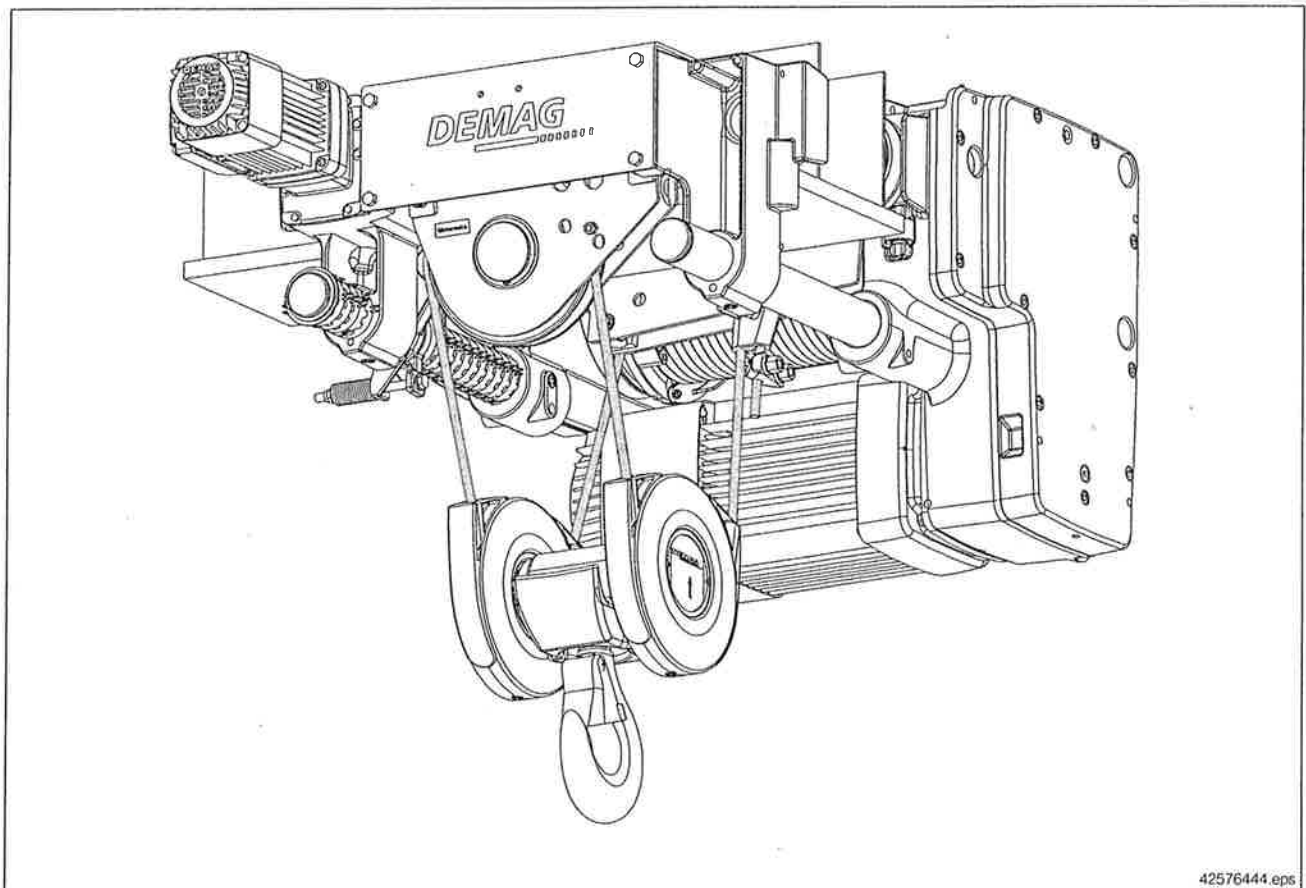


Operating instructions

Demag DR rope hoist

Low-headroom monorail hoist

EKDR 3 - EKDR 5 - EKDR 10



42576444.eps

Manufacturer

Demag Cranes & Components

29201 Aurora Road · Solon, OH 44136
Telephone (440) 248-2400 · Telefax (440) 248-3086
www.demag-us.com

Please fill in the following table before first putting the hoist into service.
This provides you with a definitive documentation of your Demag rope hoist
and important information if you ever have to contact the manufacturer or his
representative.

Owner	_____
Where in use	_____
Range	_____
Serial number	_____
Main hoist motor number	_____
Operating voltage	_____
Control voltage	_____
Frequency	_____
Wiring diagram number	_____

Accompanying documents

Component parts list for Demag rope hoist	EKDR 3	217 017 44	721 IS 813
	EKDR 5	217 018 44	721 IS 813
	EKDR 10	217 019 44	721 IS 813
Operating instructions EKDR 3 - EKDR 5- EKDR 10		214 725 44	720 IS 813
Demag test and inspection booklet for cranes and hoists		206 124 44	720 IS 100
Technical data			
Demag wire rope hoist EKDR 3 - EKDR 5 - EKDR 10		203 520 44	714 IS 813

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0 Foreword

You have purchased a Demag product.

This Demag rope hoist was manufactured in accordance with the applicable North American standards and regulations.

Demag rope hoists are of modular design.

The main assemblies include:

- Gearbox
- Hoist motor
- Integrated electrics
- Rope reeving components
- Control pendant

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

Every individual given the task of transporting, installing, commissioning, operating, maintaining and repairing our rope hoists and 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.

0.1 Copyright

These operating instructions must be treated confidentially. They should only be used by authorized personnel. They may only be entrusted or made available to third parties with the prior written consent of Demag.

All documents are protected within the sense of copyright law.

No part of this documentation may be reproduced, utilized or transmitted without specific prior consent. Infringements are an offence resulting in obligatory compensatory damages.

All industrial rights reserved.

0.2 After-sales service

Our after-sales service will provide you with all technical information on Demag products and their systematic application.

Should you have any questions regarding our products, please refer to one of our after-sales service stations, the relevant representative or to our main office.

Kindly quote the serial or order number (see test and inspection booklet, load capacity plate on the crane) in any correspondence or for 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 rope hoist test and inspection booklet.

0.3 Liability for defects

These operating instructions must be read carefully before installing and putting the rope hoist into operation.

We assume no liability for any damage and malfunctions resulting from failure to comply with the operating instructions.

Any liability claims for defects must be made by quoting the order number immediately on detecting the defect.

Any liability claims for defects are void in the event of:

- inappropriate use,
- faulty devices or equipment connected or attached to the system which are not part of our scope of supplies and services,
- use of non-genuine spare parts and accessories,
- refurbishment or modification of the product unless approved in writing by Demag.

Wearing parts are not subject to liability for defects.

0.4 Limitations of liability

All technical information, data and instructions for operation contained in these operating instructions were up-to-date on going to print and are compiled on the basis of our experience and to the best of our knowledge.

We reserve the right to incorporate technical modifications within the scope of further development of the rope hoists which are the subject of these operating instructions.

The information, illustrations and descriptions contained in these operating instructions are therefore only intended for information purposes.

The descriptions and illustrations contained in this documentation do not necessarily correspond to the scope of delivery or any subsequent spare part delivery, either; the drawings and illustrations are not to scale.

Only documentation belonging to the actual order is valid.

We assume no liability for damage and malfunctions caused as a result of operating errors, non-compliance with these operating instructions or inappropriate repairs and maintenance.

We expressly point out that only genuine Demag spare parts and accessories approved by us may be used. Accordingly, this also applies to other manufacturers' parts used.

For safety reasons, the fitting and use of spare parts or accessories which have not been approved and unauthorized modification and conversion of the product are not permitted and exempt Demag from any liability for defects or damages resulting therefrom.

With the exclusion of any further claims, our liability for defects and liability obligations for any defects pertaining to the products supplied or faults in the documentation delivered or any negligence on our part are exclusively based on the stipulations of the original contract. Any further claims, in particular any and all claims for damages, are excluded with the exception of legal claims in accordance with product liability legislation.

0.5 Definitions

Owner

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

Operating personnel/operator

Operating personnel are defined as persons entrusted by the owner of the rope hoist with operation of the equipment.

Specialist personnel

Specialist personnel are defined as persons assigned by the owner of the rope hoist 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 the rope hoist 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 the rope hoist.

1 Safety instructions

1.1 Symbol description

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



Hazard warning

This symbol appears in the operating instructions next to all instructions relating to safety at work wherever a potential hazard to life and limb exists if the instructions are not complied with.

Follow these instructions at all times and be particularly vigilant and cautious.

Pass on safety instructions to all persons entrusted with working on the rope hoist including the track and power supply.

In addition to the safety instructions, observe all general safety regulations and factory accident prevention regulations at all times.



Warning against dangerous electrical voltage

Contact with live parts can result in immediate death. Protective covers (e.g. covers and enclosures of electrical equipment) marked with this sign may only be opened by qualified electricians. Before opening, all relevant operating, control, feed or other voltages must be disconnected.



Warning against suspended load

Any person remaining in this danger zone may suffer serious injury or death. Loads must not be transported above persons when using load handling attachments which retain the load by means of magnet, friction or suction forces without an additional load securing device. In each case the special safety and operating instructions contained in the operating instructions for the load handling attachment in question must be complied with.



Operating hazard for the installation

This symbol indicates information on the appropriate use of machinery.

It indicates all warnings which, if not complied with, may result in damage to the rope hoist or the load.

1.2 Appropriate use

Rope hoists are only intended for lifting, lowering and moving loads and may be used as stationary or travelling units.

Rope hoists may only be operated when in perfect working order by trained personnel in accordance with the relevant safety and accident prevention regulations. This also includes compliance with operating and maintenance conditions specified in the operating instructions.

Rope hoists can be operated with a rated voltage of up to 480 V.



Power feed is 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 power switch (main power connection switch, isolating switch).

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

Design limit

The theoretical duration of service (to ISO 4301/FEM 9.755) in connection with the actual mode of operation (see 2.3 Selection criteria) results in the safe working period S.W.P.

Any failure to comply with these instructions may result in serious injury or death in the case of:



- unauthorized removal of covers,
- inappropriate use of the rope 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.

Advise operators to avoid inching as far as possible. It might cause excessive wear and premature failure of the rope hoist. Inching means giving short pulses to the motor to obtain small movements, e.g. when attaching a load or moving the travelling hoist unit or the crane.

1.3 Prohibited practices



Certain work and practices are prohibited when using the rope hoist as they may result in serious injury or death and result in lasting damage to the rope hoist, e.g.:

- Unsafe load handling (e.g. swinging the load).
- Do not handle suspended loads above persons.
- Do not pull or drag suspended loads at an angle.
- Do not pull free fixed or obstructed loads.
- Do not exceed the maximum permitted load capacity.
- Do not leave suspended loads unsupervised.
- Do not allow ropes to run over edges.
- Do not use the rope as a load bearing sling.
- Do not allow loads to drop when the rope is in a slack condition.
- Do not subject the control switch to inappropriate mechanical loads.
- Transporting persons with the hoist is not permitted unless hoist units are specifically approved for transporting persons.
- Do not manipulate electrical equipment.
- Do not lift the load when the rope is in slack condition.
- Do not lift the load at full speed.

1.4 Basic information on safety



Persons under the influence of drugs, alcohol or medicines which affect reactions must not install, put into service, operate, maintain, repair or disassemble the rope hoist.

Any conversions and modifications to the installation require the written consent of Demag.

Work on electrical equipment of the rope hoists may only be carried out by qualified electricians in accordance with electrical regulations. In the event of malfunctions, rope hoist operation must be stopped, the rope hoist switched off and the relevant main switches locked immediately. Defects must be rectified without delay.

National accident prevention regulations and codes of practice and general safety regulations must be observed when operating our products. Important information and instructions are marked by corresponding symbols.

Follow these instructions and/or safety regulations in order to avoid accidents and/or damage. The operating instructions must be kept available at the place where the rope hoist is in use at all times. They include significant aspects and appropriate excerpts from the relevant guidelines, standards and regulations. The owner must instruct his personnel appropriately.

If the safety instructions given in these operating instructions are not observed in any way, personal injury or even death may result.

Observe general statutory and other obligatory regulations relating to accident prevention and environmental protection and basic health and safety requirements in addition to those included in these operating instructions. Such requirements may also relate, for example, to the handling of hazardous materials or the provision/wearing of personal protection equipment. Comply with these regulations and general accident prevention regulations relevant for the place at which the rope hoist is used and follow the instructions therein when working with the rope hoist. The rope hoist may still constitute serious injury or death if it is not installed, operated, maintained or used appropriately by personnel that have not been trained or specially instructed. The operating instructions must, if required, be supplemented by the owner with instructions and information (e.g. factory regulations) relating to organization of work, working procedures, operating personnel, etc. Supervising and reporting obligations as well as special operating conditions must also be taken into consideration.

Personnel assigned to working with the rope hoist must have read and understood the operating instructions and, in particular, the section on safety information. All activities relating to rope hoists which are not described in these operating instructions may only be carried out by specifically trained specialist personnel.

The owner must ensure that personnel work in a safety and hazard-conscious manner in compliance with the operating instructions.

The owner must ensure that rope hoists are only operated when in proper working order and that all relevant safety requirements and regulations are complied with.



Rope hoists must be taken out of service immediately if functional defects or irregularities are detected. In the event of a stoppage (e.g. if defects regarding safe and reliable operation are detected, in emergency situations, in the event of operating malfunctions, for repairs and maintenance purposes, if damage is detected or after finishing work), the operator/experienced technician must carry out all prescribed safety measures.

Personal protective clothing must be worn as necessary or as required by regulations. Personnel must not wear loose clothing, jewelry including rings or long hair loose. Injury may occur, for example, by being caught or drawn into the mechanism.

All safety and hazard information and instructions on the rope hoist, e.g. at access points and mains connection switches must be maintained in complete and legible condition.

Inching (i.e. giving short pulses to the motor) must always be avoided. Emergency limit stop devices (e.g. slipping clutch or emergency limit switch) must not be approached in normal operation.

Modifications, additions to and conversions of the rope hoist which may impair safety in any way must not be carried out without the written consent of Demag. This also applies to the installation and adjustment of safety devices as well as for performing welds on load bearing parts. Safety devices must not be rendered inoperative.

Only genuine Demag spare parts and accessories may be used. Observe prescribed deadlines or those specified in the operating instructions for routine checks/inspections.

1.5 Selection and qualification of operating and maintenance personnel



For independent operation or maintenance of the rope 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 the operation or maintenance of the rope hoist and have proven their qualification to the owner in this respect (in addition to theoretical training, instruction also includes sufficient practical operating experience as well as acquiring the ability to identify defects which are a hazard to safe operation),
- who can be expected to carry out the work assigned to them reliably.

The owner must assign operating and maintenance personnel to their relevant tasks.

1.6 Safety instructions for installation and disassembly



- Installation and disassembly work may only be performed by experienced technicians.
- Installation and disassembly work must be co-ordinated by the person carrying out the work and the owner within the scope of their responsibility.
- The working and danger zone must be made safe.
- The installation must be isolated in accordance with the relevant electrical regulations.
- Customer-specific regulations must be observed.
- Only appropriate, tested and calibrated tools and equipment may be used.
- The electrode holder and earth must be connected to the same assembly when welding work is carried out (if the current flow is returned via protective conductors, screening elements or anti-friction bearings, serious damage may be caused to these or other components).
- The Demag rope hoist must be attached at the appropriate connecting points.

1.7 Safety instructions when first putting the unit into service after completing installation



- The working and/or danger zone must be made safe.
- First check that the voltage and frequency specified on the data plates match the owner's mains power supply.
- All clearance dimensions and safety distances (see approval drawing) must be checked before putting the unit into service.
- When putting the unit into service, it may be necessary to perform work in the danger zone.
- In the course of putting the unit into service, it may be necessary to temporarily render safety devices or features inoperative.
- It must be ensured that only trained personnel are employed for putting the unit into service.

1.8 Safety instructions for operation



The operator must check the function of the brakes and emergency limit stop and emergency stop devices before starting work.

All instructions and measures described in the operating instructions with regard to safe operation and items concerning general safety and accident prevention which have to be observed before, during and after putting into service must be strictly complied with. Any failure to comply can lead to accidents resulting in fatalities.

Rope hoists must be taken out of service immediately or not put into operation if any defects relating to operating safety and reliability are detected.

Safety devices must not be rendered inoperative or modified in contradiction to their intended use.

Only operate rope hoists when all protective devices and safety-relevant equipment, e.g. movable protective devices and emergency-stop devices, are fitted and fully functioning.

Anybody who identifies an immediate danger of personal injury must actuate the emergency stop button without delay. This also applies in the case of damage occurring to parts of the installation and equipment which makes immediate stoppage necessary.

After an emergency-stop, the operator must not switch on and restart the rope hoist until an experienced technician is satisfied that the cause which led to actuation of this function has been rectified and that continued operation of the installation constitutes no further hazard.



Rope hoists must be switched off immediately in the event of the following faults:

- In the event of damage to electrical devices and cables as well as parts of the insulation.
- In the event of brake and safety device failure.
- If the lifting motion is switched off during lifting of the load, this may indicate triggering of the overload protection device. In this case, the lifting motion must be interrupted and a lifted load must be set down immediately.

Ensure that nobody is endangered by operation of the rope hoist before switching it on or putting it into operation.

If the operator notices persons who may be exposed to a risk to health or personal safety by operation of the equipment, he must suspend operation immediately and may not resume operation again until the persons are outside the danger zone.



Before putting the rope hoist into operation, the operator must be satisfied that the rope hoist is in safe and correct operating condition.

Work on rope hoists may only be carried out when instructions to this effect have been issued, when operation and function of the rope hoists have been explained and when the working and danger zone has been made safe. Cooling devices, such as ventilation openings, may not be rendered permanently inoperative (e.g. covered or closed).

Special local conditions or special applications can lead to situations which were not known when these operating instructions were written. In such cases, special safety measures must be implemented by the owner.

1.9 Safety instructions for maintenance

Maintenance measures are defined as regular maintenance, inspection and repair work.

Mechanical and electrical repairs and maintenance work may only be carried out by appropriately trained personnel (experienced technicians).

Adjustment, maintenance and inspection activities and inspection intervals including specifications concerning replacement of parts/assemblies prescribed in the operating instructions must be observed.

Ensure that all electrical components are de-energized before commencing work on electrical installations and devices.

When all work on the rope hoist has been completed, operation of the rope hoist must not resume until the owner has given approval to this effect.

Unauthorized persons must be prohibited from carrying out work on machinery or parts of the rope hoist.

Before starting any maintenance work, rope hoists must be switched off, taken out of operation and secured against accidental or unauthorized putting into operation (re-starting). Switches must be locked.



It must be ensured that

- the rope hoist is switched off and checked that it is de-energized and, in special cases, isolated,
- moving parts are stationary and stopped,
- moving parts cannot start moving while maintenance work is being carried out,
- the power supply cannot be accidentally restored as long as the rope hoist has been taken out of service for maintenance and repair purposes.
- ensure that operating and auxiliary materials as well as replaced parts are disposed of in a safe and environmentally sound way.

Instructions for repair work in the course of operation

The danger zone must be marked off with red/white safety chains or safety tape and indicated with warning signs. In each individual case, the owner or the person specified by him must check whether the relevant work may be carried out in the course of operation without risk of personal injury owing to the particular local conditions.

To avoid injury, only use calibrated and appropriate tools and auxiliary materials for maintenance, inspection and repair purposes. If there is a risk of objects falling, the danger zone must be made safe.

Maintain a sufficient safety distance to moving or rotating parts to prevent clothing, parts of the body or hair becoming entangled.



Avoid naked flames, extreme heat and sparks in the vicinity of cleaning agents and flammable parts or parts liable to deformation (e.g. wood, plastic parts, oil, grease) as well as in electrical installations – non-compliance may result in fire hazard. Harmful gases may evolve or insulation may be damaged.

Additional instructions for repair work on electrical equipment

Only genuine fuse links with specified amperage and tripping characteristics may be used.

Defective fuse links must not be repaired or bridged and must only be replaced by fuse links of the same type. Switch off the rope hoist immediately in the event of electrical power supply malfunctions.

Work on the electronic and electrical components or equipment may only be carried out by qualified electricians. If inspection, maintenance and repair work is to be carried out on parts of the product, these must – if prescribed by regulations – be isolated. First verify the safe isolation of the parts from the supply before commencing work. The electrical equipment of the rope hoist must be inspected and checked at regular intervals. Defects, such as loose connections, damaged cables and worn contactor contacts must be rectified immediately.

Since it is possible that after a longer period of operation the switching points of relays (time, frequency, monitoring relays) change due to ageing of the components, the relay switching points in circuits relevant to safety must be checked at regular intervals.

Electrical equipment must be replaced as a preventive measure on reaching the limit of its theoretical duration of service (service life).



If work has to be carried out on live parts, a second person must be available to actuate the emergency-stop button or mains connection switch/isolating switch in order to disconnect the power supply in an emergency.

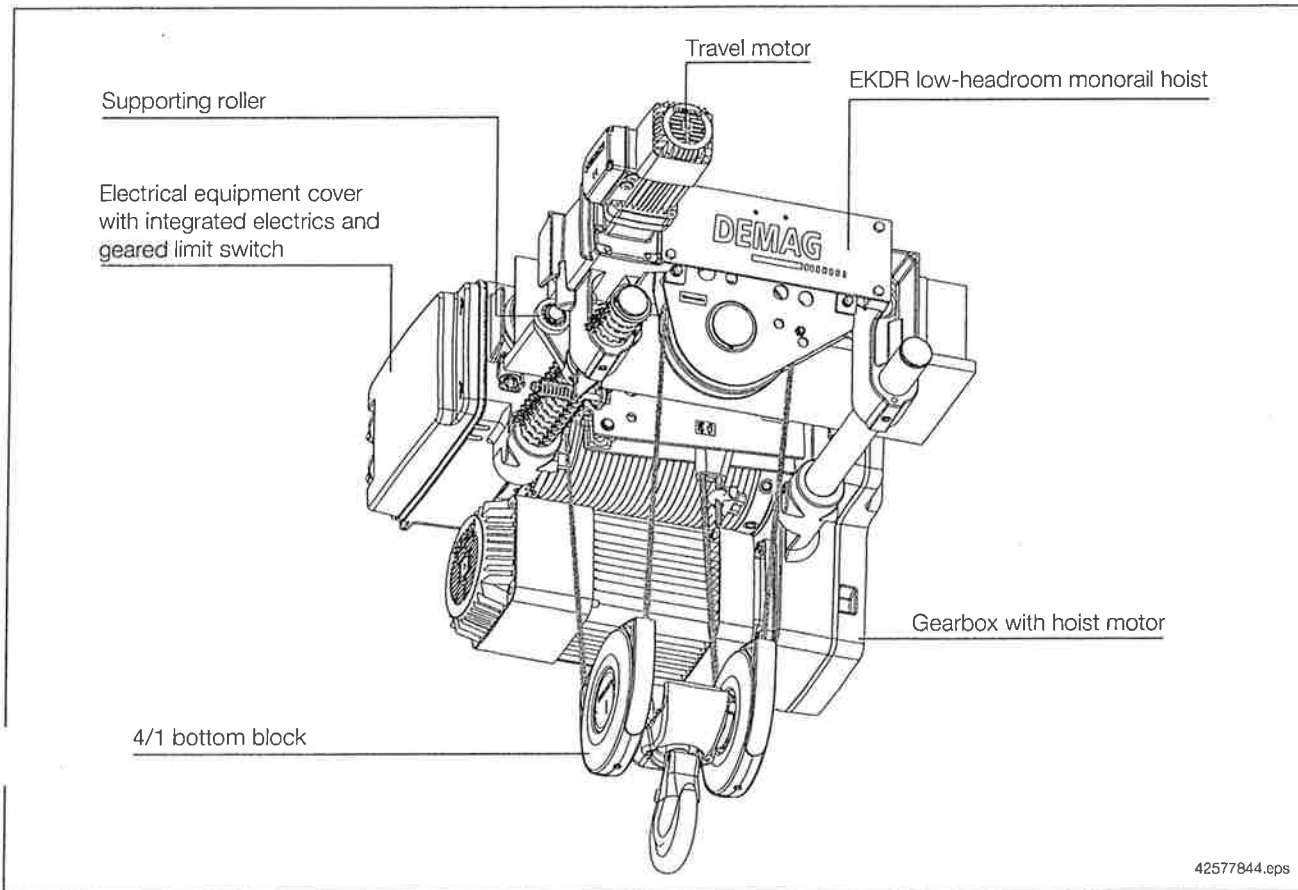
The second person must be familiar with resuscitation measures.

Only use insulated tools.

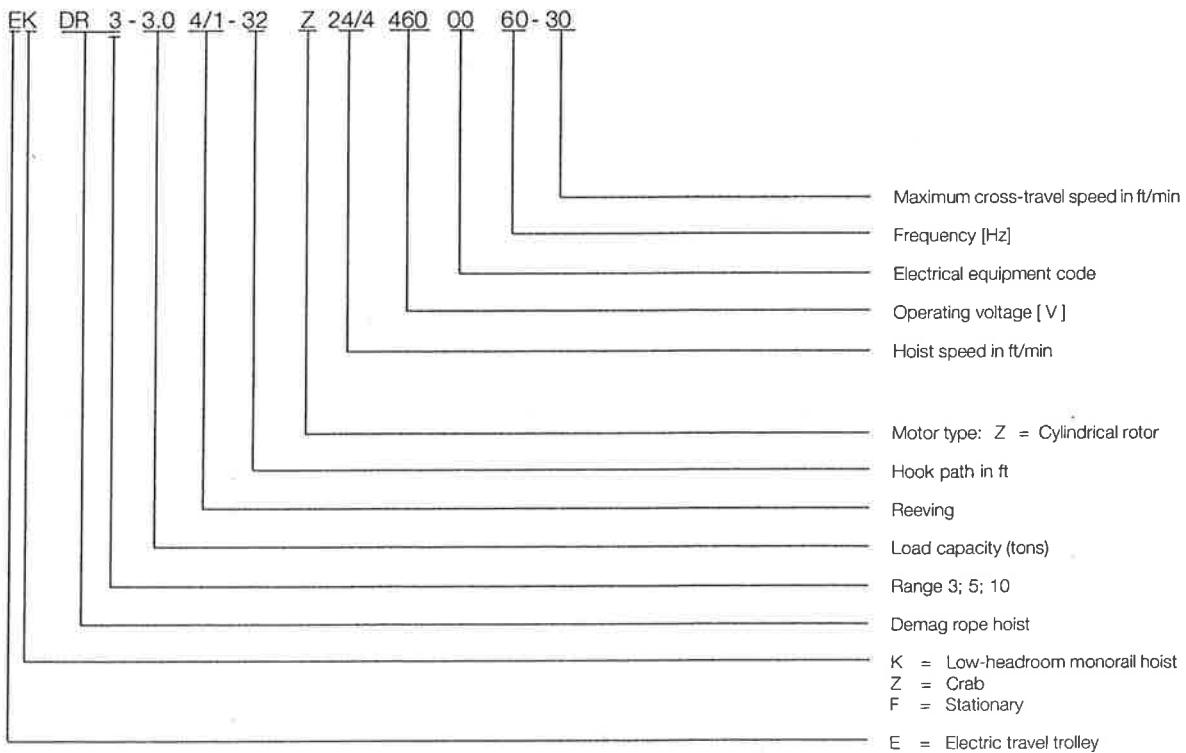
Before disconnecting and connecting electrical plug-and-socket connections, always disconnect them from the supply (this does not apply to mains connections, provided they do not represent a dangerous contact voltage in the sense of the safety regulations).

2 Technical data

2.1 Design overview



2.2 Explanation of size designation / type assignment



2.3 Selection criteria

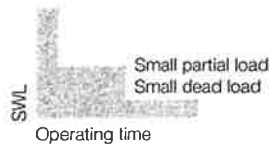
The size of the hoist is determined by the load spectrum, average operating time per working day, SWL and reeving.

The load spectrum

(in most cases estimated) can be evaluated in accordance with the following definitions:

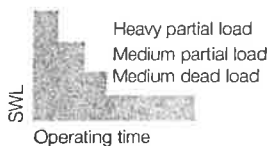
1 Light

Hoist units which are usually subject to very small loads and in exceptional cases only to maximum loads.



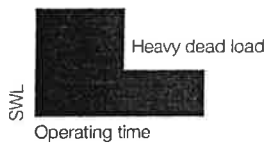
2 Medium

Hoist units which are usually subject to small loads but rather often to maximum loads.



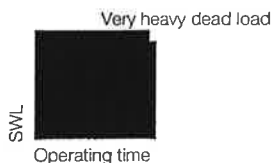
3 Heavy

Hoist units which are usually subject to medium loads but frequently to maximum loads.



4 Very heavy

Hoist units which are usually subject to maximum or almost maximum loads.



1. What are the operating conditions?
2. What is the specified safe working load?
3. To what height must the load be lifted?
4. What is the required lifting speed?
5. Do the loads need to be lifted and lowered with high precision?
6. Is horizontal load travel necessary?
7. How is the hoist to be controlled?

The group is determined from the operating time and load spectrum

Load spectrum	Average operating time per day in hours	Group of mechanisms to			
		FEM	2 m	3 m	4 m
1 Light	4-8 over 16				
2 Medium	2-4 4-8 8-16				
3 Heavy	1-2 2-4 4-8				
4 Very heavy	0.5-1 1-2 2-4				
		ISO	M 5	M 6	M 7

Group of mechanisms to FEM/ISO	2 m/M 5*
Rope reeving method	4/1
Range	Capacity in t
DR 3	3.2
DR 5	5
DR 10	10

* The gearbox service life of the new Demag DR rope hoist is approximately 20% higher than the FEM rating

Example

SWL	5 t
Load spectrum	"medium" from table
Hoist speed	6 m/min
Creep hoist speed	1 m/min
Reeving	4/1
Average hook path	3 m
No. of cycles/hour	20
Working time/day	8 hours

The average operating time per working day is estimated or calculated as follows:

$$\text{Operatingtime/day} = \frac{2 \times \text{averagehook path} \times \text{no. of cycles/h} \times \text{working time/day}}{60 \times \text{lifting speed}}$$

$$\text{Operatingtime/day} = \frac{2 \times 3 \times 20 \times 8}{60 \times 6} = 2,66 \text{ hours}$$

For the "medium" load spectrum and an average daily operating time of 2,66 hours, the table shows group 2 m. For a load capacity of 5 t and 4/1 rope reeving, the table indicates hoist size DR 5 - 5.

Selection table

Size	Group of Mechanisms	Capacity	Hook path	Lifting speed
		t	ft [m]	FPM [m/min]
	FEM/ISO	4/1		
DR 3	2 m/M 5	3.2	32.8 [10]	24/4 [6/1]
DR 5	2 m/M 5	5	32.8 [10]	24/4 [6/1]
DR 10	2 m/M 5	10	32.8 [10]	20/3.2 [5/0.8]

1) Gearbox service life 20 % above the FEM value

2.4 Hoist motor data

It is designed in accordance with the VDE regulations and the design rules of the FEM, to meet the high demands made on electric hoists.

Main/creep lifting F6

Required supply cable conductor cross sections and fuse links

Range DR 3	No. of poles	Code	P	% CDF	n	Starts/h	Rated current I_N and starting current I_A for 60 Hz		cos φ_N	cos φ_A
							460 - 480 V			
Motor size			HP (kW)		rpm		I_N (A)	I_A (A)		
ZBR 100 C 12/2 - B050	12	V1	0.90 (0.67)	20	530	240	4.6	7	0.53	0.72
	2		5.5 (4.1)	40	3400	120	8.5	40	0.78	0.88
ZBR 100 D 12/2 - B050	12	V2	1.3 (0.96)	20	510	240	5.7	9	0.55	0.75
	2		8.5 (6.3)	40	3380	120	11	55	0.88	0.85

Range DR 3	Mains connection delay fuse for 60 Hz 1)	Supply lines for 5% voltage drop ΔU and starting current I_A for 60 Hz 2)
	460 - 480 V	460 - 480 V
Motor size	A	Gauge ft
ZBR 100 C 12/2	20	16 82.0
ZBR 100 D 12/2	25	16 62.3

Range DR 5	No. of poles	Code	P	% CDF	n	Starts/h	Rated current I_N and starting current I_A for 60 Hz		cos φ_N	cos φ_A
							460 - 480 V			
Motor size			HP (kW)		rpm		I_N (A)	I_A (A)		
ZBR 100 D 12/2 - B050	12	V1	1.3 (0.96)	20	510	240	5.7	9	0.55	0.75
	2		8.5 (6.3)	40	3380	120	11	55	0.88	0.85
ZBR 132 D 12/2 - B140	12	V2	2.3 (1.7)	20	480	240	9.6	15	0.54	0.68
	2		14.4 (10.7)	40	3450	120	18	120	0.89	0.85

Range DR 5	Mains connection delay fuse for 60 Hz 1)	Supply lines for 5% voltage drop ΔU and starting current I_A for 60 Hz 2)
	460 - 480 V	460 - 480 V
Motor size	A	Gauge ft
ZBR 100 D 12/2	25	16 62.3
ZBR 132 D 12/2	50	14 49.2

Range DR 10	No. of poles	Code	P	% CDF	n	Starts/h	Rated current I_N and starting current I_A for 60 Hz		cos φ_N	cos φ_A
							460 - 480 V			
Motor size			HP (kW)		rpm		I_N (A)	I_A (A)		
ZBR 132 D 12/2 - B140	12	V1	2.3 (1.7)	20	480	240	9.6	15	0.54	0.68
	2		14.4 (10.7)	40	3450	120	18	120	0.89	0.85

Range DR 10	Mains connection delay fuse for 60 Hz 1)	Supply lines for 5% voltage drop ΔU and starting current I_A for 60 Hz 2)
	460 - 480 V	460 - 480 V
Motor size	A	Gauge ft
ZBR 132 D 12/2	50	14 49.2

2.5 Travel motor data

EKDR travel motor (100 % CDF)

Size	P _N HP (kW)	n _N rpm	M _N ft. lb. (Nm)	I _N 460 - 480 V A	cos φ _N	I _A / I _N	M _A / M _N	M _H ft. lb. (Nm)	J _{mot} lbs/ft ² (kgm ²)	M _{B stat} ft. lb. (Nm)	Weight Lbs (Kg)
ZBA 71 B 4 B003	0.60 (0.44)	1650	1.92 (2.6)	1.5	0.54	2.9	2.75	4.7 (6.4)	0.000125 (0.00061)	3.8 (5.1)	23 (10.5)

Example for calculating the cross sections of the conductors of cables exceeding the length indicated in the table:

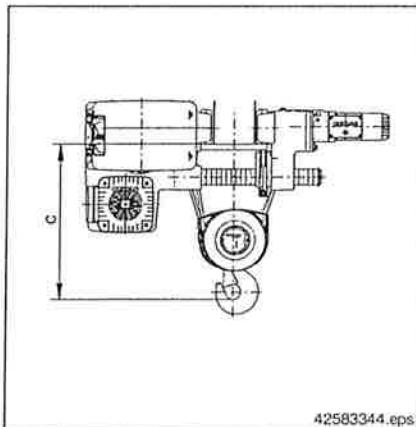
ZBR 100 C 2/12, 400 V required length 25 m

$$\frac{\text{Known cross section} \times \text{required length}}{\text{Known length of cable}} = \frac{2.5 \times 25}{16} = 4 \text{ mm}^2$$

2.6 Setting hook dimension C

Hook dimension C from girder running surface

Range	Group of mechanisms to FEM/ISO	Reeving	Flange width b in in (mm)												
			7.87 (200)	8.66 (220)	9.45 (240)	10.24 (260)	11.02 (280)	11.81 (300)	12.60 (320)	13.39 (340)	14.17 (360)	14.96 (380)	15.75 (400)	16.54 (420)	
DR 3	2 m, 3 m, 4 m M 5, M 6, M 7	2/1	20.87 (530)						21.46 (545)	22.05 (560)	22.64 (575)	23.23 (590)	23.83 (600)	24.61 (615)	
		4/1	16.34 (415)	16.14 (410)	15.94 (405)	15.75 (400)	15.55 (395)	15.35 (390)	15.94 (405)	16.54 (420)	17.12 (435)	17.72 (450)	18.11 (460)	18.70 (475)	
DR 5	2 m, 3 m M 5, M 6	2/1	21.26 (540)						21.85 (555)	22.44 (570)	23.23 (590)	23.82 (605)	24.42 (620)	25.00 (635)	
		4/1	17.52 (445)	17.32 (440)	17.12 (435)	16.93 (430)	16.73 (425)	16.34 (415)	16.93 (430)	17.52 (445)	18.31 (465)	18.90 (480)	19.49 (495)	20.08 (510)	
	4 m M 7	2/1	28.15 (715)												
		4/1	22.83 (580)												
DR 10	2 m, 3 m M 5, M 6	2/1	25.59 (650)						26.38 (670)	27.16 (690)	29.95 (710)	28.74 (730)	29.53 (750)	30.31 (770)	
		4/1	21.65 (550)	21.46 (545)	21.26 (540)	21.06 (535)	20.87 (530)	20.67 (525)	21.65 (550)	22.64 (575)	23.62 (600)	24.61 (625)	25.59 (650)	26.57 (675)	
		4/2	22.24 (565)						23.03 (585)	23.82 (605)	24.61 (625)	25.39 (645)	26.18 (665)	26.97 (685)	
	4 m M 7	2/1	33.46 (850)												
		4/1	31.10 (790)												
		4/2	22.24 (565)						23.03 (585)	23.82 (605)	24.61 (625)	25.39 (645)	26.18 (665)	26.97 (685)	



3 General

3.1 Inspection regulations

Notes on inspections in accordance with

Relevant accident prevention regulations for winches, hoists and towing devices	BGV D8
Relevant accident prevention regulations for cranes	BGV D6



The EC machinery directive requirements are therefore also complied with.
Inspection prior to putting 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 equipment 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).



Routine inspections

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. 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. A function and brake test with a load (test load that is close to the max. permissible load capacity) must be carried out.



The owner must arrange for all inspections to be carried out and documented in the hoist or the crane test and inspection booklet.

3.2 Hoist units operating outdoors



Demag rope hoists operating outdoors should be provided with a cover for protection against the weather or the crabs should be kept under shelter if they are not used.

3.3 Packing and storage

The rope hoist and accessories such as rope, bottom block and control pendant as well as the trolley are shipped in cardboard packaging or on pallets.
Store the rope hoist and accessories in a dry place.

3.4 Paint finish

Rope hoists are supplied in the following standard colors:

Hoist unit	RAL 5009 azure blue / RAL 7001 silver grey
Bottom block	RAL 1007 chrome yellow / RAL 9005 jet black
Hook	RAL 9005 jet black
Trolley	RAL 5009 azure blue / RAL 7001 silver grey

3.5 Operating conditions

Rope hoists can be operated at:

- 14 °F to 104 °F (-10° to +40°C)
- Air humidity up to 80%
- Air pressure up to 3280 ft (1000 m) above sea level

Other operating conditions are also possible.

- Corrosive atmosphere

Please refer to the manufacturer for information on any modifications that may be necessary.

See page 2 for the address.

3.6 Noise emission measurement according to DIN 45635

The sound pressure level of a rope hoist can be seen in the following table.

Type	Hoist unit Sound pressure level L_{pAF} in dB (A), measuring distance 1 m 1)			
	Without load		With load	
	Main lifting speed	Main lowering speed	Main lifting speed	Main lowering speed
EKDR 3 - 4/1	68 dB	70 dB	72 dB	76 dB
EKDR 5 - 4/1	70 dB	70 dB	73 dB	77 dB
EKDR 10 - 4/1	77 dB	78 dB	77 dB	79 dB

Type	Trolley travel Sound pressure level L_{pAF} in dB (A), measuring distance 1 m 1)			
	Without load		With load	
	Left V2	Right V2	Left V2	Right V2
EKDR 3 - 4/1	70 dB	71 dB	72 dB	72 dB
EKDR 5 - 4/1	68 dB	68 dB	71 dB	72 dB
EKDR 10 - 4/1	67 dB	66 dB	67 dB	67 dB

1) All noise level data are subject to a tolerance of ± 2 dB (A).

Sound pressure level L_{pAF} in relation to the load capacity and size of the hoist unit at a distance of 1 m

The specified values (emission values) were measured under maximum load.

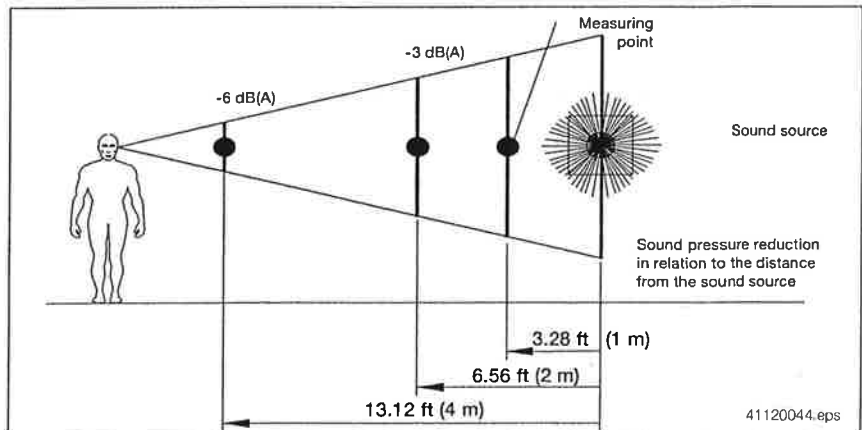
Structural influences such as:

- transmission of noise via steel structures
- reflection of noise from walls, etc.

were not allowed for in the above measurements.

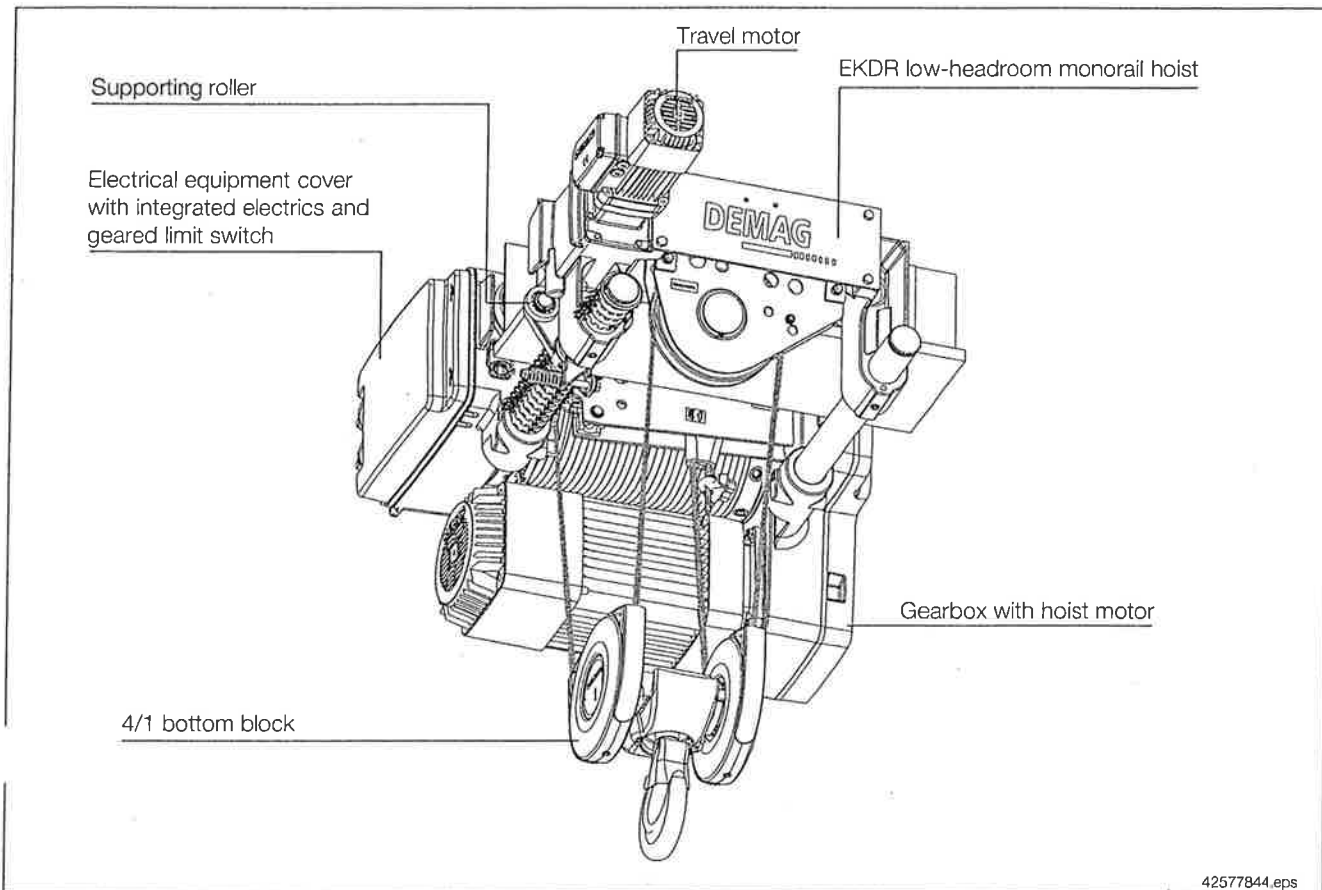


The sound pressure level is reduced by approx. 3 dB(A) each time the distance is doubled.



4 Description

4.1 Design



Demag DR rope hoists are available in three ranges with three groups of mechanisms, each.

4.2 Drive

Demag ZBR cylindrical rotor motors with separately controlled DC brakes are used as hoist drives. They are designed in accordance with the design rules of the FEM, to meet the high demands made on electric hoists. Type of enclosure of the ZBR hoist motors is IP 55 (for motor and brake).

A creep lifting speed of 1/6 of the main lifting speed can be obtained by using a 2/12-pole motor.

Demag ZBA brake motors with separately controlled brakes are used as travel motors. Type of enclosure of the ZBA travel motors is IP55.

4-pole travel motors which are controlled via a frequency inverter are used. The speed is infinitely variable.

4.3 Gearbox/rope reeving components

The torque of the motor is transmitted direct to the helical gearbox.

The hoist gearbox, which is also the basis of the rope hoist, accommodates all gear stages of the three-stage helical gearing.

The drum, rope sheaves and ropes comply with the design rules of

- FEM 9.661
- ISO 4308 -1
- prEN 13001-3.2

4.4 Arrangement of assemblies

The design is characterized by a parallel arrangement of the rope drum and the hoist motor. The gearbox and the electrical equipment housings constitute the two central assemblies of the rope hoist. These two components are bolted together to form the hoist unit frame by means of three connecting rods. The travel wheel pins, the drop stop as well as the bore hole for the trolley crossbar are integral parts of the gearbox and electrical equipment housings.

The trolley side consists of two legs, with one of the legs being designed as the gearbox housing for the travel drive. The travel motor is flanged onto the gearbox housing as a direct drive. The two legs are connected by means of a bolted plate.

The rope hoist is specifically designed for application on a crane as EKDR low-headroom monorail hoist. As an alternative, the travel wheel pins and the bore holes for the trolley crossbar can be used for fitting the rope hoist to a crab or as a stationary unit.

4.5 Geared limit switch

Limitation of motion at the upper and lower hook positions is effected by the geared limit switch. In general, the geared limit switch is provided with 4 contacts. The contacts are assigned in the factory as stated in the order of the rope hoist.

4.6 Models

EKDR low-headroom monorail hoist

4.7 Integrated controls

The electrical equipment cover accommodates the control system for the required connections, the powerfeed and further sensors. The connections are of plug-and-socket design throughout, thus increased ease of service and maintenance is ensured. The electrical equipment cover is locked by means of twist locks and fitted in hinges.

4.8 DLC-8 control pendant

The shock and impact-resistant housing of the DLC-8 is of high quality thermoplastic, it is resistant to fuels, salt water, greases, oils and alkaline solutions. If the DLC-8 is used under particularly arduous ambient conditions, it can be additionally protected by means of a bumper.

In "suspended" operating position, the DLC-8 has type of enclosure IP65 to DIN VDE.

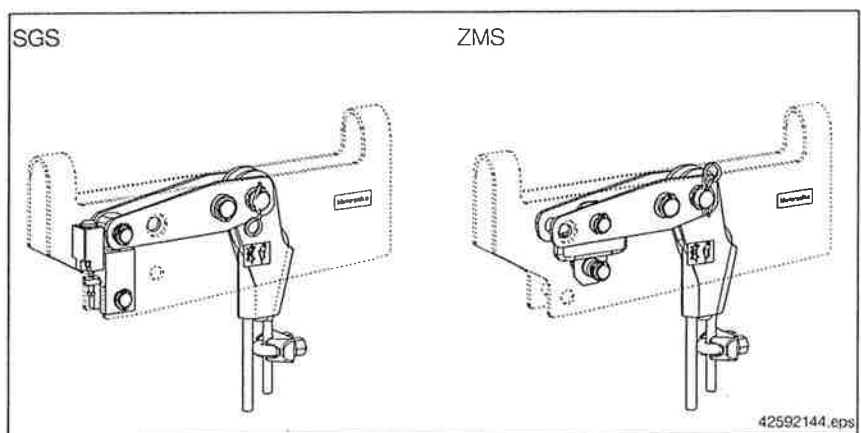
Strong mineral (e.g. hydrochloric or sulphuric) acids may corrode pendant switch housings.

Replace such pendant switches in due time.

4.9 Load detectors for Demag rope hoists

The mechanical SGS (standard on DR 3 – DR 10) or the electronic ZMS (option on DR 3 – DR 10) load detectors are used to protect Demag rope hoists and supporting structures against excessive stresses.

In combination with ZMS load detectors, a summation measuring device, slack rope relay and digital load indicator can be fitted.



4.10 Tracks

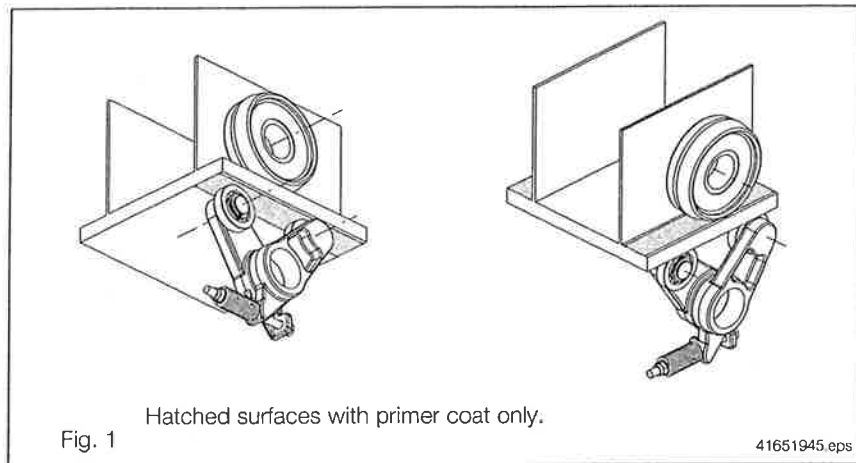
The minimum profile sections of beams for a monorail hoist track specified in our brochures must be adhered to since otherwise deformations of the bottom flanges might occur. Gradients should not exceed 2 %.

Hoist travel on track beams must in no way be obstructed by protruding suspension bolts, screw heads, butt straps, clamping plates, etc.

End stops must be fitted at both ends of the runway.

The running surfaces of rails and track beams must only be given a primer coat of 40 μ . Travel characteristics would be impaired by a top coat (see fig. 1).

Rails and track beams should be kept clean; oil, grease, ice and dirt on the running surfaces will cause travel wheels to skid.



4.11 Trolleys

The trolleys are infinitely variable within the range for adjustment to different flange widths.

When the spacer bushes have been removed from the connecting rods, release the threaded pin in the wheel legs.

The wheel legs can then be moved along the connecting rods.

For further details, see section 5.7 Adjustment of low-headroom monorail hoists.

The trolley must never be used for tearing off or pulling loads or for dragging them along the ground. The speed of the trolley should always be reduced before the buffer stops are reached; otherwise damage or accidents may occur.

The low-headroom monorail hoist is counter-balanced by supporting rollers which press against the track from below.

5 Installation

5.1 Electrical equipment



Work on electrical equipment may only be carried out by qualified electricians or trained personnel, see also section 1 Safety instructions.

Each Demag rope hoist is provided with a wiring diagram showing details of the controls.

The wiring of the Demag rope hoist complies in all respects with current DIN VDE and accident prevention regulations. Unauthorized intervention and modifications may result in infringement of these regulations.

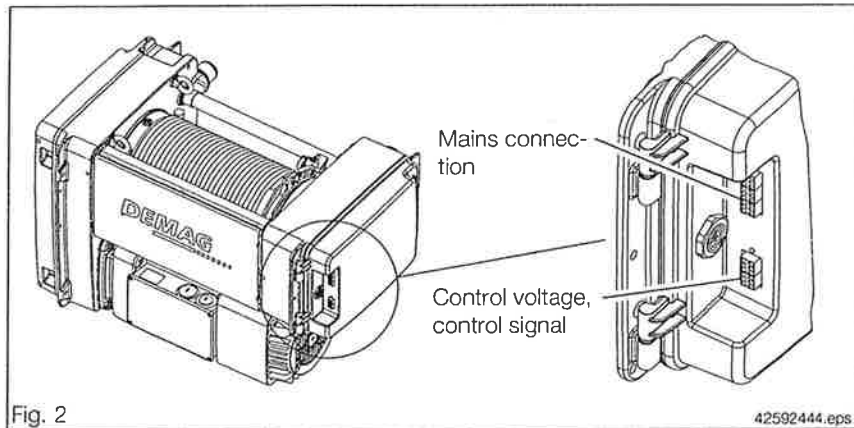
The switchgear is designed for extreme conditions. However, its life depends on usage.



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 might 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 accordingly.

5.2 Mains connection and control signal



First check whether the voltage and frequency specified on the capacity plate match your mains supply.



Voltage changing motors are wired in our works for the operating voltage stated in the order of the Demag rope hoist.

The standard control voltage is 115 V at 60 Hz (48 V 50/60 Hz).

If the measured value exceeds the voltage specified on the devices by more than 10 %, the control transformer must be connected on the primary side to terminals 11 and 12 (in the crane electrics).

The plug-in connection for the mains connection is the upper 4-pole connector (fig. 2), the lower plug-in connector is provided for supply of the 48 V control voltage and the CAN bus control signal.



Plug-in the relevant connectors and tighten the locking screws by hand.

The required supply cable conductor cross sections and fuse links can be seen in section 2.4. Please note that the length of the supply line specified for a given cross section must not be exceeded in order to avoid excessive voltage drop.

5.3 Checking the direction of movement

The direction of the rope hoist's movement is dependent on the sequence of phases in the power supply. When the control pendant switching element for "lifting" is pressed, the load hook must move upwards. If this is not the case, two leads from the supply should be changed over to ensure proper functioning of the emergency limit switches.

If the phases are changed over, the control system of the hoist automatically switches the unit off.



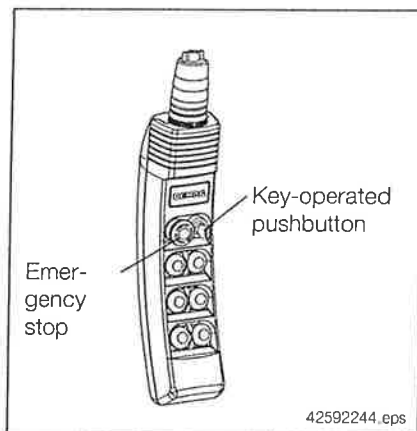
Check the top and bottom hook positions and adjust properly.

Failure to do this may result in serious damage or injury.

5.4 Control system

For control, a contactor control system is used.

5.5 DLC-8 control pendant



Demag DLC-8 control pendants are used to control the rope hoist.

Demag rope hoists are generally fitted with emergency limit switches and a key-operated button in the DLC-8 control pendant. Owing to an integrated key-operated button, an operating limit switch can be fitted at a later stage. For replacement of control pendants and their switching elements, refer to the instructions in section 5.7. The control pendants should be suspended so that the bottom edge is approx. 39 in (1 m) above floor level.

The arrow symbols on the buttons must indicate the correct direction of the respective movement.

The control pendant is generally of plug-in design, this ensures service and maintenance-friendly installation.

5.5.1 Principle

The DLC-8 consists of an integrated mechatronics solution, i.e. the actuating mechanical system acts on a magnet sensor system that evaluates the control commands via an electronic system.

This makes stepless actuation of all three motion axes possible. In accordance with the optionally selected drives, the integrated DR control system implements connection either in stages or infinitely variable.

5.5.2 Wiring

The integrated DR control system for the first time features transmission of control signals from the DLC-8 control pendant to the DR control system or to the crane control system via a CAN bus. This makes it possible to reduce wiring requirements to a minimum. The number of connection diagrams is reduced to a single schematic diagram.

5.5.3 Infra-red interface (IrDA)

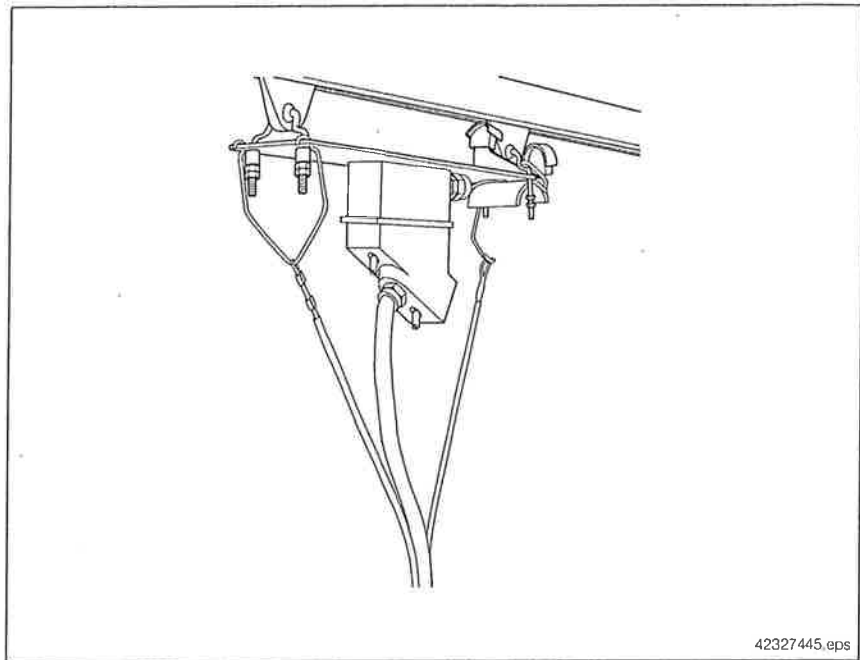
All DLC-8 control pendants are provided with an integrated infra-red interface (IrDA) for reading and transmitting the service data of the DR rope hoist.

5.5.4 Display

In addition, information on the load value and the service data (min. quantity) is available via the standard display.

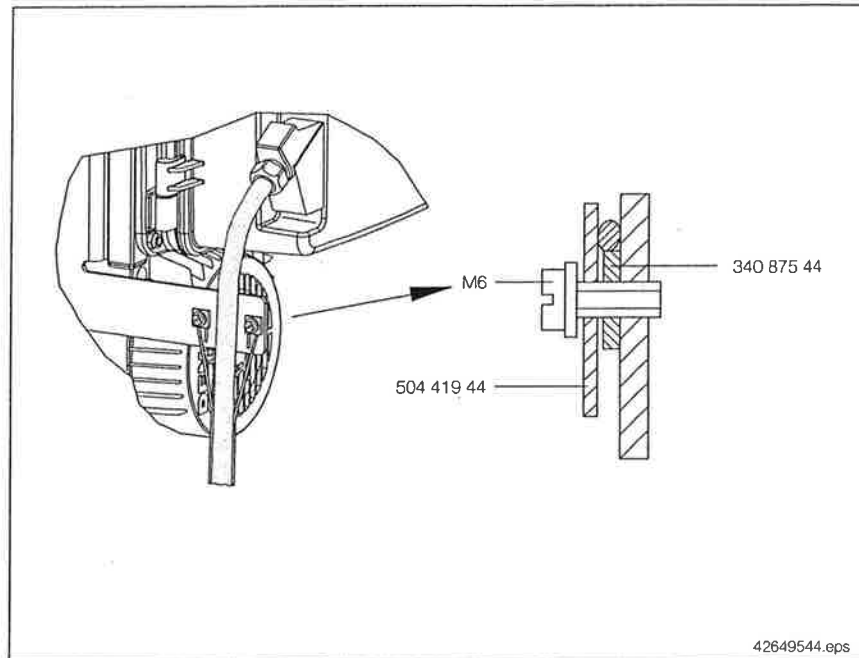
When the standard SGS load detector is used and the load is detected by means of slip calculation, the load value trend is displayed. When the strain gauge carrier link available as an option is used as load detector, a precise digital load display is provided.

5.5.5 Connection to the KBK trailing cable trolley



42327445.eps

5.5.6 Connecting the control cable with vulcanised strain relief wire cord to the DR



42649544.eps

5.6 Wire ropes

5.6.1 Construction, application and reeving of wire ropes

Range		DR 3							
Type of reeving		2/1				4/1			
Group of mechanisms to	FEM	2 m - 3 m		4 m		2 m - 3 m		4 m	
	ISO	M 5 - M 6		M 7		M 5 - M 6		M 7	
Hook path	ft (m)	39.37 (12)	65.6 (20)	39.37 (12)	65.6 (20)	19.68 (6)	32.8 (10)	19.68 (6)	32.8 (10)
Wire rope dia.	in (mm)	0.275 (7)		0.275 (7)		0.275 (7)		0.275 (7)	
see fig.		1		2		1		2	
Calculated rope breaking force	approx. lbs (kN)	11033 (49.08)		11150 (49.60)		11033 (49.08)		11150 (49.60)	
Minimum breaking force	lbs (kN)	8947 (39.8)		9576 (42.6)		8947 (39.8)		9576 (42.6)	
Rope grade	KIPS/in ² (N/mm ²)	284.3 (1960)		284.3 (1960)		284.3 (1960)		284.3 (1960)	
Rope length	ft (m)	88.4 (26.95)	141.1 (43)	88.4 (26.95)	141.1 (43)	90.9 (27.7)	143.3 (43.7)	90.9 (27.7)	143.3 (43.7)

Range		DR 5							
Type of reeving		2/1				4/1			
Group of mechanisms to	FEM	2 m	3 m - 4 m	2 m	3 m - 4 m	2 m	3 m - 4 m	2 m	3 m - 4 m
	ISO	M 5	M 6 - M 7	M 5	M 6 - M 7	M 5	M 6 - M 7	M 5	M 6 - M 7
Hook path	ft (m)	39.37 (12)		65.6 (20)		19.68 (6)		32.8 (10)	
Wire rope dia.	in (mm)	0.354 (9)		0.354 (9)		0.354 (9)		0.354 (9)	
see fig.		1	2	1	2	1	2	1	2
Calculated rope breaking force	approx. lbs (kN)	17235 (76.67)	20614 (91.70)	17235 (76.67)	20614 (91.70)	17235 (76.67)	20614 (91.70)	17235 (76.67)	20614 (91.70)
Minimum breaking force	lbs (kN)	14162 (63)	17826 (79.30)	14162 (63)	17826 (79.30)	14162 (63)	17826 (79.30)	14162 (63)	17826 (79.30)
Rope grade	KIPS/in ² (N/mm ²)	284.3 (1960)	313.3 (2160)	284.3 (1960)	313.3 (2160)	284.3 (1960)	313.3 (2160)	284.3 (1960)	313.3 (2160)
Rope length	ft (m)	89.6 (27.3)		142.6 (43.45)		92.2 (28.1)		145.3 (44.3)	

Range		DR 10									
Type of reeving		2/1				4/1				4/2	
Group of mechanisms to	FEM	2 m	3 m - 4 m	2 m	3 m - 4 m	2 m	3 m - 4 m	2 m	3 m - 4 m	2 m	3 m - 4 m
	ISO	M 5	M 6 - M 7	M 5	M 6 - M 7	M 5	M 6 - M 7	M 5	M 6 - M 7	M 5	M 7
Hook path	ft (m)	39.37 (12)		65.6 (20)		19.68 (6)		32.8 (10)		19 (5.8)	37.4 (11.4)
Wire rope dia.	in (mm)	0.512 (13)		0.512 (13)		0.512 (13)		0.512 (13)		0.354 (9)	
see fig.		1	3	1	3	1	3	1	3	1	
Calculated rope breaking force	approx. lbs (kN)	37076 (164.93)	44488 (197.9)	37076 (164.93)	44488 (197.9)	37076 (164.93)	44488 (197.9)	37076 (164.93)	44488 (197.9)	17235 (76.67)	
Minimum breaking force	lbs (kN)	29673 (132)	37361 (166.2)	29673 (132)	37361 (166.2)	29673 (132)	37361 (166.2)	29673 (132)	37361 (166.2)	14162 (63)	
Rope grade	KIPS/in ² (N/mm ²)	284.3 (1960)	313.3 (2160)	284.3 (1960)	313.3 (2160)	284.3 (1960)	313.3 (2160)	284.3 (1960)	313.3 (2160)	284.3 (1960)	
Rope length	ft (m)	92.7 (28.25)		145.2 (44.25)		96.1 (29.3)		145.2 (45.25)		103.7 (31.6)	176.5 (53.8)

Rope construction:
8 x 19 with steel core IWRC,
LH = left hand ordinary lay rope, bright finish,
with pressure sleeve on one end.

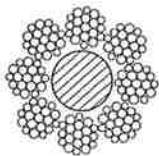


Fig. 1

Rope construction:
8 x 26 with steel core IWRC,
LH = left hand ordinary lay rope, bright finish,
with pressure sleeve on one end.

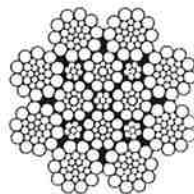


Fig. 2

Rope construction:
10 x 26 with steel core IWRC,
LH = left hand ordinary lay rope, bright finish,
with pressure sleeve on one end.

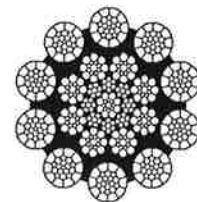
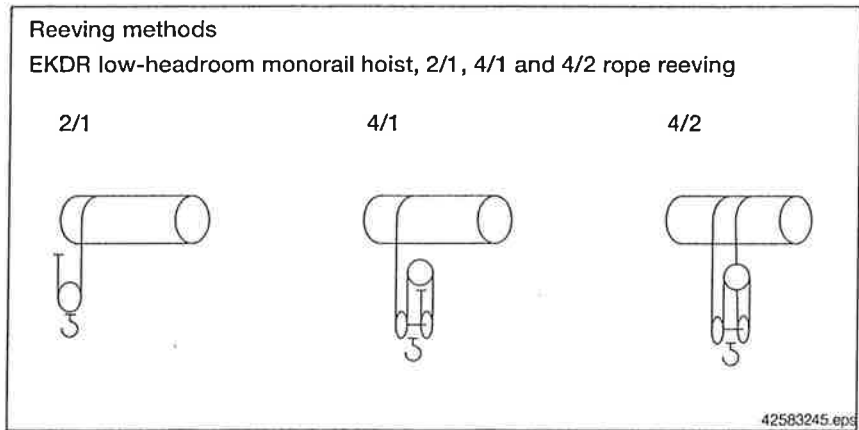


Fig. 3



5.6.2 Discarding the wire rope

For safety reasons, wire ropes must be discarded when the number of visible broken wires at the worst spot has reached the following figures (see table 1), counted over a reference length of rope of 6 times or 30 times the rope diameter, whichever gives the worst result.

A wire rope must be discarded immediately if a strand is broken, if it is found to suffer from swelling, bruising, kinks, permanent bends or corrosion, or if it is worn or damaged.

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 being approximately that of the rope sheaves.

The rope replacement may be carried out by service engineers of Demag or an authorized specialist company.

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

Wire rope construction as in fig.	Group of mechanisms to FEM/ISO	2 m/M5, 3 m/M6, 4 m/M7		2 m/M5, 3 m/M6, 4 m/M7	
	Rope dia.	Number of broken wires over length of rope 6 x rope diameter		Number of broken wires over length of rope 30 x rope diameter	
	in (mm)	Number of broken wires	Rope length in (mm)	Number of broken wires	Rope length in (mm)
1	0.275 (7)	13	1.653 (42)	26	8.268 (210)
	0.354 (9)		2.125 (54)		10.630 (270)
	0.512 (13)		3.071 (78)		15.354 (390)
2	0.275 (7)	18	1.653 (42)	36	8.268 (210)
	0.354 (9)		2.125 (54)		10.630 (270)
	0.512 (13)		3.071 (78)		15.354 (390)
3	0.512 (13)	21	3.071 (78)	42	15.354 (390)

Rope construction:
8 x 19 with steel core IWRC,
LH = left hand ordinary lay rope, bright finish,
with pressure sleeve on one end.



Fig. 1

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Rope construction:
8 x 26 with steel core IWRC,
LH = left hand ordinary lay rope, bright finish,
with pressure sleeve on one end.

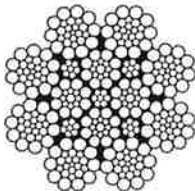


Fig. 2

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Rope construction:
10 x 26 with steel core IWRC,
LH = left hand ordinary lay rope, bright finish,
with pressure sleeve on one end.

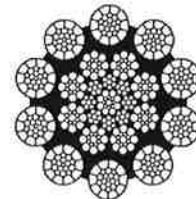


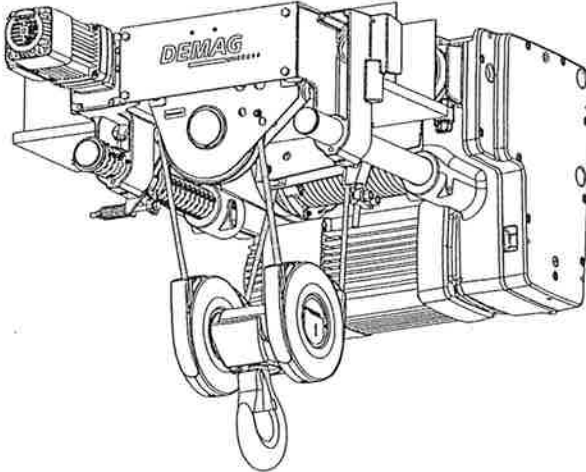
Fig. 3

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5.7 Adjustment of EKDR 3 –5 –10 low-headroom monorail hoists, 4/1, 2/1 and 4/2 rope reeving

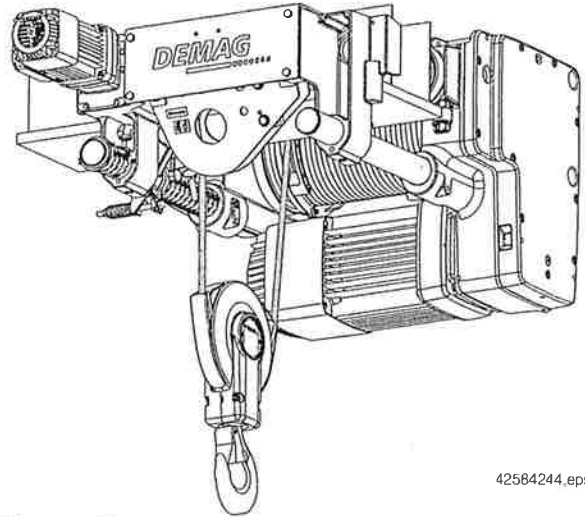
5.7.1 Fitting the trolleys Range 3, 5 and 10

4/1 reeving



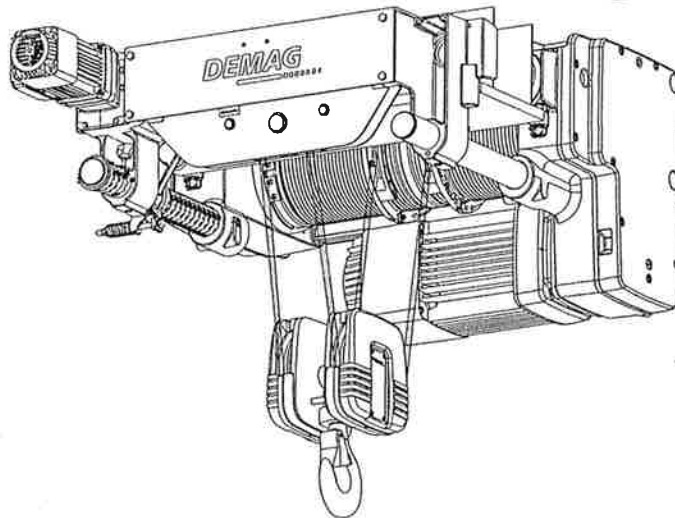
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2/1 reeving

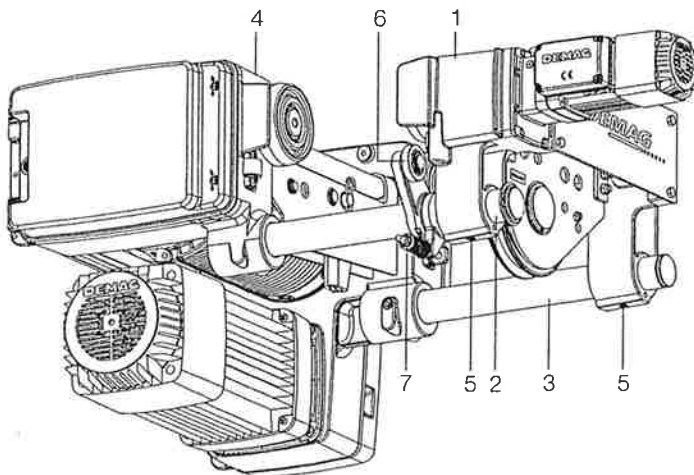


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4/2 reeving
EKDR 10



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Safely support the trolley before you place it onto the girder

to avoid any hazard during installation, i.e.

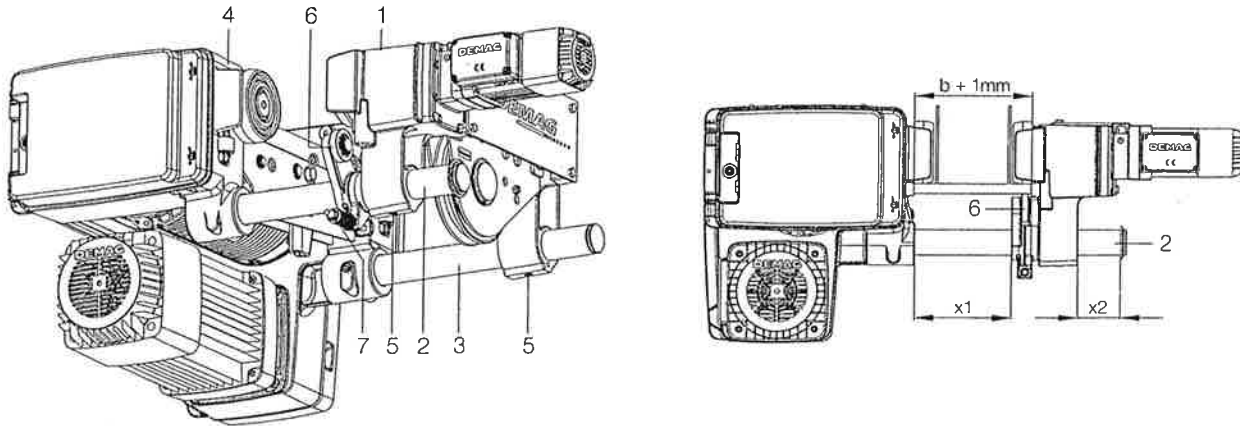
- Crushing hazard
- Shearing hazard

This support may only be removed after supporting roller (6) has been adjusted.

Slide wheel legs (1) – travel motor side – on connecting rods (2 + 3), to do this, loosen threaded pin (5).

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Assembly of the trolley on the track girder



Place the travel rollers of wheel legs (4) – drum side – onto the girder flange and slide the wheel legs (1) on the opposite side – travel motor side – towards the girder.
 Setting dimension between both opposite guide rollers is flange width $b + 0.04$ in (1 mm).
 After adjusting the trolley, press supporting roller (6) against the bottom flange of the girder by means of tensioning screw (7). Tension supporting roller (6) until the travel wheel is in contact with the girder flange.

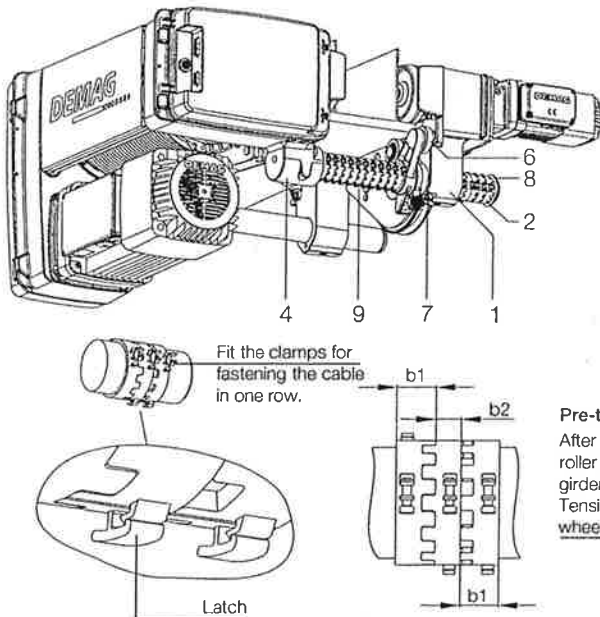
Fix wheel legs (1) on connecting rods (2 + 3) with the threaded pins (5).
 Tightening torque
 DR 3/5 range = 110 ft. lbs (150 Nm)
 DR 10 range = 148 ft. lbs (200 Nm)



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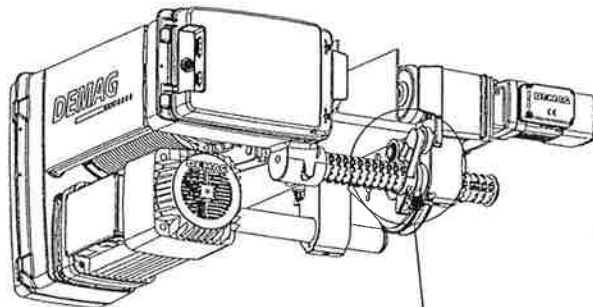
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Assembly of the spacer sleeves (only on the trolley crossbar side with supporting roller)



Fit the clamps for fastening the cable in one row.

Final setting of the supporting rollers



Pre-tensioning of pressure spring (10)
 After adjusting the trolley, press supporting roller (6) against the bottom flange of the girder by means of tensioning screw (7). Tension supporting roller (6) until the travel wheel is in contact with the girder flange.

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- 1) Measure distance x_1 between wheel legs (4) and supporting roller (6).
 - 2) Measure distance x_2 between wheel legs (1) and retaining ring with washer (8).
 - 3) This is done to determine the number of spacer sleeves (9).
- Spacer sleeve (9) is now opened and fitted on connecting rod (2).

Spacer sleeve dimensions (9)

Range	Width in (mm)		
	b1	b2	b1 + b2
DR 3/DR 5	0.902 (22.9)	0.598 (15.2)	1.500 (38.1)
DR 10	0.878 (22.3)	0.583 (14.8)	1.461 (37.1)

Determine dimension L of pre-tensioned pressure spring (10).

To obtain the pressure force of supporting rollers (6), shorten length L of pressure spring (10) by "dimension x".

Range	DR 3	DR 5	DR 10
Dim. -x [in (mm)]	-0.244 (-6.2)	-0.205 (-5.2)	-0.295 (-7.5)

5.8 Rope reeving methods for the rope hoist

The DR rope hoist is supplied with the rope separate from the bottom block.

Rope reeving arrangements 2/1, 4/1 and 4/2 on the DR rope hoist can be seen in the following figs 8 – 10.

Care must be taken to keep the rope tight and not to twist it during reeving.

The rope is retained by means of a wedge and an anchorage which is incorporated into a special crossmember.



The rope end is properly secured if the carrying fall is introduced along the vertical side of the anchorage, as in fig. 6, so that under load the wedge remains visible above the anchorage and the dead end protrudes downwards by approx. 4 in (10 cm).

The rope replacement may be carried out by service engineers of Demag or an authorized specialist company.

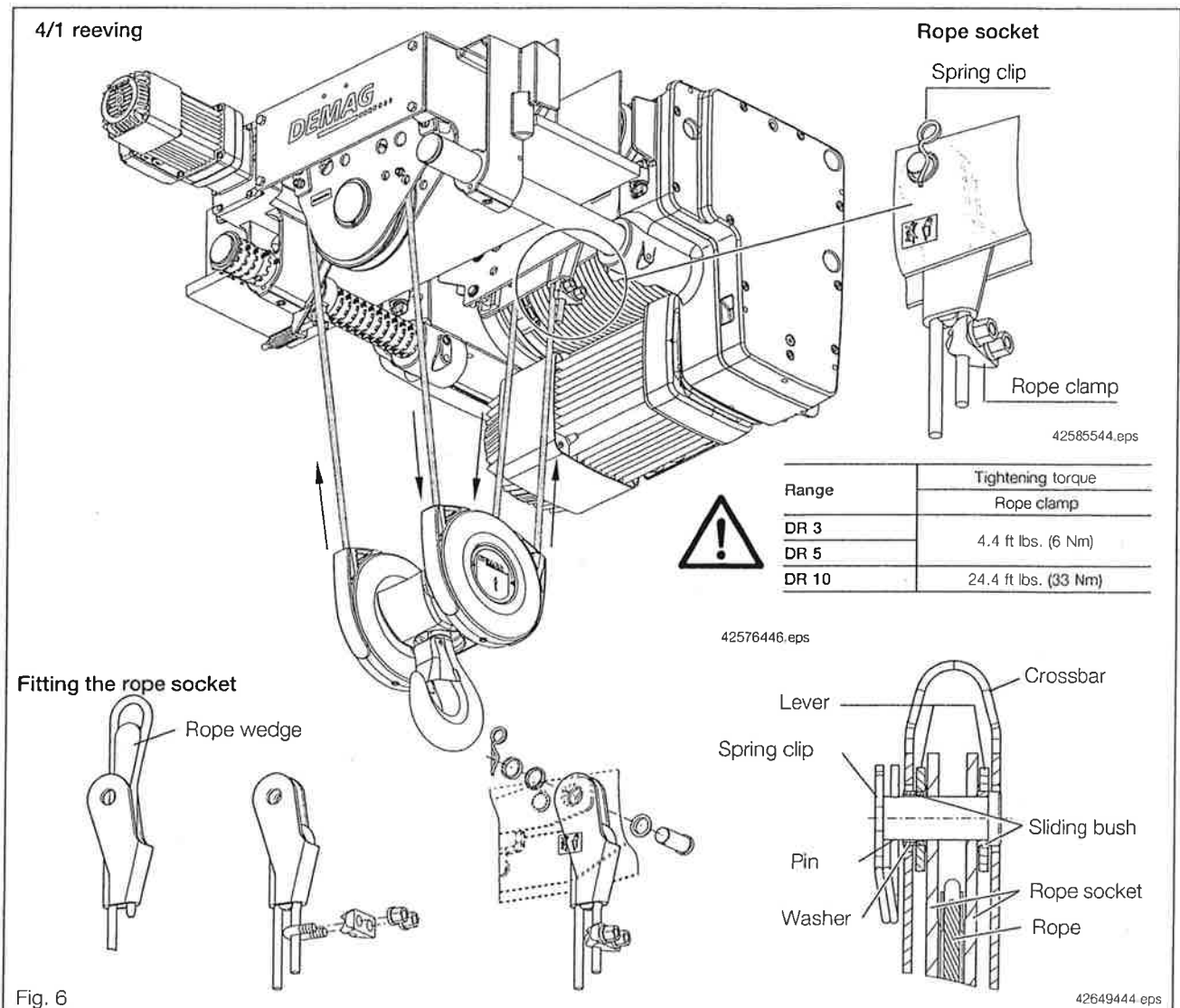


The method of securing the rope end by means of this anchorage is absolutely reliable and conforms to the relevant regulations. As an additional safety feature to prevent the dead end from slipping in accordance with ISO 4309, a clamp is fitted as shown in fig. 8. Additional clamps must not be used since these would cause bruising and uneven stress in the carrying fall of the rope and thus lead to its destruction.



Check suspension of rope socket.

When fitting the rope socket, it must be ensured that the spring clip is locked (see fig. 6).



2/1 reeving

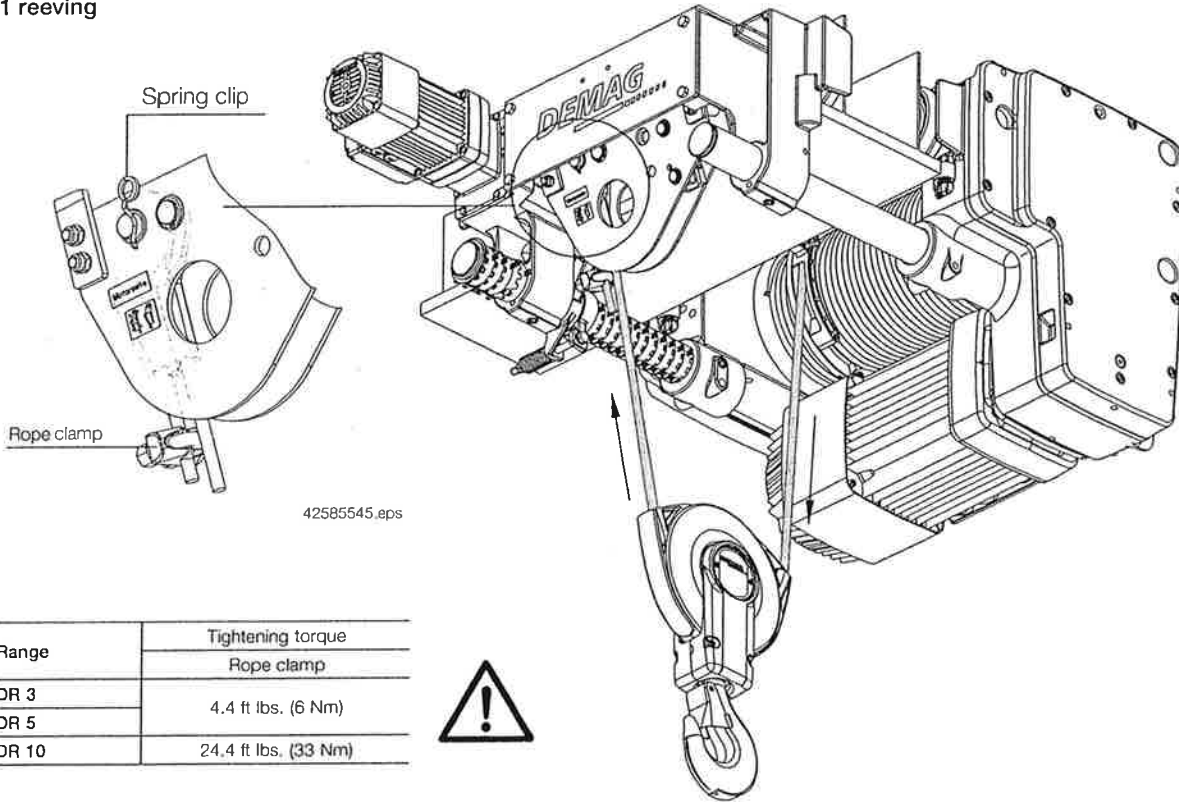
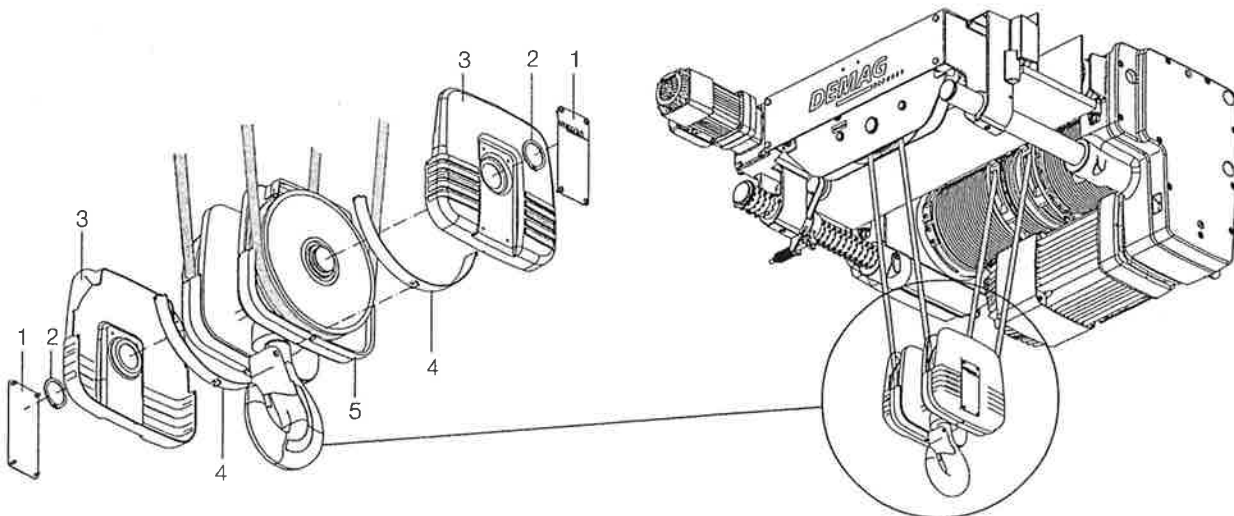


Fig. 7

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4/2 reeving
EKDR 10



Assembly of the bottom block for 4/2 reeving
Remove capacity plate (1), retaining ring (2), cover (3) and guide bracket (4).
Suspend bottom block (5) in the rope loops of the rope hoist and refit parts 1 – 4.

Fig. 8

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6 Putting into operation

6.1 Geared limit switch

The geared limit switch is fitted in the electrical equipment enclosure of the Demag rope hoist. It switches off the rope 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.

Operating limit switches are required where the end positions are approached regularly during normal operation.

In such cases, the switches must be adjusted so that the operating limit switch is actuated first and then, i.e. if this fails to operate, the emergency limit switch.

Accident prevention regulations require that the crane operator checks the emergency limit switch before starting work. This can be done using the key-operated button in the control pendant.

The operating limit switch can be by-passed by pressing this button. In order to approach the emergency limit switch, the hoist unit must be switched on and the check button pressed simultaneously.

The key-operated button must also be pressed in order to move the hook back out of the end position (lowering).

The functions carried out by the geared limit switch can be seen in the wiring diagram provided.

6.1.1 Determining the cut-out points for the geared limit switch



The emergency limit switches must be properly adjusted to ensure prevention of accidents and to avoid damaging the rope hoist. The emergency limit switches are adjusted before leaving the factory to avoid complete unwinding of the rope, only.

Following installation of the rope hoist, they must be readjusted and checked for the particular operating conditions.

If you wish to set the greatest possible lifting height for your specific operating conditions, it is essential to observe the following:

The emergency limit switch for the top hook position must be set so that when it switches off the lifting movement, the minimum distance between the top edge of the bottom block and the bottom edge of the track girder is maintained (see table 1).

Table 1

Limit switch cut-out point for the highest hook position (fig. 11)

		Dimension F in (mm)	
		2/1	4/1
Reeving		2/1	4/1
Emergency stop limit switch	Simultaneous cut-out of main and creep lifting	2.76 (70)	1.97 (50)
Operating limit switch	Simultaneous cut-out of main and creep lifting	4.72 (120)	2.76 (70)

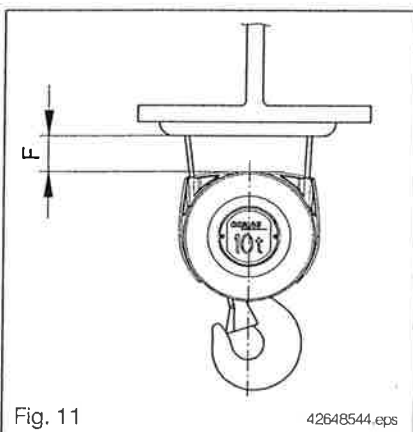


Fig. 11

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The emergency limit switch for the bottom hook position must be set so that the load hook does not touch the floor.

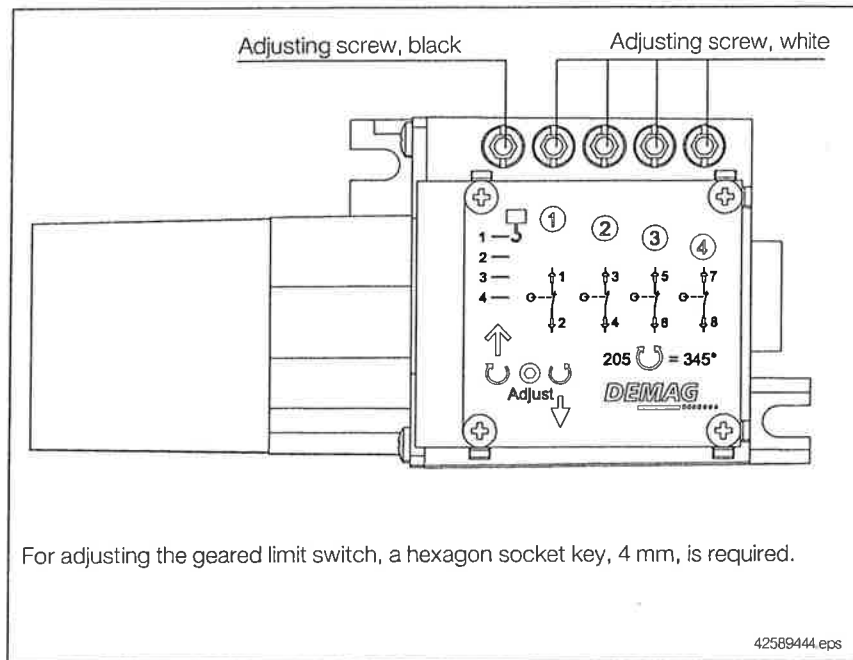
Setting of the cut-out points is described in the setting instructions (section 6.2).

Range	Safety turns	
	Reeving	
	2/1, 4/1	4/2
DR 3	3	-
DR 5	3	-
DR 10	3	3.5



Ensure the correct number of safety turns on the drum.

6.2 Geared limit switch setting instructions



Before setting the switching points, make sure that live contacts are provided with a touch guard in order to protect them against accidental contact.

Allow for run-on!

Operating principle

Each contact is allocated to a cam disc which is infinitely adjustable. The cam discs can be adjusted independently by means of the white adjusting screws.

Adjust

When turning the white adjusting screw clockwise, the cam disc is also turned clockwise. The switching point is shifted upwards in accordance with the hook path.

When turning the screw anti-clockwise, the switching point is shifted downwards. Standard cam discs are designed in such a way that a max. useful path and a run-on path are available.

Setting the contacts for individual adjustment:

The geared limit switch is already permanently connected with the control system via the system connector cable. Move load hook of the rope hoist into the specified switch-off position (switch-off points see section 6.1.1, table 1). For setting the contacts, turn the white adjusting screw until the contact maker opens the contact. If the run-on path is exceeded, the contact either opens or closes.

Setting the contacts for adjustment in blocks:

The contacts are adjusted in blocks by means of the black adjusting screw. All cam discs are adjusted together, while the relative adjustment of the individual contacts remains unchanged. When turning the black adjusting screw clockwise, the cam discs are also turned clockwise.



Approach cut-out points several times to check the limit switch functions are operating correctly!

6.3 Inspection before putting the unit into operation

When putting the hoist into operation for the first time, the inspections in accordance with section 8.3, table 2 must be carried out.

6.4 Instructions relating to safety at work



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

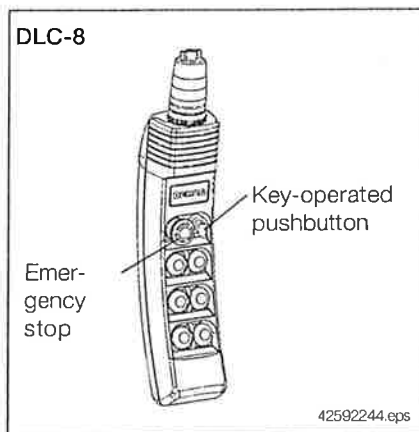
Operation with defective or damaged ropes results in a high risk of accident for persons and the rope hoist and is therefore prohibited.

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

6.5 Starting operation

See section 8.1

7 Taking the unit out of service at the end of the shift/for maintenance



7.1 Emergency stop

Every rope hoist features an emergency-stop device with which all motions can be stopped in the event of a hazard.

The emergency-stop button is arranged in the control pendant.

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.

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

7.2 Taking the unit out of service at the end of the shift

When the work has been completed, position the bottom block outside the travel area. Switch off the power supply at the mains connection or isolating switch.

7.3 Taking the unit out of service for maintenance purposes

Maintenance work on the Demag rope hoist must not commence before the load has been removed and the mains connection switch/isolating switch have been switched off.

Verify safe isolation from the power supply.

The relevant accident prevention regulations and statutory regulations must be observed for operation and maintenance.

Required tests and inspections must be carried out.

Comply with the following:

Section 1 Safety instructions and information in the maintenance schedule, page 37, table 2.



8 Inspections/maintenance/general overhaul GO

8.1 Inspection before starting work and during operation

The crane operator must carry out inspections in accordance with table 2 before starting work. Rope hoists must be taken out of service immediately if any defects relating to operating safety and reliability are detected.

Such defects are e.g.:

- brake or emergency limit switch failure,
- damage to the rope,
- unusual noise in the gearbox, etc.

8.2 Inspection and maintenance schedule



The specified inspection and maintenance intervals (table 2) apply to normal rope hoist service conditions.

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

For repairs, only use genuine Demag parts (see component parts list).

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

8.3 General overhaul GO

Upon expiration of 90% of the theoretical duration of service – if the rope hoists are correctly classified after 10 to 12 years – the owner must arrange for a general overhaul GO to be carried out. A general overhaul must be carried out on reaching the end of the theoretical duration of service, at the latest.

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 2).

- Gearing
- Gearbox bearings
- Motor
- Rope drum
- Gear oil
- Connecting elements
- Switchgear in the control system
- Trolley

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 a specialist company authorized by the manufacturer fulfils the condition for continued operation of the rope hoist.

Thus the relevant accident prevention regulations and the BGV D8 are complied with.

Further utilization is approved when an expert engineer has entered the conditions for further utilization into the test and inspection booklet. The completion of the general overhaul must be confirmed in the test and inspection booklet and a further period of utilization in accordance with FEM 9.755 must be entered.

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

Table 2
Inspection and maintenance schedule

	See section	Before putting into operation	When starting operation	Every 6 months	Once per year
Check when putting into operation, when starting operation and during operation					
Check rope securing devices and rope guide		X			X
Check spring tension of thrust rocker and plastic coat of supporting rollers		X			X
Check electrical switchgear and wiring	5.1	X		X	
Check operation of emergency limit switch	6.1	X	X		X
Check strain relieving elements, control cables and control pendant housing for damage		X	X		X
Check operation of the brake		X	X		X
Check operation of the load detector		X			X
Check lubrication of the rope		X			X
Check hook and hook safety catch		X	X		X
Check during time of operation					
Check adhesive grease in bearings of return sheaves, crossheads, compensating sheaves and pins of rope anchorage and re-grease, as required					X
Check suspension of rope anchorage Check play of the setbolt/pin in the counter bore hole for the retaining plate Check spring clip for correct fitting	5.10				X
Check brake displacement and adjust as necessary					X
Check spring tension of thrust rocker and plastic coat of supporting rollers					X
Check all connections (bolts, welds, etc.)					X
Check rope securing devices and play of rope guide on drum					X
Examine wire rope for damage and broken wires			X		X
Lubricate rope					X
Examine load hooks for cracks, cold deformation and wear					X
Check hook safety catch for deformation					X
Check bottom block					X
Check securing elements (clips, bolts, etc.) for tight fit and corrosion					X
Check and apply or supplement corrosion protection, as required	5.1/6.1				X
Change oil in main hoist/trolley gearbox	Every 8 - 10 years				
Check plastic parts of limit switch for corrosion				X	
Check electrical enclosure seals					X
Check condition of all buffers					X
Check power supply lines (main and trolley power supply) On current collectors: check sliding contacts and travel rollers for wear and sliding contacts for contact pressure					X
General overhaul					
The general overhaul should coincide with the annual inspection		On reaching the theoretical duration of service			
Fit rope hoist-specific Demag GO set		X			

The small parts (screws, washers ...) to be replaced during maintenance and assembly work are not listed separately. The tasks specified in the inspection and maintenance schedule must be carried out during a GO.



The specified maintenance intervals apply to normal rope hoist service conditions.

If the annual calculation of the actual duration of service S indicates that the theoretical duration of service D will be reached before a period of 10 – 12 years, regular maintenance work must be adapted to the operating conditions and maintenance must be carried out at shorter intervals.

For repairs, only use genuine Demag parts (see component parts list).

9 Calculating the actual duration of service

When using powered hoist units, the owner must determine and record the used share of the theoretical duration of service for the hoist, see BGV D8.

The load spectrum is recorded and calculated by means of the control system integrated in the DR. The reached duration of service is shown in the display of the DLC-8 control pendant.

During the annual inspection, read the value and enter it into the test and inspection booklet.

The value displayed is indicated in %.

A general overhaul must be arranged for to be carried out on reaching 90 % of the service life.

10 Instructions for finding faults

The control system of the Demag DR rope hoist is provided with an intelligent self and error diagnostics system. Warning and error messages are shown directly in the display of the DLC-8 control pendant.

If the control system or the operating unit is defective, the following instructions for finding faults apply:

Fault	Cause	Remedy
A Rope hoist and crane travel not functioning	1 System switched off	Check whether unit is switched on
	2 Emergency-stop actuated	Unlock emergency-stop
	3 460 V voltage missing	Check voltage
	4 Control voltage 48 V missing	Check voltage
	5 The crane switch contactor has tripped	Inform Service
B Rope hoist does not lift and lower, long and cross travel functioning	1 Phases changed over	Change-over phase sequence of powerfeed, inform Service
	2 Brake worn, brake distance too long, the lifting axis is stopped	Inform Service
	3 Brake release signal missing	Inform Service
	4 Phase missing	Check voltage
C Rope hoist only lifts and lowers at low hoist speed	Geared limit switch adjusted incorrectly	Set in accordance with the operating instructions
D Rope hoist only lowers, long and cross travel possible	1 Overload lifted	Remove overload
	2 Thermal contact hoist motor active	Allow hoist motor to cool
E Lifting does not reach top or bottom position but lifts and lowers	Geared limit switch adjusted incorrectly	Set in accordance with the operating instructions
F Cross travel not functioning	1 Thermal contact cross travel motor active	Allow cross travel motor to cool
	2 Check cross travel inverter for Ready status	Open cover of electrical equipment and check green operation LED on inverter, green = ready, otherwise inform Service
	3 Brake of trolley motor does not release	Brake or control defective, inform Service
G Trolley only travels at slow speed	1 Trolley / crane in blocked area (by-pass control *)	Leave the blocked area
	2 Fast-to-slow limit switch / area switch adjusted incorrectly	Adjust appropriately
	3 Incorrect setting of parameters	Inform Service
H Lifting and cross travel not possible, long travel is possible, switching noises of the trolley electrics main contactor can be heard	1 Trolley circuit breaker has tripped	Open cover of electrical equipment and switch circuit breaker on again
	2 460 V voltage missing	Measure voltage
	3 Connector loose	Check 460 V plug-in connections for tight fit
	4 Broken conductor in the power supply lines	Inform Service
I Long travel is not possible, lifting and cross travel are possible, switching noises of the crane electrics main contactor can be heard	Crane circuit breaker has tripped	Open cover of crane electrics and switch circuit breaker on again
J Only long travel is not possible but no switching noises of the crane electrics main contactor can be heard	Thermal contact *) long travel motor active	Allow long travel motor to cool
K Crane only travels at slow speed	1 Trolley / crane in blocked area (by-pass control *)	Leave the blocked area
	2 Check connector of fast-to-slow limit switch	Inform Service
L Display in control pendant has no display	1 Control voltage 48 V missing	Measure voltage
	2 A control voltage fuse has tripped	Open cover of crane electrics and switch fuse on again
	3 Broken conductor in the power supply lines	Inform Service

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