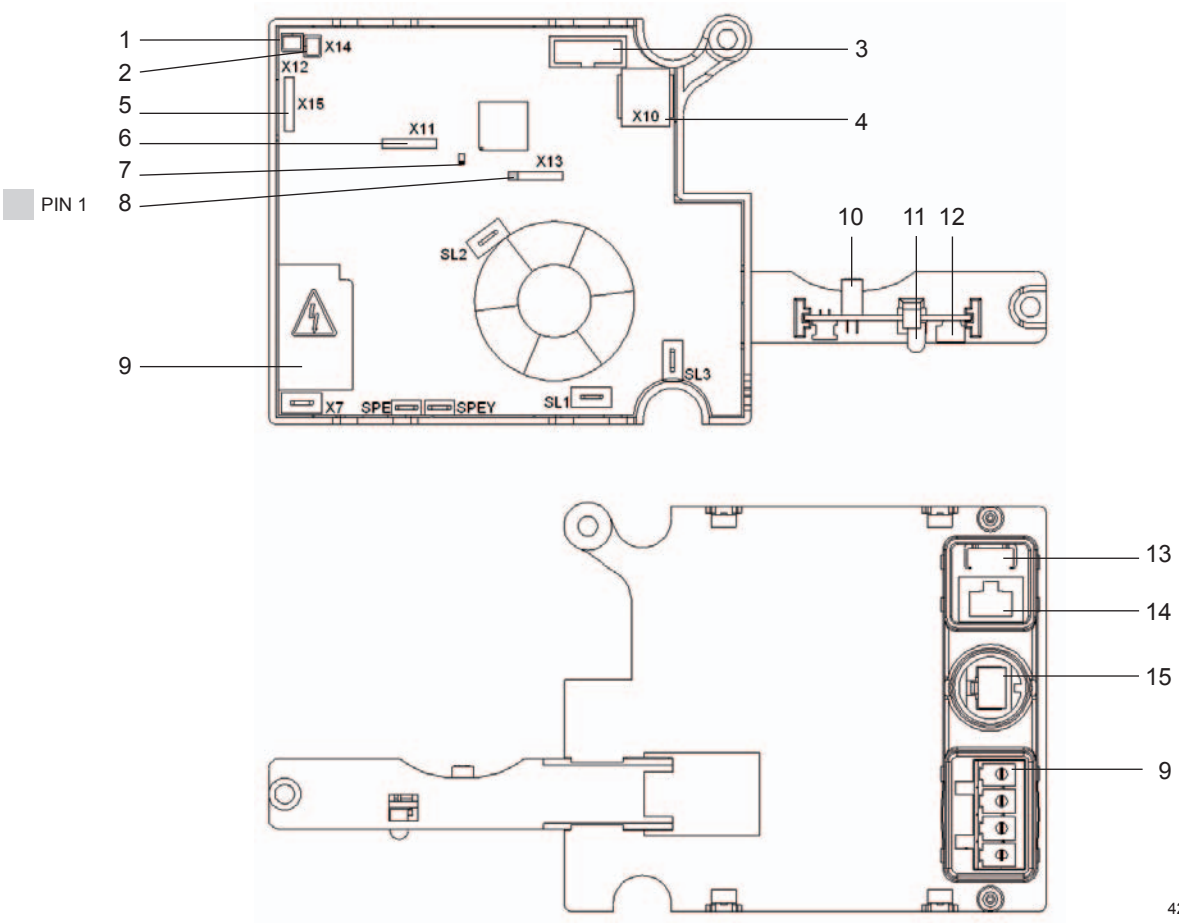
3.2 Electronic components

3.2.1 Control board

Multiple connector X13 (8)	
Operating LED (7)	
Steady flashing	Unit ready for operation
Unsteady flashing	Unit fault
LED dark	1. No voltage
	2. Electronics defective



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Note

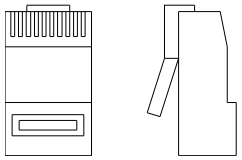
For any changes of the jumper position, the unit must be de-energized.

Item	Designation	Function
1	Plug-and-socket connector	Digital output status (X12)
2	Plug-and-socket connector	Fan (X14)
3	Plug-and-socket connector	Inverter interface
4	Plug-and-socket connector	Terminal connection RS232 (X10)
5	Plug-and-socket connector	Lead out dialogue output
6	Plug-and-socket connector	Protection against re-initializing
7	Light emitting diode	Operating LED, see table above
8	Jumper strip	Not used
9	Plug-and-socket connector	Mains connection
10	Fork light barrier	Pulse generator
11	IR transmitter diode	IR interface
12	7-segment LED	Multi-function display, e.g.: Elapsed operating time counter, status indicator, error code display
13	Plug-and-socket connector	Connection of hoist limit switch
14	Plug-and-socket connector	Trolley / crane control cable connection
15	Plug-and-socket connector	Control cable connection

RJ45 connector

Pin assignment

10 9 8 7 6 5 4 3 2 1



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RJ45 connector	
Control pendant connection (15)	
Pin	**Function assignment**
1	Control pendant 24 V supply =
2	-
3	-
4	Emergency stop
5	Control pendant 24 V~ supply
6	Lift (PWM)
7	Lower (PWM)
8	-
9	-
10	GND 24 V=

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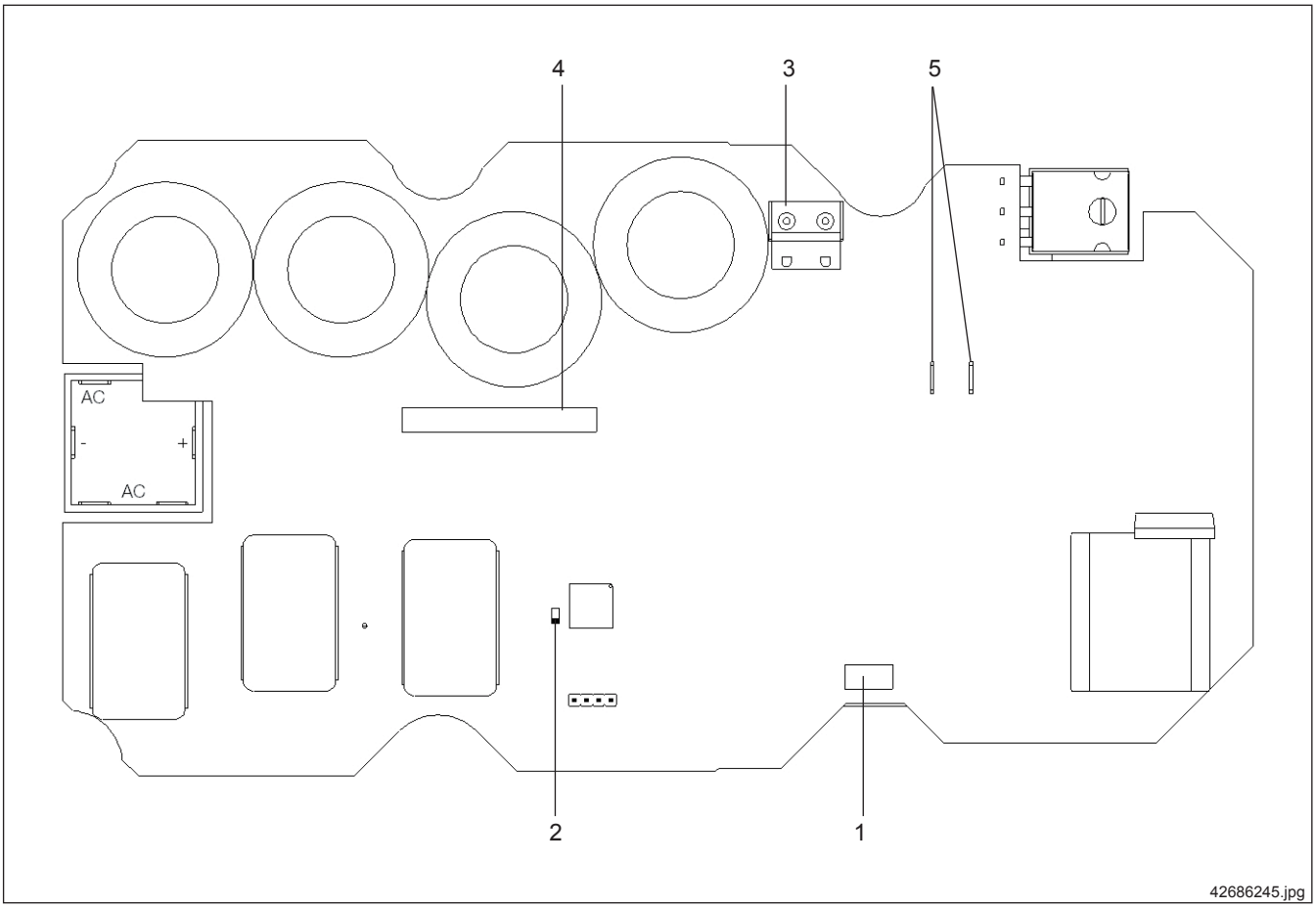
3.2.1.1 D-SH with frequency inverter



Item	Designation	Function
1	Plug-and-socket connector	Control board connection
2	Light emitting diode	Operating LED (GN)
3	Plug-and-socket connector	Brake connection (X6)
4	Plug-and-socket connector	Motor connection (X8)
5	Plug-and-socket connector	Braking resistor

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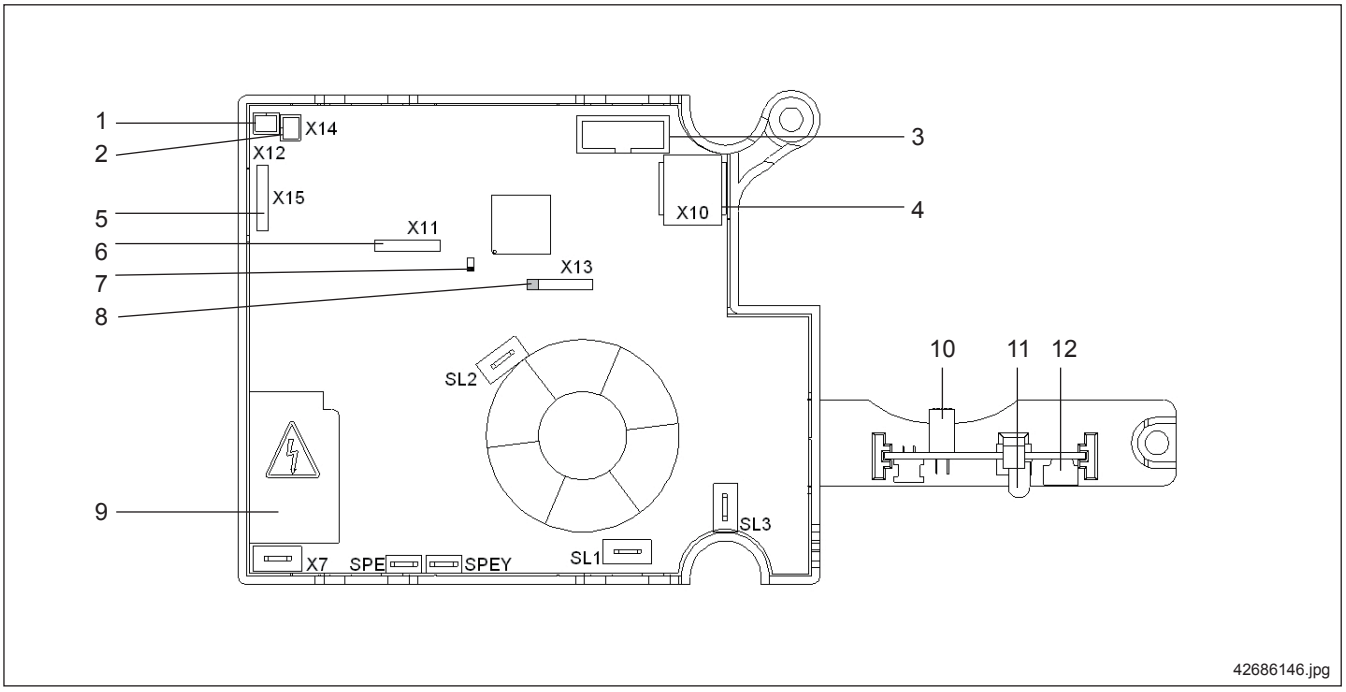
3.2.2 EEPROM hardware protection



Jumper strip X11 is used for this purpose. The jumper strip is structured as follows.

6	5	4	3	2	1

Pin 1 is located on the right-hand side at the micro-controller.

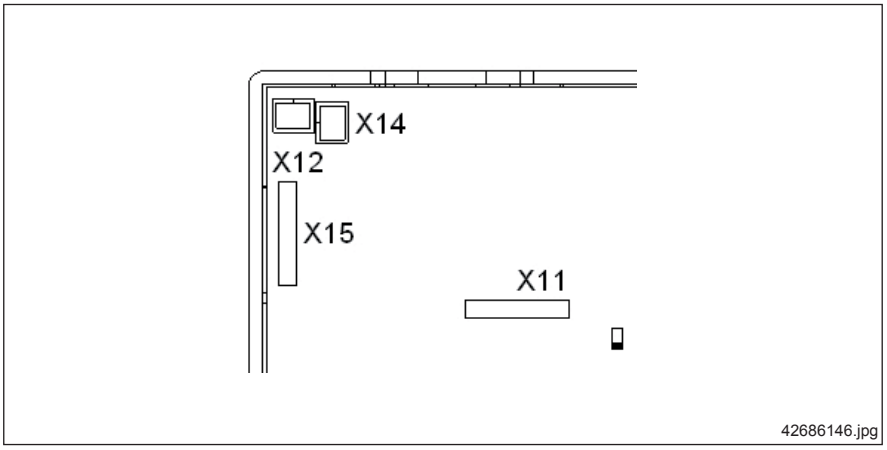
As a protection against re-initializing, a jumper must be applied between pins 5 and 4. The bridge of X13 can be used.

If re-initializing is now tripped, for example, by a detected EEPROM error, this is displayed by error E22 in the 7-segment display. In this case, neither lifting nor lowering is possible.

When the bridge is removed and the emergency stop is actuated for min. 5 seconds, a re-initializing process is performed (parameters are reset to factory setting), the error is reset. Any previously set installation-specific parameters are overwritten and must be entered once again.

3.2.3 Digital output status

Plug connector DCS DA-ext (720 145 45) is required to bring the digital output out of the D-SH hoist. It is applied on X12 and X15 (see fig.).



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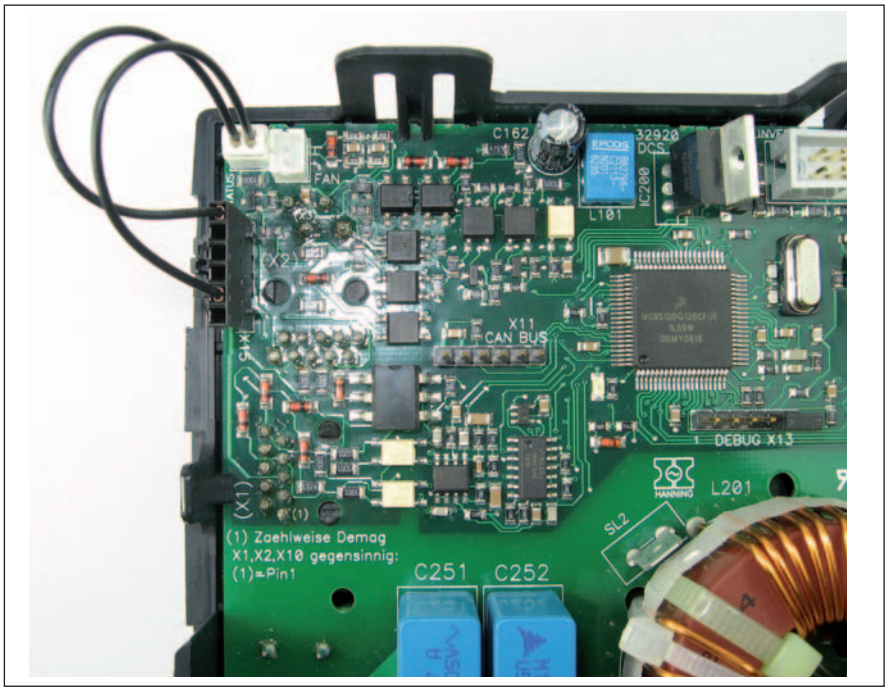

The “Digital output” signal can be brought out by means of the 10-pole control cable, 1,5 m (part no.: 772 069 45) on the trolley / crane control cable connection (see table in section 4.1, item 14). The open conductors are indicated by colours.

No.	Colour	Signal
1	Bk, black	Digital output GND
2	Br, brown	Forward
3	Bu, blue	Backward
4	Ye, yellow	Emergency stop
5	Or, orange	AC supply
6	Wh, white	24 V DC ext.
7	Vt, violet	GND ext.
8	Rd, red	Right
9	Gn, green	Left
10	Gr, grey	Digital output signal, 0 / 24 VDC

Conductors 5 and 6 must be connected with each other, as well as 7 and 9. The output signal can be tapped at conductors 1 and 10. The remaining conductors must be isolated from each other, as otherwise a short circuit is caused.

NOTE

It is urgently recommended that coupling relays be used since the internal power supply unit is limited in its capacity.

For the digital output, the following max. current is available:

		Current
D-SH unit with	D-Grip	10 mA
	Rocker switch	80 mA
	Manulift	80 mA

The meaning of the digital output can be programmed by means of parameters, see section 7.7.2.7 “Operating parameters”

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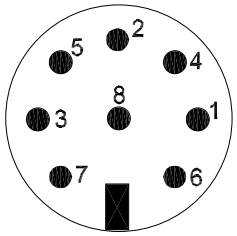
3.2.4 D-Grip connection assignment

The following diagram shows the right-angle plug socket assignment, viewed from the soldering side and the plug assignment in the grip viewed in the direction of the pins.

Connection assignment of the right-angle plug



Pin no.	Colour	Assignment
1	BN	24 V DC
2	BU	GND
3	WH	Manual force analogue
4	PK	Button left
5	YE	Switch right
6	GY	Grip occupied
7	GN	Status LED (not used)
8	---	---

Power consumption
Max. approx. 70 mA
No load: approx. 50 mA

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Technical data

Supply:	24 V DC
Current consumption:	Max. approx. 70 mA, at rest: approx. 50 mA
Digital signals:	0/24 V DC
Manual force analogue:	0...10 V DC not standardized

3.2.4.1 Emergency stop

The D-Grip is not provided with its own emergency-stop device. An external emergency-stop device is connected to terminals X2.1 and X2.2 of the analogue PWM converter.

3.2.4.2 D-Grip interface

Terminal X2 of the analogue PWM converter

The helical cable of the D-Grip is connected to terminal X2.

Terminal	Designation	Conductor colour helical cable
X2.1	Emergency stop -	If no emergency-stop switch is used, a bridge must be fitted between X2.1 and X2.2.
X2.1	Emergency stop +	
X2.1	Manual force analogue	Wh, white
X2.1	Grip occupied	Gy, grey
X2.5	n.c.	The right button (ye, yellow) is applied on X1.2
X2.6	Left button	Pk, pink
X2.7	GND	Bu, blue
X2.8	24 V DC supply	Br, brown

For further details on the analogue PWM converter, see section 7.6.

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3.2.5 Rocker switch connection assignment

DANGER by electrical current

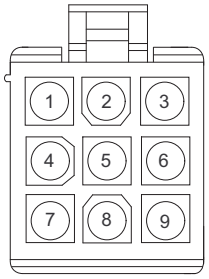
Electrical energy may cause very severe injuries.

Work on the electrical equipment may only be carried out by specialists or by trained personnel.

The rocker switch is supplied with the helical cable connected.

The diagram below shows the connector assignment in the rocker switch.

Connection assignment of plug on helical cable



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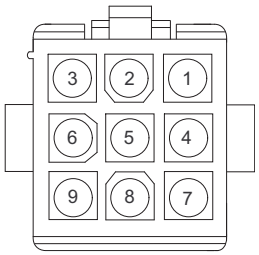
Pin no.	Colour	Assignment
1	-	Not assigned
2	-	Not assigned
3	-	Not assigned
4	GY	PWM lifting
5	YE	Emergency stop
6	-	Not assigned
7	PK	PWM lowering
8	RD	GND
9	GN	24 V DC

Connection assignment of socket on switch



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Pin no.	Colour	Assignment
1	-	Not assigned
2	-	Not assigned
3	-	Not assigned
4	**PK**	PWM lifting
5	YE	Emergency stop
6	-	Not assigned
7	**GY**	PWM lowering
8	**BU**	GND
9	**BN**	24 V DC

Technical data

Supply:	24 V DC
Current:	150 mA
Max. power consumption:	3,6 W
PWM signal:	Basic frequency 1 kHz, amplitude 24 V, Mark-to-space ratio 10 - 90 %
Weight:	Approx. 1600 g
Type of enclosure:	IP34

3.2.5.1 Emergency stop

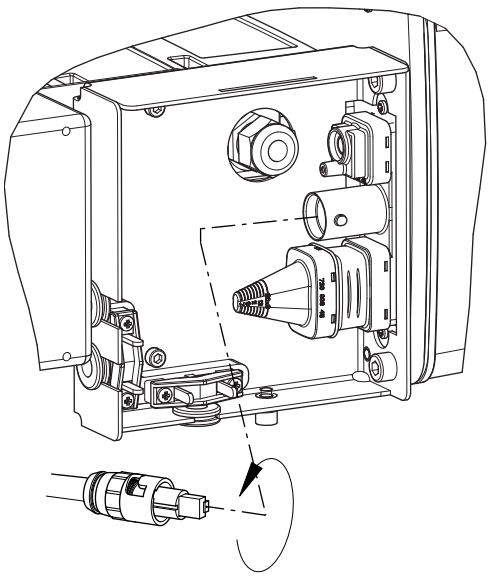
The emergency-stop button is integrated in the rocker switch and is connected via the helical cable.

Switching voltage: 24 V DC

Contacts: 2 NC (positive opening)

3.2.5.2 Rocker switch interface

The helical cable is connected in the bracket by means of the plug connector.



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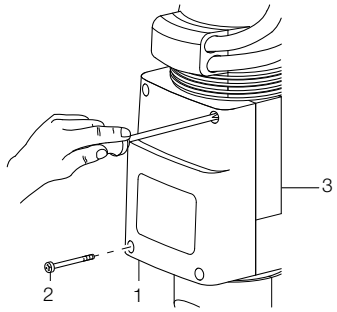
3.2.6 Manulift handle connection assignment

DANGER by electrical current

Electrical energy may cause very severe injuries.

Work on the electrical equipment may only be carried out by specialists or by trained personnel.

The DSM Manulift is supplied with the helical cable connected. If a helical cable has to be replaced, the 8 or 9 conductors must be connected as shown in the circuit diagram.



Undo the four screws (2) to remove cover (1). Tighten diagonal pairs of screws when re-fitting the cover.

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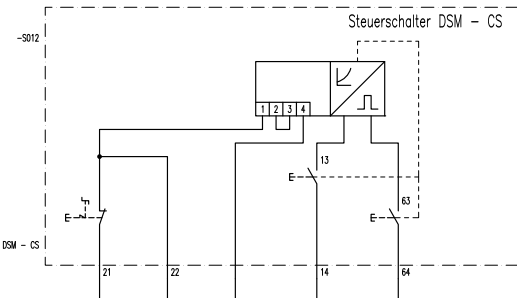
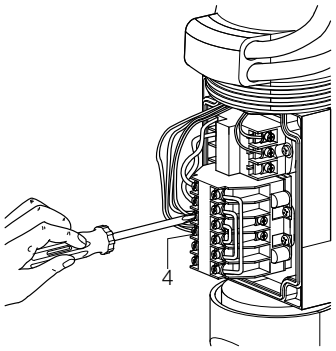


See circuit diagram page 52.



Disconnect the electrical connections (4).

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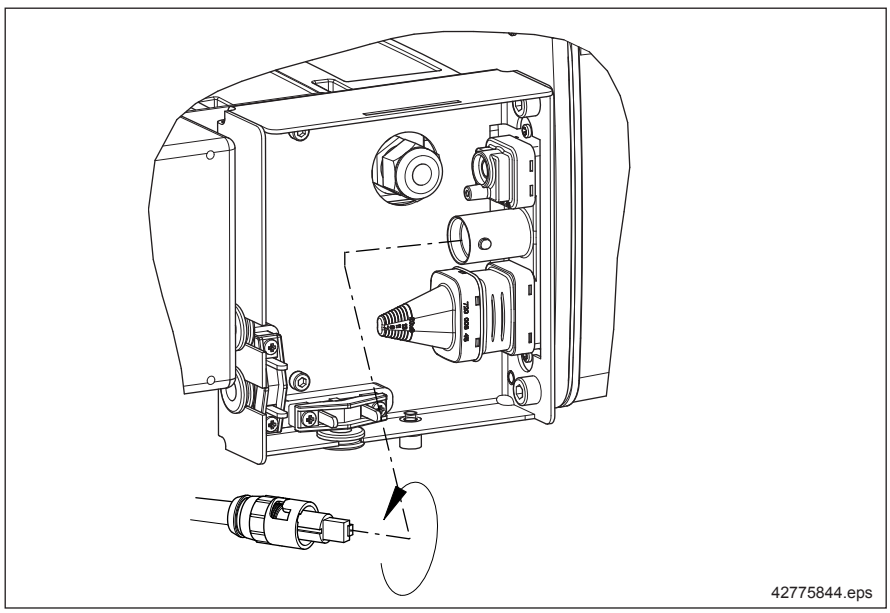
3.2.6.1 Emergency stop

The emergency-stop device is integrated in the control handle of the DSM Manulift and is connected via the helical cable.

3.2.6.2 Interface of the DSM Manulift handle

The helical cable is connected in the bracket by means of the plug connector.



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3.3 Oil and grease filling of gearbox

Oil grades

Gear oil with a viscosity of 220 mm²/s at 40 °C with mild high-pressure additives should be used for ambient temperatures of approx. -10 °C to +50 °C.

DIN 51 502 CLP 220, e.g. BP ENERGOL GR–XP 220, Esso Spartan EP 220, SHELL Omala Oil 220, Mobilgear 630 or Aral Degol BG 220.

At higher or lower ambient temperatures, the type of oil used should be adapted to the specific conditions.

Grease lubrication of the third gearbox stage

The third gearbox stage of the D-SH hoist is lubricated with grease (approx. 60 g). We recommend that the grease filling be replaced every 4 years at the latest.

Quantity of oil in litres

Range	D-SH
Litre	0,2 l

Part no. 472 902 44, 1 litre

Grease quantity in grams

Range	D-SH
Gram	60 g

Part no.: 011 058 44, 60 g

NOTE

Dispose of waste oil and grease in accordance with environmental protection requirements.

If required, a waste management company must be charged with the disposal.

3.4 Operating conditions

D-SH hoists can be operated at:

- -10° to +40° C ambient temperature
- Air humidity up to 80%
- Air pressure up to 1000 m above sea level

Other operating conditions are also possible.

Please refer to the manufacturer for information on any modifications that may be necessary. See page 2 for the address.

CAUTION

Safe operation is only possible with the specified conditions.

Please contact the manufacturer for any other operating conditions.

CAUTION

The specified hoist may be damaged if it is operated outdoors in poor weather.

The D-SH hoist may only be used inside buildings and enclosed areas.

3.5 Noise emission

The sound pressure level of the machine is max. 79 dB (A).

3.6 Paint finish

D-SH hoists are supplied in the following standard colours:

D-SH	RAL 5009	Azure blue
D-Grip	RAL 7035	Light grey
DSM Manulift handle	RAL 1007	Daffodil yellow
Rocker switch	RAL 1007	Daffodil yellow

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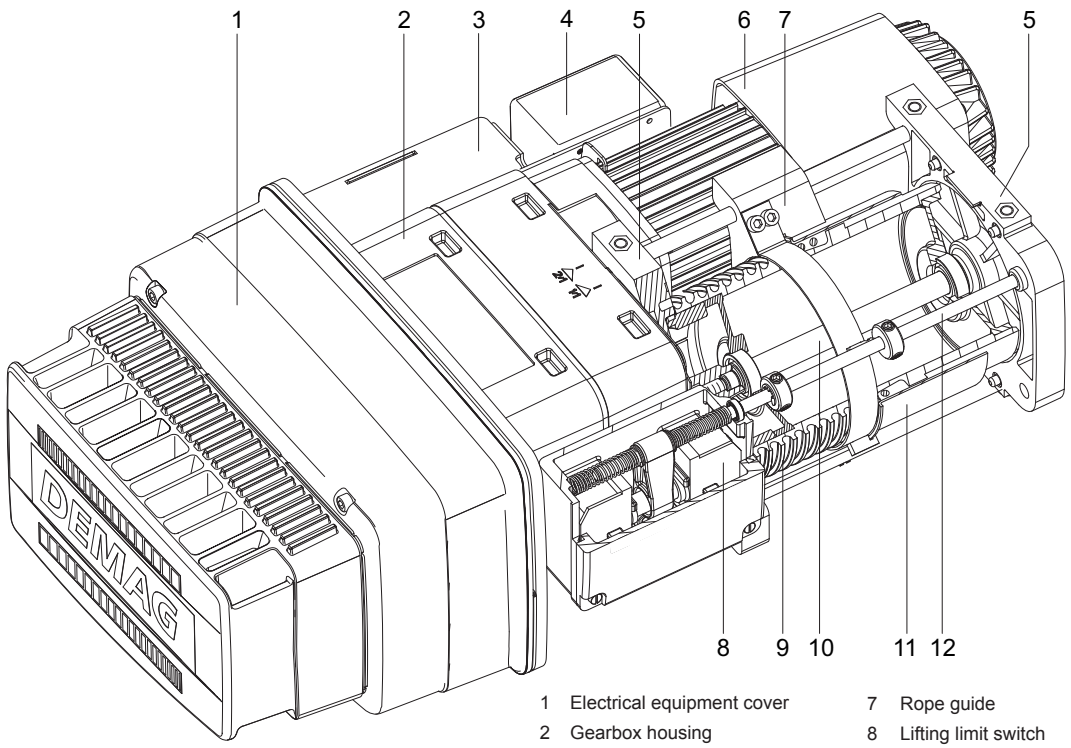
4 Design and function

4.1 Design



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1	Electrical equipment cover	7	Rope guide
2	Gearbox housing	8	Lifting limit switch
3	Bracket	9	Rope drum
4	Analogue PWM converter	10	Drum axle
5	Frame	11	Cover plate
6	Fan cover	12	Switching rod

4.2 Drive

The hoist motor is a 2-pole Demag motor with a cylindrical squirrel-cage rotor and integrated brake. The double-sided brake can be separately controlled and is released by means of an electromagnet. The brake engages when no voltage is applied to the magnet coil. The motor is built according to ICE 34-1; insulation class F, type of enclosure IP 55 according to ICE 34-5.

4.3 Gearbox

The D-SH hoist is provided with a 3-stage helical gearbox. All stages are provided with helical gearing. The first and the second stages of the gearbox are lubricated by a mineral oil to DIN 51502 CLP 220.

The output stage is lubricated by gearbox grease (part no. 011 058 44).

A slipping clutch is fitted in the wheel of the first gear stage. It performs the function of a load limitation and protects the D-SH hoist against extreme overloads.

4.4 Rope reeving components

The drum, rope sheaves and rope comply with DIN 15020 and the FEM design rules. The rope is wound in one layer on the rope drum, the rope is prevented from escaping from the rope groove by means of a rope guide.

4.5 Limit switch

Limitation of motion at the upper and lower hook positions is effected by a double limit switch. This double limit switch is actuated via two adjustable stops which are fitted on the switching rod. In addition, software fast-to-slow switches are set by approaching these limit switches when the hoist is put into operation. The max. lifting speed is reduced by these fast-to-slow switches.

Additional operating limit switches are required when the end positions are approached regularly during normal operation.

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4.6 Frame

The frame of the D-SH consists of two end caps on both drum ends and two cross-beams fitted in-between which are positively connected and bolted to each other via the drum axle.

The gearbox housing is also connected positively and bolted to one end cap.

In addition, the end caps are provided with two M8 threaded bore holes on the upper and lower sides, for foot or ceiling mounting and for fitting to trolleys.

4.7 Electrical equipment

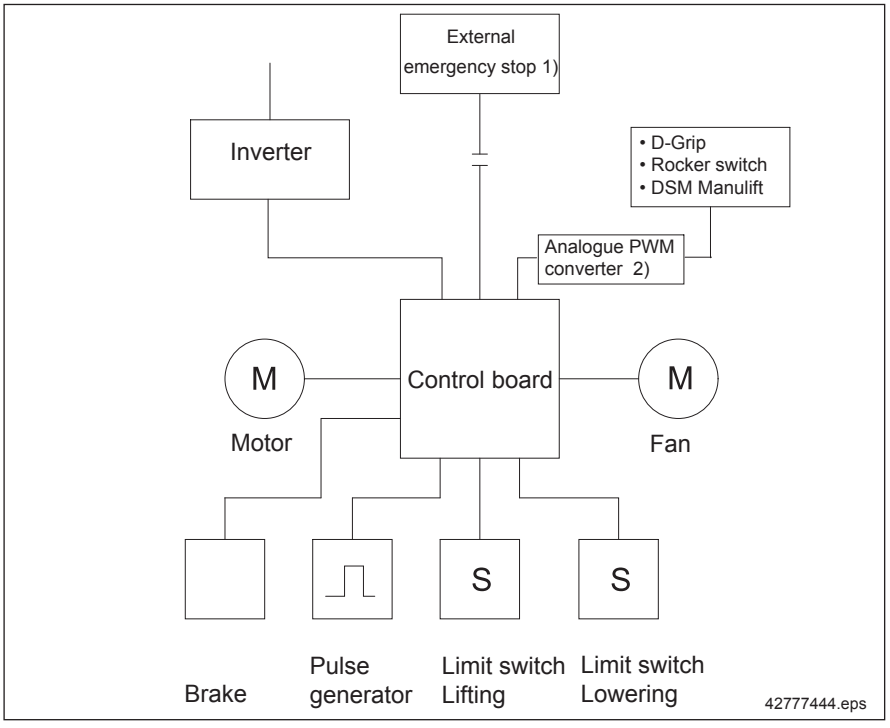
4.7.1 General description

The D-SH is designed for fast load handling applications and offers various benefits:

- Easy, intuitive operation thanks to the D-Grip control handle, alternatively
- Simple operation using the rocker switch or the DSM Manulift handle
- Infinitely variable speed control
- Very fast lifting and lowering speeds (up to 70 m/min)
- Individually adjustable dynamics (speed and acceleration) by means of programming device or software
- One digital output (not for safety-relevant applications)
- Lifting and lowering motions cut-off in the limit positions
- Direction of rotation monitoring via integrated speed feedback
- Overload cut-off
- Electronic controls integrated in the electrical enclosure of the handling device
- Temperatures of motor and electronic equipment monitored
- Diagnosis support by an error code being displayed (7-segment display) and by means of a terminal and error memory
- Integrated elapsed time counter

4.7.2 Overview

The following schematic illustration provides an overview of all components required for the control system.



1) only for D-Grip. The emergency stop is integrated in the control unit when a rocker switch or the DSM Manulift handle is fitted.

2) only for D-Grip

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4.7.3 Inverter

The inverter is the power section and provides infinitely variable speed control of the D-SH motor.

4.7.4 External emergency stop (only D-Grip)

With the emergency-stop device, the lifting or lowering motions can be stopped in the event of a hazard. The emergency-stop switch must be fitted externally, for example on the load handling attachment or the crane pillar.

4.7.5 Control board

The control board contains the “intelligence” of the D-SH hoist. The inputs are evaluated and processed here by a micro-controller control system.

4.7.6 Fan

The fan is used to protect the motor against overtemperature. **As standard, it is connected to the fan output of the control board and is controlled depending on the temperature.**

4.7.7 Fast-to-slow limit switch function

The fast-to-slow limit switch function prevents the buffer from travelling against the emergency limit switch at rated or double the rated speed. The fast-to-slow limit switch function makes it possible to use one limit switch in each direction which results in an optimal C dimension. When the fast-to-slow limit switch is reached **(350 mm before the limit switch)**, the speed is limited to approx. 35 % of the rated speed.
The function can be switched off by setting the relevant parameters, in this case the maximum speed is limited to 2700 rpm (D-SH 80: 38 m/min and D-SH 160: 19 m/min.

NOTE

If the emergency-stop button is pressed while lifting is actuated, the reference point may be lost and the limit switch positions must be approached again for testing, see also Instructions for finding faults.

4.7.8 Pulse generator

The pulse generator is used to record the motor speed. A failure of the generator is detected by the control system (see chapter 10 “Fault finding and elimination”).

4.7.9 Brake

The brake is used to hold the load when the motor is at standstill.

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4.8 Trolley

The load capacity of the D-SH hoist must not exceed the load capacity of the trolley.

KBK I and KBK II trolleys as well as Aluline 120 and 180 trolleys can be used.

The D-SH hoist is fitted to the trolley via a separate frame.

4.8.1 Runways

When selecting a track, we suggest you specify our KBK and KBK Aluline crane construction kit track section (fig. 1) of special design. They feature a low dead-weight. The cold-rolled track sections feature a smooth running surface and offer the advantage of simple power supply by means of trailing cables or integrated conductor lines.

The track radius on curved sections should always be as large as possible in order to ensure good travel characteristics.

Ready-made curved sections are available for our special track.

Resilient buffers should be mounted at travel wheel axle level at the ends of tracks in order to prevent the trolley from derailing.

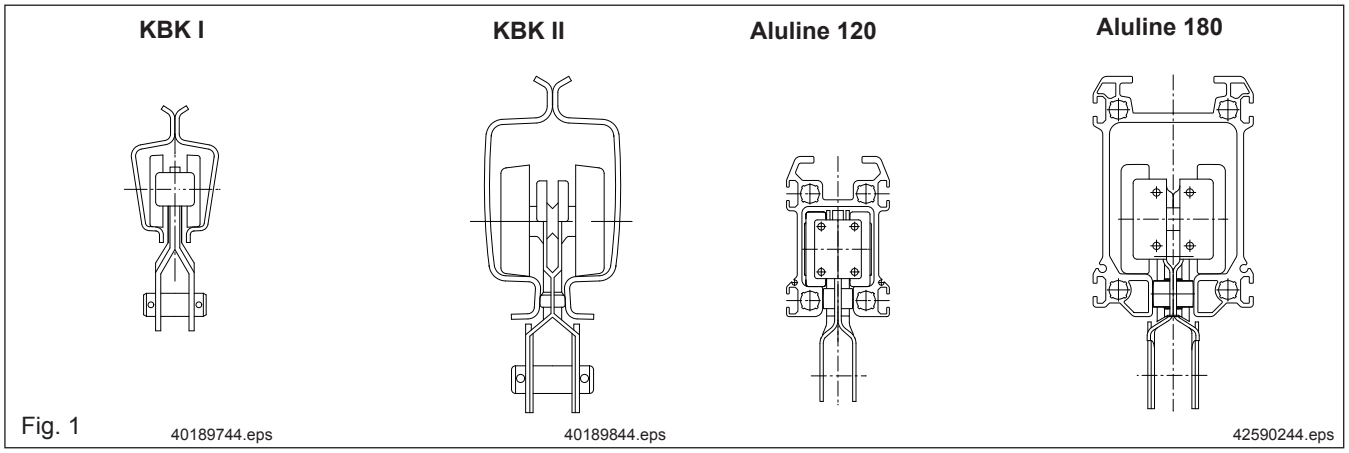

Fig. 1

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5 Transportation, packing, storage

5.1 Safety instructions

WARNING Suspended load. Falling parts.

Danger of injury by falling parts

Secure the components during transport. Do not step under the suspended load.

CAUTION Danger by inappropriate transport

Risk of injury and damage to the machine.

Lift loads only on the marked lifting points. Only use suitable hoisting equipment with sufficient load capacity.

5.2 Transport inspection

D-SH hoists are shipped as a complete unit, i.e. with the control element (D-Grip, rocker switch or DSM Manulift) connected, in cardboard packaging.

- Check the delivery for completeness and transport damage immediately upon receipt.
- In the case of transport damage visible from the outside, only accept the delivery under reservation. Note scope of damage in shipping documents / delivery note of the forwarding company and bring your claim to attention.
- Claim any defects not immediately detected directly on detecting them, since claims for damages may only be asserted within the valid time for complaints.

5.3 Packing

If no agreement on the return of the packing material has been made, separate the material according to type and size and make it available for further use or recycling.

Environmental protection:

- Always dispose of packing material in an environmentally compatible way and according to the locally applicable disposal regulations.
- If required, a recycling company must be charged with the disposal.

5.4 Storage

Until installation the D-SH hoist and its accessories must be kept closed and only be stored under the following conditions:

- Do not store it outdoors.
- Store in dry and dust-free places, relative air humidity: max. 80%.
- Do not expose it to aggressive media.
- Protect it against solar radiation.
- Avoid mechanical vibrations.
- Storage temperature: -10 to +40 °C.
- Avoid strong temperature fluctuations (condensation).
- Oil all blank machine parts (rust protection).
- Check the general condition of all parts of the packing at regular intervals. If required, refresh or renew preservation.
- If stored in damp locations, the D-SH hoist must be packed tight and protected against corrosion (desiccant).

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6 Installation and putting into operation for the first time

6.1 Safety instructions

DANGER
By electrical current.

Electrical energy may cause very severe injuries.

Work on the electrical equipment may only be carried out by specialists or by trained personnel.

Before starting work, switch off the electrical supply and secure against restoration.

WARNING
Danger of injury by assembly errors

Inappropriate installation can lead to severe injury and/or damage to property.

Therefore, this work may only be carried out by authorized, instructed personnel who are familiar with the principle of operation of the machine in compliance with all safety regulations:

- Ensure sufficient working clearance before starting work.
- Secure and fence off the working and danger zone.
- Wear protective clothing.
- Caution on open components with sharp edges. Danger of injury.
- Ensure the workplace is clean and in good order. Store any machine parts or fittings and tools that are not needed in such a way that they cannot fall down.
- Fit components appropriately. Comply with prescribed screw tightening torques. Inappropriately fitted components may fall down and cause severe injuries.
- The electrode holder and earth must always be connected to the same assembly as otherwise serious damage may be caused to the machine.
- Attach the D-SH hoist only at the appropriate connecting points.
- Only carry out installation, if all requirements regarding the location of installation are fulfilled, see section 3.4 “Operating conditions”.

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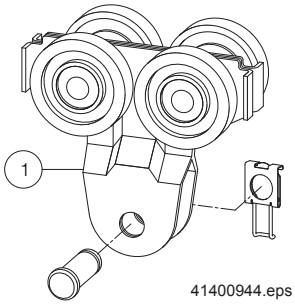
6.2 Assembling the trolley

6.2.1 KBK I, KBK II, Aluline classic 120 and 180 trolleys

KBK I trolley with pin



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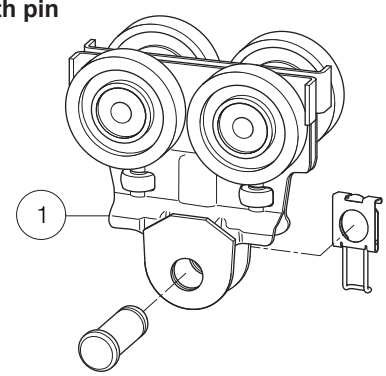
KBK II trolley with pin



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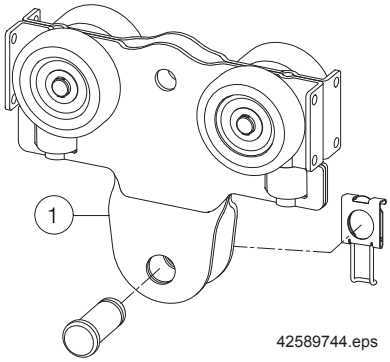
Aluline classic 120 trolley with pin



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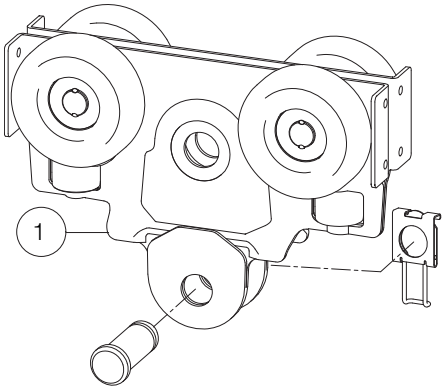
Aluline classic 180 trolley with pin



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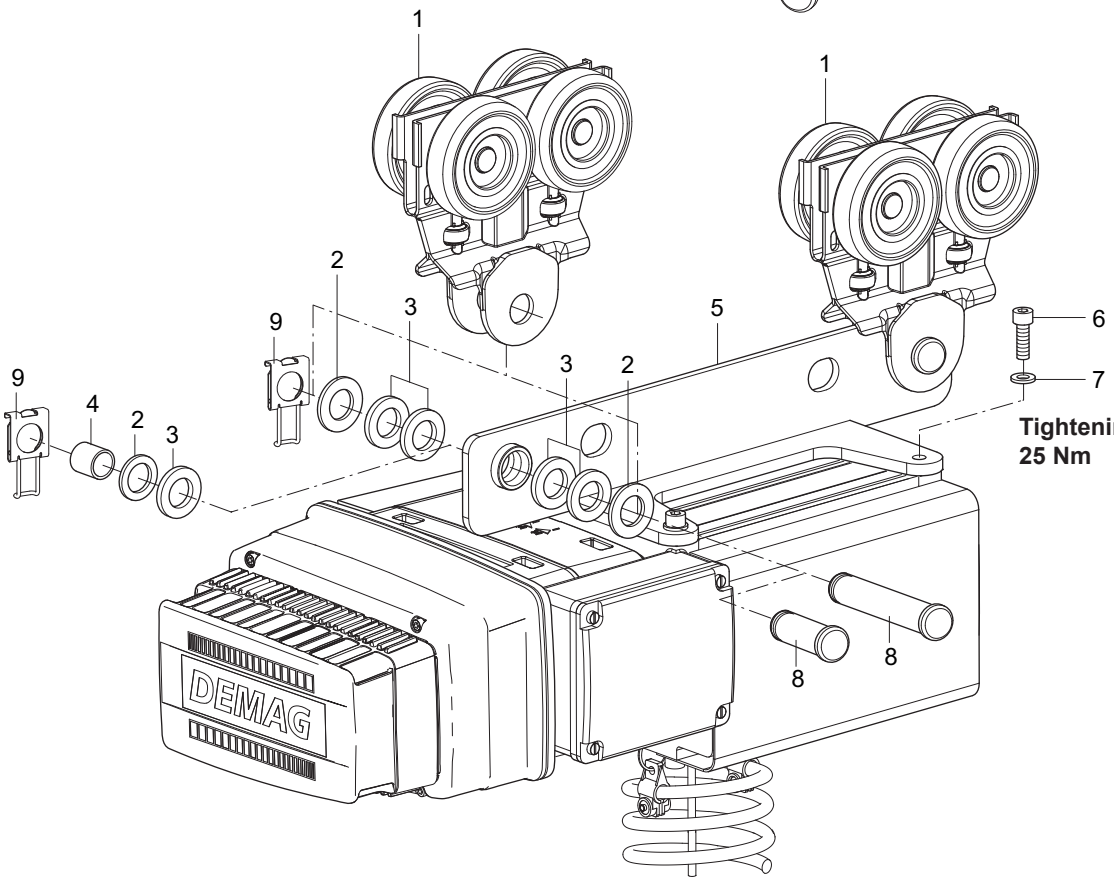

Tightening torque 25 Nm

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1 Trolley with pin
2 Washer A21 x 37 x 3
3 Washer 20 x 32 x 4 KBK I and KBK II
4 Tube 20 x 2 x 22 KBK I
5 Load bar
6 Hex. socket screw M 8 X 22
7 Washer 8 x 16 x 2
8 KBK I, KBK II, Aluline classic 120 and 180 pins
9 BoClip

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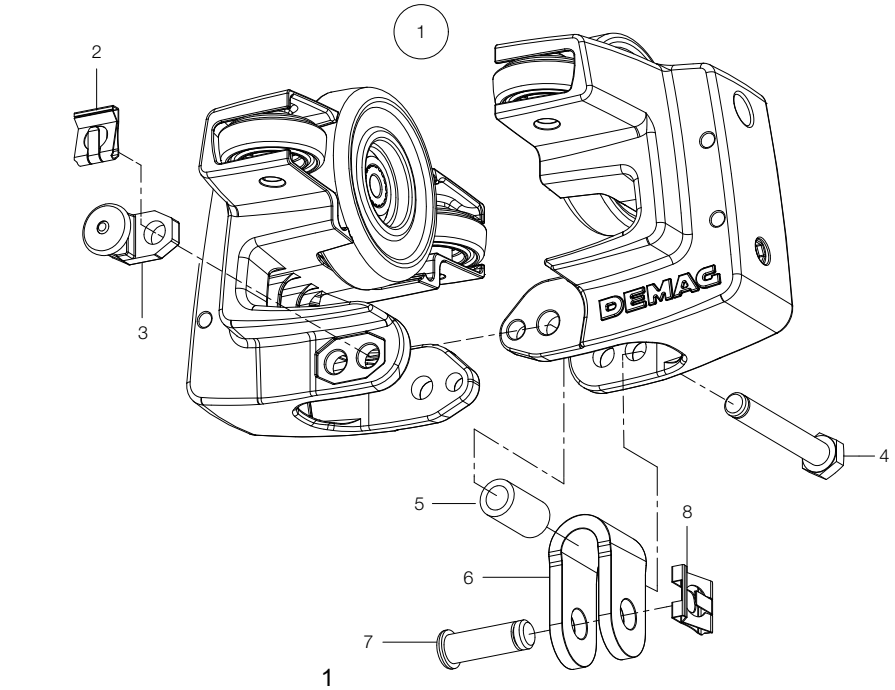
6.2.2 CF 5 trolley, flange width 50 – 91 mm with load bar



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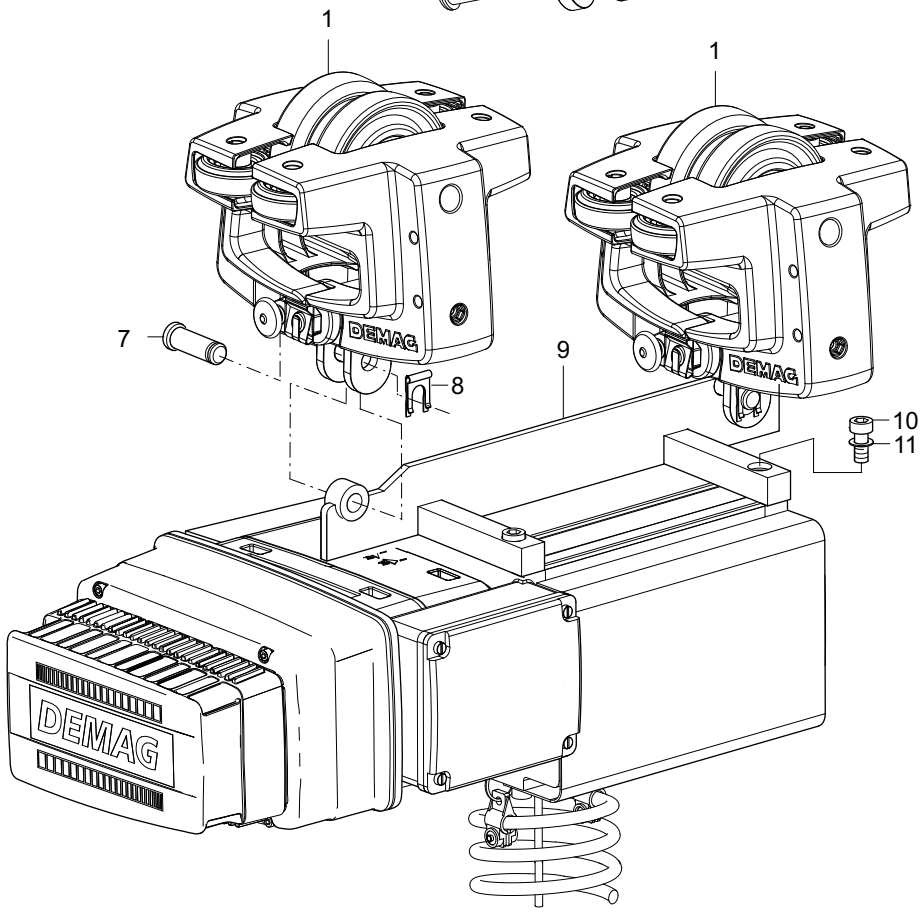

Tightening torque
25 Nm

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1 CF 5 click-fit trolley
2 Retaining clip SL 10 SXN08
3 CF5 retaining elements
4 Head pin 10 x 64,8 slot
5 Tube 16 x 2,8 x 29
6 CF5 suspension eye bracket
7 Head pin 12H11 x 30 slot
8 Retaining clip SL 12 SXN08
9 CF5 trolley crossbar
10 Hex. socket screw M 8 x 22
11 Washer 8 x 16 x 2

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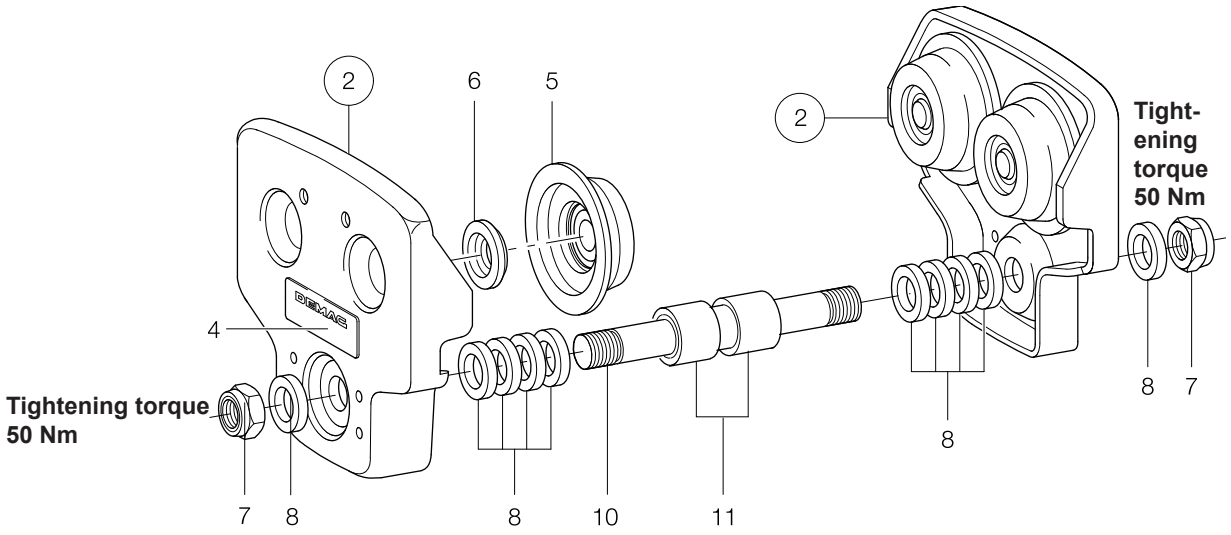
6.2.3 RU trolley, flange width 50 – 90 mm with load bar



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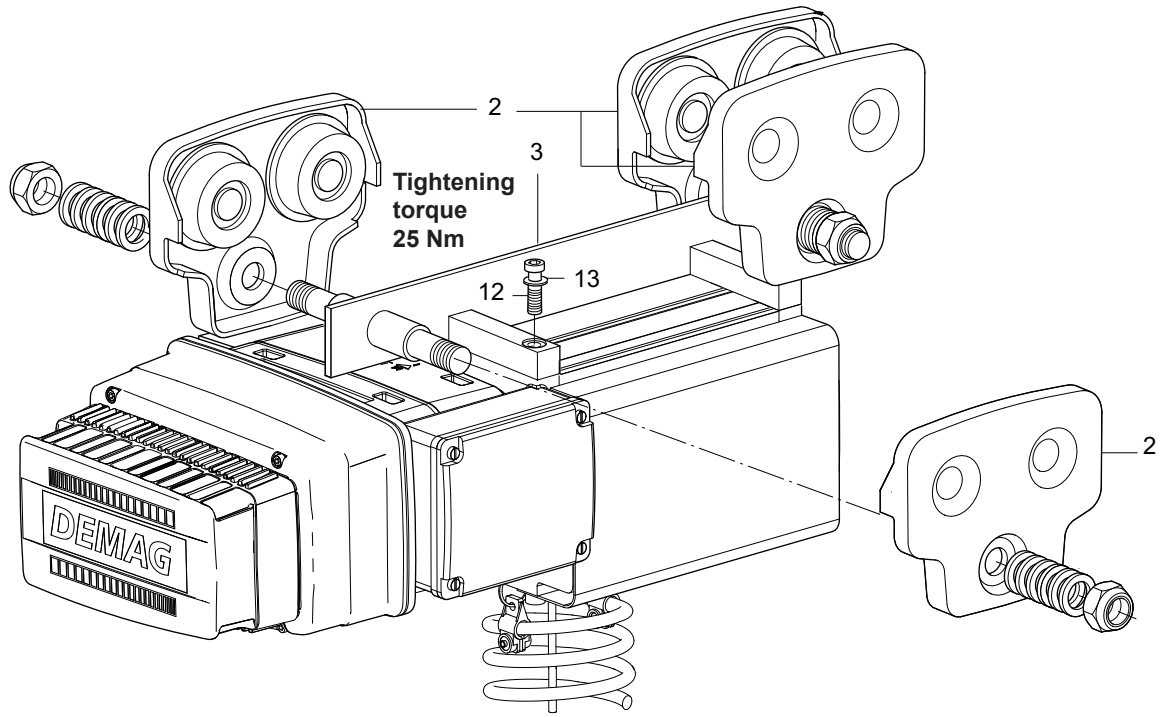

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2 Side cheek travel wheel univ. no toothed rim
3 D-SH load bar
4 Load capacity plate 450kg
5 RU 3DK travel wheel universal
6 Sleeve 12,1 x 27 x 9
7 Hex. nut M16 x1,5
8 Washer 16,5X 25 X 4
9 Load bar RU 3 cpl. (item 7, 8, 10, 11)
10 Pin RU 3 load bar
11 Tube 26,9 x 2,65 x 31
12 Hex. socket screw M 8 X 22
13 Washer 8 x 16 x 2

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6.3 Electrical connection

DANGER
Live components

Danger to life and limb.

All wiring and connection work may only be carried out by an instructed and qualified electrician according to the specifications of the electrical connection diagram included in the supply.

Every D-SH hoist is provided with a wiring diagram showing details of the control system.

The wiring of the D-SH hoist complies in all respects with current DIN VDE and accident prevention regulations.

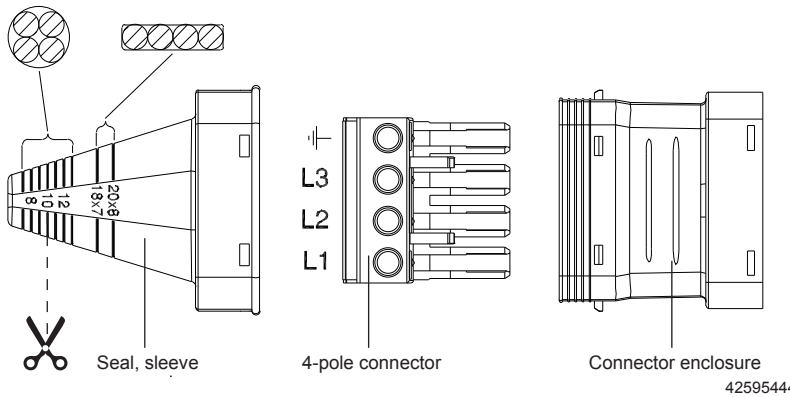
Unauthorized intervention and modifications may result in infringement of these regulations.

The switchgear is designed for extreme conditions. However, its service life depends on usage. Advise operators that

- inching (i.e. giving short pulses to the motor to obtain small movements) should be avoided as far as possible, e.g. when attaching a load. It may cause excessive wear and premature failure of the switchgear.
- corrosion on plastic (identifiable by dull, sooty or brittle surfaces) and metal components in enclosed switchgear housings can be caused by too frequent inching.
- corroded parts must be replaced in good time.

6.3.1 Mains connection

Mains connection set



To connect the hoist to the power supply, the mains connection cable, the mains connection fuse links and the devices for disconnecting and switching the power-feed must be available on site. For power supply, a 4-lead cable with an earth lead (PE), which complies with the table in section 3.1.5, is required.

NOTE

Please note that the length of the supply cable specified for a given cross section must not be exceeded in order to avoid excessive voltage drop and malfunctions during start-up of the motor caused by undervoltage.

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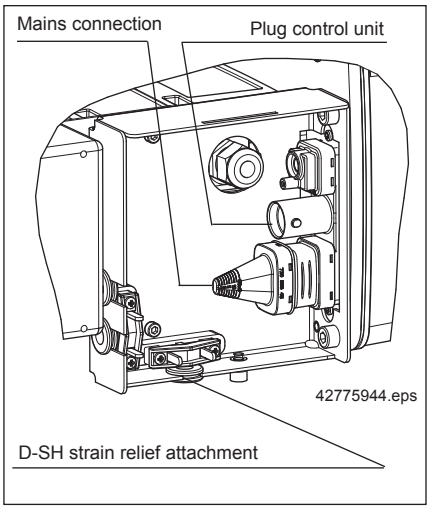

- First check whether the voltage and frequency specified on the data plate match your mains supply. Ensure that the mains connection cable is at zero voltage and secured against accidental restoration of the power supply.
- Remove the cover to connect the supply cable.
- Use the mains connection set included in the delivery to produce the plug-in connection for the mains connection cable.
- Cut the sleeve to suit the geometry of the mains cable.
- For a round cable in the marking area of 7 to 13, for a flat cable in the marking area of 18 x 7 to 20 x 8. Cable cross sections 4 x 1,5² or 4 x 2,5² have been taken into account.
- Slide the sleeve onto the mains cable. Make sure the sleeve tightly encloses the cable to comply with the type of enclosure.
- Connect the mains cable on the connector to terminals L1, L2, L3 and to the PE. If required, use the wire end sleeves included in the delivery.
- Slide the connector into the enclosure until it latches and close the enclosure with the sleeve.
- Then place the connector into the control system until the enclosure latches with the card bracket.
- Finally, insert the mains cable into the union on the enclosure and fix it with the strain relief clamp. Depending on the cable type (flat or round cable), the strain relief clamp for the D-SH hoist must be turned to suit the cable contour.

NOTE

All enclosure parts must be securely latched to ensure the unit is sealed.

The mains connector must never be disconnected under load.

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6.4 Putting into operation for the first time

6.4.1 Checks before putting the hoist into operation for the first time

The owner is obliged to carry out the following checks before putting the hoist into operation for the first time, see section 2.8 “Regular inspections”.

Activity	Section	Check
Check oil level in the hoist gearbox of the D-SH hoist	3.3 “Oil and grease filling of gearbox”	x
Check rope securing devices and rope guide	After-sales service	x
Check electrical switchgear and wiring	6.3 “Electrical connection”	x
Check operation of limit switch	7.3 “Switching on”	x
Check rope securing devices, cable and control unit housing for damage	6.9.2 “Connecting the rope to the grip”, 8.14 “Connection of the helical cable”	x
Check operation of the gearbox and slipping clutch	7.3.3 “Checking operation of the gearbox and slipping clutch”	x
Check hook and hook safety catch	8.13 “Load hook inspection”	x

NOTE

Inspection when putting the product into operation for the first time

If hoist units are used as cranes, an inspection must be carried out by an expert engineer in accordance with relevant accident prevention regulations (BGV D6, § 25) for cranes.

Hoist units used in accordance with relevant accident prevention regulations for winches, hoists and towing devices (BGV D8) must be inspected by an experienced technician.

The inspection in accordance with relevant accident prevention regulations for winches, hoists and towing devices (BGV D8) mainly consists of a visual inspection and a function check. It is designed to ensure that the machine is in a safe condition and that any defects and damage, e.g. caused by inappropriate handling during transport, are identified and repaired.

In addition, regulations specific to cranes must also be taken into consideration during acceptance and other inspections in accordance with relevant accident prevention regulations for cranes (BGV D6).

D-SH hoists are shipped as a complete unit, i.e. with the control element (D-Grip or rocker switch) connected, in cardboard packaging. The control element still has to be fitted to the wire rope at the correct working height by means of the rope socket and the rope wedge.

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6.4.1 Emergency stop connection Setup (D-grip)

For operation of the D-SH hoist with the D-Grip, an external emergency-stop device must be fitted. It is applied on terminals X2.1 and X2.2 of the analogue PWM converter (see section 7.6).

If no emergency-stop switch is used, terminal X2.1 and X2.2 must be jumpered.

Commercially available emergency stop switches or the switches offered as an option (mushroom-head pushbutton/trip-wire switch) may be used.

It is useful to determine the position of the emergency stop device in line with the specific system, e.g. integrated in the operating elements of a load handling attachment or of a lifting mast.

6.4.2 Emergency limit switch

The emergency limit switch is located in the terminal box of the D-SH hoist. It automatically switches off the D-SH hoist when the top or bottom hook position is reached. The direction of movement can be reversed. The emergency limit switch must not be approached in normal operation.

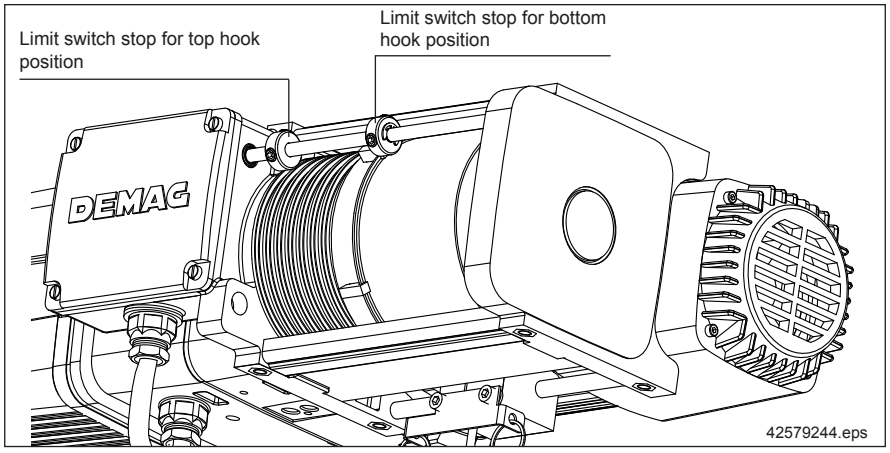
6.4.3 Adjustment of the emergency limit switch actuator

To avoid damage to the D-SH hoist and to prevent accidents, the emergency limit switch stops must be properly adjusted. Check the switching rod for smooth operation. Caution when the D-SH hoist is freshly painted. The limit switch stops for the emergency limit switch actuator on the switching rod are set by us for the maximum hook path. They must be re-set for your operating conditions. To do this, the two limit switch stops can be moved on the switching rod towards the rope drum centre.

NOTE

If you want to set the maximum possible lifting height for your specific operating conditions, the following must be observed:

The motor-side limit switch stop for the top hook position must be set so that when it switches off the lifting movement, the distance between the top edge of the rope socket and the bottom edge of the rope guide or the next obstacle is at least 10 cm.



NOTE

The limit switch stop for the bottom hook position must be set so that it is lower than the lowest point of the working area.

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6.5 Inspection before putting the unit into operation

The inspections specified in section 11.3, table 1 must be carried out when the unit is put into operation for the first time.

6.6 Instructions relating to safety at work

All fitting and assembly work must be completed in accordance with the operating instructions and the rope must be greased.

WARNING
Working with defective or damaged ropes

Operation with defective or damaged ropes results in a high risk of accidents with personal injuries and damage to the machine.

Operation with defective or damaged ropes is prohibited.

Any change or modification which prejudices safety must be reported to the nearest person responsible immediately. Repairs may only be carried out by experienced technicians.

6.7 Putting the unit into operation

6.7.1 Putting into operation with a D-Grip

- Switch on the power supply to the D-SH unit.
- For lifting or lowering, switch on the right switch (LED is on)
- If the figure 8 is shown in the display of the D-SH, unlock the emergency-stop button.
- When the hoist is put into operation for the first time, the limit switch for lifting must be approached to initialize the software fast-to-slow limit switches. The fast speed is only enabled after this has been done.
- D-SH is ready for operation

6.7.2 Putting into operation with a rocker switch

- Switch on the power supply to the D-SH unit.
- If the figure 8 is shown in the display of the D-SH, unlock the emergency-stop button.
- When putting the hoist into operation for the first time, approach the upper limit switch by actuating the rocker.
- D-SH is ready for operation

6.7.3 Putting into operation with a DSM Manulift handle

- Switch on the power supply to the D-SH unit.
- If the figure 8 is shown in the display of the D-SH, unlock the emergency-stop button.
- When the hoist is put into operation for the first time, approach the upper limit switch.
- D-SH is ready for operation

6.8 Starting operation

See section 7.3

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6.9 Putting into operation

CAUTION
Cutting and tearing injuries

When working with and on wire ropes, cutting and tearing injuries may be caused by broken wires on the wire rope.

Always wear robust working gloves when working with or on wire ropes.

6.9.1 Grip height adjustment

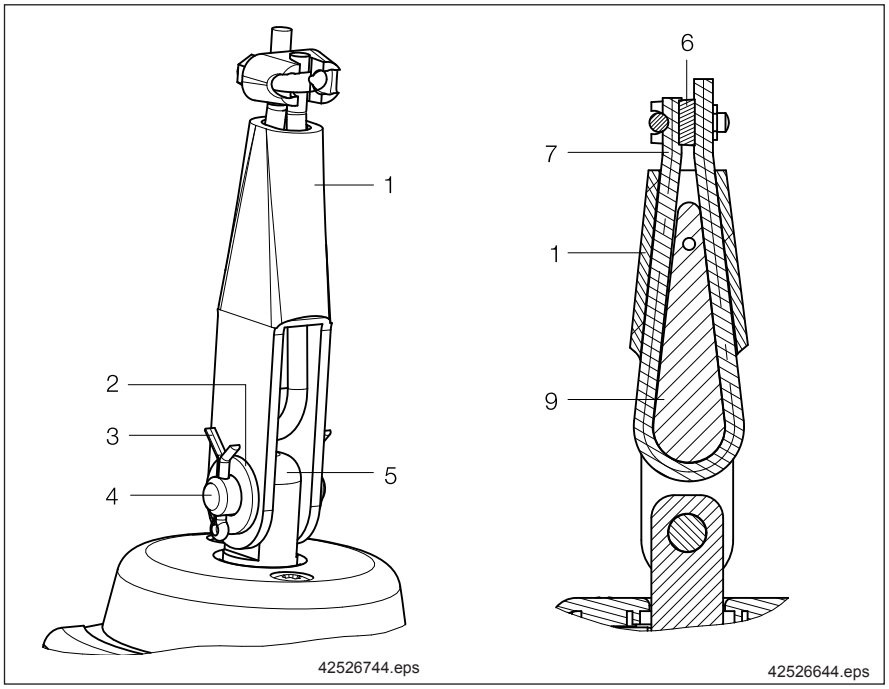
Set the control grips to the required working height. Make this adjustment and connect the rope to the grip at the place where the D-SH is used based on the description of the following section 6.9.2.

6.9.2 Connecting the rope to the grip

- Unroll wire rope (7) until you reach the drum end stop.
- Remove split pin (protection against loss) from rope wedge (9) and rope wedge from rope socket (1).
- Insert rope end into rope socket (1) from above, avoid twisting.
- Return rope end into rope socket in a loop from below.
- Insert rope wedge (9) into the rope loop and pull into the rope socket together with the wire rope. Slightly tighten the wire rope.
- Slide rope socket (1) over rope holder (5) and push pin (4) through. Place a washer (2) on each pin end and secure pin with split pins (3) against sliding out.
- Now set the working height for the D-Grip by means of clamping the rope wedge in the rope socket. Set the lowest handling range to the required working height in this way. Note that the lowest end position of the basic unit is not approached in normal operation.

  Ensure that the free end of the rope is long enough to fasten rope clamp (6).
- Secure the **free** rope end with rope clamp (6).

  Fit the rope clamp at a distance of approx. 10 mm to the rope stop on the free rope end. This distance must not be reduced since this would result in the rope slipping and, as a consequence, the load might drop.
- When a load is picked up, the rope wedge is pulled into the rope socket and results in a self-locking clamp-type connection.
- Shorten the wire rope, as required (see section 6.9.3).



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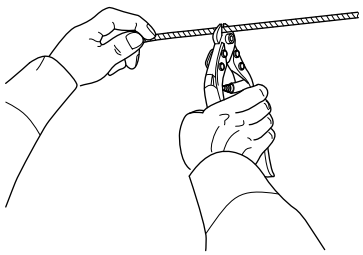
6.9.3 Shortening the wire rope

If, in exceptional cases, it is necessary to shorten the wire rope, this must be done in compliance with engineering standards and only with the consent of the manufacturer of the machine.



Cut any excessive rope length to the required length with wire rope scissors.

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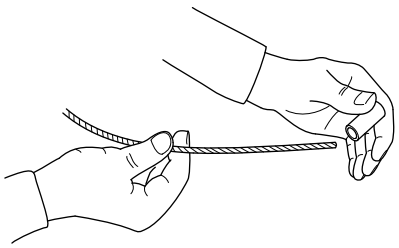

Slide heat-shrinkable sleeve part no. 343 706 44 over the shortened end of the rope.

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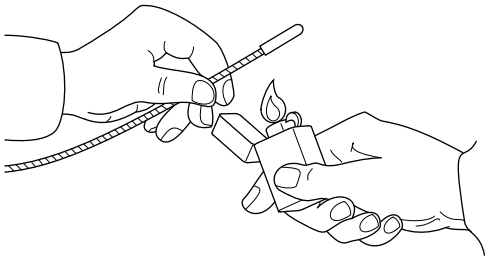

Shrink the sleeve by means of a hot air fan or a lighter onto the end of the rope.

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6.9.4 Putting the unit into operation

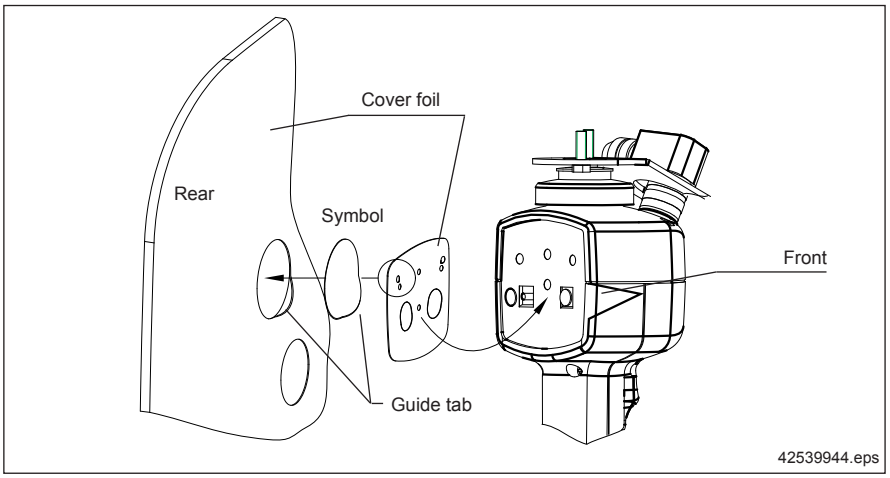
- Switch on the power supply.

  During the initializing phase, it must be ensured that
  - the “Grip occupied” sensor of the D-Grip is not actuated by hand or by objects (see section 7.2),
  - the switching rocker of the rocker switch is not actuated.
- If required, adjust the parameters if the operating characteristics do not fulfil the requirements of the user (see section 7.7.2 “Setting the parameters with a laptop”).

6.10 D-Grip button assignment

Depending on the place where they are fitted, the buttons of the D-Grip can be individually assigned. The following adhesive symbols are provided for this purpose, they are to be fitted on the rear side of the cover foil.

Select the required symbols from the enclosed adhesive symbol sheet (see symbols and their description in the tables), peel them off and fit them in accordance with the button assignment in the correct position, with the guide tab in the rear side of the cover foil. Remove the protective foil from the rear side of the cover foil and fix the cover foil on the clean front of the D-Grip (front must be free of grease and dirt). Press on well and then check the functions of the buttons.



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Symbols of the adhesive symbol sheet

	1	2	3	4	5	6	7	8	9	10	11	12	13
A													Dummy without symbol
B													Dummy without symbol
C													Dummy without symbol
D													

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Designation of the symbols

	1	2	3	4	5	6	7	8	9	10	11	12	13
A	On – off, non-latching	Switch-off	Connect	Manual operation	Unlatch (enable change of status)	Latch (status fixed)	Brakes; brake applied	Release brake; released	Speed; normal run	Speed increased; fast run	Attached load weight (mass)	Vacuum	Dummy without symbol
B	Insert	Remove	Turntable; general	Turn load handling attachment clockwise	Turn load handling attachment counter-clockwise	Lift by means of rope reeving mech.	Lower by means of rope reeving mech.	Acoustic signal device (horn)	Right-turn movement, limited	Left-turn movement, limited	Transport position	Lock, closed	Dummy without symbol
C	Unlock, open	Lower fork carrier	Lift fork carrier	Tilt lifting device (fork) to the front	Tilt lifting device (fork) to the rear	Push frame or fork forwards	Retract frame or fork	Push slide to the left	Push slide to the right	Adjust prongs; increase distance	Adjust prongs; reduce distance	Turn fork or frame counter-clockwise	Dummy without symbol
D	Turn fork or frame clockwise	Release load retainer	Fix load retainer	Push off load	Fix, clamp	Release, lift off	Measuring value constant; characteristic constant	Rising value	Decreasing value; falling curve	Brake, general	Two-hand operation	Manual control for loading and conveying equipment	Manual control for loading and conveying equipment

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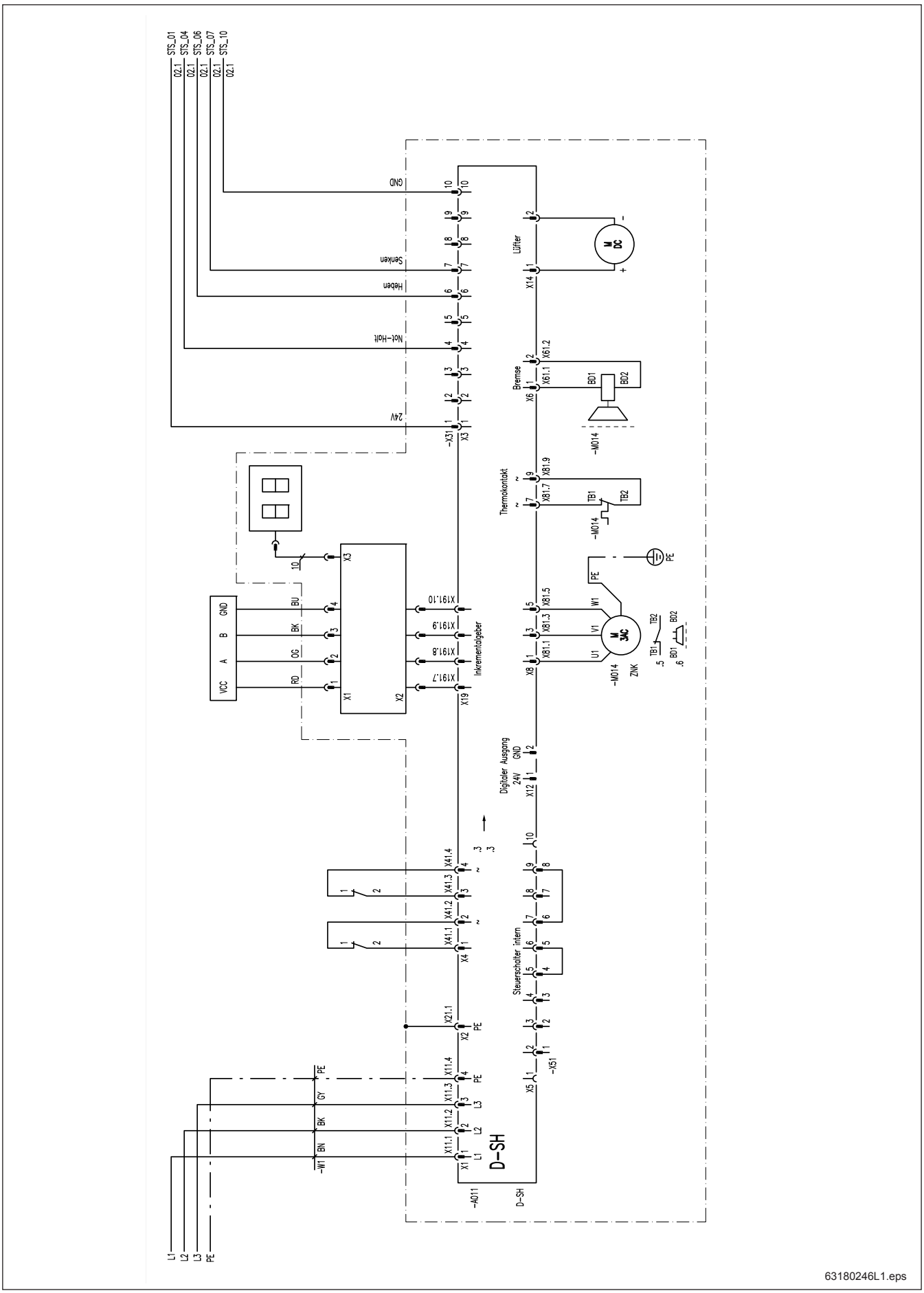
6.11 Circuit diagrams

6.11.1 D-SH circuit diagram

6.11.1.1 D-SH with D-Grip



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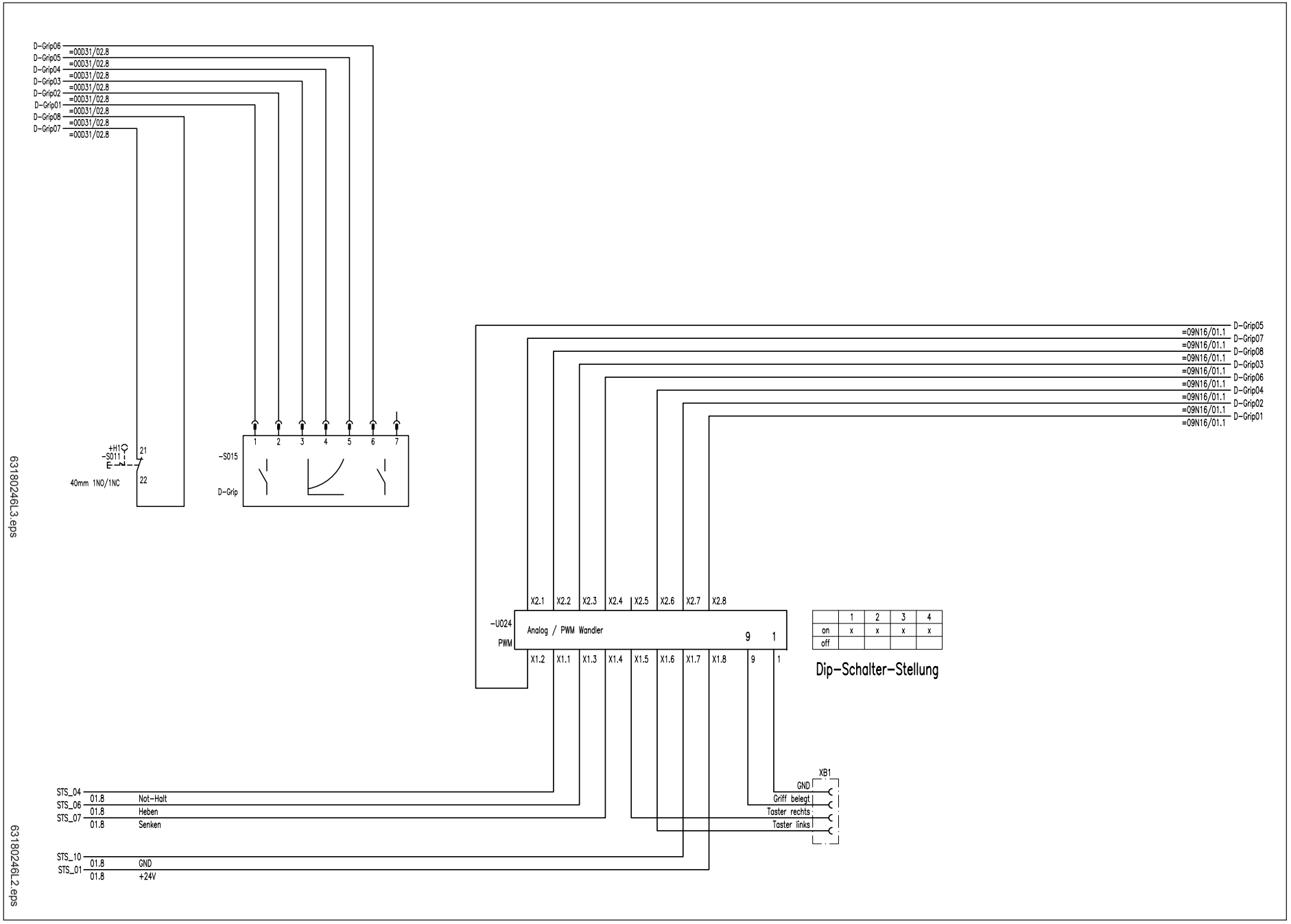
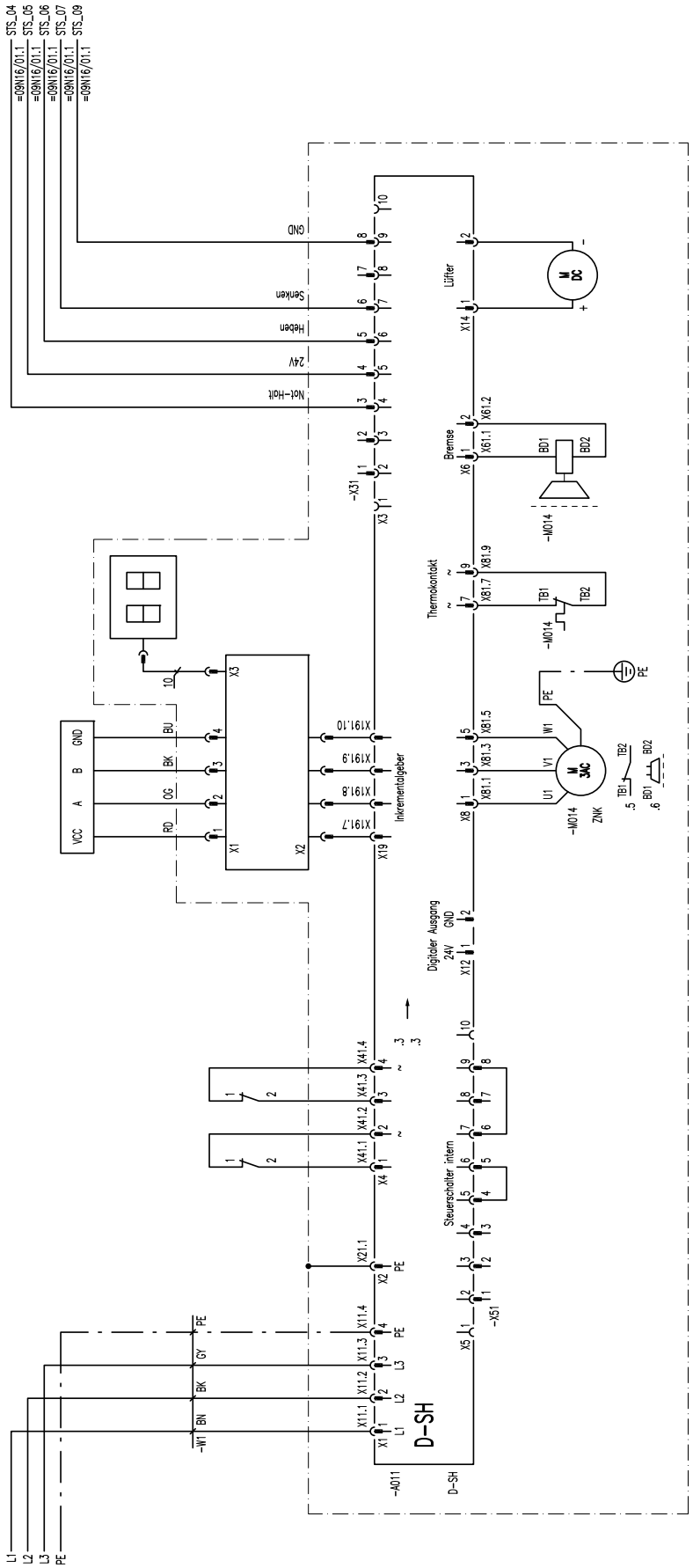


6.11.1.2 D-SH with rocker switch



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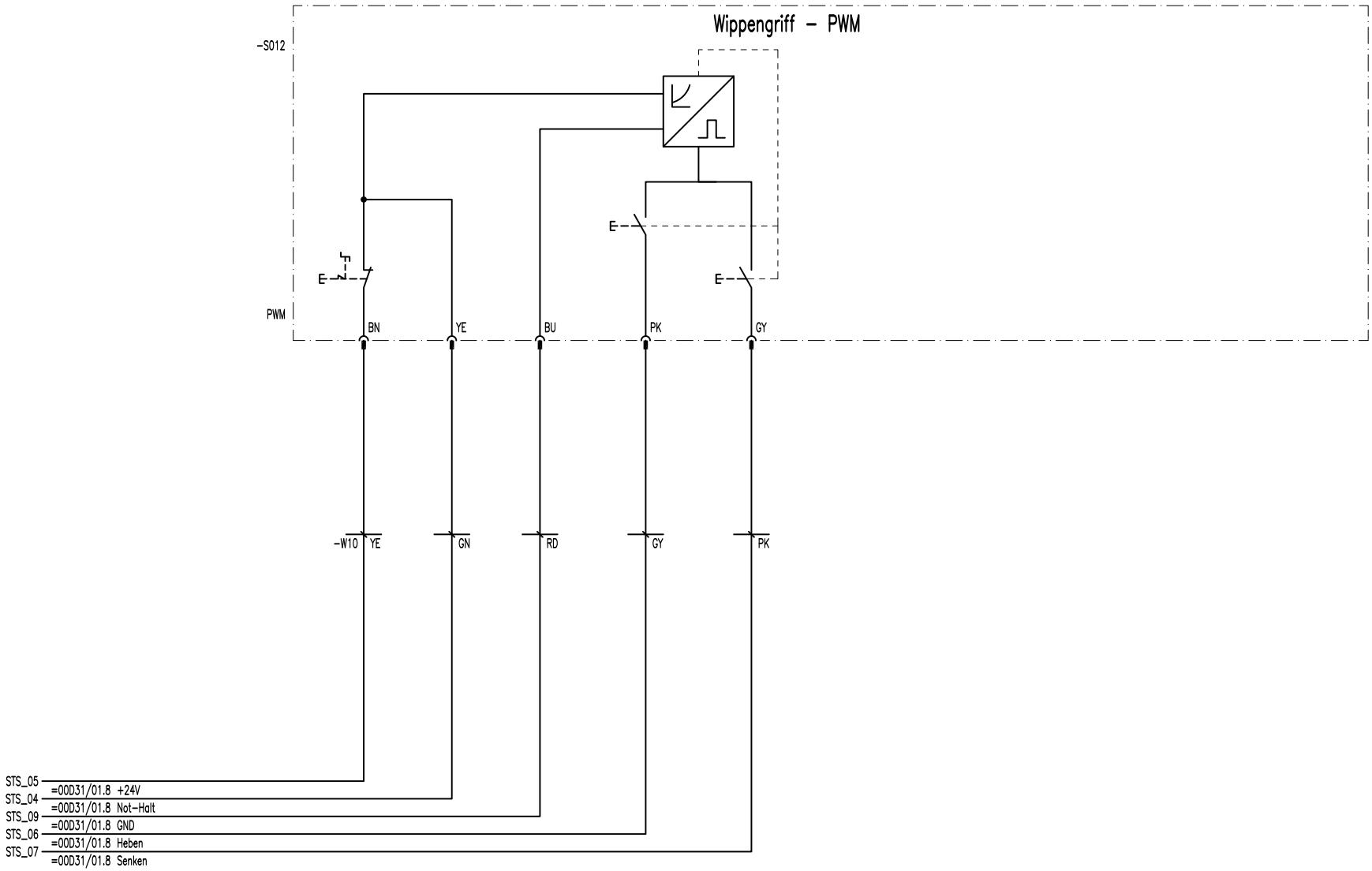

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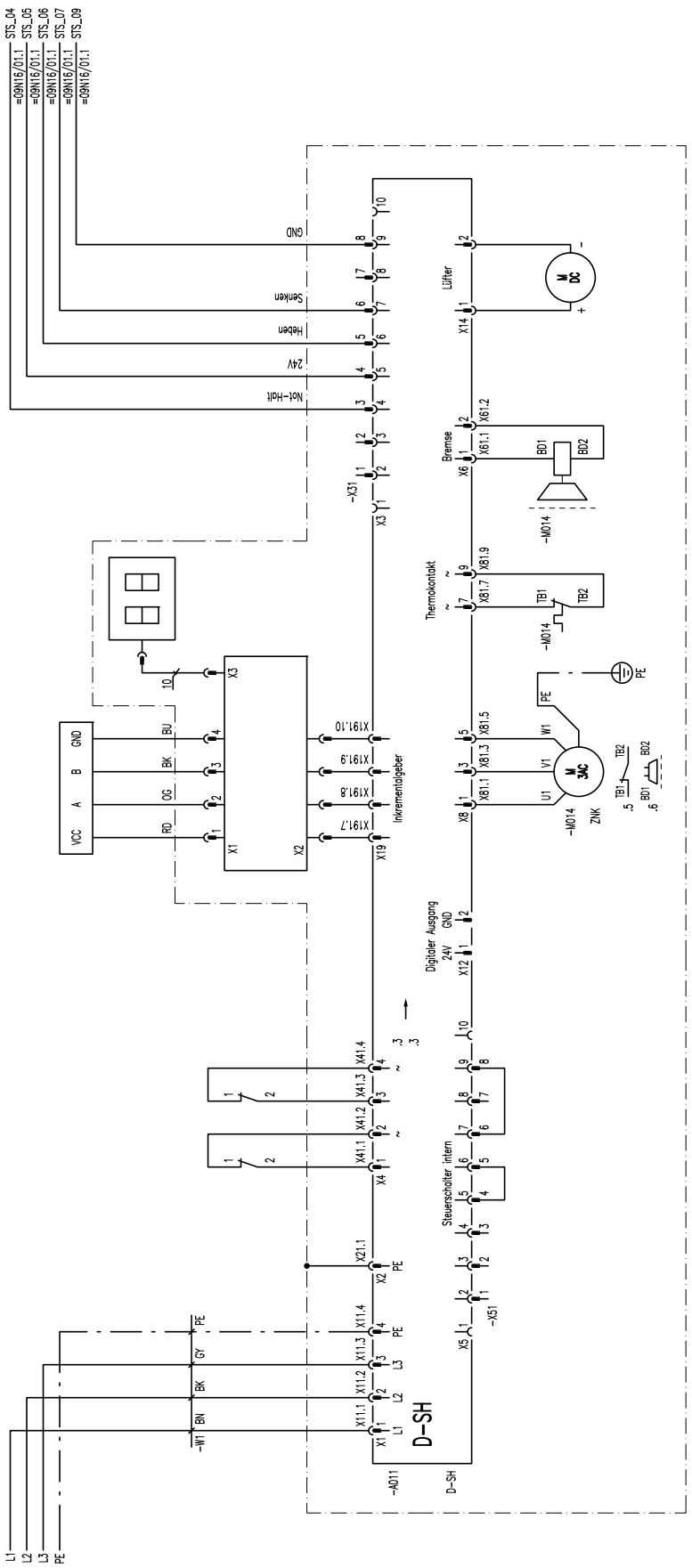
6.11.1.3 D-SH with DSM Manulift



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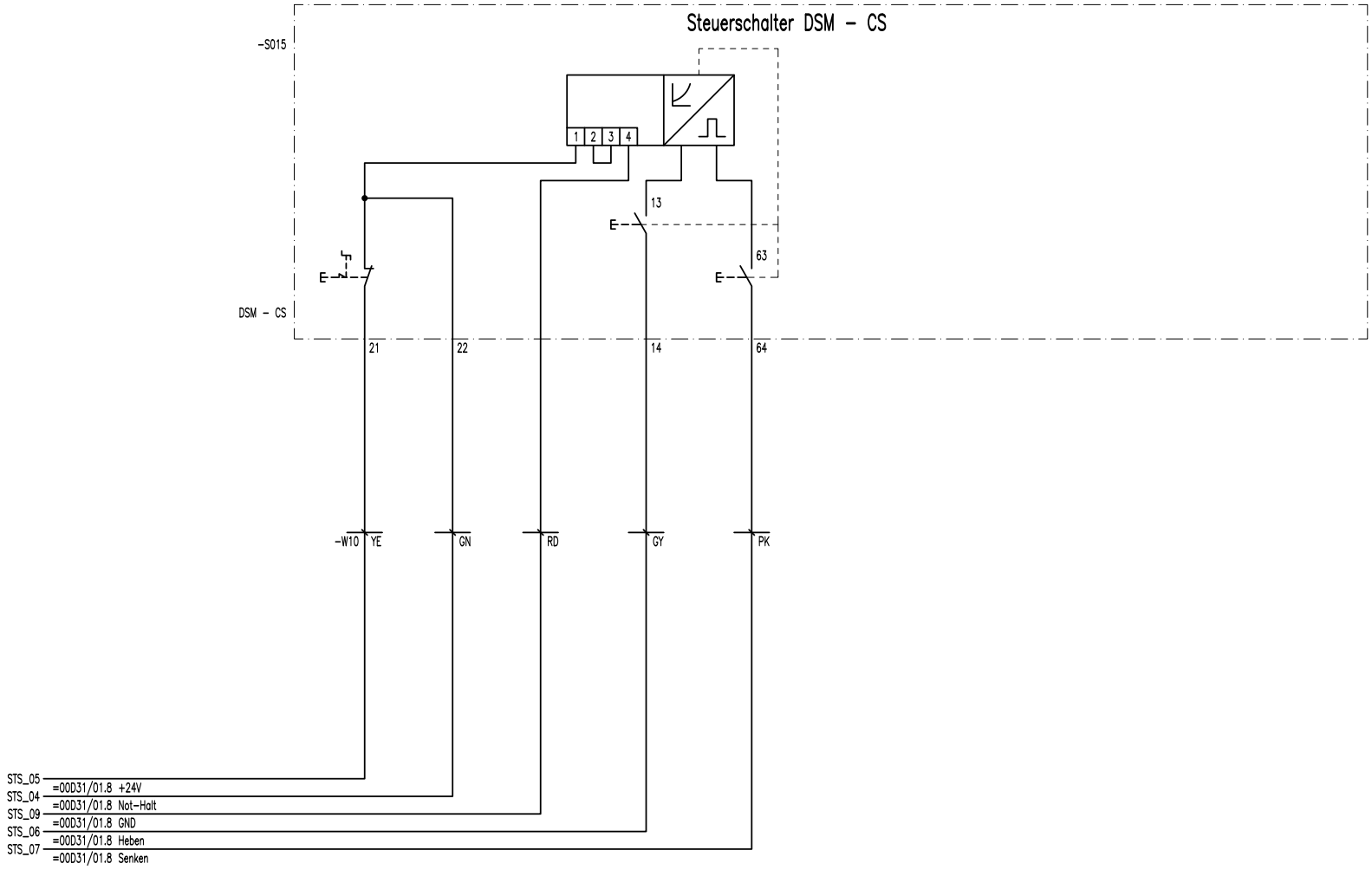

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7 Operation

7.1 Safety instructions

WARNING
Inappropriate operation

Inappropriate operation may result in severe injury or damage to property.

The machine may only be operated by authorised and instructed personnel in compliance with all accident-prevention and safety regulations.

- National regulations for the use of cranes and lifting appliances must be observed and complied with.

WARNING
Danger if duty of care is neglected

There is a danger to life and limb if the machine is operated with little care.

Requirements for operating the machine include:

- All fitting/assembly work has been carried out according to the operating instructions.
- The rope is adequately lubricated.
- The rope is in good condition. Operation with defective or damaged ropes results in a high risk of accidents with personal injuries and is therefore prohibited. Danger of damage to the machine.
- Any changes or modifications which prejudice safety must be reported to the nearest person responsible immediately.
- Repairs may only be carried out by experienced technicians.

WARNING
Falling loads

Any person remaining in this danger zone may suffer serious injury or death.

The load must not be transported above persons when using load handling attachments which retain loads by means of magnet, friction or suction forces without an additional load securing device. The operating instructions for the load handling attachment must be complied with in any case.

Before starting work:

- Put on protective clothing.
- Verify that there are no persons in the danger zone of the machine.
- Check functioning of the brakes, emergency limit stop devices and emergency stop devices.

During operation:

- Do not approach emergency limit stop devices (e.g. emergency limit switch) in normal operation.
- Do not render safety devices inoperative.
- For lifting and travel movements, move to a position which ensures a free field of view into the danger zone.

WARNING
Damaged components/malfunctions on the machine

Danger to life and limb.

In the event of obvious defects or malfunctions, stop the machine without delay and secure it against switching on again.

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CAUTION
Danger due to premature wear/corrosion

Corrosion on plastic (identifiable by dull, sooty or brittle surfaces) and metal components in enclosed switchgear housings can be caused by too frequent inching.

Corroded parts must be replaced in good time.

NOTE

Advise operators to avoid inching (i.e. giving short pulses to the motor to obtain small movements) as far as possible, e.g. when attaching a load. It may cause excessive wear and premature failure of the switchgear.

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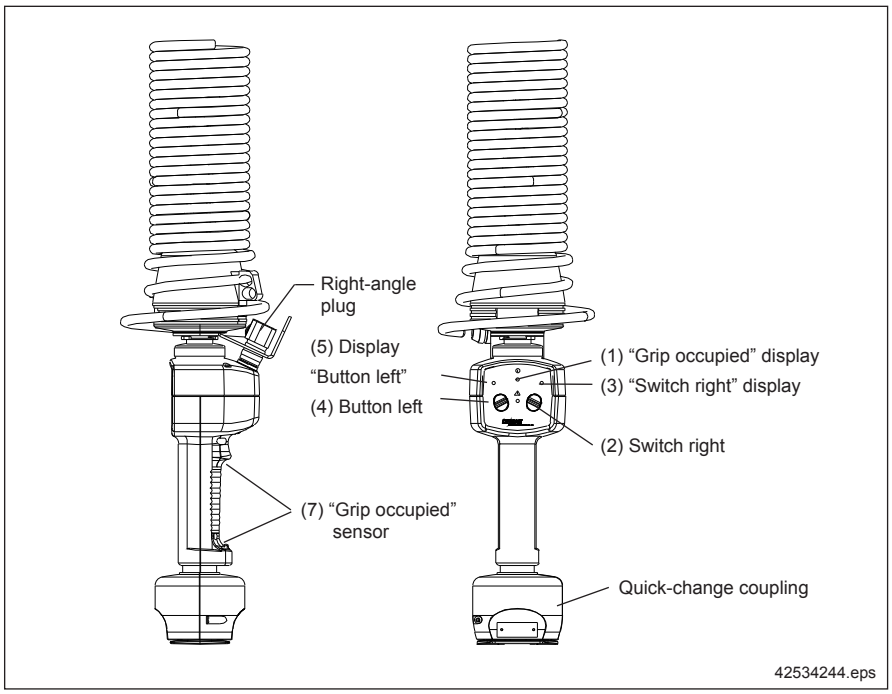
7.2 Description of the control unit

7.2.1 Control switches D-Grip



The grip includes the following control and signal devices:

- "Grip occupied" sensor with LED signal display.

  If the grip is covered by the operator's hand, this is indicated by LED (1) lighting up.
- When the grip is released, the motion is stopped and the brake is applied.
- For activating and de-activating the lifting movement, press the right switch (2) once.
  - LED display (3) off: Switch off.
    Lifting/lowering motion not enabled.
  - LED display (3) on: Switch on.
    Lifting/lowering motion enabled.

  The final speeds can be adjusted by programming a parameter in the software (see chapter 15 "Setting the parameters").

  When the unit is switched on, the right switch (2) is always off. The right switch (2) is used for stopping and enabling the lifting movement.
- Button left (4) with LED display (5)

  The button signal can be looped through as a digital output, i.e. as long as the button is held down, a 24 V DC signal is output at the relevant output of the analogue PWM converter.

7.2.1.1 Operation with the grip

In general, load movements are only possible if the right switch (2) is switched on and the grip is covered by the operator's hand so that the "Grip occupied" indicator (1) lights up. Otherwise, manual forces do not become effective. A lifting movement of the load is caused by an upwards movement of the grip (intuitive operation). To lower the load, move the grip downwards.

The speed of the load movement is proportional to the force with which the grip is moved upwards or downwards. The measured force is limited at the top and at the bottom by means of mechanical end stops.

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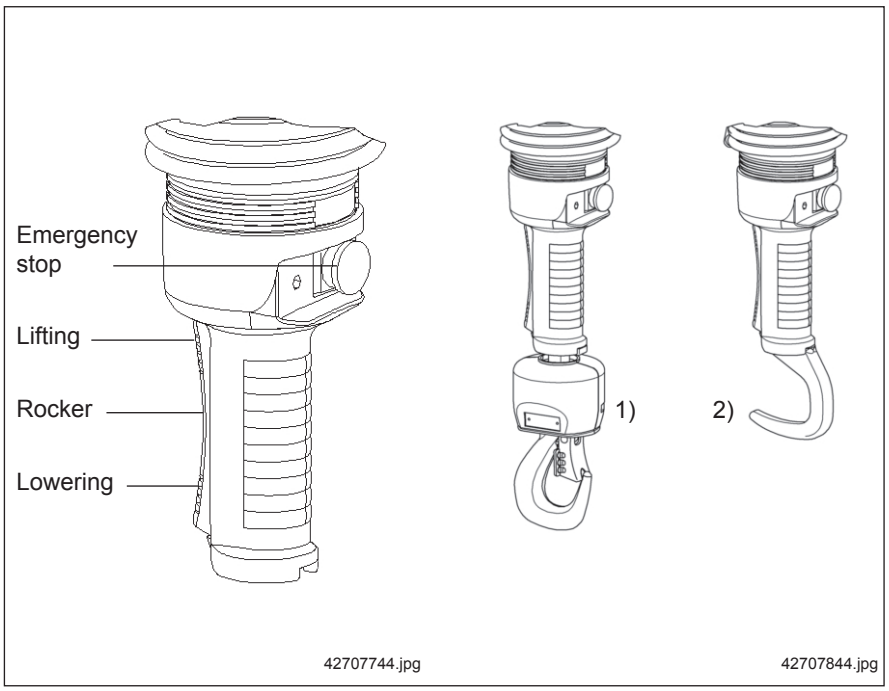
7.2.2 Control switches Rocker switch



NOTE

The operating element of the rocker switch is designed with IP 34 type of enclosure.

In the following, the design and functioning of the rocker switch are described. The switch includes the following command devices:

Emergency stop button
Used to stop the lifting motion in the event of hazardous situations.

Rocker
Infinitely variable control of the upward and downward motions is performed by means of the rocker. This is done by pushing the rocker in the upper area for lifting and in the lower area for lowering.

Variants
Two variants are available for load attachment:

1) Quick-change coupling for various load handling attachments that can be easily replaced
2) Permanently fitted C hook

7.2.2.2 Operation with the rocker switch

Press the top of the rocker to lift the load, press the bottom of the rocker to lower the load. The speed of the load movement is proportional to the movement of the rocker switch when it is pressed.

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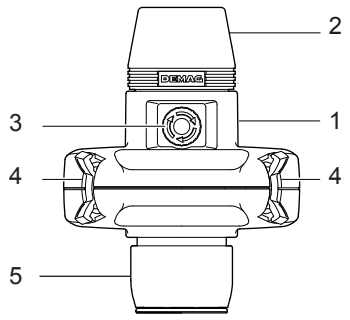
7.2.3 Control switches DSM Manulift

1 DSM Manulift
2 Top cover
3 Emergency-stop switch
4 Actuating rockers
5 Quick-change coupling



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7.2.3.1 DSM Manulift quick-change coupling

Mechanical interlocking of the switching elements prevents movement in opposite directions being switched on simultaneously. The shock and impact-resistant housing of the is of high quality thermoplastic, it is resistant to fuels, salt water, grease, oil and alkaline solutions.

IP65 type of enclosure.

The main operating elements and controls are:

- The spade handle for guiding, positioning and moving the load horizontally.
- The right and left actuating rockers (lifting and lowering) which both (4) have the same functions.

The handle can thus conveniently be gripped with the left or right hand. The actuating rocker (4) is actuated with the thumb without opening the fist.

7.2.3.2 Operation with the handle

The lifting and lowering movements are marked by arrow symbols.

Press the top of the actuating rocker (4) to lift the load, press the bottom of the actuating rocker (4) to lower the load.

The speed of the load movement is proportional to the movement of the stepless rocker switch when it is pressed.

The rigid link between the DSM Manulift and the load handling attachment provides a direct connection between the operator’s hand and the load.

The integrated quick-change coupling (5) allows to quickly change a load handling attachment when no load is applied.

Power is supplied to the DSM Manulift through a wear-resistant helical cable.

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7.3 Switching on

7.3.1 Checks when starting work

The operator is obliged to carry out the following checks when starting work (see section 2.8 “Regular inspections”):

Activity	Section	Check
Check operation of limit switch	4.5 “Checking the limit switch” 6.4.2 “Emergency limit switch”	x
Check operation of the slipping clutch	7.3.3 “Checking operation of the gearbox and slipping clutch”	x
Check hook safety catch and load hook	8.14 “Load hook inspection”	x
Check rope for damage and broken wires	8.7 “Discarding the wire rope”	x

WARNING Danger in the case of defects

Such defects include, for example:

- **brake or emergency-stop device failure,**
- **damage to the rope,**
- **unusual noises, etc.**

D-SH hoists must be taken out of service immediately if any defects relating to operating safety and reliability are detected.

7.3.3 Checking operation of the gearbox and slipping clutch

The slipping clutch is arranged between the motor shaft and the pinion shaft. It performs the function of the emergency limit stop device for the highest and lowest hook position and protects the D-SH hoist against overloads. The additional mechanical limit switches for the highest and lowest hook positions prevent the slipping clutch from being approached as an emergency limit stop device during normal operation.

The brake arranged on the load side prevents load sinking when the unit is at rest. Monitoring of the slipping clutch and automatic cut-out of the drive in the event of slip increase the service life and protect the slipping clutch against overload and incorrect use. The slipping clutch is therefore maintenance-free.

7.3.4 Checking the hook safety catch

Inspection of the hook safety catch, see section 8.14 “Load hook inspection”.

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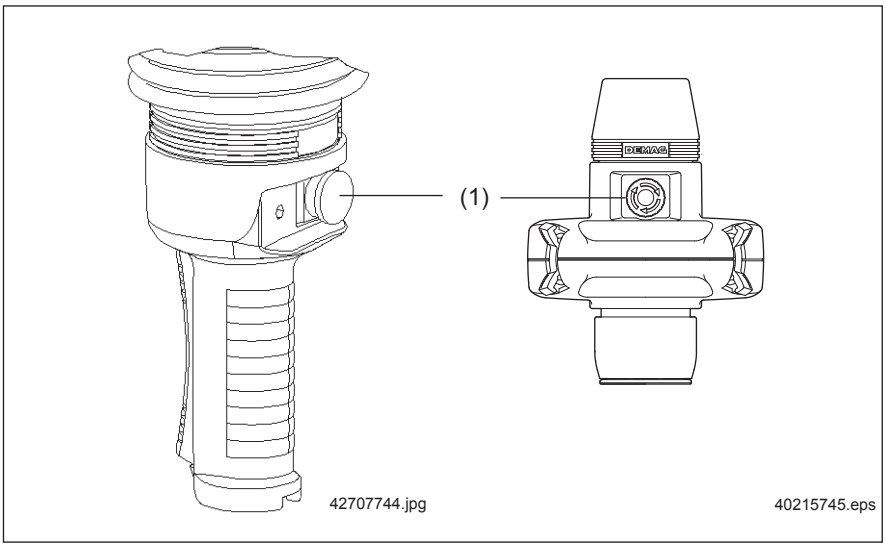
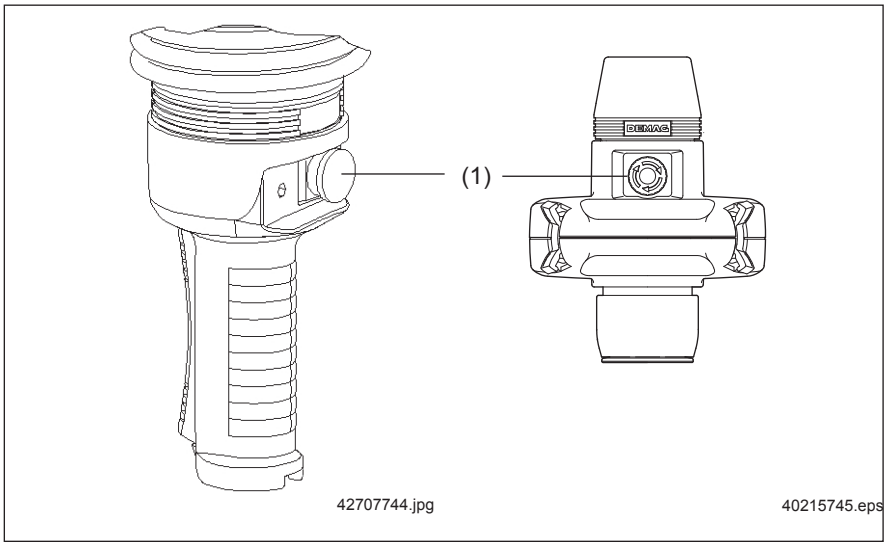
7.4 Switching off

1. When the work has been completed, position the unloaded bottom block and the control grip outside the travel area.
2. Press emergency-stop button (1). The emergency-stop button is unlocked by turning it.
3. Switch off the power supply at the mains connection or isolating switch.



7.5 Stopping operation in the event of an emergency

1. Press emergency-stop button (1).



Every D-SH hoist must be fitted an emergency-stop device with which all motions can be stopped in the event of a hazard.

The device must be fitted in the freely accessible working range of the D-SH hoist.

To actuate the emergency-stop button, press the button until it reaches the end stop. It then locks automatically.

To unlock the actuated emergency-stop button, turn the pushbutton in the direction of the arrow and release, or pull the button out on the rocker switch.

It is also possible to use emergency-stop switches that are actuated by a wire pull.

The emergency-stop device must only be reset after the hazard and its cause have been eliminated.

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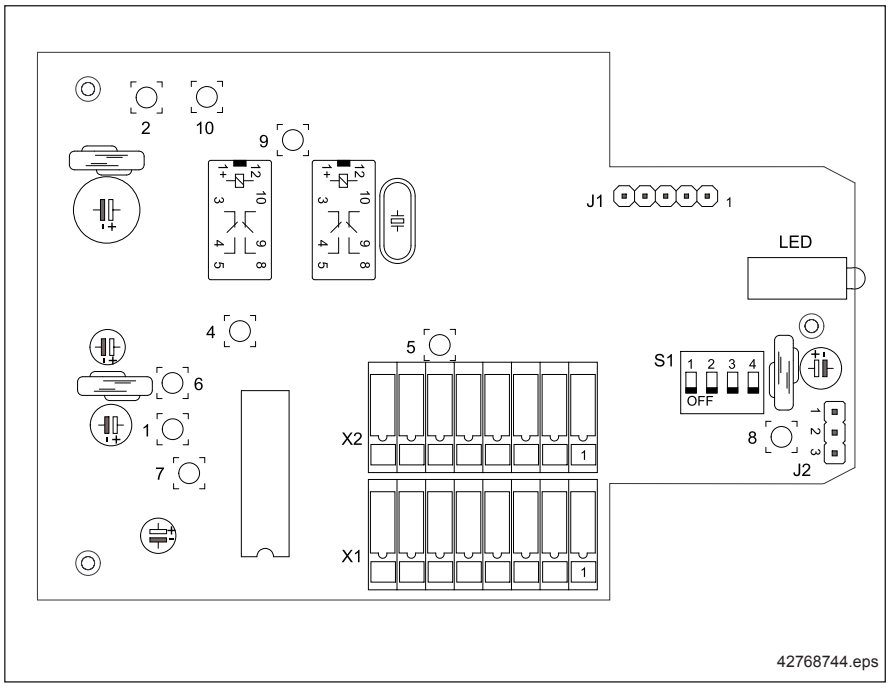
7.6 Analogue PWM converter

7.6.1 Function

The analogue PWM converter is used for converting the analogue voltage signal of the D-Grip into the appropriate PWM lifting or PWM lowering signal for the D-SH hoist.

The basic frequency of the PWM signal is 1 kHz. The mark-to-space ratio varies depending on the analogue voltage in the range of min. 10% and max. 90%.

The converter is supplied with 24 V DC provided by the D-SH hoist.



Terminal X1

Terminal X1 is used for connecting the control cable of the D-SH. A control unit cable (part no. 772 073 45) with a bayonet lock on one end and open conductor ends on the other end is used. The colour sequence is specified.

Terminal	Designation	Conductor colour
X1.1	Emergency stop	Ye, yellow (cable 772 073 45)
X1.2	24 V supply / right button	Ye, yellow (helical cable D-Grip)
X1.3	PWM lifting	Wh, white (cable 772 073 45)
X1.4	PWM lowering	Vt, violet (cable 772 073 45)
X1.5	n.c.	-
X1.6	Left button ext.	-
X1.7	GND	Gy, grey (cable 772 073 45)
X1.8	24 V DC supply	Bk, black (cable 772 073 45)

Terminal X2

The helical cable of the D-Grip is connected to terminal X2.

Terminal	Designation	Conductor colour Helical cable
X2.1	Emergency stop -	If no emergency-stop switch is used, a bridge must be fitted between X2.1 and X2.2.
X2.2	Emergency stop +	
X2.3	Manual force analogue	Wh, white
X2.4	Grip occupied	Gy, grey
X2.5	n.c.	The right button (ye, yellow) is applied on X1.2
X2.6	Left button	Pk, pink
X2.7	GND	Bu, blue
X2.8	24 V DC supply	Br, brown

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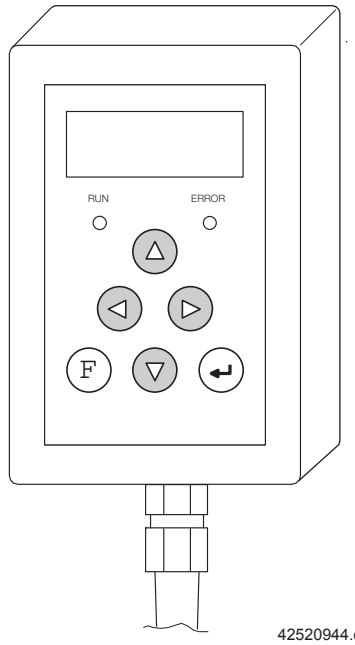
7.7.1 Setting the parameters with the manual terminal

Manual operating terminal type UPBT2-A00



The operating unit features the following keys:

- Arrow up (↑)
- Arrow down (↓)
- Arrow right (→)
- Arrow left (←)
- Return (↵)
- Escape (F).

The meaning of the keys is described below.

Open the electrical equipment cover of the D-SH to connect the operating unit.

DANGER Live components

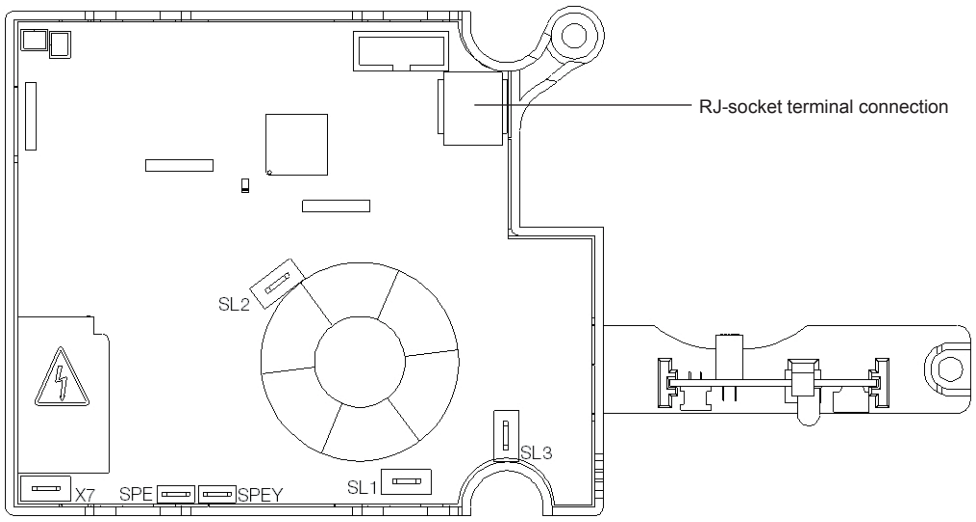
Danger to life and limb.

Electrical energy may cause very severe injuries. If the insulation or individual components are damaged, there is a danger to life caused by electrical current.

Before you remove the cover, switch off the power supply.

The discharge time of the link capacitors of the inverter is approx. 3 min.

Terminal connection on the control board



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7.7.1.1 Cables and connection

On the control board, a 6-pole RJ socket is provided for connecting the modular cable (see “Cables and connection”, section 7.7.2.1). On the other end, the adapter (red dot) and the operating terminal are connected.

7.7.1.2 Putting the manual operating terminal into operation

1. Switch off the D-SH power supply;
2. Open electrical equipment cover;
3. Connect the operating terminal type UPBT2-A00 with modular cable and adapter to the RJ socket;
4. Switch on the power supply;
5. If the operating terminal indicates “DEMAG D-SH”, the correct mode (VT100) is set. If the operating terminal indicates “Connecting DRIVE” in the first line, the mode for setting the parameters of Demag inverters is set and the mode must be changed.

Changing to VT100 mode

To change to “VT100” mode, proceed as follows:

1. Disconnect connector;
2. Reconnect connector and press and hold down the (↵) key, then release it after approx. 3 seconds.
3. The following menu appears:
   Beenden/Exit
   Save & Exit
   Connect PARCOM
   :
   :
   Mehr / More...
   Select “Mehr/More” with the arrow keys and press (↵).
4. The following menu appears:
   Test/Setup (1)
   EXIT!
   SAVE & EXIT
   :
   :
   VT100 Setup
   :
   :
   Select “VT100 Setup” with the arrow keys and press (↵).
5. The following menu appears:
   EXIT!
   SAVE & EXIT
   Enabled = 0
   :
   :
   Select “Enabled = 0” with the arrow keys. Then press (↵) and set to Enabled = 1 with (↑). Now press (↵) and move to “SAVE & EXIT” with (↑) and press (↵).
6. Switch off the power supply;
7. Repeat items 4 and 5 under “Putting the operating terminal into operation”;
8. The operating terminal displays DEMAG D-SH and the version number.

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7.7.1.3 Navigating with the manual operating terminal

Navigate to menu items on the same menu level (vertical direction) with (↑) (↓). To change from a menu to a sub-menu (horizontal direction), actuate the (↵) key. You can return to the next higher level with the (F) key on every level. To return to the original item, it may be necessary to actuate the (F) key several times.

A distinction is made between diagnosis values (which are only displayed) and parameters (which are displayed and can be changed, as required).

7.7.1.4 Diagnosis variables

For diagnosis variables, the name of the variable is given in the first and the second line, the current value with unit is indicated in the third line.

7.7.1.5 Parameters

For the parameters, the name of the parameter is given in the first and the second line, the current value with unit is indicated in the third line. If parameters can be changed, edit mode can be entered by pressing the (↵) key. The cursor moves to the current value and the value range in which the parameter can be changed is displayed in the fourth line. The value can be changed upwards or downwards in steps using the (↑) (↓) keys. The changes have an immediate effect on the characteristics of the unit. If you quit edit mode with the (F) key, the original value (before the change) is restored. If you quit edit mode with the (↵) key, the currently set value is saved. If no key is pressed for approx. 10 sec., edit mode is also quit and the current value is saved.

Edit mode is not available for parameters which are only displayed.

Parameters include, for example:

- Maximum speed,
- Acceleration time, etc.

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7.7.2 Setting the parameters with a laptop/PC (software terminal)

7.7.2.1 Cables and connection

A PC or a laptop is required. Windows 3.10/95/98/NT/ME/2000/XP are supported as operating systems.

The modular cable with RJ12-DSUB9 adapter (blue dot) from the parameter setting set is used to connect the control system to the PC/laptop.

For connection to the control system, the electrical equipment cover on the D-SH must be opened. One end of cable is plugged onto the RJ socket of the control board. The other end is connected to the COM1 or COM2 interface of the PC/laptop by means of the adapter.

If the PC has no COM interface, a serial USB converter must be connected to the USB interface, e.g. Digitus DA-70146 available from Reichelt Elektronik (part no. USB2 SERIELL).

DANGER Live components

Danger to life and limb.

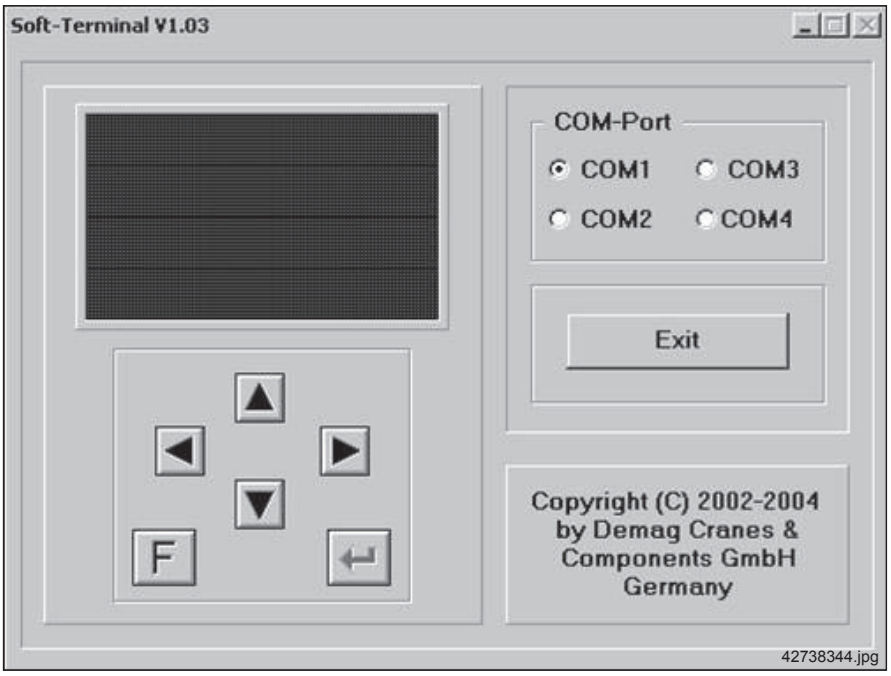
Electrical energy may cause very severe injuries. If the insulation or individual components are damaged, there is a danger to life caused by electrical current.

Before you remove the cover, switch off the power supply.

The discharge time of the link capacitors of the inverter is approx. 3 min.

7.7.2.2 Starting the program

To start the software terminal, call up the SoftTerm.exe program on the CD of the parameter setting set. The following window appears:



The program is operated by using the mouse or the keyboard.

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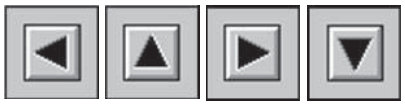
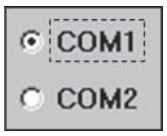
Using the mouse	Using the keyboard	Meaning
	Esc or F	like hand-held terminal
	Return or Enter on num. block	like hand-held terminal
	Arrow keys	like hand-held terminal
	Alt X or select the window with the tab key and actuate the space bar	Exit program
	Select with the tab key and actuate the space bar	Select interface

Select the COM interface to which the cable is connected to start communication. Then actuate the F or the Esc key. The name of the unit and the version number of the firmware are then displayed in the window. If it is not the case, see Possible causes of errors.

Operation is identical with operation by means of the hand-held terminal.

7.7.2.3 Possible causes of missing communication

Possible cause	Remedy
Incorrect COM interface selected	Select another COM interface
Control system has no power	Switch on control system
Cable not connected appropriately	Check cable connection
Incorrect cable	Check cable connection
Cable or adapter defective	Check cable connection
Adapter for terminal used	Use adapter for PC

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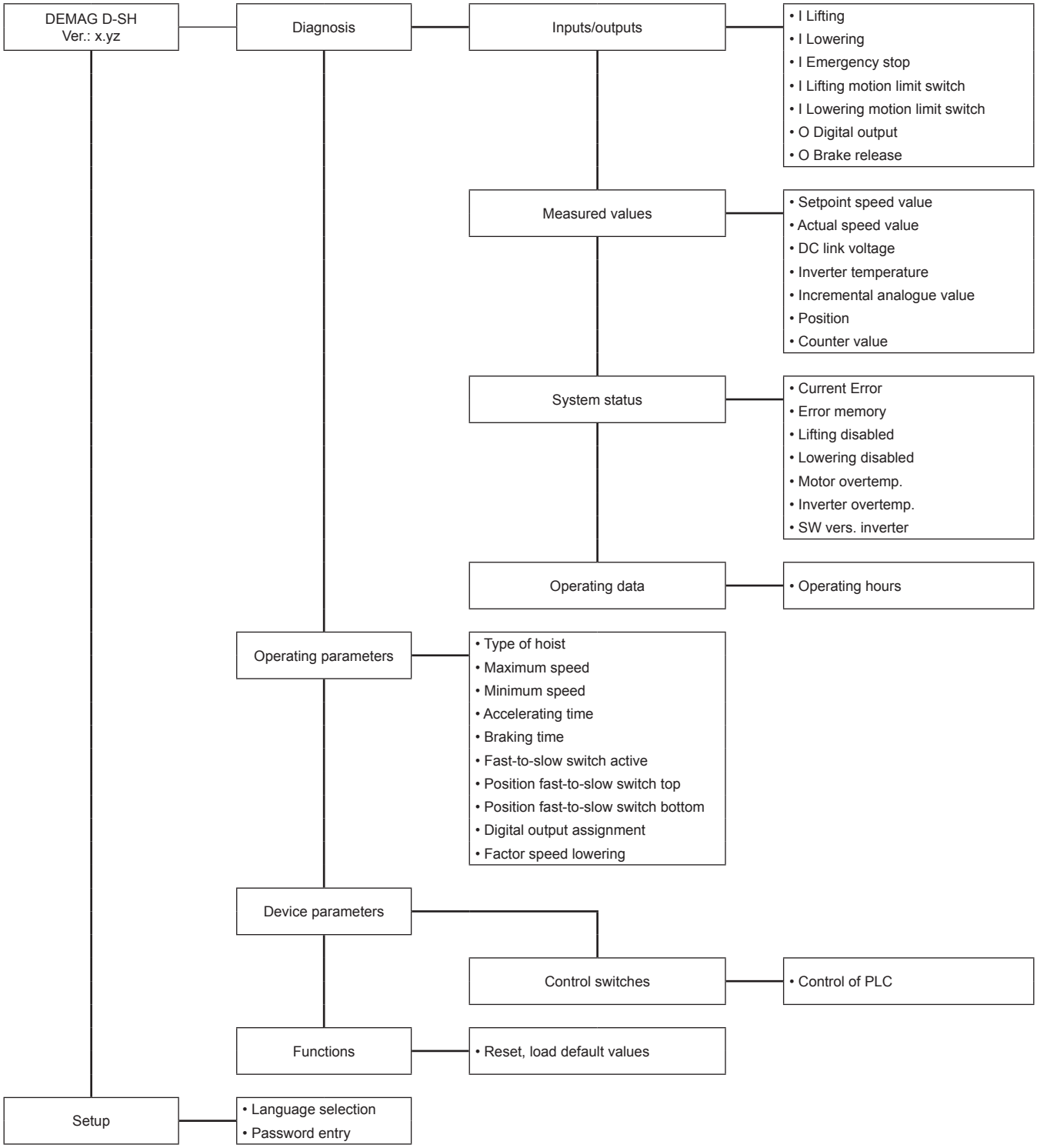
7.7.2.4 Menu structure and parameters

The diagram below shows the menu tree and the available parameters and diagnosis variables.



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7.7.2.5 Setup

Parameter name	Remark
Language selection	Here you may choose between German and English. To do this, change to edit mode and select the required language.
Password entry	Further functions can be enabled here by entering a password.

7.7.2.6 Diagnosis

(these parameters are only displayed)

Inputs/outputs The statuses of the digital inputs (I) and outputs (O) are displayed here.

Parameter name	Remark
I Lifting	Indicates whether the lifting button on the control switch is actuated
I Lowering	Indicates whether the lowering button on the control switch is actuated
I Emergency stop	Indicates whether the emergency-stop is pressed
I Limit switch for lifting	Indicates whether the emergency-limit switch in the lifting direction has been approached
I Limit switch for lowering	Indicates whether the emergency-limit switch in the lowering direction has been approached
O Digital output	Indicates whether the digital output has been set (see below)
O Brake release	Indicates whether the brake has been released

Measured values This displays various measured values.

Parameter name	Remark
Setpoint speed value	Displays the setpoint speed value currently supplied to the inverter by the control system.
Actual speed value	Displays the measured actual speed value.
DC link voltage	Displays the value of the link voltage of the inverter.
Inverter temperature	Displays the temperature measured on the control board.
Incremental analogue value	Displays the digitalised analogue value of the control switch.
Position	Displays the position measured from the upper limit switch (lower side guide plate to upper side buffer).
Counter value	Displays the counter value of the incremental encoder.

System status Status messages and error messages are displayed here for trouble-shooting.

Parameter name	Remark
Current error	Displays the currently pending error, if a malfunction has occurred.
Error memory	Displays the last 10 errors with operating hour and frequency. To do this, go to edit mode with the (↵) key, you can then scroll in the error list with the (↑) and (↓) keys.
Lifting disabled	Displays that lifting has been disabled, e.g. overload or upper limit switch approached.
Lowering disabled	Displays that lowering has been disabled, e.g. overload or lower limit switch approached.
Motor overtemperature	Displays that the motor temperature has been exceeded.
Inverter overtemperature	Displays that the inverter temperature has been exceeded.
Software vers. inverter	Displays the software version of the inverter.

Operating data Operating hours are counted as soon as the brake has been released.

Parameter name	Remark
Operating hours	Displays the operating hours.

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7.7.2.7 Operating parameters

Parameter name	Unit	Value		Range	Remark
		Minimum	Maximum		
Type of hoist					Displays the type of hoist.
Maximum speed	rpm	800	5200	100	The maximum speed can be set here. These speeds correspond to the speeds listed in the table (approx.). For maximum speeds < 2500 the Pro-Hub function is no longer active.
Minimum speed	rpm	0	200	1	The minimum speed can be changed here.
Accelerating time	ms	300	5000	100	The acceleration time is changed here. The acceleration time is the time needed to accelerate from speed 0 to maximum rated speed, i.e. the longer the acceleration time, the flatter is the acceleration ramp.
Braking time	ms	100	1000	100	The braking time is changed here. The braking time is the time needed to brake down from rated speed to standstill, i.e. the longer the braking time, the flatter is the braking ramp.
Fast-to-slow limit switch activated		Yes	No		The fast-to-slow limit switch can be de-activated here (see section 5.7.7 “Fast-to-slow limit switch function”) When the fast-to-slow limit switch is de-activated, only a reduced speed is possible.
Position fast-to-slow limit switch top	mm	70	2000	5	When the position of the upper fast-to-slow limit switch is reached, the maximum speed is reduced to approx. 35 % of the rated speed, until the limit switch has been reached and completely switches off the D-SH.
Position fast-to-slow limit switch bottom	mm	70	2000	5	When the position of the lower fast-to-slow limit switch is reached, the maximum speed is reduced to approx. 35 % of the rated speed, until the limit switch has been reached and completely switches off the D-SH.
Assignment digital output		**Note** The digital output cannot be used for the control of safety relevant functions.			Ready for operation/ Emergency limit switch for lifting/ Emergency limit switch for lowering/ Fast-to-slow limit for lifting/ Error/ Hoist enable/ Release brake
Factor speed lowering	%	70	100	1	The lowering speed compared with the lifting speed can be reduced here.

Conversion of speed (rpm) into lifting speed (m/min)

n_N [rpm]	D-SH 80 Lifting speed [m/min]	D-SH 160 Lifting speed [m/min]
5200	76	38
4800	70	35
4000	58	29
3200	47	23,5
2400	35	18
1600	23	11,5
800	12	6

7.7.2.8 Device parameters

Control switches

Parameter name	Value		Remark
	Minimum	Maximum	
Control of PLC	Yes	No	The input interface can be set to linear PWM control here (see also section 7.7.4 “Control of PLC”).

Functions

Parameter name	Remark
Reset	Loads the default values The factory setting of the parameters can be restored here (see section 7.7.3 “Documentation of parameters”).

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7.7.3 Documentation of parameters

The factory setting is restored by a reset of the parameters in the “Functions” menu item.

Parameter name		Factory setting	Value:
Operating parameters			
D-SH type		D-SH	
Maximum speed	[rpm]	4800	
Minimum speed	[rpm]	1	
Accelerating time	[ms]	400	
Braking time	[ms]	200	
Fast-to-slow limit switch activated	No – Yes	Yes	
Position fast-to-slow limit top	[mm]	70	
Position fast-to-slow limit bottom	[mm]	70	
Assignment digital output		Ready	
Factor speed lowering	[%]	100	

7.7.4 Control of the PLC

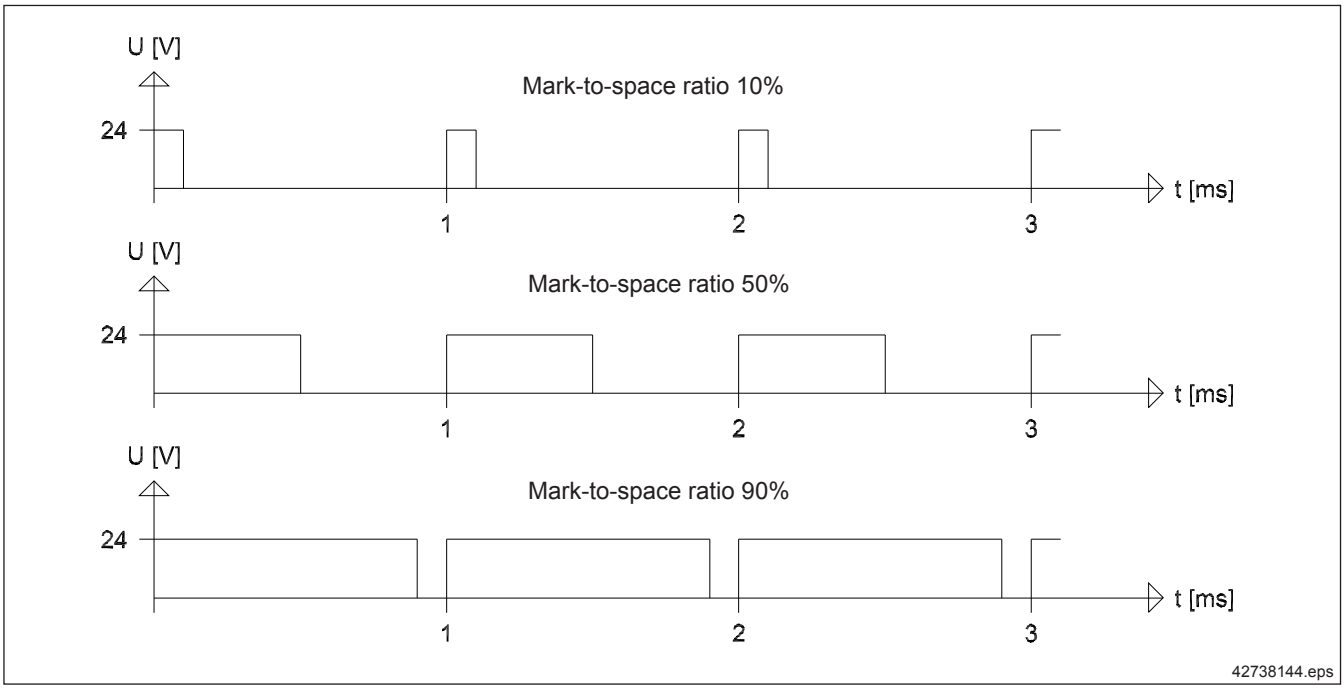
It is possible to control the D-SH hoist by means of a PLC by using defined PWM signals (pulse width modulation). The PWM signal is specified as follows:

Amplitude: 24 V DC

Basic frequency: 1 kHz

Effective adjustment range: 10...90%

The graphic below shows the example of a PWM signal with 10%, 50% and 90% mark-to-space ratio (PPV).



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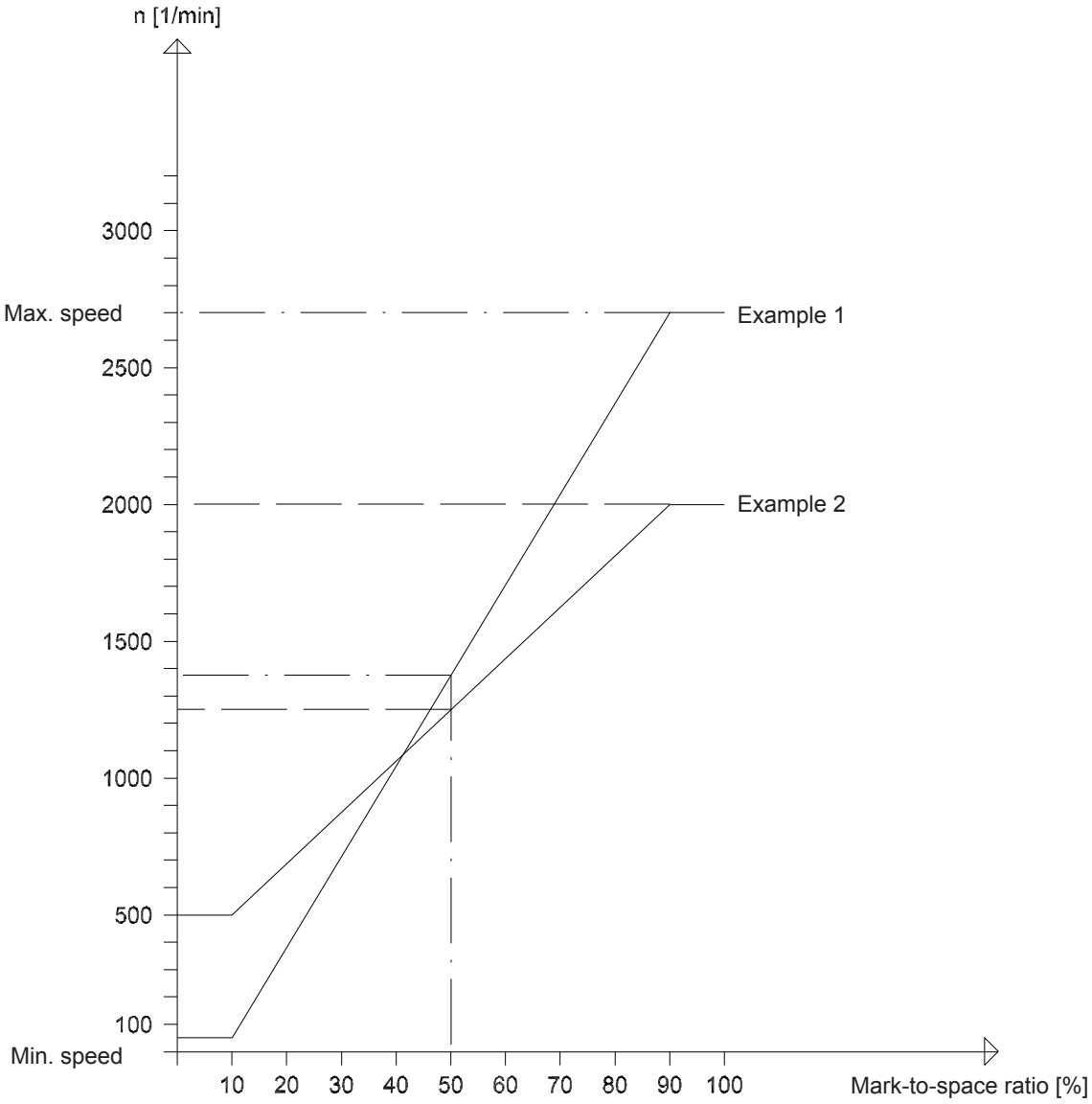

$$n = \frac{\text{Max. speed} - \text{Min. speed}}{80} (\text{PPV} - 10) + \text{Min. speed}$$

PPV = 10 ... 90%

n	Motor speed in rpm
Max. speed	Max. speed parameter
Min. speed	Min. speed parameter
PPV	Mark-to-space ratio of the PWM signal in %

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8 Maintenance

8.1 Safety instructions

In the following sections, the maintenance work required for optimum and trouble-free operation of the machine is described.

DANGER
By live components

There is a danger to life and limb due to electric current.

Work on electrical equipment may only be carried out by qualified personnel in compliance with the safety regulations.

Before starting work, switch off the electrical supply. The mains connection or isolating switch must be secured against unauthorised or accidental switching on by means of a padlock.

WARNING
Danger of burns!

After operation of the D-SH hoist, there is the danger of burns by contact.

Do not touch the heated motor housing. Before commencing any maintenance work, first allow motor to cool.

WARNING
Inappropriate maintenance work

Danger to life and limb. Danger of material damage.

Maintenance work may only be carried out by authorised and instructed specialist personnel in compliance with the safety regulations.

- Secure and fence off the working and danger zone.
- If a work platform is used for maintenance, only use appropriate systems for the transportation of persons which ensure safe standing and working.
- Only suitable, tested and calibrated tools and accessories may be used for maintenance work.
- Only use approved spare parts.
- Wear protective clothing.
- Caution on open components with sharp edges. Danger of injury.
- Ensure the workplace is clean and in good order. Store any machine parts or fittings and tools that are not needed in such a way that they cannot fall down.
- Fit components parts appropriately. Comply with prescribed screw tightening torques. Inappropriately fixed component parts may drop and result in severe injuries.
- Welding work may only be carried out by persons with specific qualification, the requirements for welding work in accordance with DIN must be complied with. The electrode holder and earth must always be connected to the same assembly as otherwise serious damage may be caused to the hoist unit. Trolleys must not be welded or drilled.
- Customer-specific regulations must be observed.

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CAUTION
Lubricants/oils

Risk of injury resulting from contact with the body/skin.

Oils and lubricants are extremely harmful to health.

Contact with these media may result in serious damage to health (poisoning, allergies, skin irritation, etc.)

Pay attention to the manufacturer's safety data sheets and instructions.

CAUTION
Danger of injury. Danger of slipping.

Leaking oils and lubricants are hazards due to the increased risk of slipping.

Spilt oils and lubricants must be absorbed immediately by means of sawdust or oil absorbent and disposed of in an environmentally compatible way.

8.2 Basic principles for maintenance

General information maintenance / servicing

The specified inspection and maintenance intervals (see section 8.3 "Maintenance schedule") apply to normal hoist service conditions. In the course of the annual inspection, all wearing parts are checked.

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

Electrical components

In the circuits, only fuse links with specified amperage and tripping characteristics may be used. Defective fuse links must not be bridged.

When working on machinery or parts of the machine, observe the following:

1. Wear personal protection equipment.
2. Before starting maintenance work, switch off the mains connection switch and protect it against unauthorized or accidental reconnection to the supply by locking the switch with a padlock.
3. Make sure that the D-SH hoist is switched off and checked that it is de-energized and, in special cases, isolated.
4. Only carry out maintenance work on the D-SH when the load has been removed.
5. Ensure that there is sufficient space to move. Ensure the workplace is clean and in good order. Loose components and tools left lying loose are sources of accidents.
6. Stop all moving parts and ensure that they cannot start moving while maintenance work is being performed.
7. Observe the relevant accident prevention regulations, instructions concerning appropriate use and statutory regulations for operation and maintenance.
8. Observe the relevant safety regulations when repairing electrical equipment.
9. After maintenance work, appropriately install the protective devices again and check for functioning.

Maintenance work which is not possible from the floor may only be carried out from work stands or platforms. If there is a risk of objects falling, the danger zone below the D-SH hoist must be fenced off.

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Instructions for maintenance work in the course of operation

If maintenance work on the D-SH hoist must be carried out in the course of operation, special safety precautions are necessary, depending on the operating situation. In each individual case, the owner or the person assigned by him must check whether the maintenance work may be carried out in the course of operation without risk of personal injury and, taking into account the local conditions, implement all necessary safety precautions.

Replace damaged or deformed spring clip fasteners and split sleeves.

Defective bolted connections must be replaced.

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

8.3 Routine inspections

8.3.1 Specified inspections

WARNING
Non-compliance with operating and maintenance regulations

Danger to life and limb.

Specified tests and inspections must be carried out.

- An annual inspection as specified, for example, in German accident prevention regulations UVV/BGV D8 § 23 (2) and BGV D6 (1) must be carried out.
- Adjustment, maintenance and inspection activities and inspection deadlines including specifications concerning replacement of parts/assemblies prescribed in the operating instructions must be observed.

This work may only be carried out by specialists.

NOTE

Hoists and cranes must be inspected by an experienced technician at least once a year. Routine inspections mainly consist of a visual inspection and a function check which should include a check to determine the condition of components and equipment regarding damage, wear, corrosion or other alterations and a check to determine the integrity and efficiency of safety devices.

Routine inspections must be carried out in accordance with BGV D6 and ZH 1/27 “Principles for the inspection of cranes” in Germany. The results of the inspection must be entered into a test and inspection booklet.

It may be necessary to dismantle the unit in order to inspect wearing parts.

Load carrying means must be inspected along their entire length, including those parts which cannot normally be seen. Defective parts and components and parts close to failure must be replaced.

In this respect, please also pay attention to chapter 9 “Measures necessary for achieving safe working periods” and section 8.4 “Maintenance schedule”.

All inspections must be arranged and documented by the owner.

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8.3.2 Service life of the contactor

The switchgear is subject to wear during operation of the D-SH hoist. Its service life has been rated for the specified loading group. In the case of extreme switching frequencies, premature wear is possible.

	Reeving	Display value C for U_{nom} 380 - 575 V	Display value C for U_{nom} 220 - 240 V
D-SH 80/160	1/1	80	80

The display value C indicates the service life of the contactor to be expected multiplied by 100.000. This value was determined under normal operating conditions. For other conditions, the service life of the contactor may be shorter or longer. We recommend that the contactor or the control module be replaced when the relevant display value has been reached.

8.4 Maintenance schedule

NOTE

The specified inspection and maintenance intervals apply to normal operating conditions. If routine maintenance reveals that the intervals are too long, they should be reduced in line with the specific operating conditions.

Only use genuine Demag parts for repairs.

The use of spare parts not approved by Demag renders any liability and liability for defects claims void.

Check before first putting into operation and before starting work

Activity	See section	Before first putting into operation	When starting operation	During the annual inspection
Check continuity of the PE conductor connections	-	X		
Check emergency stop device	7.5	X		X
Check 7-segment display	8.5	X	X	
Check rope securing devices and rope guide	8.8	X		X
Check rope for damage and broken wires	8.7		X	X
Check electrical switchgear and wiring	6.3	X		
Check control cable and control unit housing for damage	-	X	X	X
Check operation of the limit switches for lifting and lowering	6.4.3	X	X	X
Check the slipping clutch function for fitting the load handling attachment	8.13	X		X
Check operation of the brake	8.11	X	X	X
Check quick-change coupling	7.2	X	X	X
Check hook and hook safety catch	8.14	X	X	X

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Check during operation

Activity	See section	Before first putting into operation	When starting operation	Every 6 months	During the annual inspec-tion
Read operating hours for determining the remaining duration of service	8.5 and 9				X
Read the C switching cycles	8.3.2				X
Check operation of the slipping clutch	8.13				X
Check all connections (bolts, weld seams etc.)	-				X
Lubricate rope	8.9				X
Check trolley, load bar and status of buffers	6.2				X
Check load hooks for cracks, deformation and wear	8.14				X
Check hook safety catch for deformation	8.14				X
Check hook bearing for wear	-				X
Check suspension, securing elements (clips, bolts, etc.) for tight fit and corrosion	-				X
Check and apply or supplement corrosion protection, as required	-				X
Renew oil/grease lubrication	3.3	Every 4 – 10 years			
Clean and oil limit switch rods	-				X
Check plastic components of limit switch for corrosion	-			X	
Sealings of electrical connections and connection enclosures	-				X
Check electrical enclosure and gearbox for leakage	-				X
Check electrical switchgear and wiring	3.2 and 6.3				X
Check external fan function	-			X	
Check brake displacement	Every 3 years				
Check brake wear	Every 10 years				

General overhaul

Activity	Before first putting into operation	When starting operation	Every 6 months	Once per year
The general overhaul should coincide with the annual inspection	**On reaching the theoretical duration of service**			
Fit D-SH hoist-specific Demag GO set	X			

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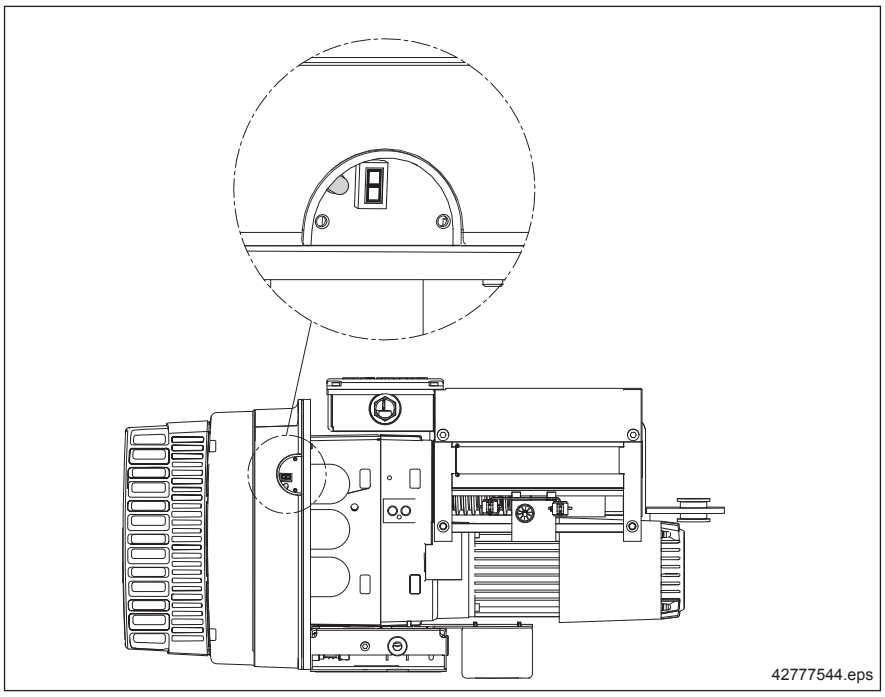
8.5 Display of operating hours / statuses

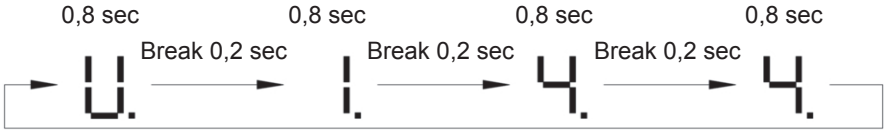
The 7-segment display is located on the bottom of the D-SH hoist in the electrical equipment cover behind a semi-circular window. The following operating information can be displayed. For further displays of warning messages and error statuses, see sections 10.2.



Software version

Every time, power is switched on or after an emergency-stop, the software version is first displayed (from software version 1.44).

Example: Software version 1.44



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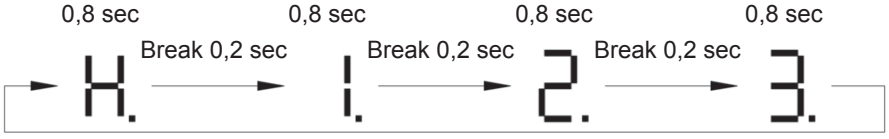
Operating hours

Display appears after approx. 5 sec without lifting motion (example 123 operating hours)



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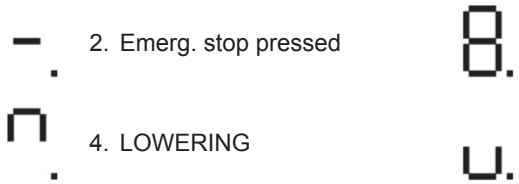
Operating statuses

1. Flashing: READY
2. Emerg. stop pressed
3. LIFTING
4. LOWERING



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8.6 Wire rope

8.6.1 Construction, application and reeving of wire ropes

RH = right-hand ordinary lay rope

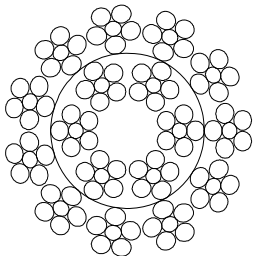

Figure 1

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RH = right-hand ordinary lay rope

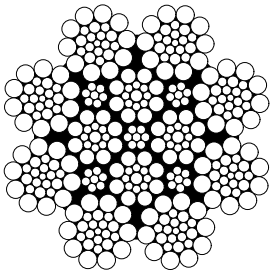

Figure 2

42579544.eps

Range	D-SH	
Wire rope diameter	5 mm	
See figure	1	2
11,0 m rope length part no. 1)	826 623 44	826 435 44 2)

8.7 Discarding the wire rope

The following information on the assessment and maintenance of wire ropes has been compiled on the basis of German, European and international standards as well as relevant trade literature and is to be regarded only as the most significant information that is not intended to be complete, but to help the owner of a D-SH hoist to become familiar with the subject of “Discarding wire ropes”. Furthermore, all national standards, regulations or any legislation of other countries must be fulfilled and considered together with the above information or they take priority, as applicable.

Assessment of the discard criteria of wire ropes requires many years of experience and expert knowledge.

An assessment may only be carried out by a Demag service engineer or by a corresponding specialist.

A visual check must always be carried out over the entire length of the rope, including points which cannot normally be seen, critical points must be inspected with particular care and attention.

CAUTION Cutting and tearing injuries

When working with and on wire ropes, cutting and tearing injuries may be caused by broken wires on the wire rope.

Always wear robust working gloves when working with or on wire ropes.

NOTE

In order to discover broken strands more easily, the load must be removed from the unit and the rope bent manually along its entire working length. The bending radius should be approximately that of the rope sheaves.

A wire rope must be discarded when its condition is no longer considered to be safe for further operation. Wire ropes must be discarded when the number of visible broken load-carrying wires in the external strands at the worst spot has reached the following figures (see table 2), counted over a reference length of rope of 6 times or 30 times the rope diameter, whichever gives the worst result.

1) Specify any special lengths/special construction in your order

2) Standard rope suitable for return load

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Critical points are, e.g.:

1. Rope zones subject to the highest number of alternating bending cycles and in particular to alternative deflection.

   This also applies to rope zones on compensating sheaves which are subject to a very high number of reversed bending cycles due to rope swing or uneven winding on rope drums. These rope sections show increased abrasion and a higher number of broken wires.
2. The zones at which loads are picked up, i.e. rope zones which are on a rope sheave during a preferred load pick-up point or are wound up onto or off a rope drum.
3. Rope anchorages loading the wire rope in addition to normal tensile load. Vibrations in the transition area and moisture penetrating into the rope anchorage result in corrosion and broken wires.
4. Rope zones on rope drums. The load pick-up point on the rope drum is subject to increased wear (abrasion, broken wires and/or structural changes).
5. Rope zones exposed to aggressive media, general weather conditions or high temperatures. Observe the specifications of the manufacturer of the wire rope and the lubricant used.

NOTE

The rope may be replaced by Demag service engineers or an authorized specialist company.

Wire ropes for D-SH units can be supplied direct from our plant in Wetter or through our distributors.

Table 2: Wire ropes must be replaced to ISO 4309, table 1, when the following numbers of broken wires are visible

Size	Rope construction as in fig.	Rope dia. mm	Number of broken wires over a rope length of 6 x rope diameter		Number of broken wires over a rope length of 30 x rope diameter	
			Number of broken wires	Rope length mm	Number of broken wires	Rope length mm
D-SH	1	5	3	30	6	150
	2					

RH = right-hand ordinary lay rope

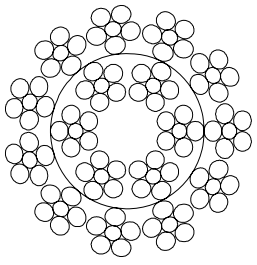

Figure 1 92069044.eps

RH = right-hand ordinary lay rope

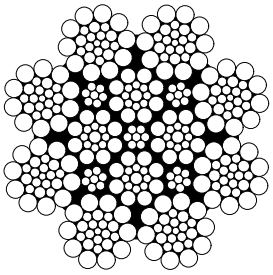

Figure 2 42579544.eps

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8.8 Removing/fitting the rope

8.8.1 Unwinding the rope

Before a rope is reeved, the whole length of the rope should be rolled out on the ground as shown in fig. 2. Any twisting of the rope should be strictly avoided.

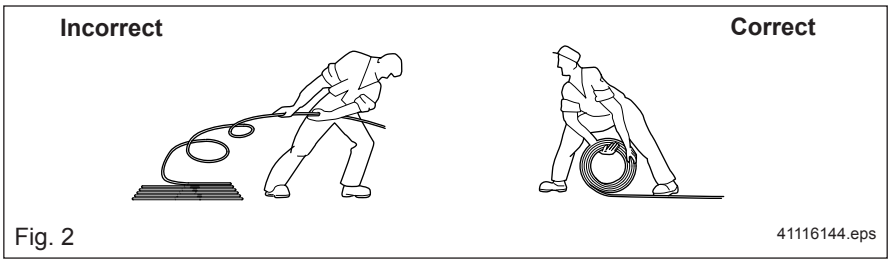


Fig. 2 41116144.eps

WARNING
Pre-stressed components

Danger to life and limb.

Pay attention to the following hazards when replacing wire ropes:

– Crushing hazard/cutting hazard
– Shearing hazard
– Hazards arising from gripping or winding
– Hazards arising from drawing-in or entanglement

CAUTION
Cutting hazard

When rolling out the wire rope, there is the danger of cutting fingers/ hands on sharp edges of the wire rope.

Always wear protective gloves when working with the wire rope.

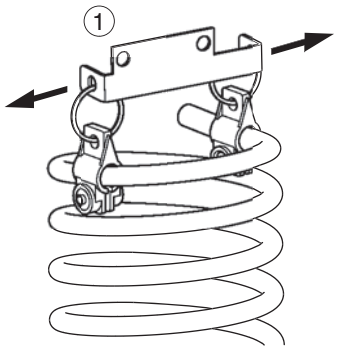
WARNING
Danger of crushing and gripping

When the rope is removed and fitted, there is the danger of crushing and gripping of parts of the body and limbs.

When working on the unit, make sure

- that during removing or fitting the rope no limbs are drawn-in between rope and rope guide, crosshead, top or bottom block.
- that there are no persons in the immediate danger zone.

8.8.2 Removing the rope



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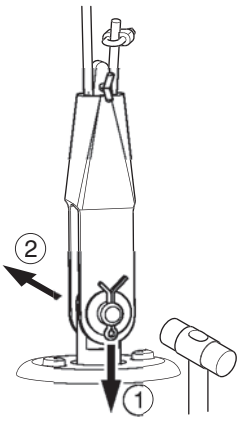

Lay the grip on its side, disconnect connections in switchgear cabinet, as required

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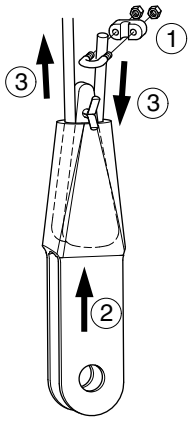

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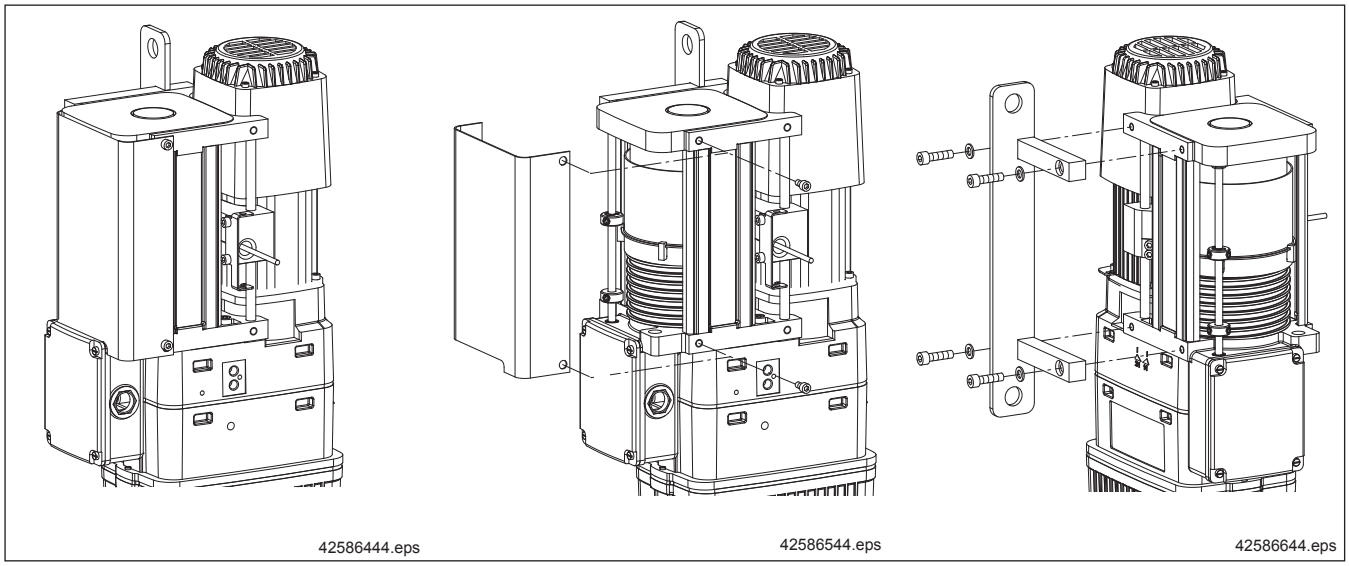

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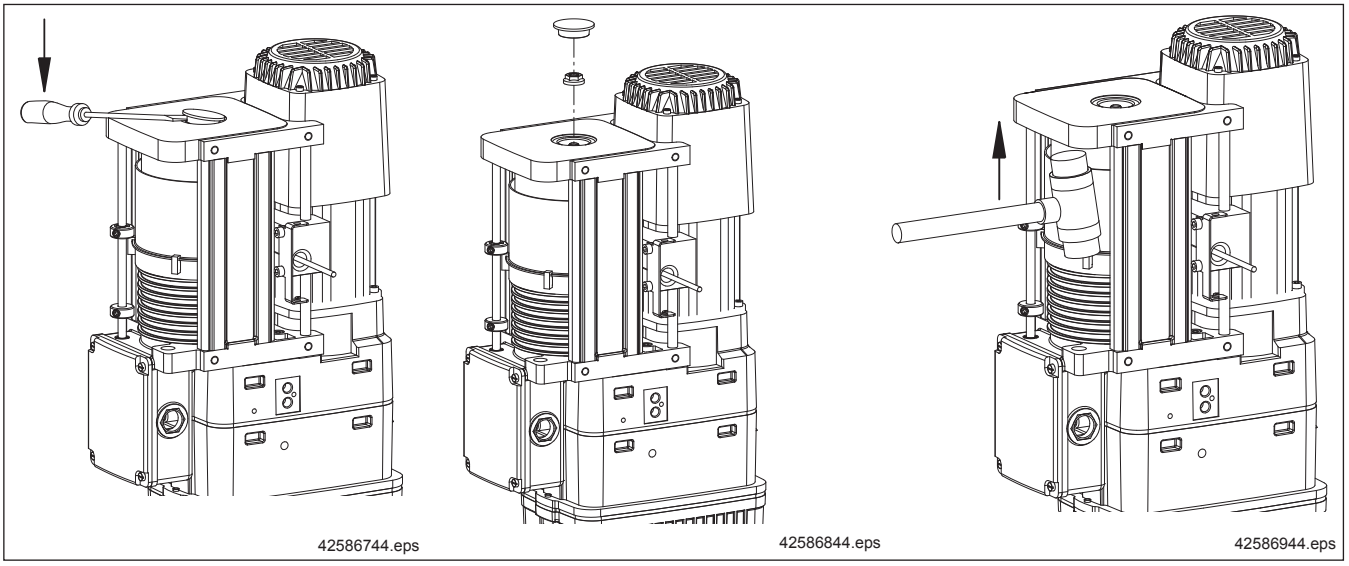

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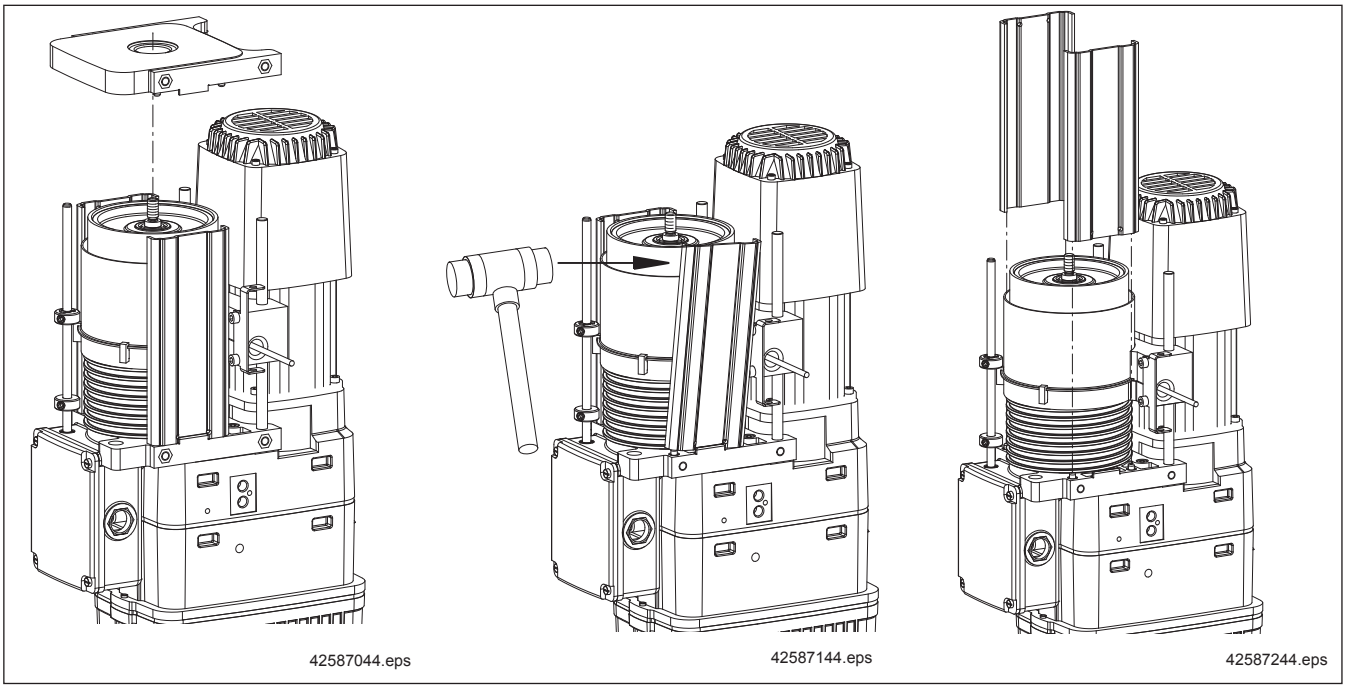

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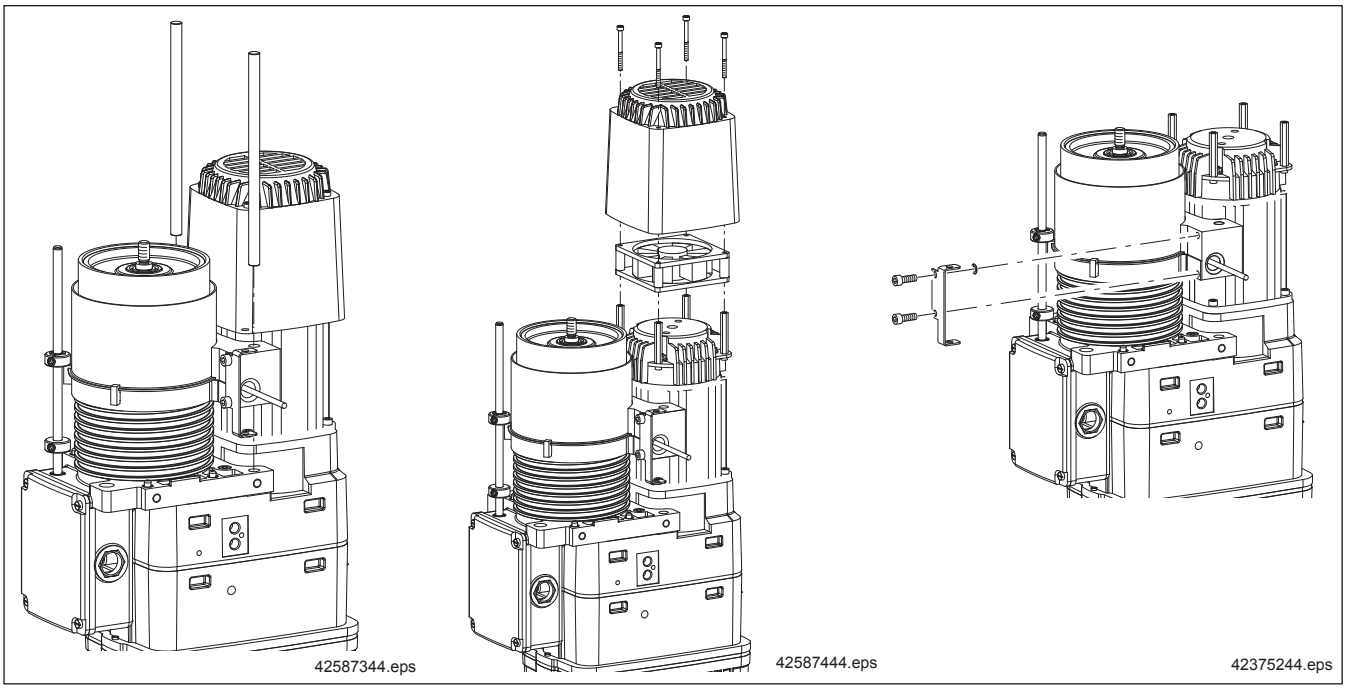

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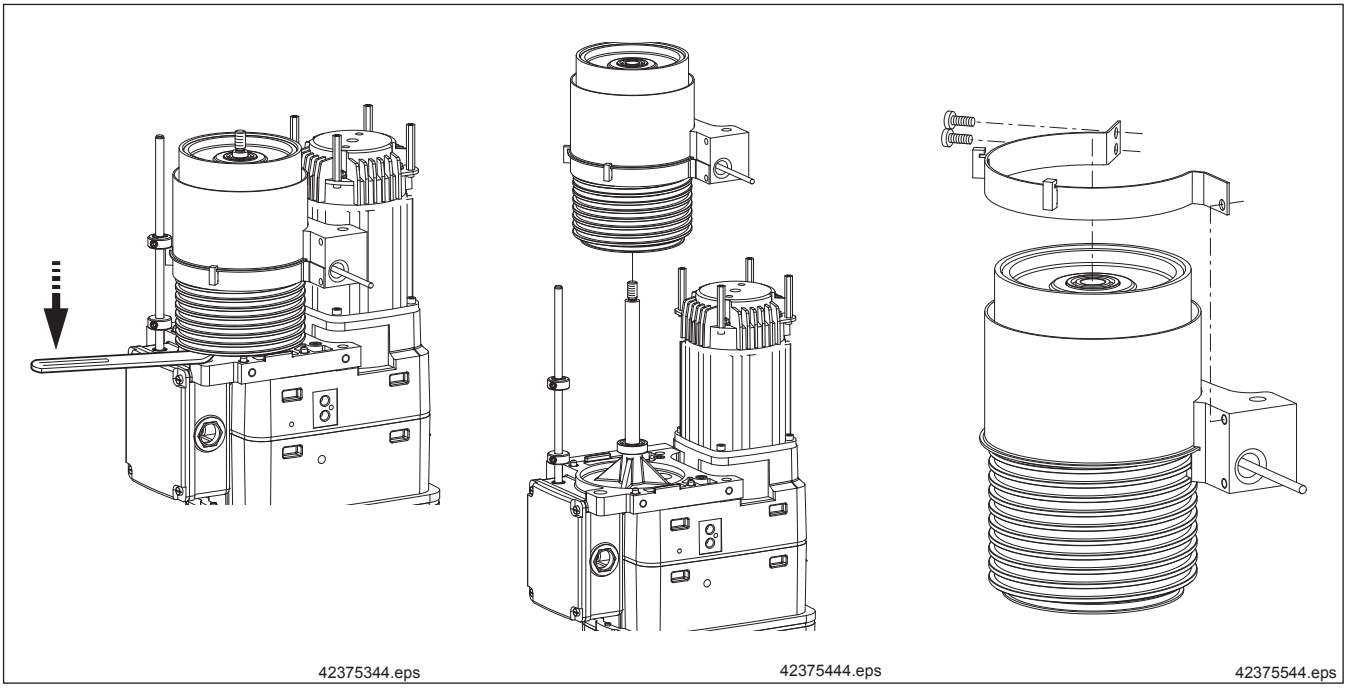

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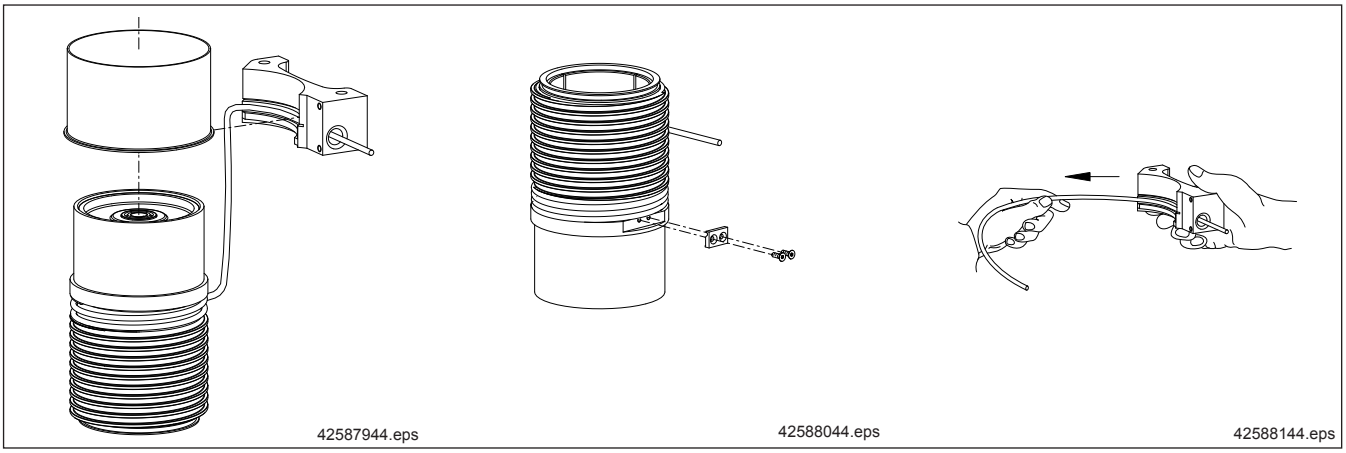

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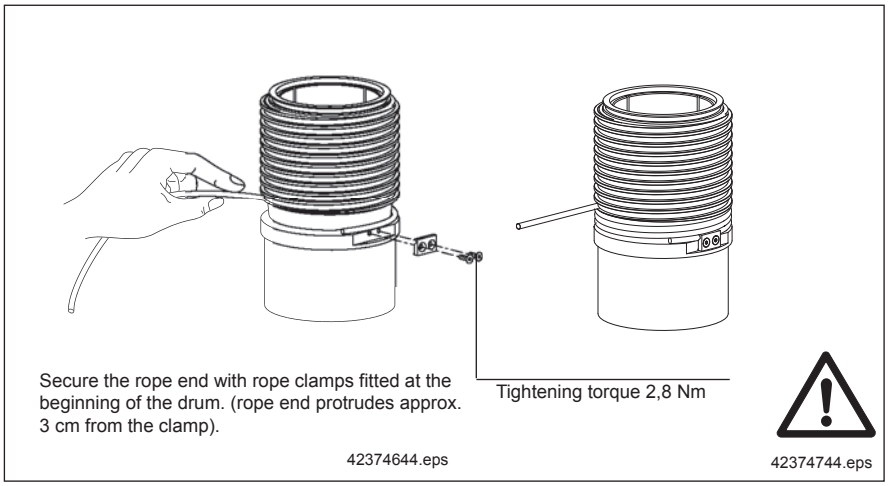
8.8.3 Fitting the rope

Secure the rope end with rope clamps fitted at the beginning of the drum. (rope end protrudes approx. 3 cm from the clamp).

For construction, application and reeving of wire ropes for the D-SH, see section 8.6.1.

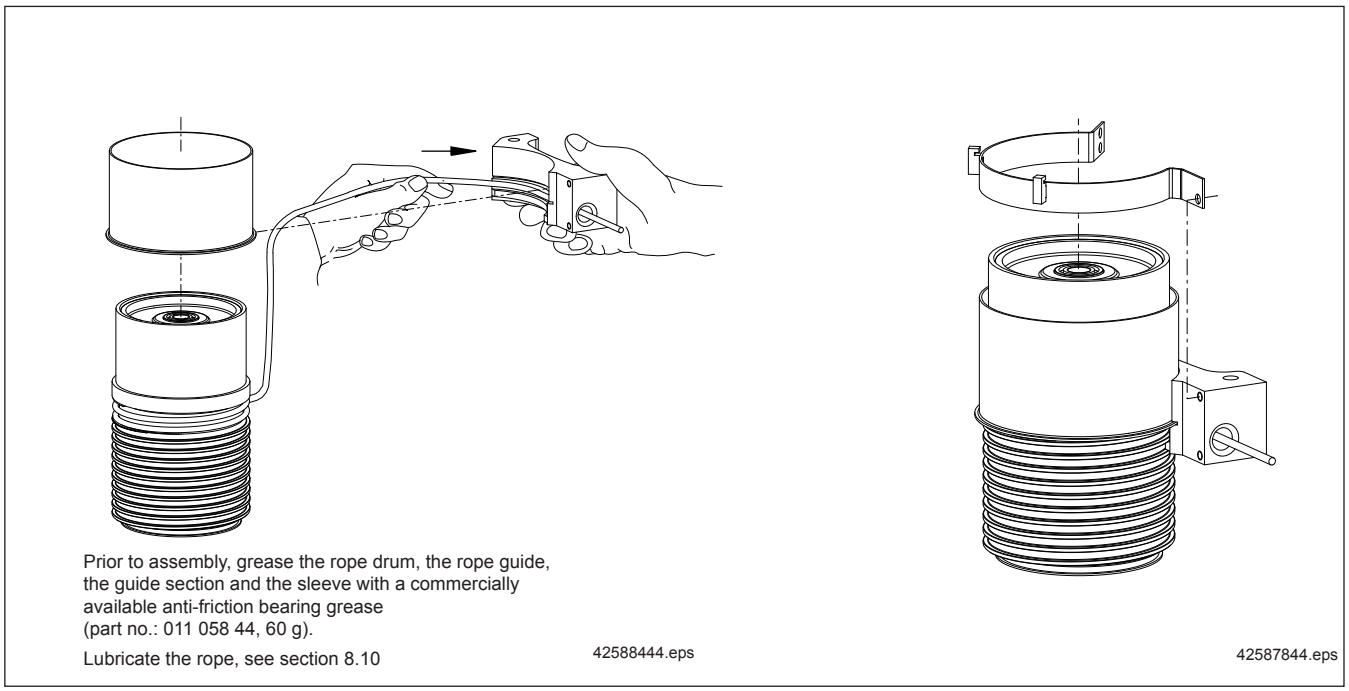


CAUTION Danger by loose connections

Loose connections are a danger to life and limb.

Apply the tightening torques specified in the following.

Tightening torque 2,8 Nm



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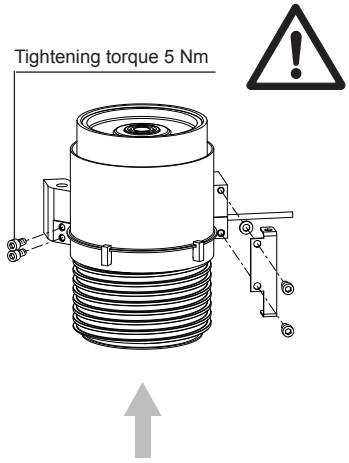

Grease the internally toothed rim of the rope drum before assembly
(part no.: 011 058 44, 60 g).

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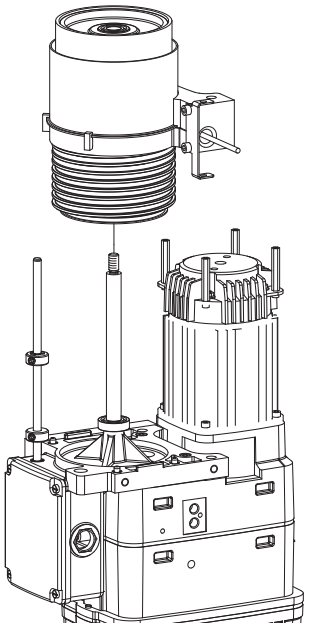

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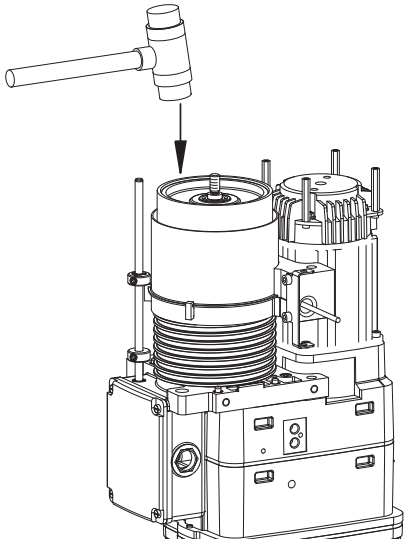

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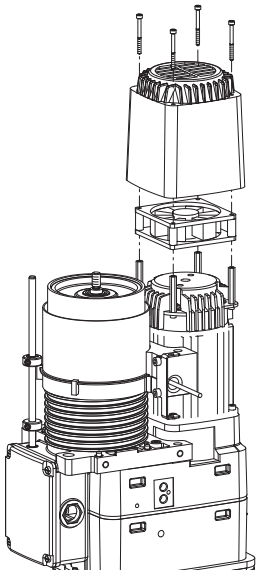
CAUTION Danger by loose connections

Loose connections are a danger to life and limb.
Apply the tightening torques specified in the following.
Tightening torque of the drum fastening 5 Nm



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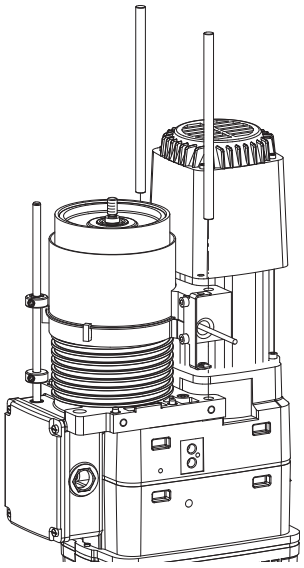

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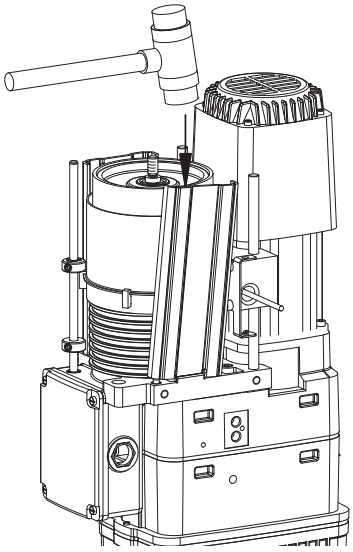

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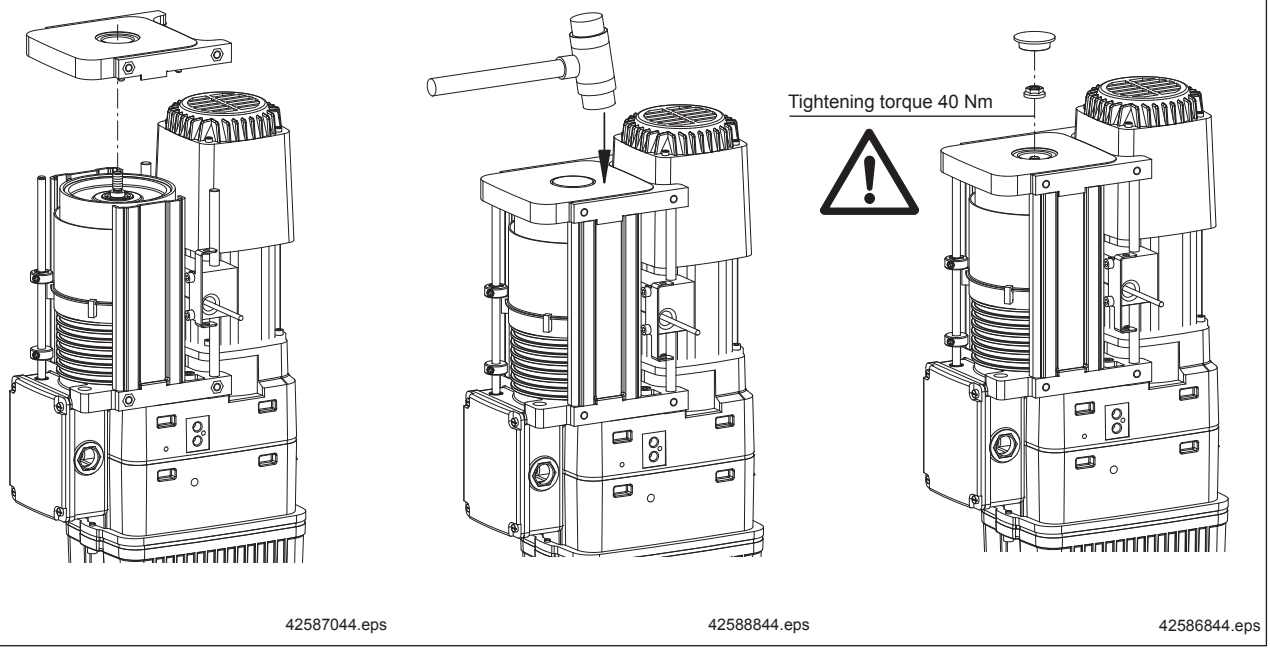
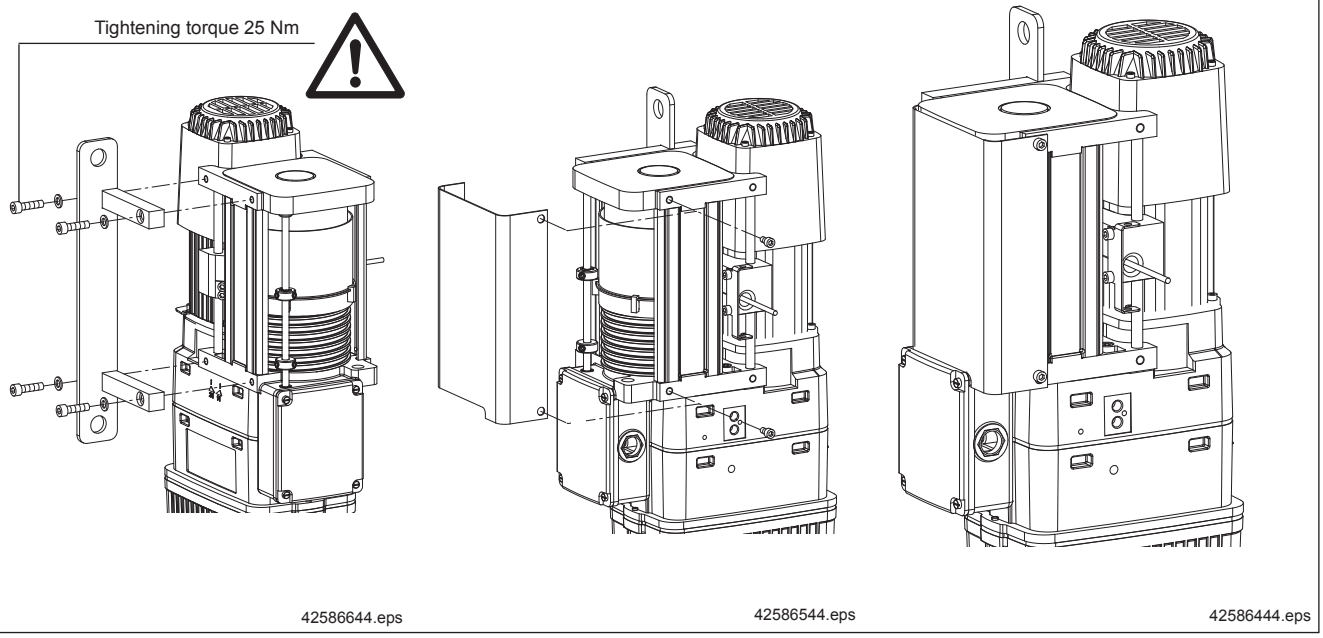


CAUTION Danger by loose connections

Loose connections are a danger to life and limb.
Apply the tightening torques specified in the following.
Tightening torque of flange fastening 40 Nm



CAUTION Danger by loose connections

Loose connections are a danger to life and limb.
Apply the tightening torques specified in the following.
Tightening torque of the crosshead fastening 25 Nm

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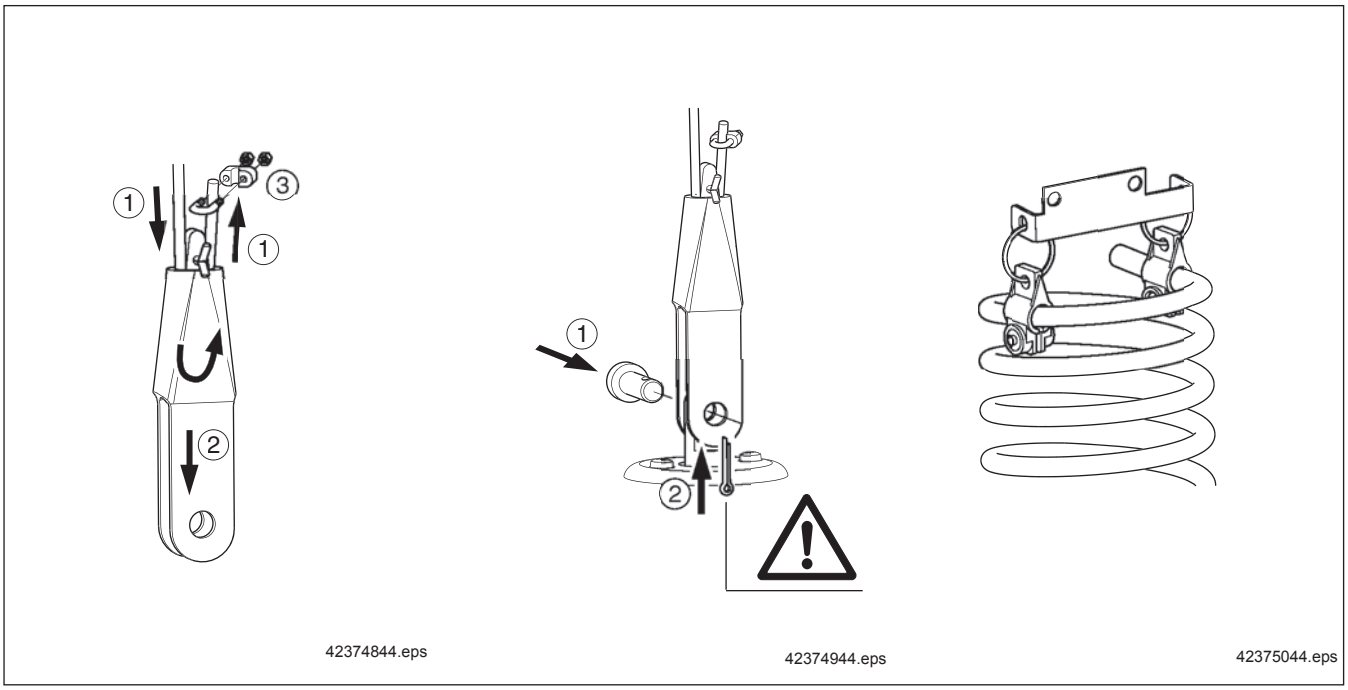

CAUTION Danger by loose connections

Loose connections are a danger to life and limb.

Make sure that split pins, retaining rings, split sleeves etc. are appropriately fitted.

Apply the tightening torques specified in the following.

Tightening torque of rope clamp 3 Nm

8.9 Shortening the wire rope

See section 6.9.3

8.10 Lubricating the wire rope

The rope must be lubricated with gear oil ELP 220. Ensure that the oil reaches the interior of the rope structure, part no. 665 013 44.

Grease the bearing points of the top block, crosshead, compensating sheave, the pin of the rope anchorage and the guide rod of the rope guide with a commercially available anti-friction bearing grease, part no. 472 933 44.

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8.11 KDP 63 hoist motor brake

Functioning of the brake on the hoist motor can be tested by interrupting the “Grip occupied” detection of the D-Grip. When the “Grip occupied” detection is interrupted, the brake is released, when the “Grip occupied” detection is enabled, the brake is applied.

8.11.1 Measuring the brake displacement

WARNING Danger by brake failure

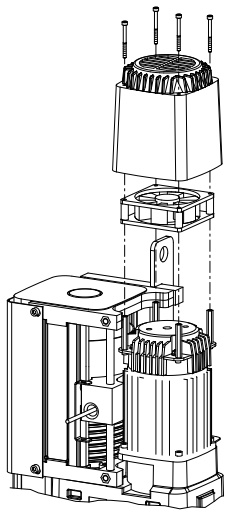
A brake displacement which is too large > 1,2 mm may result in failure of the brake.

It is imperative that the brake displacement is measured at regular intervals.

This work may only be carried out by specialist personnel.

Observe relevant safety regulations and codes of practice and the instructions contained in chapter 2 “Safety”.

The brake disk must be replaced when the maximum displacement of 1,2 mm is reached.



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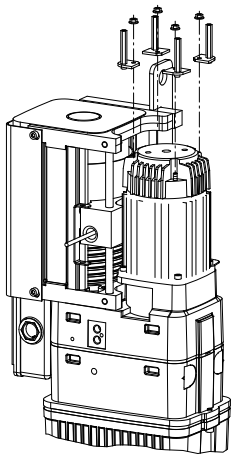

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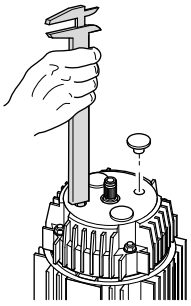

Remove plug and measure brake displacement using depth gauge of sliding calliper.

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The brake displacement must be between min. 0,3 mm and max. 1,2 mm.

Measure brake displacement in braking and running position at both openings of the brake casing. Use both measurements to calculate mean value.

The brake disc must be replaced (see 8.11.2 Replacing the brake disc) if the brake displacement is > 1,2 mm.

If the measurement is within the above tolerances, re-assemble motor.

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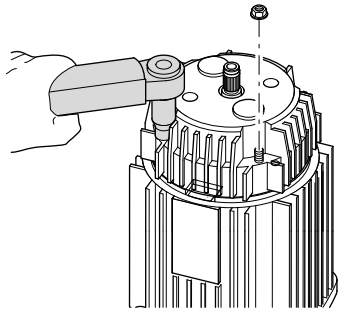
8.11.2 Replacing the brake disc

NOTE

This work may only be carried out by specialist personnel.

Observe relevant safety regulations and codes of practice and the instructions contained in chapter 2 “Safety”.



Loosen and remove the 4 nuts.

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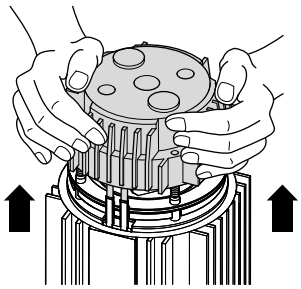

Remove brake cover.

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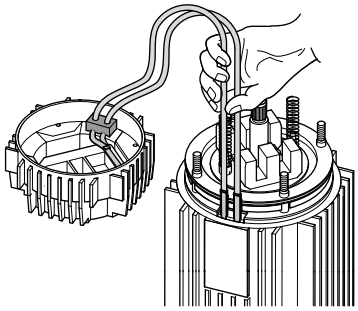

Pull cables out slowly until resistance is felt.

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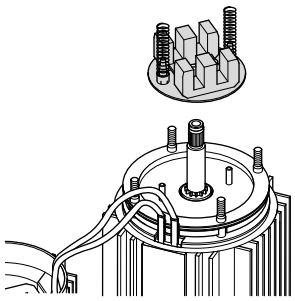

Remove armature disc.

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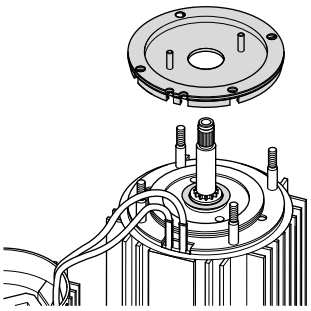

Remove friction plate with lip seal.

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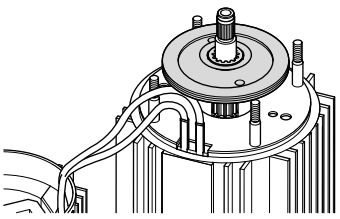
Remove brake disc and thin seal,
fit new brake disc and seal.

NOTE

Long hub side must face motor.



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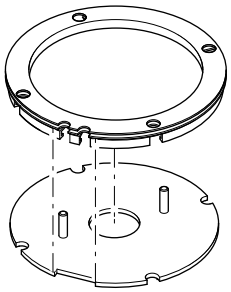

Fitting the lip seal
Fit lip seal to friction plate.

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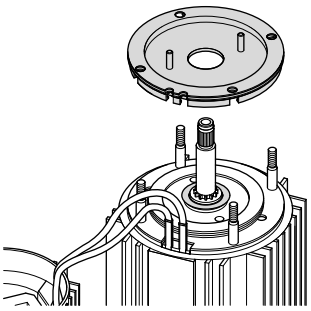

Fit friction plate with lip seal.

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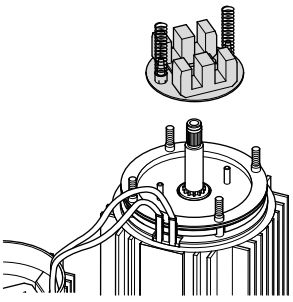

Fit armature disc.

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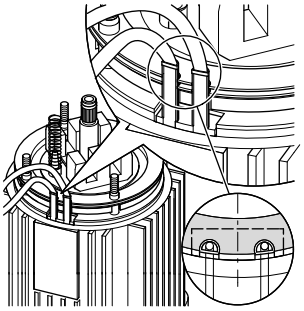

NOTE

Ensure correct fit of lip seal. The cable duct must lie in the recess of the lip seal.

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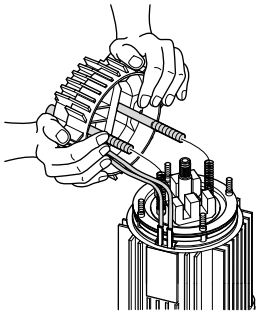

Use two 6 mm dia. bolts or pins (as assembly aid) to guide the brake spring.

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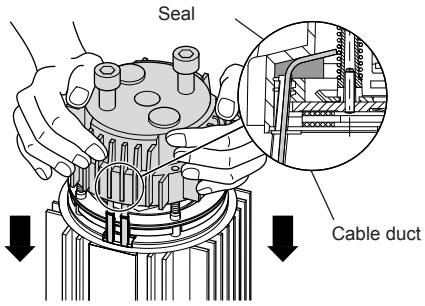

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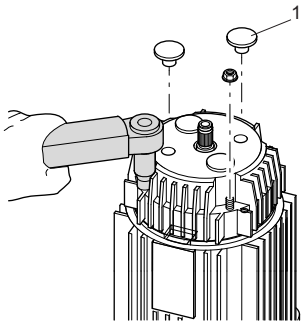
Fit brake casing.

Keep cables pulled tight during assembly.

Then remove assembly guide.

NOTE

Seal in brake enclosure must always be in contact with the cable duct.



Tighten the 4 nuts with a tightening torque of 3 Nm and fit plugs (1).

CAUTION
Danger by loose connections

Loose connections are a danger to life and limb.

Apply the tightening torques specified in the following.

Tightening torque of motor nuts 3 Nm

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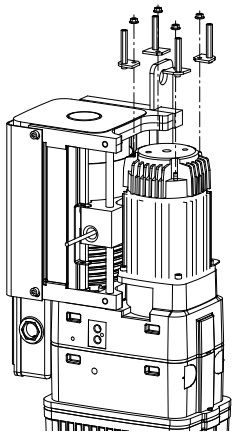

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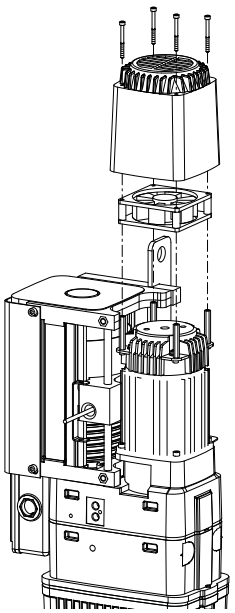

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8.12 Oil change

8.12.1 Safety instructions

CAUTION Danger of injury. Danger of slipping.

Leaking oils and lubricants are hazards due to the increased risk of slipping.

Spilt oils and lubricants must be absorbed immediately by means of sawdust or oil absorbent and disposed of in an environmentally compatible way.

CAUTION
Leaking oil endangers operation

Oil leaks/loss of oil in the course of operation may cause damage to or total failure of the machine. In such a case, stop the machine and notify Service.

8.12.2 Gearbox

Oil lubrication of the first and second gearbox stages

All lubrication points of D-SH hoists are adequately greased. The gearbox is filled with oil.

Under normal operating conditions, the lubricant must be changed every 4 years, at the latest.

Under exceptional conditions, e.g. increased ambient temperatures, we recommend that oil changes be adapted to suit these conditions.

Oil change

Open the D-SH gearbox. Clean gear parts and gearbox casing thoroughly with commercially available cleaning agents. Then reassemble the gearbox. Re-fill with fresh gear oil before closing the gearbox.

Required quantity of oil = 0,2 litres

Oil grades

Gear oil with a viscosity of 220 mm²/s at 40 °C with mild high-pressure additives should be used for ambient temperatures of approx. – 10 °C to + 50 °C.

DIN 51 502 CLP 220, e.g. BP ENERGOL GR–XP 220, Esso Spartan EP 220, SHELL Omala Oil 220, Mobilgear 630 or Aral Degol BG 220.

At higher or lower ambient temperatures, the type of oil used should be adapted to the specific conditions.

NOTE

Dispose of waste oil in accordance with environmental protection requirements.

Grease lubrication of the third gearbox stage

The third gearbox stage of the D-SH hoist is lubricated with grease (approx. 60 g). We recommend that the grease filling be replaced every 4 years at the latest.

To do this, remove the drum and clean the toothed rim in the drum thoroughly with commercially available cleaning agents. Then grease the toothed rim with the new grease.

Required quantity of grease = 60 g, part no.: 011 058 44 (60 g)

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8.13 Adjusting the slipping clutch

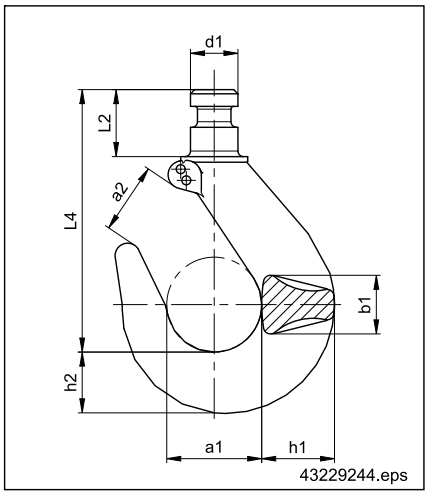
Under normal operating conditions, the slipping clutch does not need to be adjusted. The clutch runs in the oil bath and the linings are virtually wear-free. The slipping clutch is initially set in the factory. Adjustment of the slipping clutch may only be carried out by authorized specialists. An increase of the tripping torque which exceeds the factory setting is not permitted.

NOTE

A new locknut must be fitted each time the clutch lining is replaced.

8.14 Load hook inspection

If a check or inspection reveals that these components are worn beyond the dimensions specified or if cracks can be seen in these parts, they must be replaced at once. Check the hook safety catch for correct functioning and for any damage.



Demag SpeedHoist		D-SH	80	160
SWL	kg		80	160
Reeving			1/1	
Dimensions	mm	a1	30	
		$a2_{Nom}$ 1)	25,3	
		$a2_{max}$	27,83	
		b1	13	
		h1	22	
		$h2_{Nom}$ 2)	18	
		$h2_{min}$	17,1	
		L2	22	
		L4	86	
		d1	19,8	
Max. test force	kN		8	
Max. hook force	kN		16	

8.15 Replacing the helical cable on the D-SH

DANGER
Live components

Danger to life and limb.

All wiring and connection work may only be carried out by an instructed and qualified electrician according to the specifications of the electrical connection diagram included in the supply.

The D-SH is supplied with the helical cable connected. If a helical cable has to be replaced, the leads must be connected as shown in the circuit diagram.

- Disconnect D-SH hoist from power supply (mains connection switch).
- Open and disengage the service cover.
- **D-Grip:** Open analogue PWM converter. Remove the conductors of the helical cable from the terminals.
- **Rocker switch/DSM:** Loosen bayonet lock by turning and remove helical cable plug connection.
- Loosen the screw on the helical cable lock and remove the lock.
- Remove the helical cable.

Fit the new helical cable in reverse order. It must be ensured that

- the groove of the connector holder matches the swivel lock in the enclosure and
- that the two pins on the enclosure match the bayonet lock.

1) permissible deviation + 10 %
2) permissible deviation - 5 %

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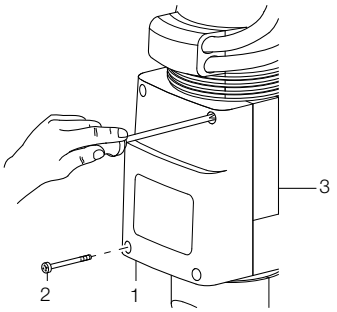
8.16 Replacing the helical cable on the DSM operating handle



Undo the four screws (2) to remove cover (1). Tighten diagonal pairs of screws when re-fitting the cover.

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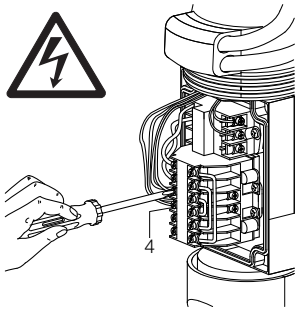

Disconnect electrical leads (4).

Only connect according to the circuit diagram, see section 6.11.

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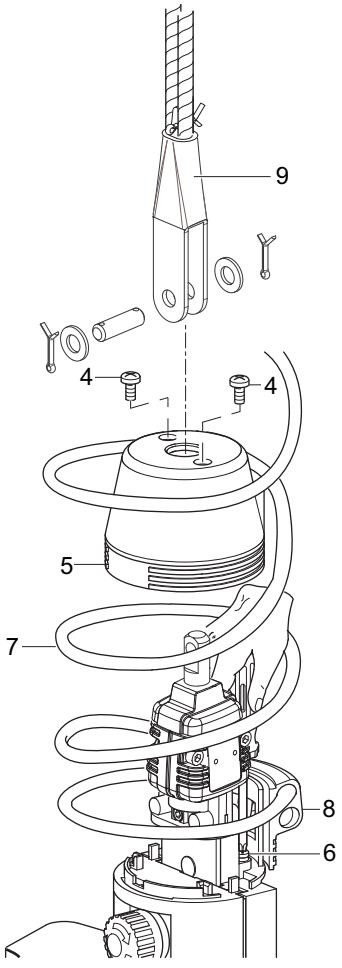

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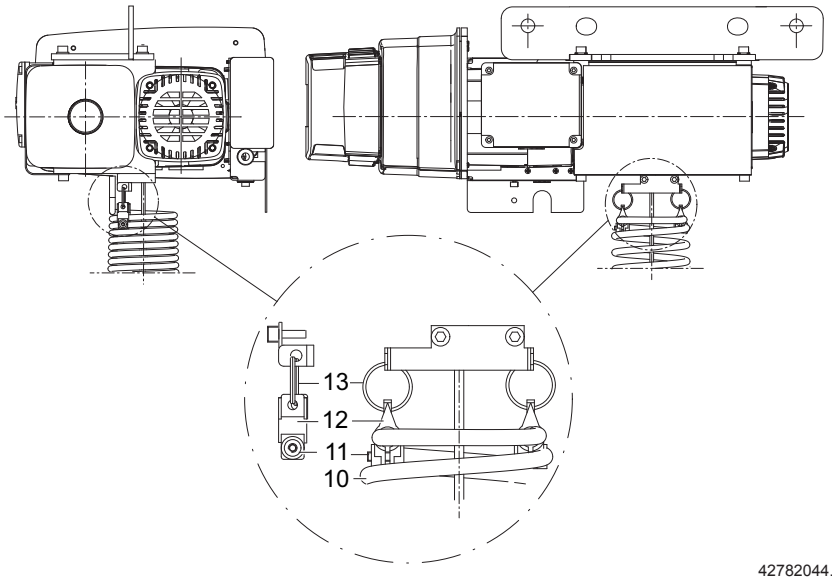

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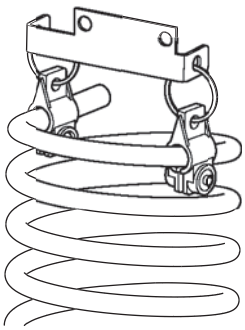

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Loosen rope socket (9) from control switch.

Loosen cap screws (4):

Pull off cap (5) upwards.

Undo flanged cable entry sleeve (6), remove helical cable (7).

Fit helical cable inlet (8) to centering rib of housing and ensure helical cable is correctly arranged.

When fitting the new cable, seal by tightening the flanged cable entry sleeve with rubber seal.

Disconnect helical cable (10), screws (11) and pipe clamps (12) from the adapter ring (13).

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8.17 General overhaul GO

Upon reaching the theoretical duration of service, the owner is obliged to carry out a general overhaul (see “Regular inspections”, section 2.8).

WARNING
Operating safety at risk

Failure to carry out the general overhaul or carrying it out inappropriately can lead to severe injury and/or damage to property.

Prescribed general overhaul intervals must be strictly complied with.

The theoretical duration of service D (hours at full load h) depends on the Group of Mechanisms classification of the D-SH (see section 9, table 3).

The owner must arrange for a GO general overhaul to be carried out when 90% of the theoretical duration of service has elapsed. A general overhaul must be carried out no later than when the end of the theoretical duration of service is reached.

NOTE

During the general overhaul the following parts must be replaced in addition to the checks and work specified in the inspection and maintenance schedule (see table 1).

- Gear wheels of the gearbox
- Gearbox bearings
- Motor shaft
- Motor bearings
- Connecting elements
- Gear oil

The small parts (screws, washers ...) to be replaced during maintenance and assembly work are not listed separately.

The general overhaul carried out by the manufacturer or an authorized specialist company fulfills the condition for continued operation of the D-SH hoist.

Thus the provisions of the relevant accident prevention regulations and BGV D8 are satisfied.

Further utilization is approved when an expert engineer has certified that the conditions for further utilization have been met. Completion of the general overhaul must be confirmed and a further period of utilization in accordance with FEM 9.755 must be entered.

NOTE

The general overhaul may be carried out by Demag expert engineers or an authorized specialist company.

The general overhaul carried out by the manufacturer or a specialist company authorized by the him fulfils the condition for continued operation of the machine.

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9 Measures for achieving safe working periods S.W.P.

The safety and health provisions of EC directive 2006/42/EC make it a legal requirement to eliminate special hazards which may be caused, for example, by fatigue and ageing.

This requirement is also reflected in the third supplement to German accident prevention regulations BGV D8 of 1.4.1996. This requirement obliges the owner of serial hoist units to determine the actual duration of service of the D-SH unit on the basis of the operating hours, load spectra and/or recording factors. This is based on FEM 9.755/06.1993 Measures for achieving safe working periods for powered serial hoist units (S.W.P.).

The objective of this rule is to determine measures for achieving safe working periods (S.W.P.) over the entire duration of service, although, according to the state-of-the-art, hoist units are designed for specific periods of operation.

Premature failure cannot, however, be ruled out.

The following items have been taken from FEM rule 9.755 with reference to the D-SH hoist:

1. The actual duration of service determined on the basis of operating time and load must be documented at least once per year.
2. The actual duration of service S is calculated as: $S = k_{mi} \times T_i \times f$
3. The load k_{mi} (actual factor of the load spectrum) must be estimated.
4. Operating time T_i (number of operating hours) can be estimated or read on the internal elapsed time indicator (see also section 9.1.2).
5. The value determined for operating time T_i using an elapsed time indicator must be multiplied by the type of recording factor f = 1,1.
6. The value determined for the estimated operating hours and load spectrum must be multiplied by the type of recording factor f = 1,2.
7. A general overhaul must be carried out when the theoretical duration of service is reached.
8. All checks and inspections and the general overhaul must be arranged by the owner of the D-SH hoist.

A general overhaul is defined as:

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

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

Table 3:

Type	1Am	1Bm
Duration of service (full-load hours) [h]	800	400

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

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9.1 Calculating the actual duration of service S

The actual duration of service S of the D-SH hoist can be determined as follows:

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

k_{mi} : Actual load spectrum factor

T_i : Number of operating hours

f : Factor depending on the type of recording

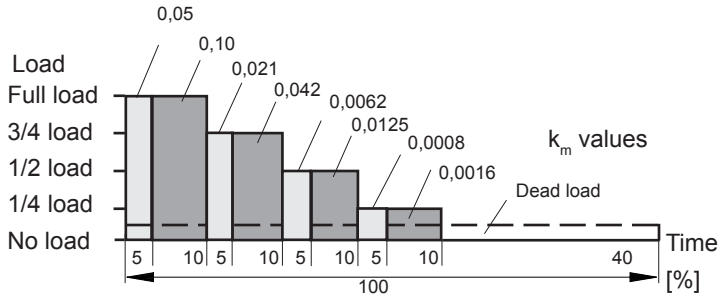
9.1.1 Estimating the load spectrum factor k_{mi} (by the owner)

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

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

The operating time for each type of load is divided up within the inspection interval (e.g. 1 year) in terms of percentage.

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



Load spectrum factor k_{mi} can be obtained by adding together the individual k_m load spectrum modules.

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

The operating time can be calculated by means of the integrated elapsed time indicator or according to the following method:

Operating time per inspection interval:

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

Only lifting and lowering movements are counted, long and cross travel times are not taken into consideration.

9.1.3 Factor depending on the type of recording f

f = 1,1 for calculating the operating hours using an elapsed time indicator

f = 1,2 for estimating the operating hours and the load spectrum

The elapsed operating time counter can be read out with the 7-segment display or the software included in the delivery as well as the cable, see section 9.1.2. A factor of 1.1 can be used for calculation using the read-out data.

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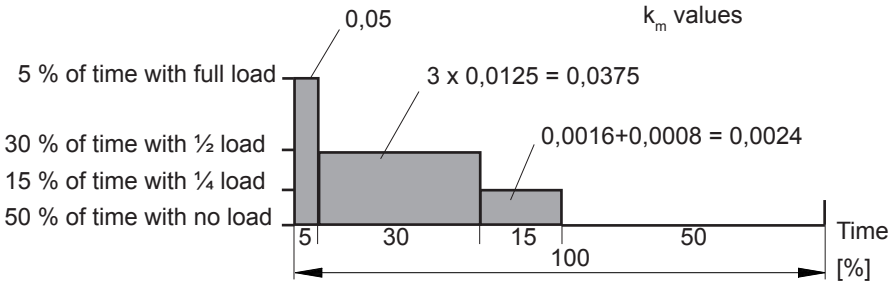
9.2 Example: D-SH – 80 in 1Am

Lifting speed	:	50 m/min 1)
No. of cycles per hour	:	100 cycles/h
Lifting and lowering	:	(1+1) m/cycle = 2 m/cycle
Operating time per day	:	8 h/day
Days per inspection interval	:	250 days/inspection interval

$$T_i = \frac{2 \times 100 \times 8 \times 250}{60 \times 50} = 133{,}3 \text{ h/inspection interval}$$

In the operating time as calculated above, the D-SH hoist has transported the following loads:



Adding the load spectrum modules k_m together results in the load spectrum factor:

$$k_{mi} = 0{,}09$$

Thus, the actual duration of service amounts to:

$$S = k_{mi} \times T_i \times f = 0{,}09 \times 133{,}3 \times 1{,}2 = 14{,}4 \text{ hours}$$

For classification in FEM group of mechanisms 1Am (see D-SH data plate) with a theoretical duration of service of 800 hours (see table 4) the hoist has a theoretical remaining duration of service of 785,6 hours.

Documentation

Enter these values in your documents.

This entry may appear as follows:

Table 4

Date		Operating hours	Load [%] km factor					Load factor		Actual duration of service	Theoretical use	Remaining duration of service
from	to	TI value [h]	full	3/4	1/2	1/4	without	k_{mi}	f	S [h]	D [h] / group of mechanisms	D-S [h]
3.1.--	30.12.--	133,3	5	-	30	15	50	0,09	1,2	14,4	800 / 1Am	785,6
			0,05	-	0,0375	0,0024	-					

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1) Unit infinitely variable, therefore assumed mean speed

10 Fault finding and elimination

10.1 Error messages

No.	Error event		Cause and elimination of the error
1	Load drifts when the “Grip occupied” detection in the grip is activated	-	Take hand from the grip, wait approx. 5 seconds and repeat the test. If the same effect occurs again, start new zero balance by switching the unit on/off
2	Manual force does not return to the value 0 again (deviates significantly)	-	Check whether the swivel cover is fitted correctly. The cable entry gland must be on the side opposite the grip buttons.

10.1.1 DSM fault messages

Error messages are indicated by means of the letter E and one of the subsequent figures:

Fault	Display	Possible cause	Remark
Inverter undervoltage	E 1	- Insufficient cable cross section - One phase is missing - Insufficient supply voltage	- Check cable - Measure phases - Check voltage
Inverter overvoltage	E 2	- Deceleration too high - Load lowered at excessive speed	- Program lower deceleration
Slip fault output stage	E 3	- Deceleration too high - Rotary encoder defective - Brake does not release	- Program lower deceleration - Check encoder, replace control board, as required - Check brake / plug X6
Inverter overtemperature	E 4		- Allow D-SH to cool
Motor overtemperature	E 5	- Motor overheated - Motor connector loose	- Allow motor to cool - Check motor connector X8, thin cables are thermistor connections
Short-circuit output stage	E 6	- Output stage transistor defective - Motor allows excessive current flow	- Replace output stage - Check motor cables, measure windings approx. 3 Ω
Current in output stage too high	E 7	- Load too large - Direction of rotation of the motor reversed	- Do not overload the D-SH - Check direction of rotation of the motor
Brake current too high	E 8	- Brake defective - Output stage defective	- Check brake - Replace output stage
Enable error output stage	E 13	- Emergency stop opens / closes briefly - Error is repeated	- Do not allow control unit to hit an obstacle - Replace control board or output stage
Watchdog output stage	E 14	- Quartz crystal of output stage defective	- Error cannot be reset, replace output stage
Control board communication error	E 15	- Control board connector defective - Data line fault	- Check cable / connector, replace as required - Opto-coupler of output stage defective, replace output stage
No brake current	E 16	- Brake defective - Brake plug not connected	- Check brake - Connect plug X6
Transistor for brake cannot be disabled	E 17	- Enable defective - Braking transistor defective	- Replace control board or power board - Replace power board
Transistor of rectifier cannot be disabled	E 18	- Enable defective - Transistor of rectifier defective	- Replace control board or power board - Replace power board
No output stage test possible	E 19	- Starting frequency too high	- Reset error, perform load detection once with unloaded hook, if the test result is OK, continue to use D-SH
Inverter communication error	E 20	- Control board connector defective - Data line fault	- Check cable / connector inverter interface, replace as required - Opto-coupler of output stage defective, replace output stage
Rotary encoder error	E 21	- Rotary encoder signal not OK - Brake does not release	- Check encoder, replace control board, as required - Check brake / plug X6
Parameter writing protection active	E22	- Re-initialisation	- see section EEPROM hardware protection
D-SH faster while lifting than while lowering	-	- The “Factor speed lowering” parameter has not been set to 100 %	- Set the “Factor speed lowering” parameter to 100 % wit the parameter programming set included in the supply and a PC or the optional terminal.

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10.1.2 D-Grip error messages

Fault	Display	Possible cause	Remark
Lifting and lowering do not function, brake does not release	8	Ext. emergency-stop switch actuated and/or right switch is off	Release emergency-stop and/or switch on right switch
Lifting and lowering do not function, brake does not release	-	Grip not correctly covered by the operator's hand	Cover the grip with your hand so that the "Grip occupied" LED is lit
Lifting and lowering do not function, brake releases	-	Incorrect DIP switch position in analogue PWM converter	All switches must be set to "on"
Lifting and lowering do not function, brake does not release, red LED in the converter box flashes 2 x	-	Broken conductor analogue value or D-Grip electronics defective or no supply to D-Grip	Check the helical cable Replace D-Grip Check voltage supply/wiring
Lifting and lowering do not function, brake does not release, yellow LED in the converter box is not lit	-	No voltage supply of converter box	Check control cable to D-SH and wiring

The symbols are shown one after the other.

To reset errors, press and unlock the emergency stop button in the case of the rocker switch and DSM Manulift handle. For the D-Grip, this is done by switching off and on with the right key.

Please contact our after-sales service, if the cause of fault cannot be eliminated with the above measures.

10.1.3 Instructions for finding faults

If the measures under A are not successful, continue trouble-shooting after removing the electrical equipment cover on the D-SH.

Disconnect the power supply before removing the electrical equipment cover!

DANGER Live components

Danger to life and limb.

Electrical energy may cause very severe injuries. If the insulation or individual components are damaged, there is a danger to life caused by electrical current.

Before you remove the cover, switch off the power supply.

The discharge time of the link capacitors of the inverter is approx. 3 min.

Switch on the power supply again and comply with the relevant instructions when working on live parts!

No.	Fault	Possible cause	Remark
A	D-SH not functioning	- No line voltage - System switched off - Broken conductor in the power supply line - **The unit has detected a fault**	- Replace mains fuse link - Switch on main switch - Check power supply line - Actuate and release emergency stop **or disconnect and restore the mains power supply**
B	7-segment display of control board not lit	- See item A - 10-pole cable from hoist inverter defective - Hoist inverter has no voltage or is defective	- Check fuse, emergency stop actuated? - Check cable to hoist inverter, replace, if required - Check hoist inverter
C	Drive lifts only in one direction	- Limit switch approached, note message	- Travel unit out of fast-to-slow/limit switch range - Check limit switch / connector

Please contact our after-sales service, if the cause of fault cannot be eliminated with the above measures.

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10.2 Warning messages and error statuses

Warnings are indicated by means of the lightning symbol and the subsequent figures (see instructions for finding faults). The current direction of movement is stopped.

Movement in the opposite direction is possible, the current warning is then deleted automatically.

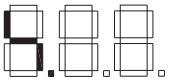
Error messages are indicated by means of the letter E and the subsequent figure (see instructions for finding faults). No further movement is possible. All error messages are saved in the error memory with frequency and operating hour. The error memory can be read out using the laptop or via the infra-red interface.

To delete the error messages, actuate the emergency stop and release it again.

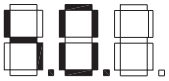
If an error occurs again, refer to the instructions for finding faults.

Warning messages

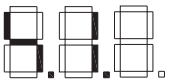
Warning messages start with the lightning symbol.



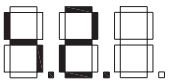
SLIP LIFTING (overload)
Lowering is possible



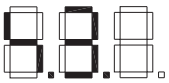
LIMIT SWITCH LIFTING actuated
Lowering is possible



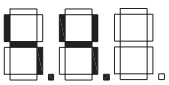
SLIP LOWERING (overload)
Lifting is possible



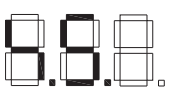
LIMIT SWITCH LOWERING actuated
Lifting is possible



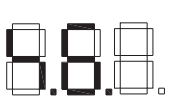
Both limit switches actuated at the same time (error present)
No further movement possible
(Check limit switch)



Lifting + lowering button pressed at the same time



Input signal error



Motor overtemperature
Lowering is possible

Inverter overtemperature
Lowering is possible

42777344.eps

The symbols are shown one after the other.

For error statuses, see instructions for finding faults.

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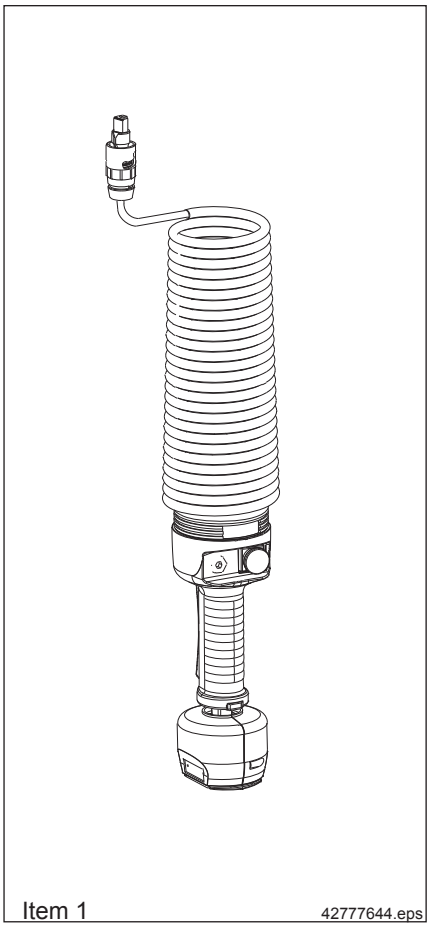
11 Accessories



	Part no.:
Plug protection for D-Grip	773 235 44
The operating terminal is used to display and program the SpeedHoist parameters.	
UPBT2-A00 Operating terminal	537 414 84

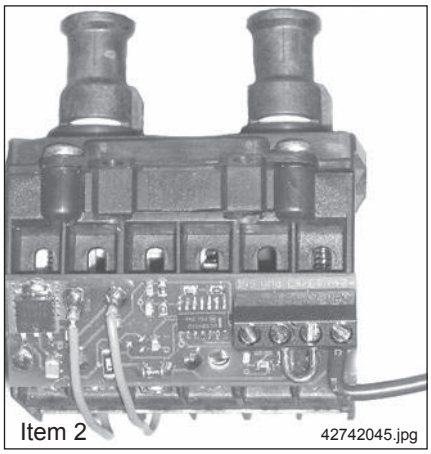
Item 1

Rocker switch component up to 250 kg

The complete rocker switch component with 2,8 m or 4,3 m helical cable can be retrofitted to a D-SH (incl. quick-change coupling and material for fitting the helical cable on the D-SH hoist housing).

Part no.: 773 299 44 (2,8 m)

Part no.: 773 298 44 (4,3 m)



For operating units provided by the customer

For integration in operating units provided by the customer, the following switching elements can be used for controlling the D-SH.

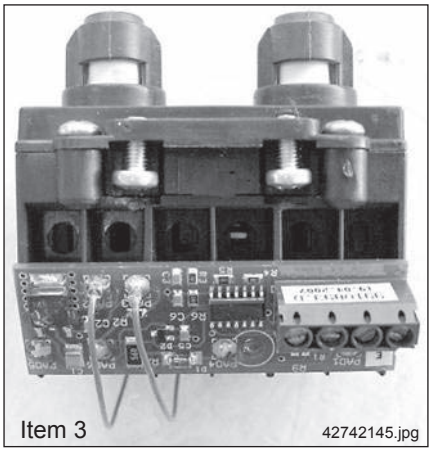
Item 2

CBDM-PWM switching element with converter board, analogue – PWM, for Manulift DSM and rubber caps

Part no.: 772 176 44

CBDM-PWM2 switching element with converter board, analogue – PWM, for Manulift DSM and rubber caps

Part no.: 772 207 44



Item 3

CBD-PWM switching element with integrated analogue PWM converter for DSK3-CS control pendant and rubber caps

Ident. no.: 773 557 44

CBD-PWM2 switching element with integrated analogue PWM converter for DSK3-CS control pendant and rubber caps

Part no.: 773 208 44

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Hereby we,

Demag Cranes & Components GmbH

Ruhrstraße 28, 58300 Wetter

declare that the electrically driven hoist for lifting loads

Demag Speedhoist

Serial no.: xxx xxx xx

supplied as **partly completed machinery** is intended to be incorporated into machinery and that it must not be put into serviceuntil the machinery* into which this partly completed machinery is to be incorporated has been declared in conformity with all relevant provisions of

EC Machinery Directive 2006/42/EC.
(* insofar as this machinery is subject to the scope of application)

Basic requirements of the EC Machinery Directive, insofar as they are relevant for the scope of delivery, are met by application ofthe following harmonised standards or C standard drafts:

EN 14492-2	**Cranes - Power driven winches and hoists - Part 2: Power driven hoists**
EN 60204-32	**Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines**

The safety objectives of **Low Voltage Directive 2006/95/EC** are achieved
The product additionally complies with the following relevant directives/provisions:
EC EMC Directive **2004/108/EC**

The special technical documentation according to Annex VII Part B of Directive 2006/42/EC has been compiled and will be made available to authorised national authorities by the designated authorised representative in response to a justified request.

Authorised representative for technical documentation
Hans-Jörg Böttcher, Demag Cranes & Components GmbH, 58286 Wetter

Wetter, 15.02.2011

ppa. Dr. Harkort	**ppa. D. Schulte**
Wetter Factory Manager	**Engineering/Development HT/AT**

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Hereby we,

Demag Cranes & Components GmbH

Ruhrstraße 28, 58300 Wetter

declare that the electrically driven hoist for lifting loads

Demag Speedhoist with rocker switch / Demag Speedhoist with Manulift switch

Serial no.: xxx xxx xx

ready for service - as a series product or manufactured to order - with a cable-connected control pendant/wireless control unit complies with all relevant requirements of

EC Machinery Directive 2006/42/EC.

The safety objectives of **Low Voltage Directive 2006/95/EC** are achieved.
The product additionally complies with the following relevant directives/provisions:
EC EMC Directive 2004/108/EC

Applied harmonised standards, in particular

EN 14492-2	**Cranes - Power driven winches and hoists - Part 2: Power driven hoists**
EN 60204-32	**Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines**

The relevant technical documentation according to Annex VII Part A of Directive 2006/42/EC has been compiled and will be made available to authorised national authorities by the designated authorised representative in response to a justified request.

Authorised representative for technical documentation
Hans-Jörg Böttcher, Demag Cranes & Components GmbH, 58286 Wetter

Wetter, 15.02.2011

ppa. Dr. Harkort	**ppa. D. Schulte**
Wetter Factory Manager	**Engineering/Development HT/AT**

Sample

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Hereby we,

Demag Cranes & Components GmbH

Ruhrstraße 28, 58300 Wetter

declare that the electrically driven hoist for lifting loads

Demag Speedhoist with manual force control

Serial no.: xxx xxx xx

ready for service - as a series product or manufactured to order - with a cable-connected control pendant/wireless control unit **after completion of assembly/being put into service including function check and load test prior to being put into service to be confirmed on page 2** complies with all relevant requirements of

EC Machinery Directive 2006/42/EC.

The safety objectives of **Low Voltage Directive 2006/95/EC** are achieved.
The product additionally complies with the following relevant directives/provisions:

EC EMC Directive	**2004/108/EC**

Applied harmonised standards, in particular

EN 14492-2	**Cranes - Power driven winches and hoists - Part 2: Power driven hoists**
EN 60204-32	**Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines**

The relevant technical documentation according to Annex VII Part A of Directive 2006/42/EC has been compiled and will be made available to authorised national authorities by the designated authorised representative in response to a justified request.

Authorised representative for technical documentation
Hans-Jörg Böttcher, Demag Cranes & Components GmbH, 58286 Wetter

Wetter, 15.02.2011

ppa. Dr. Harkort	**ppa. D. Schulte**
Wetter Factory Manager	**Engineering/Development**
	HT/AT

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Demag Speedhoist with manual force control

Serial no.: xxx xxx xx

For assembly / first putting into service including function check

....., date .....

Company that carries out the work: .....

Function in the company: .....

Name: .....

Signature: .....

For the load test in the scope of the acceptance test

....., date .....

Company that carries out the work: .....

Function in the company: .....

Name: .....

Signature: .....

Sample

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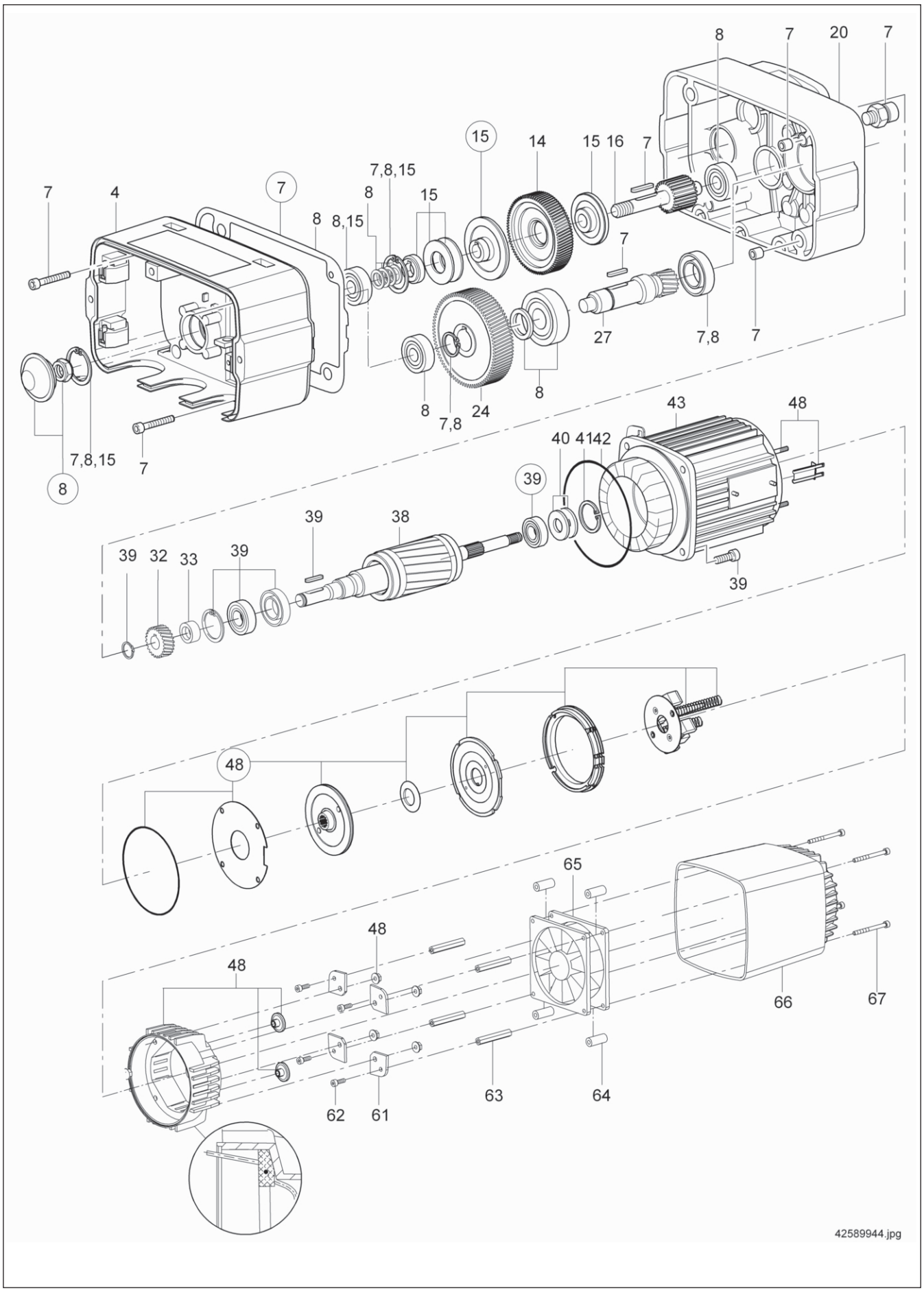
12 Spare parts

12.1 Gearbox with KDP 63 B2 motor



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12.1 Gearbox with KDP 63 B motor

Item	Part no.	Qty.	Designation		Material	Standard
4	83410644	1	DK 1 T.2 gearbox housing	1)		
6	34149999	4	Shim 12X 18X0,5		St2K50	DIN 988
7	83413933	1	Gearbox seal set DK 1	1)		
8	83414833	1	Bearing set DK 1			
14	82641844	1	Toothed wheel Z 61 M 0,8 B 15			
15	83426033	1	Coupling DK 1 set			
16	82641744	1	Pinion shaft Z28M1 B 24			
21	34264844	1	Vent valve AM10X1			
24	82641444	1	Toothed wheel Z 73 M 1 B 20			
27	82641644	1	Drive shaft Z15 M1,25			
31	34251199	1	Retaining ring 10X1		FedSt	DIN 471
32	82641144	1	Toothed wheel Z 29 M 0,8 B 18			
33	82640444	1	Sleeve 10/12X 16 X 8,5			
34	15245399	1	Key A 4X 4X 12		C 45 K	DIN 6885
38	12439584	1	Rotor KD 63B/D-SH80			
39	75269833	1	Small parts set KDP 63			
43	12418984	1	Stator KDP 63B2 ES AB	230V50HZ		
48	12485533	1	Brake set KD63/400V50			
61	82643444	4	Plate D-BE 80			
62	31882599	4	Hex. socket screw M 4 X 12	2 Nm	8.8 A2F	DIN 912
63	15245699	4	Spacer pin SW7 M4x45 MsNi			
64	15245599	4	Spacer sleeve 4,3X22, 2			
65	12496484	1	Fan 3314 H 24V DC			
66	82643244	1	Fan cover KD63 D-BE			
67	32168599	4	Hex. socket screw M 4 X 45	1 Nm	8.8 A2F	DIN 912

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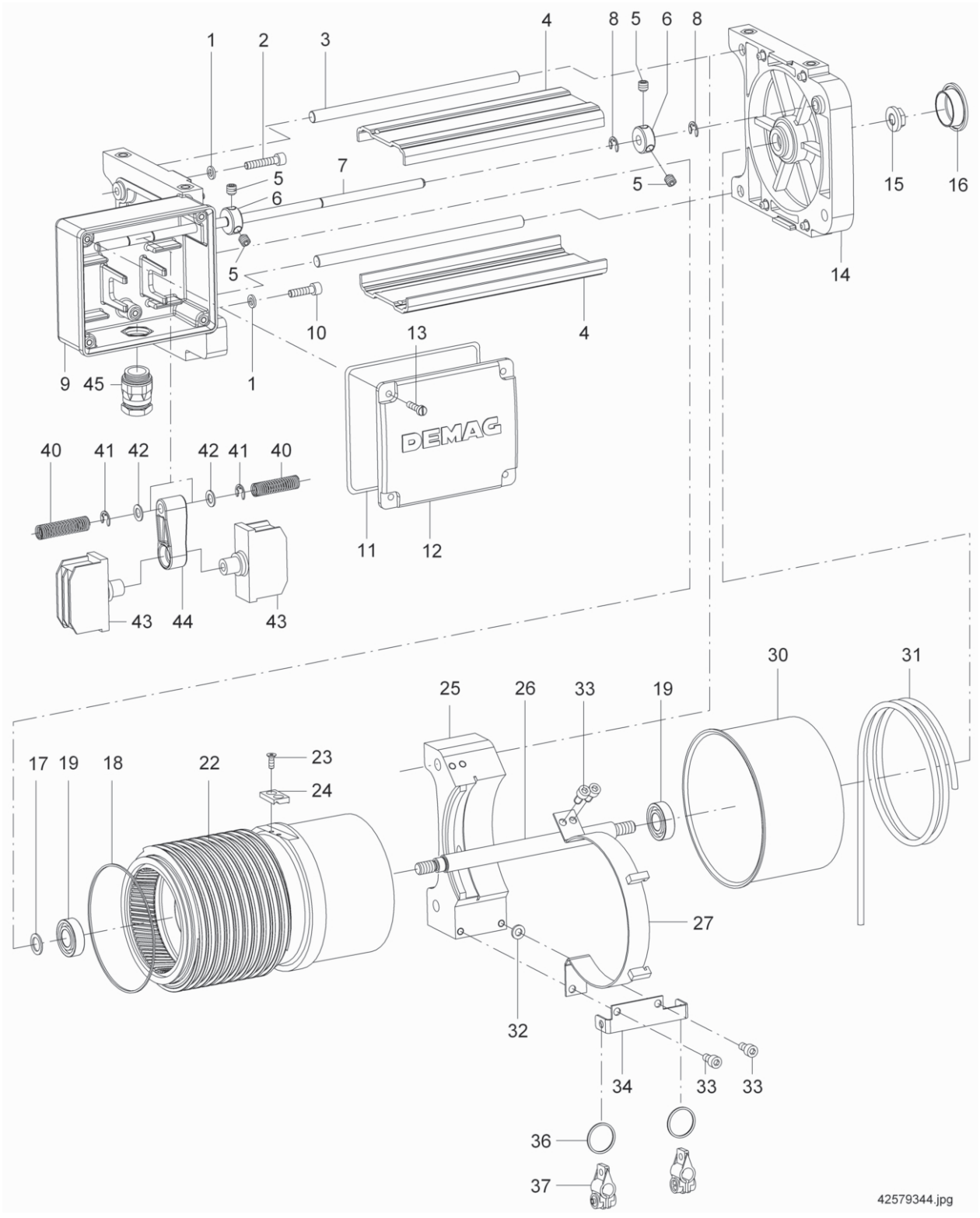
1) Quantity 0,1 litres, 1 kg container, part no. 472 902 44.

12.2 Rope drum/frame



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12.2 Rope drum/frame

Item	Part no.	Qty.	Designation		Material	Standard
1	34045599	3	Washer 6,4X 11 X 1,6		140HV A2F	DIN 433
2	32154199	2	Hex. socket screw M 6 X 30	10 Nm	10.9 A2F!L	DIN 912
3	82644344	2	Bar SWM-10, 201			
4	83431144	2	Crossbeam DS1-H 7			
5	15054599	4	Threaded pin M 8 X 8		45H	DIN 916
6	83437544	2	Adjusting ring DS1			
7	82644444	1	Bar 8X320,5			
8	34347999	2	Lock washer 7		Fedst	DIN 6799
9	82644144	1	End cap A/D-BE			
10	32141599	1	Hex. socket screw M 6 X 22	10 Nm	8.8 A2F	DIN- 912
11	15054399	1	O-ring 132 X 3,55 N		NBR 70	DIN 3771
12	83437644	1	Cover DS1			
13	31817999	4	Hex. socket screw M 5 x 20		4.8 A2F	DIN 84
14	82644244	1	End cap B/D-BE			
15	30044244	1	Locknut M10 VB.RIPP	40 Nm		
16	34255544	1	Plug 30,9X 8,6			
17	34348999	1	Thrust washer 12X 18X1,2		Fedst	DIN 988
18	15054299	1	O-ring 100 X 3,55 N		NBR 70	DIN 3771
19	36816299	2	Grooved ball bearing 6002 2RS		Wlz-St !L	DIN 625
22	82642044	1	Rope drum D-BE			
23	32200299	2	Countersunk screw M 4 x 12	2,8 Nm	8.8 A2F	DIN 7991
24	82642344	1	Rope clamp D-BE			
25	82642444	1	Rope guide D-BE			
26	83434144	1	Drum axle DS1-H 7			
27	82642644	1	Guide section	1/1, 2/1		
30	82642544	1	Sleeve D-BE			
31	82662044	6m	Wire rope 5 X6000+anchorage			
31	00000001	6m	Textkonserve ABG W 1			
32	34065399	1	Washer A 6,4x 12 x1,6		140HV A2F	DIN 125
33	31958899	4	Hex. socket screw M 6 X 12	5 Nm	10.9 A2F!L	DIN 912
34	82644644	1	Plate D-SH 80 hel. cable			
36	34260944	2	Key ring 25			
37	89566844	2	Cable clip RD 11			
40	15246299	2	Pressure spring 1,1 X10,9X 55,9		D-179M	DIN- 2098
41	34347999	2	Lock washer 7		Fedst	DIN 6799
42	34147999	2	Shim 8X 14X1		St2K50	DIN 988
43	87461044	2	SED switching element SPRG			
44	83437444	1	Switching lever DS1			
45	50468644	1	Cable union compl. PG16 RD K			

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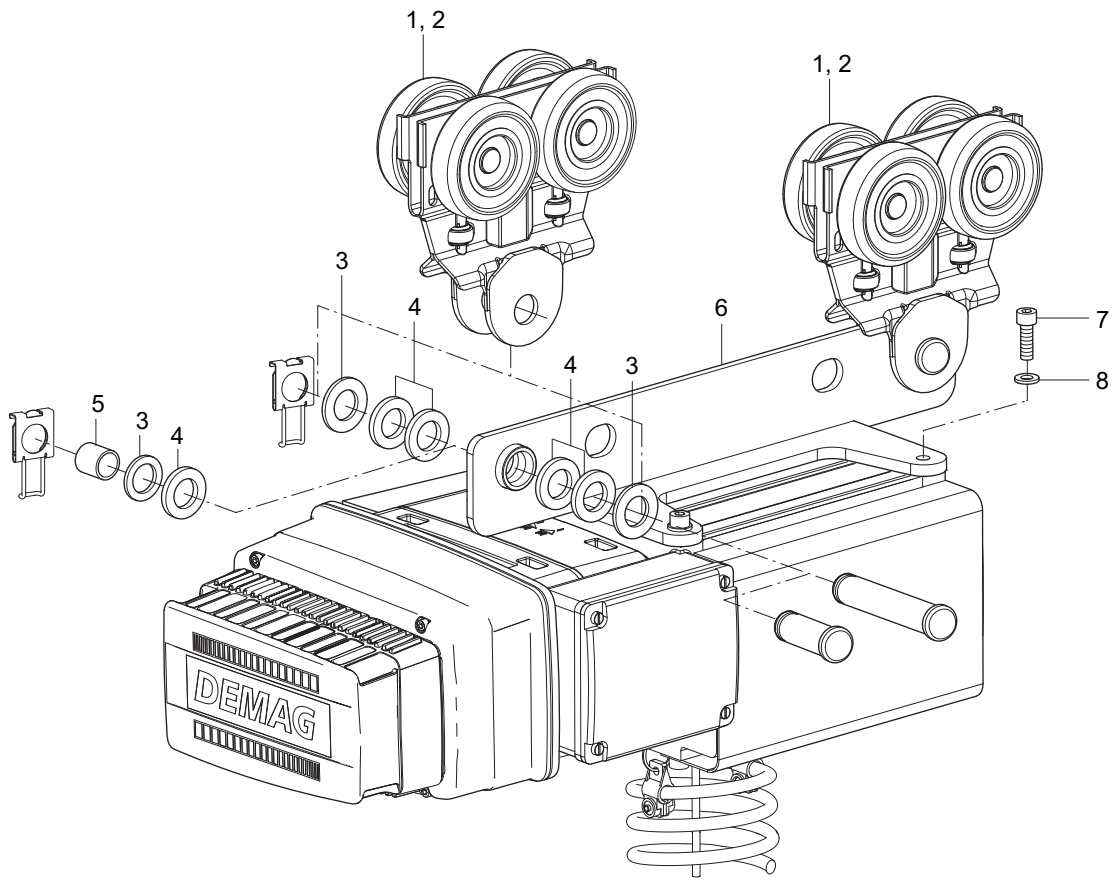
12.3 Trolleys with load bar: KBK I, KBK II and Aluline classic 120, 180



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Item	Part no.	Qty.	Designation		Material	Standard
1	98061044	2	Trolley with pin KBKI	KBK I, 1)		
2	98211044	2	Trolley with pin KBKII	KBK II, 1)		
3	34045499	4	Washer A21 x 37 x3		140HV A2F	DIN 125
4	34064399	4	Washer 20 X 32 X 4	KBK I	St A2F	DIN 1440
4	34064399	1	Washer 20 X 32 X 4	KBK II	St A2F	DIN 1440
5	83005744	2	Tube 20 X 2 X 22	KBK I		
6	85119544	1	D-BE / DS1 load bar			
7	32147199	4	Hex. socket screw M 8 X 22	25 Nm	10.9 A2F!L	DIN- 912
8	33950599	4	Washer 8 X 16 X 2		St A2F	DIN 1440

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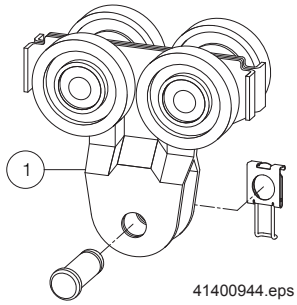
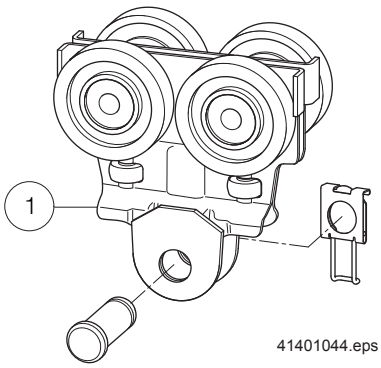
1) For component parts, see page 71

12.4 KBK I, KBK II, Aluline classic 120, Aluline classic 180 trolleys

KBK I trolley



KBK II trolley



KBK I trolley

Item	Part no.	Qty.	Designation	Material	Standard
1	98061044	1	Trolley with pin KBKI		

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KBK II trolley

Item	Part no.	Qty.	Designation	Material	Standard
1	98211044	1	Trolley with pin KBKII		

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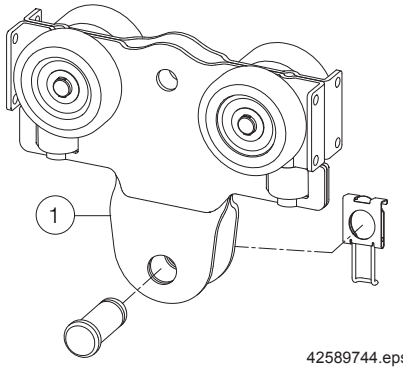
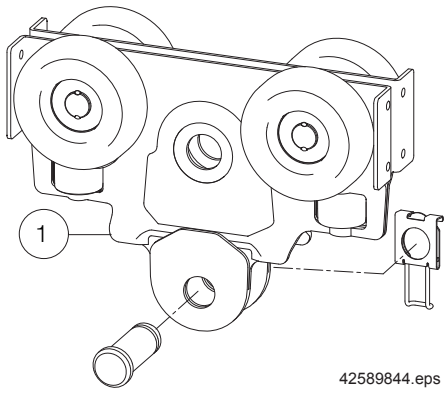
Trolley
Aluline classic 120



Trolley
Aluline classic 180



Aluline classic 120 trolley

Item	Part no.	Qty.	Designation	Material	Standard
1	85505044	1	ALULINE 120 trolley		

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Aluline classic 180 trolley

Item	Part no.	Qty.	Designation	Material	Standard
1	85508044	1	ALULINE 180 trolley		

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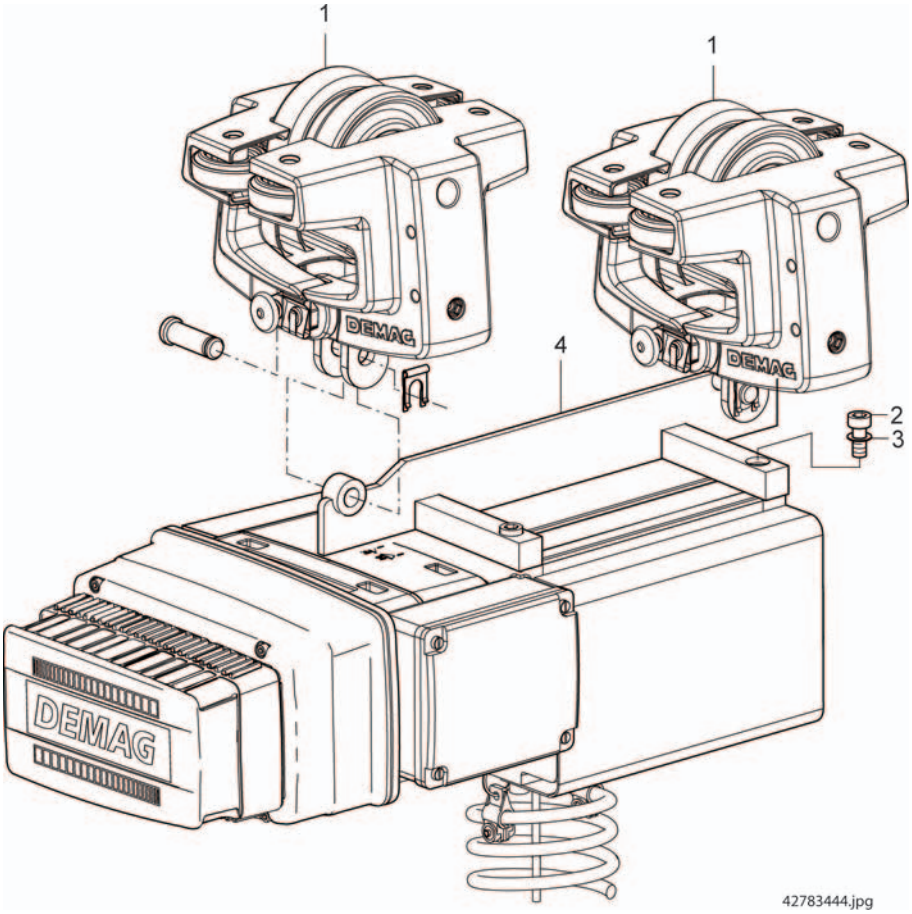
12.5 CF 5 trolley with load bar, flange width 50 – 91 mm



Flange width 50 – 91 mm

Item	Part no.	Qty.	Designation		Material	Standard
1	84020544	2	CF 5 click-fit trolleys, azure blue	1)		
2	32147199	4	Hex. socket screw M 8 X 22	25 Nm	10.9 A2F!L	DIN- 912
3	33950599	4	Washer 8 X 16 X 2		St A2F	DIN 1440
4	41686646	1	CF5 trolley crossbar	H7		

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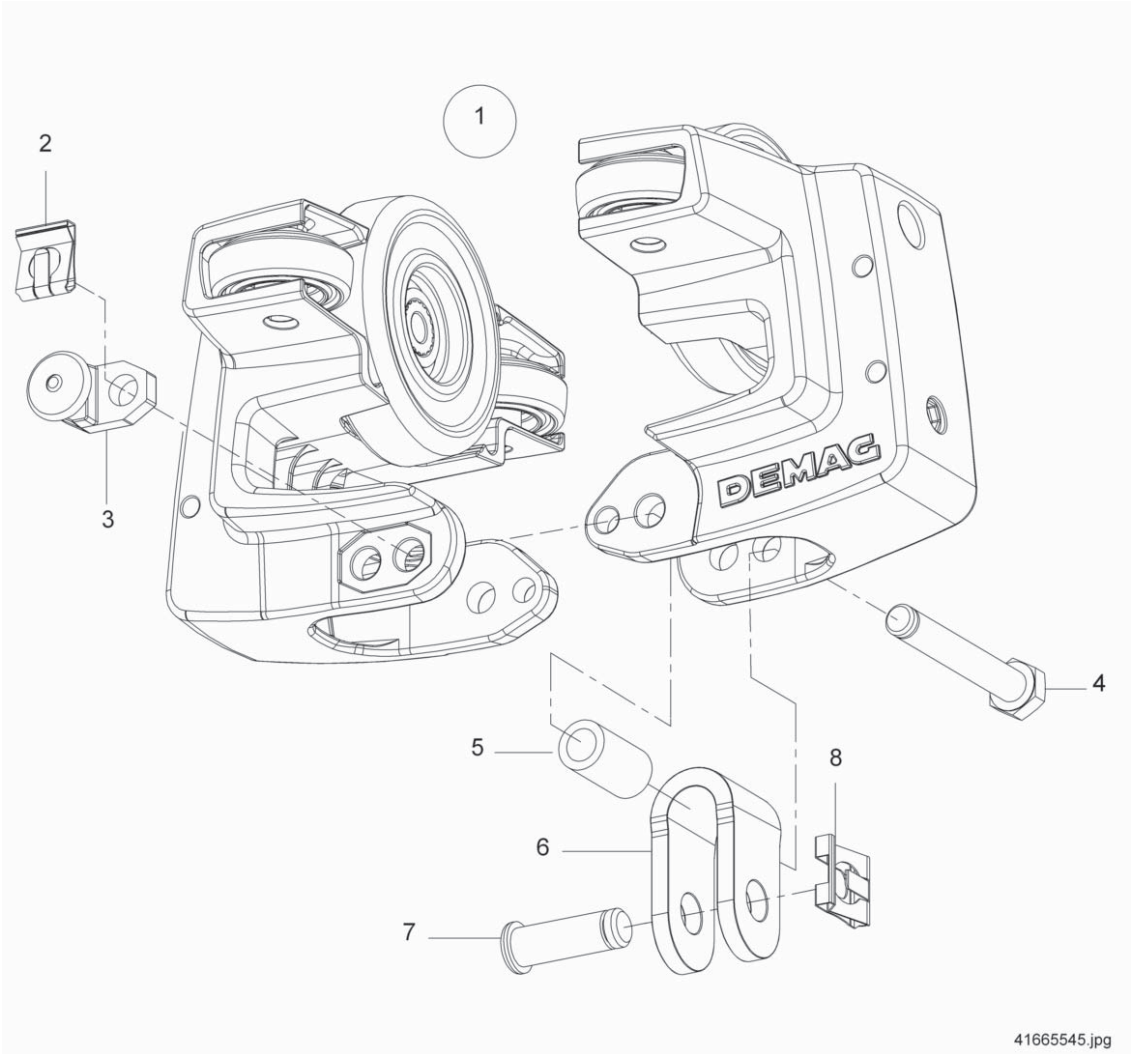
1) Component parts, see page 93

12.6 CF 5 trolley, flange width 50 – 91 mm



Flange width 50 – 91 mm

Item	Part no.	Qty.	Designation		Material	Standard
1	84020544	1	CF 5 click-fit trolleys, azure blue	cpl. (items 2 – 5)		
2	34287544	1	Retaining clip SL 10 SXN08			
3	84001544	1	CF5 retaining elements			
4	84002244	1	Head pin 10 X64,8 slot			
5	84002744	1	Tube 16 X 2,8 X 29			
6	84002544	1	CF5 suspension eye bracket			
7	84002144	1	Head pin 12H11X 30 slot			
8	34287644	1	Retaining clip SL 12 SXN08			

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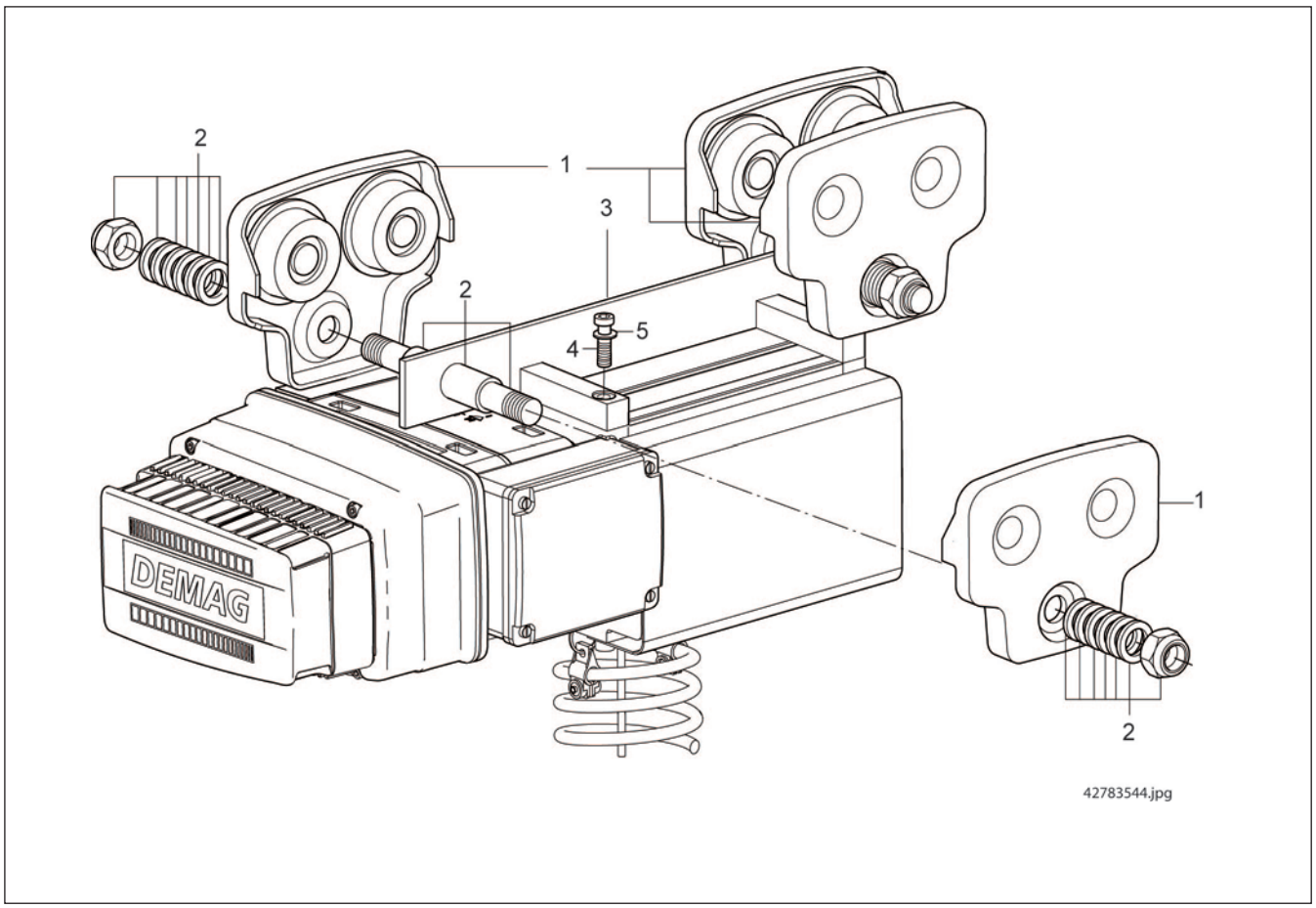
12.7 RU trolleys with load bar, flange width 50 – 90 mm



Item	Part no.	Qty.	Designation		Material	Standard
1	83961044	4	Side cheek travel wheel univ. no toothed rim	1)		
2	83961944	2	RU 3 DS 1 load bar	1)		
3	83005244	1	DS1-H 7 load bar KBK			
4	32147199	4	Hex. socket screw M 8 X 22	25 Nm	10.9 A2F!L	DIN- 912
5	33950599	4	Washer 8 X 16 X 2		St A2F	DIN 1440

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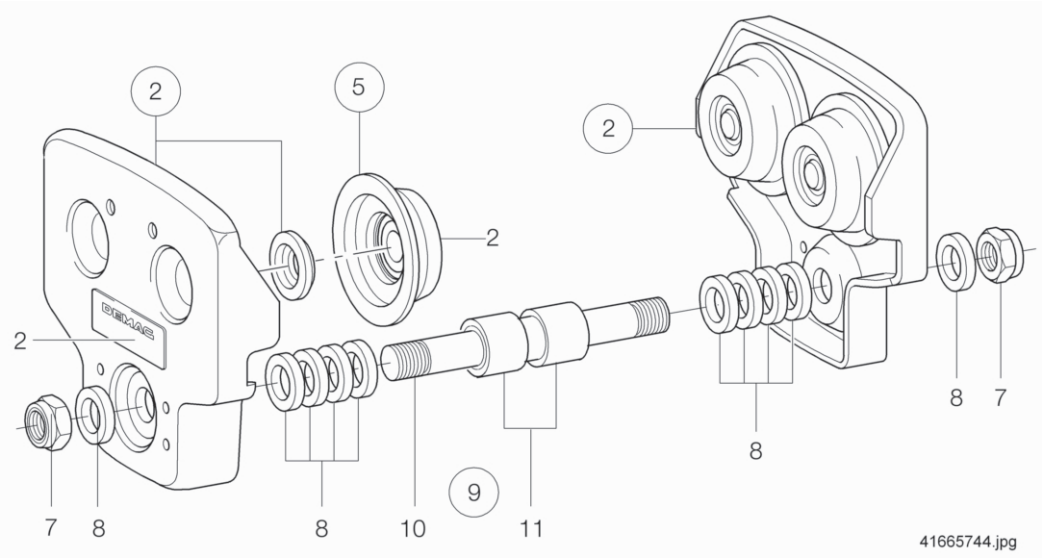
1) Component parts, see page 95

12.8 RU trolleys, flange width 50 – 90 mm



Item	Part no.	Qty.	Designation		Material	Standard
2	83961033	1	RU 3 side cheek set			
5	83961533	2	Travel wheel set univ. 4xOZ			
7	33460199	2	Hex. nut M16 X1,5	50 Nm	8 A2F	DIN 985
8	56302344	12	Washer 16,5X 25 X 4			
9	83961944	1	RU 3 DS 1 load bar	cpl. (items 7, 8, 10, 11)		
10	83961644	1	Pin RU 3/DS1 load bar			
11	83961844	2	Tube 26,9X 2,65X 31			

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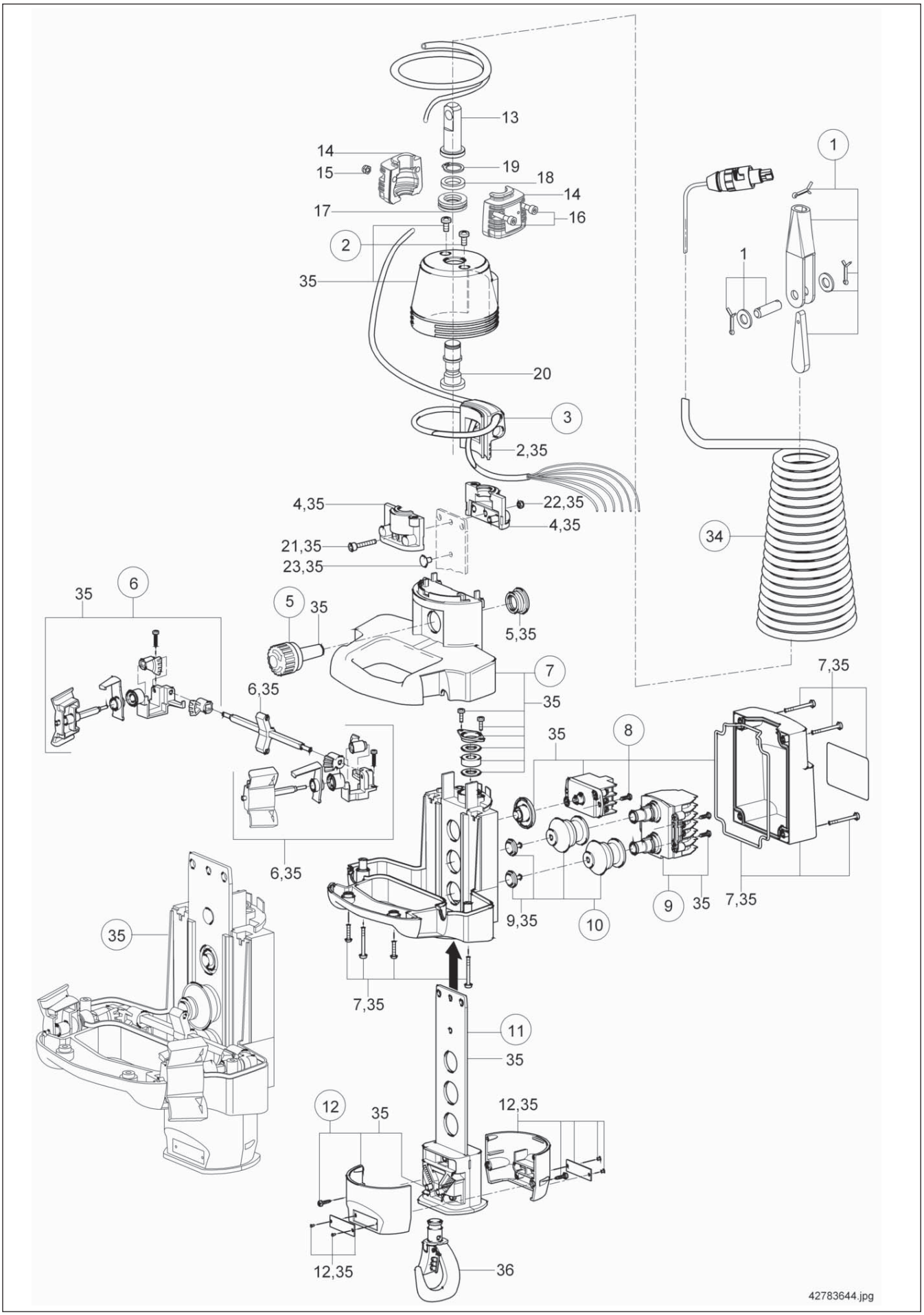
12.9 DSM-CS control unit



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12.9 DSM-CS control unit

Item	Part no.	Qty.	Designation	Material	Standard
1	15183733	1	Rope socket D-BP Set		
2	77206833	1	Cap DSM 5 set		
3	77203933	1	Helical cable union		
4	77202144	2	Bracket half chain DSM5		
5	77204733	1	Emergency pushbutton set x4		
6	77207533	1	Bearing DSM 5		
7	77200133	1	Housing set DSM 5		
8	77207933	1	Switching element CBDN 3OE		
9	77220744	1	Switching element CBDM-PWM2		
10	77202333	1	Cap set		
11	77207633	1	Load capacity element 125/250		
12	77201833	1	Unlocking half		
13	82646444	1	Pin DSM/D-SH		
14	83575144	2	Hook assembly half		
15	34657299	2	Lock nut V M 5	8 A2F	DIN 980
16	31921899	2	Hex. socket screw M 5 X 30	10.9 A2F!L	DIN 912
17	36400399	1	Ball thrust bearing 51103	Wlz-St	DIN 711
18	83566644	1	Shim 17X25X4		
19	34244799	1	Retaining ring 17X1,5	FedSt	DIN 471
20	83566744	1	Pin DKM 1/2		
21	31921799	1	Hex. socket screw M 5 X 25	10.9 A2F!L	DIN 912
22	15056399	1	Hex. nut M 5	8 A2F	DIN 985
23	87350344	1	Conductor line pin DFL		
34	75270333	1	Helical cable D-SH 2800		
34	75270433	1	Helical cable D-SH 4300		
35	77347833	1	DSM-CS control unit		
36	83566544	1	Load hook DKDSM5 250KG		

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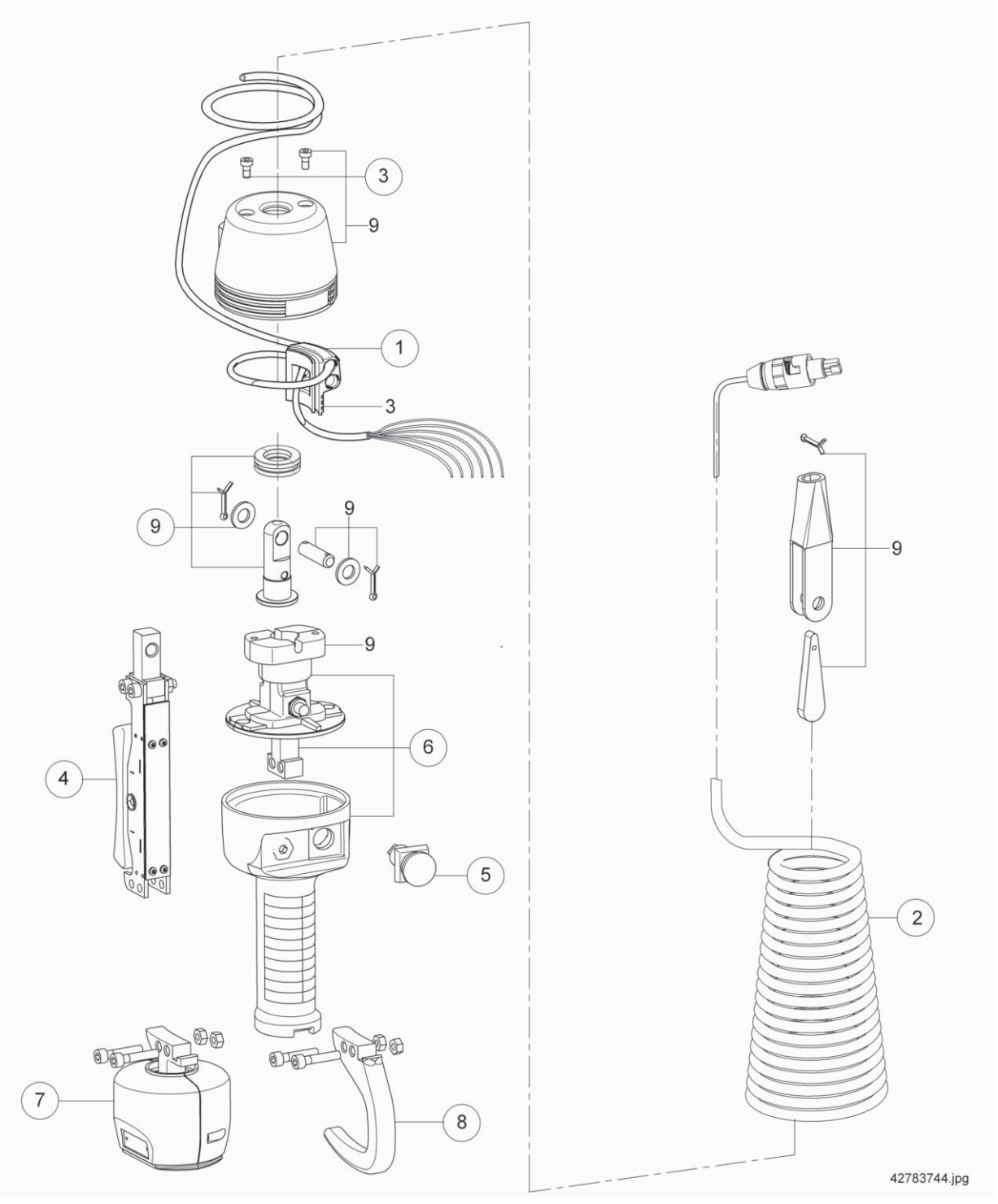
12.10 Rocker switch



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12.10 Rocker switch

Item	Part no.	Qty.	Designation	Material	Standard
1	77203933	1	Helical cable union		
2	75270933	1	Helical cable D-SH 2800		
2	75271033	1	Helical cable D-SH 4300		
3	77206833	1	Cap DSM 5 set		
4	77327633	1	Electronic module set		
5	77328933	1	Emergency-stop button		
6	82646533	1	Housing set sub-assembly		
7	77324533	1	Coupling connection set		
8	77327333	1	Fittings C hook set		
9	77326233	1	Swivel set		

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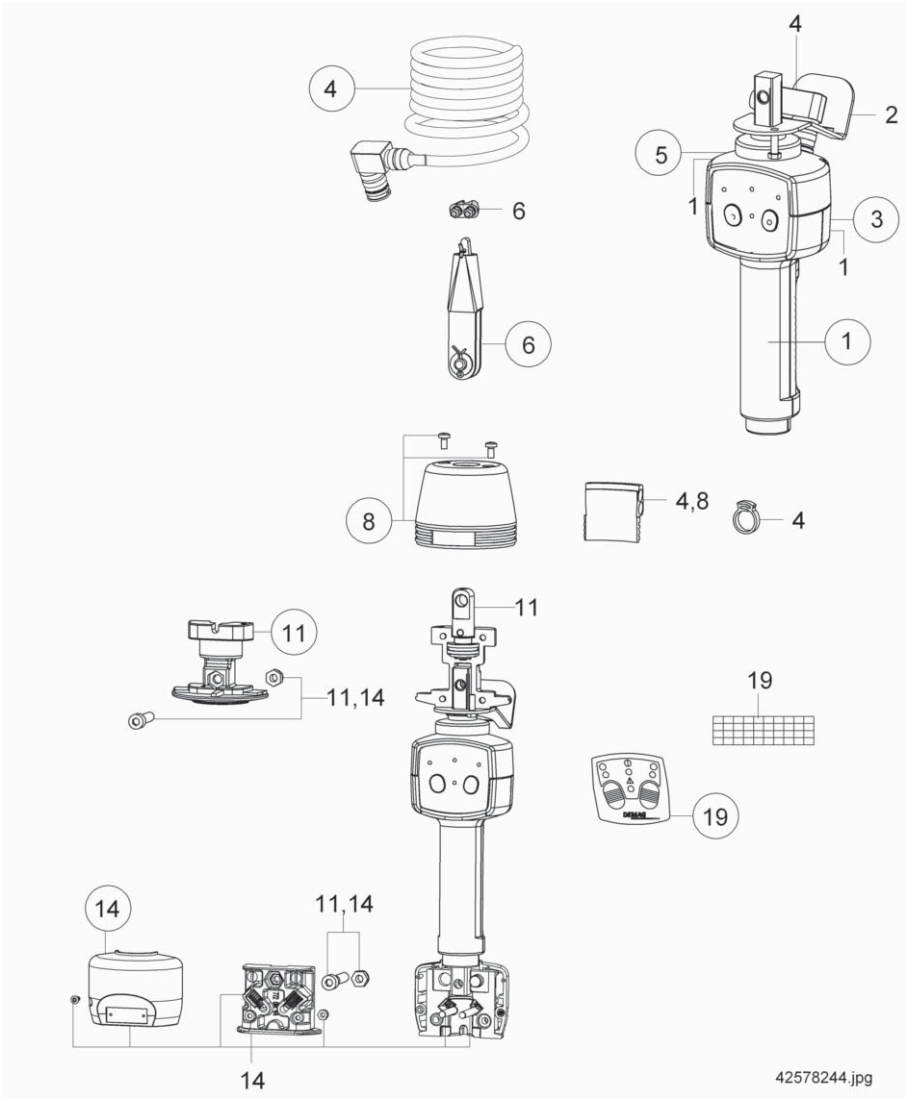
12.11 D-Grip and accessories



Item	Part no.	Qty.	Designation	Material	Standard
1	77325544	1	Sub-assembly D-Grip 1D Solo		
2	77323544	1	Protective plate		
3	77323433	1	Sensor D-Grip + rear part		
4	77325133	1	Helical cable set D-BP		
5	77322533	1	Housing D-Grip set		
6	15183733	1	Rope socket D-BP Set		
8	77206833	1	Cap DSM 5 set		
11	77326233	1	Swivel set		
14	77324633	1	Coupling set		
19	77322433	1	Cover foil set		

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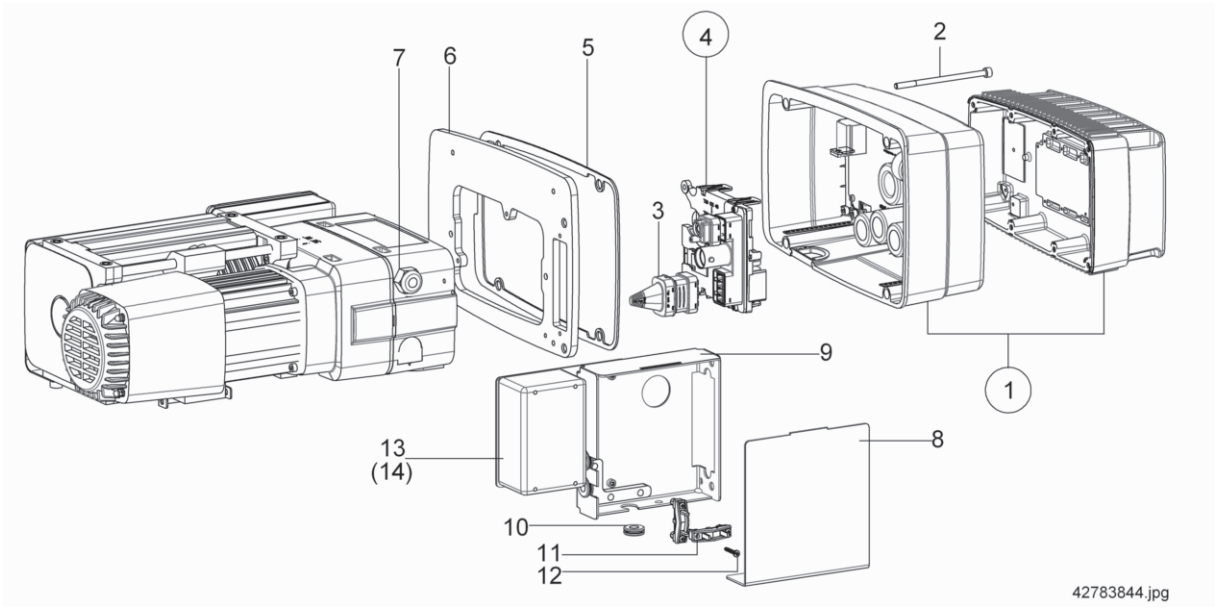
12.12 Electrical components



Item	Part no.	Qty.	Designation		Material	Standard
1	72094533	1	DCS 10 hoist inverter			
2	15282799	4	Hex. socket screw M 6 X110		8.8 A2F	ISO- 4762
3	72003445	1	Connector set 4P			
4	75271333	1	D-SH control system			
5	71511445	1	Sealing electrical equipment cover DC			
6	74949646	1	Flange D-SH 80/DC-10			
7	71903845	1	Cable union compl. M20 RD K			
8	82640944	1	Cover			
9	82640244	1	Bracket			
10			Connecting socket DK-TPE 10/18/22-2			
11	72005345	2	Strain relief DC10/20			
12	15265599	4	Self-tapping screw ST 3,5X25 -C-Z		St A2F	ISO 7049
13			PWM box	Zasche		
14			PWM board	Zasche		
15	75271444	1	Weld connection plate DRS160			

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