

EUROBLOC®



SERVICE MANUAL FOR HOIST

English SUPDOC_SM_Q11-0.ORD 24.6.2015

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Original instructions

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1 UPDATE HISTORY

Section	Description	Date	Handled by
Whole document	New layout and several product updates	12.2011	KHHJII
Whole document	Updates and corrections	10.2013	XJAASKPA
Whole document	Updates and corrections. Integrating partial GO as part of maintenance tasks. Instructions on replacing gearbox sealings in smaller drum frame sizes added.	11.2014	XJAASKPA
6.1	Periodic inspections and maintenance tasks/Motors and gears/Motor/gear coupling: table updated.	04.05.2015	TUISKSA
7.1.1	Hoisting machinery/ Disassembly, step 3: lifting device updated.	04.05.2015	TUISKSA
7.1.13.3	Added new section: Hook operated control limit switch, Frame size: VT1, VT2.	29.05.2015	TUISKSA
7.2.8	Overload protection: Added a note.	29.05.2015	TUISKSA
7.2.7.6	Section Magnet operated hook latch trigger updated.	03.06.2015	TUISKSA

2 GENERAL INTRODUCTION

2.1 Foreword: About this manual

This manual offers guidance to enable safe and efficient service.

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

This manual is not intended as a substitute for proper training but provides recommendations and methods for safe and efficient service.

2.2 Symbols used in this manual

Readers should familiarize themselves with the following symbols which are used in this manual.



NOTE: Indicates items which require special attention by the reader. There is no obvious risk of injury associated with notes.

2.3 Safety Alert Symbols and Signal Words

The following symbols are used in this manual to indicate potential safety hazards.

	Obey all safety messages that follow this symbol to avoid possible injury or death.
CAUTION	Indicates a potentially hazardous situation, which if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.
WARNING	Indicates a potentially hazardous situation, which if not avoided, COULD result in death or serious injury.
DANGER	INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.
NOTICE	Addresses situations not related to personal injury, such as likely or possible damage to equipment.
Shall	Indicates that a rule is mandatory and must be followed.

Should	Indicates that a rule is a recommendation, the advisability of which depends on the facts in each situation.
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2.4 Questions and Comments

Any questions or comments relating to the content of this manual and/or the operation, maintenance and/or service of manufacturer products should be directed to: www.verlinde.com

2.5 Manual Use

Every person exposed to the manufacturer's equipment must, prior to OPERATING, SERVICING AND/OR MAINTAINING SUCH PRODUCTS, read and understand the contents of this manual and strictly adhere AND CONFORM THEIR CONDUCT WITH AND TO THE INFORMATION, RECOMMENDATIONS AND warnings provided herein.



Note: Keep these instructions in a safe, accessible location for future reference by personnel operating the equipment or exposed to the equipment's operation.

	<p>Read and understand the contents of this manual prior to operating, servicing, and or/maintaining the equipment. Failure to do so can result in serious injury or death.</p>
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Manufacturer shall not be liable for and owner and READER shall release, and hold manufacturer, harmless from any and all claims, demands, AND damages, regardless of their nature or type losses and expenses, whether known or unknown, present or future, any and all liability, of and from any and all manner of actions, cause[s] of actions, all suits in law, in equity, or under statute, State or Federal, of whatever kind or nature, third party actions, including suits for contribution and/or indemnity on account of or in any way arising out of acts or omissions of the Owner or READER and relating in any way to this MANUAL or THE PRODUCTS referenced herein, including, but not limited to the Owner's or READER'S use thereof or any other cause identified herein or that may be reasonably inferred HEREFROM.

2.6 Service personnel

Only authorized service personnel or an experienced service technician authorized by the manufacturer may perform the detailed examinations necessary for scheduled maintenance. Such examinations must be performed in accordance with the inspection and maintenance plan provided by the product's manufacturer. The original manufacturer has approved authorized service personnel to maintain its products.

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



Note: Mechanical and electrical maintenance work requires special skills and tools to ensure safe and reliable operation of the product. Maintenance work shall be carried out only by authorized service personnel or an experienced service technician authorized by the product's manufacturer.

2.7 Terminology

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

ANSI	American National Standards Institute
ISO	International Organization for Standardization
Authorized personnel	Persons who are authorized by the owner and who have the necessary training to carry out operation or service actions.
Experienced service person authorized by the manufacturer	A person with service experience who is properly trained to perform service actions.
CE marking	The CE-marking indicates that the product complies with the appropriate CE regulations.
Check	A visual and functional assessment (not a test) of the product without dismantling.
Emergency brake	A brake that can be applied by the operator, or automatically upon loss of power.
Electric panel	Power is controlled to the motors and components through the electric panel.
Parking brake (storm lock)	A brake that can be applied either automatically or manually and prevents horizontal movement of the trolley or bridge. Used when movements need to be prevented in windy conditions.
Main brake	A brake that stops motion and prevents movements.
Second brake (Holding brake)	A brake that supports the load if the main brake fails.
Operator	Person operating the product for the purpose of handling or moving loads.
Inching	Making very small movements by repeatedly and momentarily pressing the direction control.
Bridge	The bridge (main girder) moves along the runway
Main girder	The main girder (bridge) is connected to the bridge end carriages.
Main isolation switch	The main isolation switch is the power switch which the operator should normally use to turn off the power.
Hoist	Drive mechanism for lifting and lowering the load.
Inspection (Visual)	Looking for defects and checking the operation of the controls, limiting and indicating devices without loading the product. This is much more than a check but does not normally require any part of the product to be dismantled other than for removal or opening of covers or housings.
Power supply	Power is supplied to the components via the power supply.
Controller	The pendant or other type of controller is used by the operator to give commands to the product.
Qualified personnel	One with necessary qualification based on theoretical and practical knowledge of hoists or/and cranes. The person must be in a position to assess the safety of the installation in conjunction with the application. Persons with the authority to undertake certain maintenance work on products of manufacturers include manufacturers' service engineers and trained fitters with corresponding certification.
Maximum capacity	Load that the product is designed to lift for a given operating condition (e.g. configuration, position of the load).
Runway	The product rides on or under the runway.
Trolley (hoisting unit)	The trolley (hoisting unit) moves along the main girder.
Sling	A sling is used to attach the hook to the load when the load cannot be lifted directly by the hook.

2.8 Standards and Directives

This state of the art product has been designed and manufactured to conform to European and international standards and directives. The product also fulfils the requirements of the following standards (if applicable): CSA, UL, RoHS, OSHA, CCC.

3 SAFETY FIRST!

Safety requirements must be understood and followed.

3.1 Personal protective equipment (PPE)

For safety, the service personnel or others in close proximity to the product may be required to wear Personal Protective Equipment (PPE). Various types of PPE are available and must be selected according to the requirements of the working environment.



Note: Follow the local regulations and requirements of the working environment.

3.1.1 Fall Protection



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

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

If the product does not have dedicated fixing points for fall protection, it is the owner's responsibility to make sure that there are suitable fixing points in the building structure.

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

A typical fall protection program may include:

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

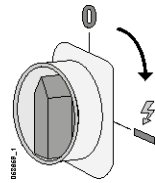
If necessary, contact your supplier or service organization for assistance with designing your fall protection program.


3.2 Fire Safety

In the event of a fire, only attempt to fight it if you can do so without putting yourself in danger. Turn the power off if it is possible to do so. Evacuate the area. Notify other people about the potential danger, and call for help.

 WARNING	Never use a powder type fire extinguisher on high voltage.
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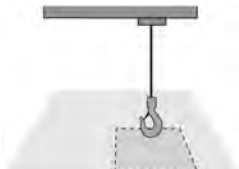



3.3 Main isolation switch



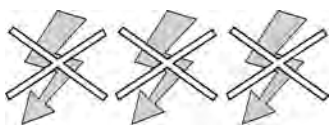

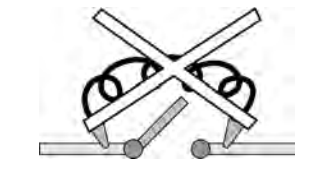
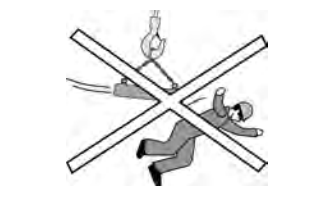
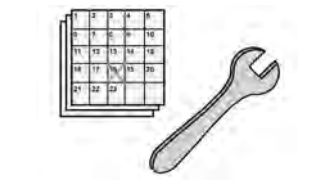
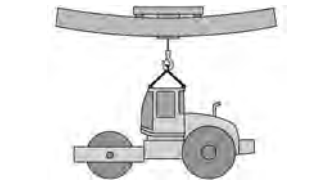
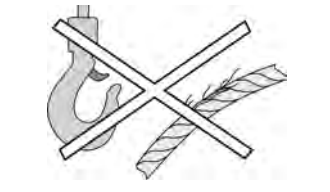


 CAUTION	Service personnel shall be aware of main isolation switch functionality. Eventhough one switch is turned off, there may still be voltage in some parts of the product. This may result in exposure to electric shocks.
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3.4 Safety during maintenance

Before and during product maintenance, the following precautions should be taken by maintenance personnel:

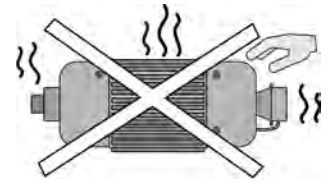
1	Choose a safe working location The product should be moved to a location where it will cause the least disturbance and where it can be accessed easily.	
2	Prevent unauthorized access to the site Prevent unauthorized persons and bystanders from walking on or below the work site. For example, you can lock doors, install barriers and display notices. Ensure that the secured area is spacious enough to prevent injuries which could occur as a result of falling components or tools.	
3	Inform that equipment will be undergoing maintenance Before starting maintenance, people must be properly informed that the equipment is being removed from operation.	
4	Ensure that there is no load on the lifting device Before starting maintenance there should be no load on the hook or lifting device. Park the hook on the ground if there is any chance that the hoisting brake will be opened during maintenance. A raised empty hook will fall to the ground if the hoisting brake is opened.	

<p>5</p>	<p>Turn all controllers and main switches off</p> <p>All controllers and main isolation switches must be placed in the off position before starting maintenance.</p>	
<p>6</p>	<p>Lockout – Tagout</p> <p>The product power source must be locked out and tagged out when necessary, in accordance with local regulations. See chapter “Lockout – Tagout Procedure”</p>	
<p>7</p>	<p>Verify that power is completely disconnected</p> <p>Measure between the phases and between each phase to ground to ensure that power is completely disconnected from the product.</p>	
<p>8</p>	<p>Use hand lines for lifting and lowering tools</p> <p>Hand lines, securely attached to the building structure, should be used for lifting or lowering materials and tools. Use proper safety equipment to prevent objects from falling when working in high places.</p>	
<p>9</p>	<p>Safety devices must be restored to operational status</p> <p>Ensure that any safety devices which have been bypassed for testing purposes have been restored to full operational status before allowing the product to be used for normal operation.</p>	
<p>10</p>	<p>Minimize the risks of moving machinery</p> <p>Secure the area so that personnel are not at risk from the movements of machines, automatic doors or adjacent cranes at the installation site.</p> <p>Ensure that machinery and equipment cannot start up accidentally and cannot move during installation and servicing.</p> <p>Be prepared in case equipment moves in the wrong direction during testing.</p>	
<p>11</p>	<p>Perform regular inspections and preventive maintenance</p> <p>To ensure ongoing safe and efficient operation of the product, carry out regular inspections and preventive maintenance in compliance with the instructions. Keep a record of all inspections and servicing. If in doubt, contact the supplier of the product.</p>	
<p>12</p>	<p>Returning the product to operation after overload or collision</p> <p>After an overload or collision incident, the appropriate inspection and repair operations must be discussed with the supplier of the product.</p>	
<p>13</p>	<p>Pay special attention to all safety-critical components</p> <p>The brakes, limit switches, hook, rope and controller are all safety-critical items which must always be kept in good order.</p> <p>Ensure that safety devices (overload protectors, limit switches, etc.) work properly so that they provide protection against human error.</p>	

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Beware of high temperature components

Some components of the product, such as the motors, can become very hot during use. Check that components are cool before working on them.



3.4.1 Lockout - Tagout Procedure



During installation, inspection and maintenance, lockout-tagout procedures must be followed in accordance with local regulations and the documented site lockout-tagout policy. The owner must ensure that the operators are fully aware of the applicable lockout - tagout practices.

Lockout-tagout procedures are primarily intended to protect personnel by preventing accidental starting or exposure to electric shocks. Individual locks and tags are placed on controls to prevent their use until the person who installed the lock or tag removes it.



CAUTION

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

Items which are normally included in the documented lockout-tagout policy:

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

4 IDENTIFICATION

This manual contains information for several hoist types, components and options. The information in this manual is identified by individual feature of hoist or by product code or by part of product code. Identification data is on hoist data plate or component data plate.

4.1 Manufacturer

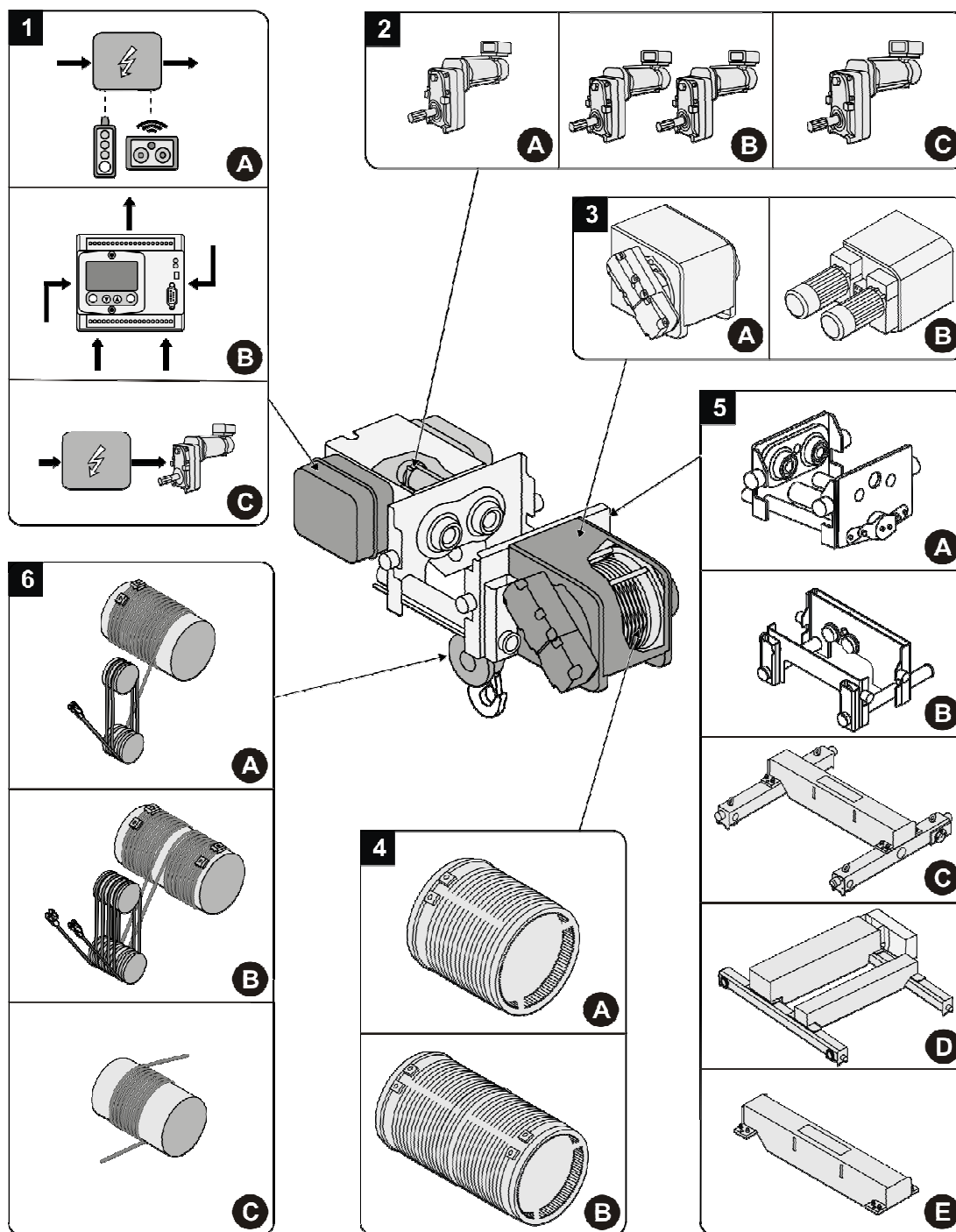
Manufacturer: **Verlinde S.A.**
Address: **2, Boulevard de l'Industrie**
BP 20059
28509 VERNUILLET CEDEX
FRANCE



Note: For further information about the product, operational training or servicing, please contact the manufacturer or manufacturer's representative.

4.2 Hoist series

The series of hoist covers a lot of variants with load capacities ranging from 400 kg to 80 000 kg. It covers a whole range of modular hoists with numerous options under hoist components. The following illustration and the table after show in brief different modules/components available.



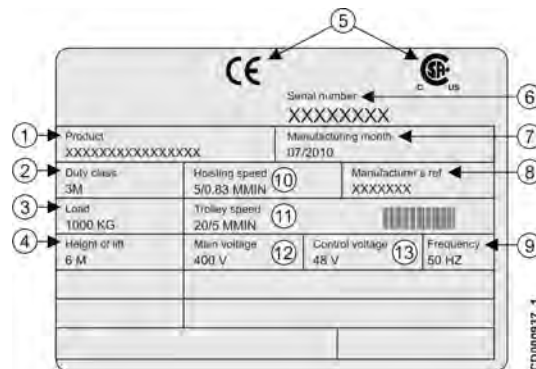
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Pos.	Module or component	Description of modules of hoist series
1	A	Several control device, driving device and measuring/monitoring device variants and combinations. <ul style="list-style-type: none"> Controlling devices: push button pendant, remote controls etc. Measuring and monitoring devices: condition monitoring, overload indication etc. Driving devices: contactor controls, frequency controllers etc.
	B	
	C	
2	A	Several machinery sizes. Several motor and gear size variants and combinations.

Pos.	Module or component	Description of modules of hoist series
B C		<ul style="list-style-type: none"> Several quantity variants on applications.
3 A B	Hoisting machinery	Several machinery frame sizes. Several motor, gear and drum size variants and combinations. <ul style="list-style-type: none"> From drum size Ø 243 mm. Up to drum size Ø 608 mm with two motor drive.
4 A B	Rope drum length	Several drum length variants. <ul style="list-style-type: none"> Short drum lengths for short lifting heights. Long drum lengths for long lifting heights.
5 A B C C C D E E	Trolley	Single girder trolley variants: <ul style="list-style-type: none"> Low headroom trolley Normal headroom trolley Double girder trolley variants: <ul style="list-style-type: none"> Double girder trolley Double girder trolley ,Low Double girder trolley ,Medium Double girder trolley ,High Two hoist trolley Fixed connection variants: <ul style="list-style-type: none"> Fixed hoist Machinery hoist
6 A B C	Reeving system	Several reeving system variants: <ul style="list-style-type: none"> Standard reeving True vertical reeving Machinery reeving

4.3 Hoist Identification Data

The hoist serial number is stated on the hoist's data plate which is located on the trolley.



1	Product	Exact model of the product, product code.
2	Duty class	Duty group defined based on the expected use of the product
3	Load	Maximum load which can be lifted with the product
4	Height of lift	Maximum lifting height of the hook
5	Approvals and standards	Directives and approvals which the product complies to. Refer to the chapter "Standards and directives".
6	Serial number	A unique number which identifies the product
7	Manufacturing month	Manufacturing month/year
8	Manufacturer's reference	Factory work number
9	Frequency	Supply frequency which the product is designed for
10	Hoisting speed	High/low hoisting speed
11	Trolley speed	High/low trolley travelling speed
12	Main voltage	Supply voltage which the product is designed for
13	Control voltage	Control circuit voltage



Note: The example data in the above figure is shown for illustration purposes only and does not match the data on your product.

4.4 Verlinde code example (Verlinde: VT, Factory: Q)

VT	1	04	1	1	5	R	15	A	N	P1	405	SE	M	20	E	N
	(GE09)	DES27			(DIM01)	(DES01)	(DIM03) (DIM05)	GE08		(HM01) (HM02)		(EL05)	(HS03)		(TR05)	
1,2	3	4,5	6	7	8	9	10,11	12	13	14,15	16-18	19,20	21	22,23	24	25

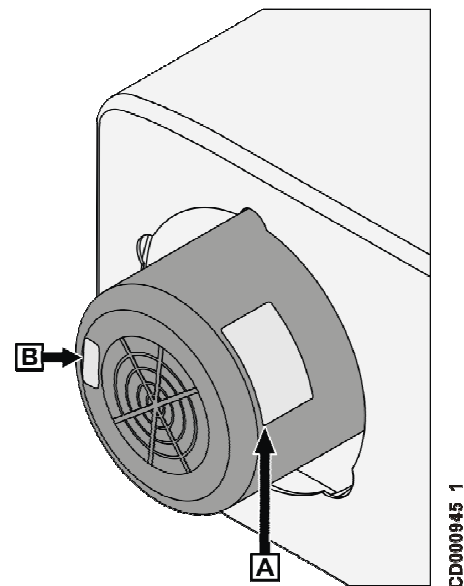
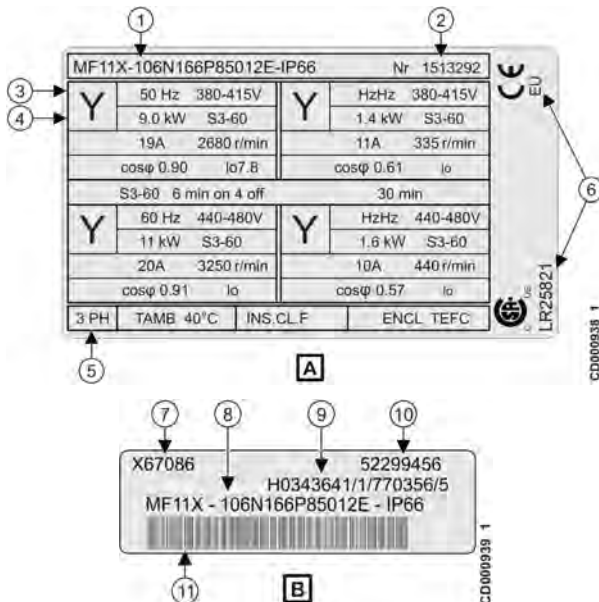
Pos.	Code	Feature code	Feature	Available properties																																																						
1,2	VT		Short product name	VT Hoist																																																						
3	1	(GE09)	Frame size	<table border="0"> <tr> <td>s</td> <td>243 mm rope drum diameter</td> <td><u>GE09 value</u></td> <td>Z</td> <td>3</td> <td>406 mm rope drum diameter</td> <td><u>GE09 value</u></td> <td>C</td> </tr> <tr> <td>1</td> <td>303 mm rope drum diameter</td> <td></td> <td>A</td> <td>4</td> <td>608 mm rope drum diameter</td> <td></td> <td>D</td> </tr> <tr> <td>2</td> <td>355 mm rope drum diameter</td> <td></td> <td>B</td> <td>5</td> <td>608 mm rope drum diameter (2 hoisting motors)</td> <td></td> <td>E</td> </tr> </table>	s	243 mm rope drum diameter	<u>GE09 value</u>	Z	3	406 mm rope drum diameter	<u>GE09 value</u>	C	1	303 mm rope drum diameter		A	4	608 mm rope drum diameter		D	2	355 mm rope drum diameter		B	5	608 mm rope drum diameter (2 hoisting motors)		E																														
s	243 mm rope drum diameter	<u>GE09 value</u>	Z	3	406 mm rope drum diameter	<u>GE09 value</u>	C																																																			
1	303 mm rope drum diameter		A	4	608 mm rope drum diameter		D																																																			
2	355 mm rope drum diameter		B	5	608 mm rope drum diameter (2 hoisting motors)		E																																																			
4,5	04	DES27	Rope reeving code	<table border="0"> <tr> <td colspan="2"><u>Falls at the hook block</u></td> <td><u>DES27 value</u></td> <td colspan="2"><u>Falls at the hook block</u></td> <td><u>DES27 value</u></td> </tr> <tr> <td>02</td> <td></td> <td>02</td> <td>04</td> <td></td> <td>22</td> </tr> <tr> <td>04</td> <td></td> <td>04</td> <td>08</td> <td></td> <td>24</td> </tr> <tr> <td>06</td> <td></td> <td>06</td> <td>12</td> <td></td> <td>26</td> </tr> <tr> <td>08</td> <td></td> <td>08</td> <td>16</td> <td></td> <td>28</td> </tr> </table> <p>M1 = Machinery hoist, 1 rope fixed to drum, M2 = Machinery hoist, 2 ropes fixed to drum</p>	<u>Falls at the hook block</u>		<u>DES27 value</u>	<u>Falls at the hook block</u>		<u>DES27 value</u>	02		02	04		22	04		04	08		24	06		06	12		26	08		08	16		28																								
<u>Falls at the hook block</u>		<u>DES27 value</u>	<u>Falls at the hook block</u>		<u>DES27 value</u>																																																					
02		02	04		22																																																					
04		04	08		24																																																					
06		06	12		26																																																					
08		08	16		28																																																					
6	1		Nbr of driven rope	1 Leverage standard																																																						
7	1		Nbr of hook	1 Standard																																																						
8	5	(DIM01)	Hoist duty group	<table border="0"> <tr> <td colspan="2"></td> <td><u>DIM01 value</u></td> <td colspan="2"></td> <td><u>DIM01 value</u></td> </tr> <tr> <td>3</td> <td>ISO M3</td> <td>M3</td> <td>5</td> <td>ISO M5</td> <td>M5</td> </tr> <tr> <td>4</td> <td>ISO M4</td> <td>M4</td> <td>6</td> <td>ISO M6</td> <td>M6</td> </tr> </table>			<u>DIM01 value</u>			<u>DIM01 value</u>	3	ISO M3	M3	5	ISO M5	M5	4	ISO M4	M4	6	ISO M6	M6																																				
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9	R	(DES01)	Trolley type	<table border="0"> <tr> <td colspan="2"></td> <td><u>DES01 value</u></td> <td colspan="2"></td> <td><u>DES01 value</u></td> </tr> <tr> <td>F</td> <td>Foot Mounted</td> <td>F</td> <td>N</td> <td>Normal headroom trolley (parallel)</td> <td>N</td> </tr> <tr> <td>S</td> <td>Fixed Suspended</td> <td></td> <td>T</td> <td>Normal headroom trolley (perpendicular)</td> <td></td> </tr> <tr> <td>R</td> <td>Low headroom trolley</td> <td>L</td> <td>M</td> <td>Machinery hoist</td> <td>V</td> </tr> <tr> <td>H</td> <td>Double girder trolley (high)</td> <td>H</td> <td>B</td> <td>Swivelling trolley</td> <td></td> </tr> <tr> <td>E</td> <td>Double girder trolley (medium)</td> <td>M</td> <td>X</td> <td>Special</td> <td>X</td> </tr> <tr> <td>W</td> <td>Double girder trolley (low)</td> <td>W</td> <td>J</td> <td>Special low headroom trolley</td> <td>J</td> </tr> </table>			<u>DES01 value</u>			<u>DES01 value</u>	F	Foot Mounted	F	N	Normal headroom trolley (parallel)	N	S	Fixed Suspended		T	Normal headroom trolley (perpendicular)		R	Low headroom trolley	L	M	Machinery hoist	V	H	Double girder trolley (high)	H	B	Swivelling trolley		E	Double girder trolley (medium)	M	X	Special	X	W	Double girder trolley (low)	W	J	Special low headroom trolley	J												
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10,11	15	(DIM03) (DIM05)	Flange width/ Rail gauge	<table border="0"> <tr> <td>Flange width (Monorail) (i.e. 358 mm = 35)</td> <td>Rail gauge (Double girder trolley) (i.e. 1200 mm = 12)</td> <td>Fixed hoist 00</td> </tr> </table>	Flange width (Monorail) (i.e. 358 mm = 35)	Rail gauge (Double girder trolley) (i.e. 1200 mm = 12)	Fixed hoist 00																																																			
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14,15	P1	(HM01) (HM02)	Hoisting motor type / size	<table border="0"> <tr> <td colspan="2">e.g. P1 -> P = HM01 value, 1 = HM02 value</td> </tr> <tr> <td colspan="2"><u>HM01 value</u></td> <td colspan="2"><u>HM02 value</u></td> </tr> <tr> <td>Frequency converter motor, ASR</td> <td>A</td> <td>Nom. Power 1.5 kW / 50Hz</td> <td>X</td> </tr> <tr> <td>Frequency converter motor, ESR</td> <td>S</td> <td>Nom. Power 1.8 kW / 50Hz</td> <td>1</td> </tr> <tr> <td>Pole change motor</td> <td>P</td> <td>Nom. Power 2.5 kW / 50Hz</td> <td>Z</td> </tr> <tr> <td>Frequency converter motor</td> <td>T</td> <td>Nom. Power 3.6 kW / 50Hz</td> <td>2</td> </tr> <tr> <td>Pole change motor 3:1</td> <td>R</td> <td>Nom. Power 4.5 kW / 50Hz</td> <td>3</td> </tr> <tr> <td>Ex-proof pole change motor Single speed motor</td> <td>E</td> <td>Nom. Power 7.5 kW / 50Hz</td> <td>4</td> </tr> <tr> <td>Cast iron pole change motor</td> <td>O</td> <td>Nom. Power 9 kW / 50Hz</td> <td>5</td> </tr> <tr> <td></td> <td>C</td> <td>Nom. Power 15 kW / 50Hz</td> <td>6</td> </tr> <tr> <td></td> <td></td> <td>Nom. Power 18 kW / 50Hz</td> <td>7</td> </tr> <tr> <td></td> <td></td> <td>Nom. Power 23 kW / 50Hz</td> <td>8</td> </tr> <tr> <td></td> <td></td> <td>Nom. Power 28 kW / 50Hz</td> <td>9</td> </tr> <tr> <td></td> <td></td> <td>Nom. Power 35 kW / 50Hz</td> <td>A</td> </tr> </table>	e.g. P1 -> P = HM01 value, 1 = HM02 value		<u>HM01 value</u>		<u>HM02 value</u>		Frequency converter motor, ASR	A	Nom. Power 1.5 kW / 50Hz	X	Frequency converter motor, ESR	S	Nom. Power 1.8 kW / 50Hz	1	Pole change motor	P	Nom. Power 2.5 kW / 50Hz	Z	Frequency converter motor	T	Nom. Power 3.6 kW / 50Hz	2	Pole change motor 3:1	R	Nom. Power 4.5 kW / 50Hz	3	Ex-proof pole change motor Single speed motor	E	Nom. Power 7.5 kW / 50Hz	4	Cast iron pole change motor	O	Nom. Power 9 kW / 50Hz	5		C	Nom. Power 15 kW / 50Hz	6			Nom. Power 18 kW / 50Hz	7			Nom. Power 23 kW / 50Hz	8			Nom. Power 28 kW / 50Hz	9			Nom. Power 35 kW / 50Hz	A
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19,20	SE	(EL05)	Electric provisions	<table border="0"> <tr> <td colspan="2"></td> <td><u>EL05 value</u></td> <td colspan="2"></td> <td><u>EL05 value</u></td> </tr> <tr> <td>S</td> <td>SOLO</td> <td>SOLO</td> <td>E</td> <td>With time counter</td> <td></td> </tr> <tr> <td>K</td> <td>KIT</td> <td></td> <td>M</td> <td>Monitoring device</td> <td></td> </tr> <tr> <td>J</td> <td>Hoist for tandem use</td> <td>TANDEM</td> <td>0</td> <td>Without connection</td> <td></td> </tr> <tr> <td>W</td> <td>Without electric</td> <td>NO</td> <td>1</td> <td>With connection and cubicle</td> <td></td> </tr> </table>			<u>EL05 value</u>			<u>EL05 value</u>	S	SOLO	SOLO	E	With time counter		K	KIT		M	Monitoring device		J	Hoist for tandem use	TANDEM	0	Without connection		W	Without electric	NO	1	With connection and cubicle																									
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21	M	(HS03)	Overload device	M Mechanical limit switch C Strain gauge	<u>HS03 value</u> MEC SG	P Hoist power measurement 0 Without overload device	<u>HS03 value</u> POW NO
22,23	20		Trolley high speed	20 < 25 m/min 30 ≥ 25 m/min		BV 2 speeds motor	
24	E	(TR05)	Travelling control mode	M MS2 E EP2	<u>TR05 value</u> MS2 EP	C Contactor (2 speeds motor)	<u>TR05 value</u>
25	N		Special properties	S Standard O Standard pre-designed features		<u>Special</u> M Meca E Elec D M+E	

4.5 Motor Identification Data

Motor serial number and other motor information such as motor type are stated on the motor rating plate which is located on the motor.

Hoisting motor



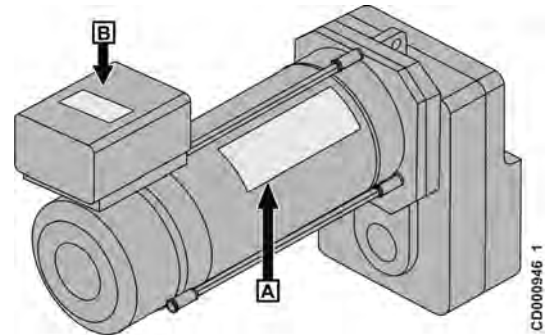
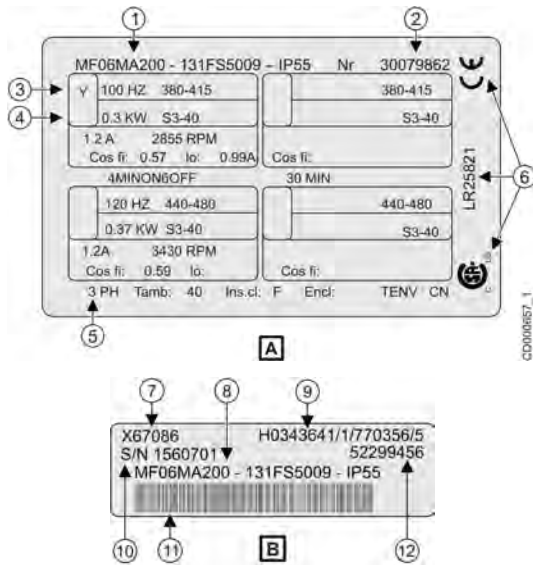
Note: Hoisting motor data plate may also be located on the side plate of the hoist/trolley.

A	Motor rating plate	Product identification data
B	Bar code sticker	Product order references
1	Motor type code	Exact model of the product
2	Motor serial number	Unique number which identifies the unit
3	Input	Acceptable main voltage range and frequency that the product can be connected to
4	Output	Voltage range the product is able to provide at a specified output capacity
5	Phases	Phase quantity of the motor
6	Approvals and standards	Directives and approvals which the product complies to. Refer to the chapter "Standards and directives".
7	Factory work number	Motor factory work number
8	Motor type code	Exact model of the product
9	Reference numbers	Order related numbers
10	Identification number	Identification number of the motor, this number used when ordering spare parts
11	Bar Code	Bar code which includes, for example, the product's serial number and ID in an optically readable form



Note: The example data in the above figure is shown for illustration purposes only and does not match the data on your product.

Traveling motor




A	Motor rating plate	Product identification data
B	Bar code sticker	Product order references
1	Motor type code	Exact model of the product
2	Motor serial number	Unique number which identifies the unit
3	Input	Acceptable main voltage range and frequency that the product can be connected to
4	Output	Voltage range the product is able to provide at a specified output capacity
5	Phases	Phase quantity of the motor
6	Approvals and standards	Directives and approvals which the product complies to. Refer to the chapter "Standards and directives".
7	Factory work number	Motor factory work number
8	Motor type code	Exact model of the product
9	Reference numbers	Order related numbers
10	Motor number	Unique number which identifies the unit
11	Bar Code	Bar code which includes, for example, the product's serial number and ID in an optically readable form
12	Identification number	Identification number of the motor, this number used when ordering spare parts





Note: The example data in the above figure is shown for illustration purposes only and does not match the data on your product.


5 GENERAL ABOUT MAINTENANCE

Maintenance actions, excluding the daily actions performed by operators, must be done by service personnel who are authorized by the product manufacturer.

 WARNING	<p>Do not modify the product without the manufacturer’s permission. Any modifications to the product structures or performance values must only be made after they have been approved by the product’s manufacturer.</p>
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 WARNING	<p>Do not allow the product to be used if it is not in proper condition. The usage of a defective product can result in serious damage, injury or death.</p>
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 CAUTION	<p>Only use genuine spare parts, materials and lubricants approved by the product’s manufacturer.</p>
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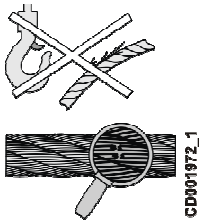
 CAUTION	<p>Never wash the crane or hoist with chemical products or high pressure water jets, as they can cause problems like detaching of the stickers and water entering inside the electrical components.</p>
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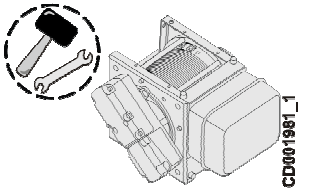




For installation and commissioning instructions, refer to the separate manual: “Installation and Commissioning for Hoist”.

5.1 Service process

Service process should include following steps.

1	<p>Preliminary actions</p> <p>This may include:</p> <ul style="list-style-type: none"> • Prepare schedules, process plans and documentation. • Reserve sufficient resources like properly trained personnel, enough time and appropriate tools. • Plan safety actions and reserve proper safety equipment. 	
2	<p>Examination of usage and service history</p> <p>This may include document reviews and discussions with Owner and Operator:</p> <ul style="list-style-type: none"> • Check Log book for service actions and plans enlisted. • Observe the intended use and cahanges of usage with Owner and Operator. • Collect Owner’s and Operator’s experiences and observations like unusual or irregular operation of the equipment. 	
3	<p>Inspection</p> <p>Carry out independent inspection to assess the condition of the product. Note down all irregularities not present in previous records. Carry out all inspections including daily inspection and periodic inspections according to maintenance program.</p>	

4	Maintenance and service This may include testing, adjusting, lubricating, repair and replacement work. Investigate root cause of the problems, if any and inform the owner/operator of the recommended repair or replacement.	
5	Conclusion Do conclusions with Owner and Operator based on collected information during service process. These may result further actions like shortened service intervals or proposal of product update.	
6	Documentation and feed back This may include: <ul style="list-style-type: none"> • Update of logbook and other product documentation. • Training about operation and daily maintenance. 	

5.2 Periodic inspections and actions


Periodic inspections must be carried out by authorized service personnel or experienced service technician authorized by the product's manufacturer. Inspections must be carried out according to manufacturer's instructions.



Note: If the working environment or product usage changes, the inspection and maintenance intervals may need to be revised.



Note: Periodic inspections SHALL be carried out in accordance with local regulations.

 CAUTION	Any defects or abnormalities which are detected during the inspections must be investigated and corrected in accordance with the instructions relevant to component in question.
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5.2.1 Daily inspections

Daily inspection items are listed in Hoist Operator's Manual. In most cases these checks will be performed by operators on start of each work shift.

Check if there is need for other daily checks caused by application, usage, product options, environment or some other reasons. Update Operator's instructions if needed.

5.2.2 Periodic inspections and maintenance tasks

Carry out the inspection and servicing procedures for the hoist in accordance with the maintenance program.

Check if there is need for other periodical maintenance tasks or need to shorten the intervals caused by application, usage, product options, environment or some other reasons. Update Owner's and Operators instructions if needed.



Note: Product used under harsh conditions may require shorter service intervals.

5.3 Approaching Theoretical Calculated Lifetime

In order to ensure safe operation of cranes, the proper working and operational condition shall be maintained according to standard ISO 9927.


This requirement covers also special assessments to be carried out by an expert engineer at regular intervals to check the remaining Safe Working Period (SWP) of the hoist as stated in standard ISO 12482-1.

The condition monitoring unit (CID) (if fitted) provides two different SWP values: the runtime-based SWP (CID parameter 2-12 SWPRT%), and the working cycle-based SWP (CID parameter 2-15: SWPHC%). The CID display of the data counter SWP always shows the lesser value of two parameters.

If the component does not have a condition monitoring unit, use the method explained in the APPENDIX: SAFE WORKING PERIOD (SWP) CALCULATION to calculate the remaining SWP%.

5.3.1 General Overhaul

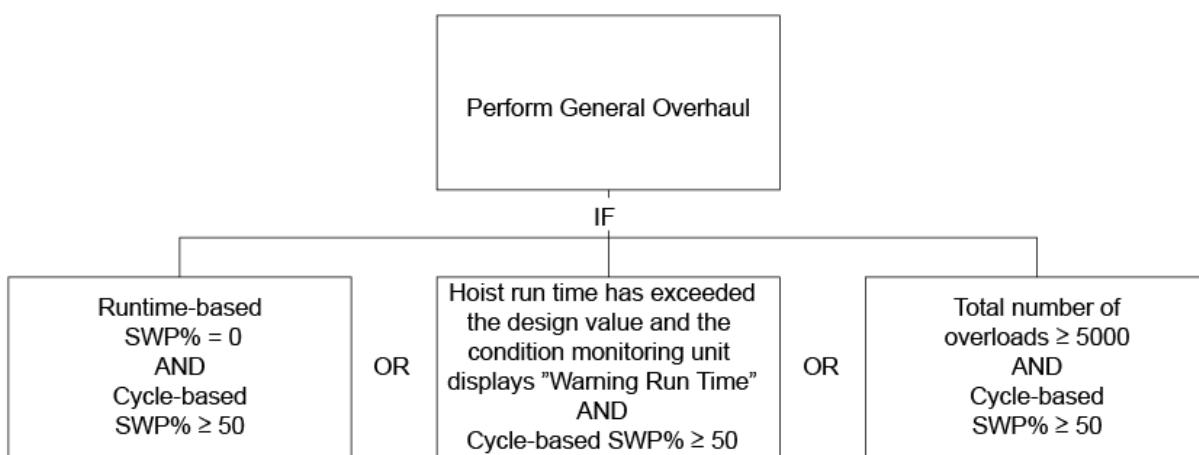
In the GO service, the product is assigned with a new, runtime-based SWP, provided that it is safe to continue the operation. The runtime-based SWP means the lifetime of the interchangeable rotating components of the hoist like hoisting gear, hoisting motor, and rope sheaves. Note that in case of hoists with a smaller drum size, it is often more cost-efficient to replace the hoist with a new one.

 <p>WARNING</p>	<p>When the Safe Working Period (SWP) of the hoist has decreased to zero or is counting in the negative, the hoist may only be used after a GO service has been conducted, or the hoist must be replaced with a new one. Any usage of a defective hoist can result in serious damage, injury, or death.</p>
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<p>CAUTION</p>	<p>When performing General Overhaul, the construction of the hoist may not be changed or the supporting structures repaired without permission from the manufacturer. If there are any deformations, cracks or corrosion in the supporting structures of the hoist, the parts have to be replaced or repaired according to the instructions given by the manufacturer.</p>
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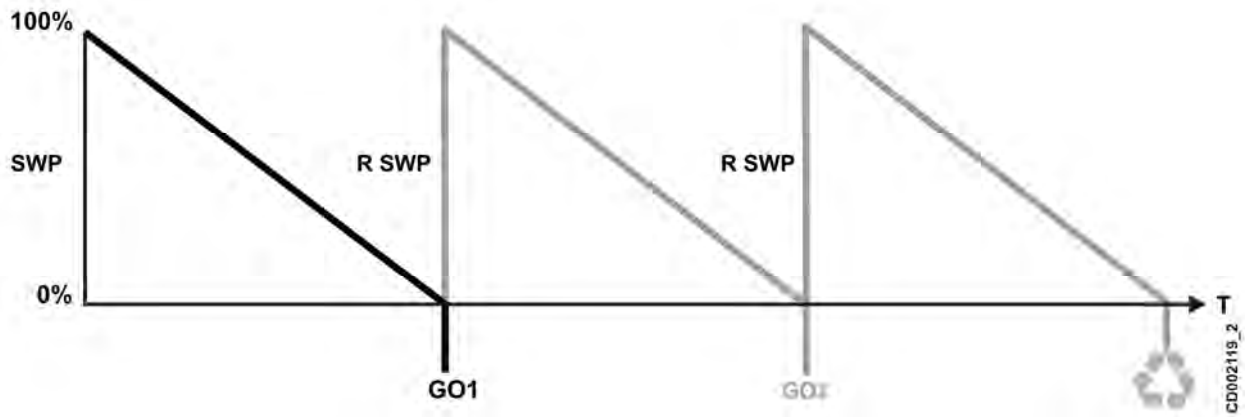
Only authorized service personnel or an experienced service man that is authorized by the manufacturer or manufacturer representative may conduct a General Overhaul service.

The following figure summarizes the conditions based on which General Overhaul can be performed.



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The same hoisting machinery can undergo no more than two GOs before it must be replaced completely:




SWP = Safe Working Period
RSWP = Runtime-based Safe Working Period
GO1 = First General Overhaul
GO2 = Second General Overhaul
T = Time

6 MAINTENANCE PROGRAM

The lifetime of the hoist is divided into Safe Working Periods (SWPs). At the beginning of the Safe Working Period, a new hoist has an SWP% of 100. A Safe Working Period ends when the SWP% of the hoist is zero. When a Safe Working Period ends, a General Overhaul (GO) must be conducted, after which the hoist is assigned a new Safe Working Period, refer to the section 'General Overhaul, GO'.

During the SWP, the safe and efficient operation of the hoist is contingent on regular servicing.


	CAUTION	For the safety carry out the inspection and servicing procedures for the hoist in accordance with maintenance task list.
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	CAUTION	To avoid any risk of spark with explosive proof hoists due to the friction of two mechanical parts, it is important to follow strictly the maintenance intervals. The safety of the equipment could be compromised if not.
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6.1 Periodic inspections and maintenance tasks


The servicing intervals for the hoist are defined as SWP% periods. The actual operation of the hoist is taken into account in SWP%. If the hoist is provided with a condition monitoring unit, the SWP value can be read from the unit display. Refer to the more detailed instructions that are given in the separate operating instructions for the condition monitoring unit.

The following table shows the service intervals for the hoist in SWP% periods and in calendar months. The servicing procedure must be carried out at the end of SWP% period latest, or after the stated number of calendar months. Hoists without a condition monitoring unit must follow a servicing procedure guide by calendar months. For ensuring the usability of the hoist, the servicing intervals can be shortened.

	CAUTION	Hoists used under harsh conditions may require a shorter servicing interval than stated in the table. Consult with a representative of the manufacturer for a tailored service agreement.
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	CAUTION	If ambient temperature is frequently over 40 °C (104 F), the servicing interval is half of the interval that is stated in the following table.
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	CAUTION	If the hoisting machinery is used outdoors, the lubrication of all the hoisting machinery parts, as a general rule, should be carried out on a quarterly basis (every three months).
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	WARNING	Periodical inspecting and servicing procedure may only be carried out by a serviceman authorized by the hoist manufacturer, or by the service personnel that are adequately trained by the hoist manufacturer.
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Note: Intervals on the following table are SWP% periods or a stated number of calendar months. For ensuring the usability of the hoist, the servicing intervals can be shortened.

General

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Hoist	10% 12	<p>Test-run the hoist first to see that all movements (hoisting, traveling) function smoothly without any unusual noise or vibration.</p> <p>Inspect the general condition and cleanness of the hoist. Visually check the general condition and accumulation of dust or dirt. Pay special attention to:</p> <ul style="list-style-type: none"> • Hoist motor body. Remove dust or dirt to eliminate insulating factor, as the motor heat must be able to dissipate • All parts that need cooling • Parts that wear if the surfaces are not clean • Optical and other sensors. 	
	10% 12	<p>Inspect the condition and fixing of covers. Test by hand that all covers are fixed. Visually check that covers are not bent or cracked. Fix or replace if needed.</p>	
Stickers and markings	10% 12	<p>Inspect the condition and readability of warning stickers and other stickers and markings. Visually check that all type plates and stickers exist and are readable. Replace all missing and unclear stickers.</p>	See sections: Hoist identification data Motor identification data
Capacity labeling		Check that the capacity load of a hoist is readable on the hook block.	
Instructions and log books	10% 12	<p>Check the availability and readability of instructions. Visually check product documentation. Verify that the user and owner are aware of the documentation and it is available for them. Replace all missing and not readable documentation.</p>	
	10% 12	<p>Check the validity of log book. Update the log book during the service process.</p>	

Limiting devices

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Trolley buffers (Bumpers)	10% 12	<p>Inspect the condition of trolley buffers and buffer end stops Verify that buffers (bumpers) make contact at the end stops. Replace worn or broken buffers.</p>	Maintenance of trolley buffers
Trolley traveling limit switches	10% 12	<p>When installed, check the operation of the slowdown limit of a trolley. When installed, check the operation of the stop limit of a trolley.</p>	


Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Hoisting limit switches Up Limit Slow Down Up Limit Down Limit Hook limit (Safety Up Limit/ Ultimate Limit)	10% 12	<p>Verify the condition and operation of hoisting limit switches.</p> <p>Operate the hoist in the up direction and slowly drive to the Up Limit Switch Activation point. Check that it works.</p> <p>Run the hook block down at a short distance and drive at high speed and check if the Slow Down Up Limit activates to override the high-speed command to slow down the speed before the Up Limit activates.</p> <p>Operate the hoist in the down direction and drive to the Down Limit Switch Activation point.</p> <p>Test the Hook Limit by hand actuation.</p> <p>Adjust or replace parts as required.</p>	<p>Construction of hoisting limit switch for hoist frame size: VTs</p> <p>Construction of hoisting limit switch for hoist frame size: VT1, VT2, VT3, VT4, VT5</p> <p>Maintenance task for hoisting limit switch, hoist frame size: VTs</p> <p>Maintenance task for hoisting limit switch, hoist frame size: VT1, VT2, VT3, VT4, VT5</p>
Up Limit Distance	10% 12	<p>Verify Up Limit Distance.</p> <p>Verify the Up Limit Distance to the frame of the trolley. It is important to adjust the C dimension according to the specification, to minimize rope and sheave wear.</p>	
Down Limit Distance	10% 12	<p>Verify Down Limit Distance.</p> <p>When the hook block is in the Down Limit Switch Activation point, verify that there is a minimum number of wraps of rope on the drum according to the standards (the absolute minimum is two full turns of a rope).</p>	
Overload protector	10% 12	<p>Inspect the condition and operation of the overload protector.</p> <p>Mechanical switch and load sensor overload device: Test the free movements of mechanical parts. Test the mechanical overload limit switch by mechanically activating the switch and checking for a click. Clean and lubricate lever mechanism. Verify that the set screw is locked in its place. When required to confirm calibration, place a test weight of a nominal load plus 10%. Adjust mechanical overload to stop hoisting at 110% of capacity. Replace damaged parts.</p> <p>Power measurement overload device: Conduct a test operation of the power measurement overload device according to the local regulations if necessary.</p>	<p>Overload protection</p> <p>Maintenance of overload device</p> <p>Operation test of overload</p>
Condition monitoring unit	10% 12	<p>Verify the operation of the condition monitoring unit.</p> <p>Test the condition monitoring unit by lifting a known load and verify that the unit reads the load within 5% accuracy. If not reading properly, a new calibration of the unit required. Check for possible error codes and warnings.</p>	Service manual for hoist control device

Runway mechanical

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Crane runway rail		<p>Inspect the crane runway rail.</p> <ul style="list-style-type: none"> • Check the bridge squareness • Check that both end trucks are working simultaneously in the starting and the stopping phases • Monitor for possible sounds of grinding or any unsmooth travel of the bridge along the runway • Visually check the straightness • Check rail fastenings randomly for possible loose connections • Check the rail for any signs of wear. 	

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Crane runway end stop		Inspect the crane runway end stops. Inspect the end stops for wear, cracks, or deformation. Inspect the runway end stop fastenings. The end stops are to be in parallel position.	

Runway electrics

 WARNING	Switch off the power to the runway before you carry out the inspection.
--------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Crane power supply collectors		Inspect the power collector shoes. <ul style="list-style-type: none"> Check for any signs of wear Check that there is a proper contact between the shoes and the conductor bar Check the spring tension of the collector Inspect the collector bar. <ul style="list-style-type: none"> Check straightness Verify that the fasteners are fixed properly Check the bar for possible signs of wear: burn marks, oxidation, cracks, or any other general damage. 	
Main isolation switch (Main runway disconnect switch)		Inspect the main isolation switch (the main runway disconnect switch). Verify the following: <ul style="list-style-type: none"> Main isolation switch is labeled to indicate what crane runway it controls Main isolation switch functions properly Main isolation switch is lockable. Inspect the fuses and the holder of fuses. Verify the following: <ul style="list-style-type: none"> Fuses are secure Holder has no corrosion Wiring to the holder is secure. 	

Bridge mechanical

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Bridge capacity labeling	10% 12	Verify that the capacity load of the crane bridge is readable by the crane operator.	
Bridge buffers (bumpers)	10% 12	Inspect the condition of bridge buffers and buffer end stops. Verify that buffers (bumpers) make contact with the end stops of the bridge at the same time.	
Bridge end truck connection	10% 12	Check the connection for <ul style="list-style-type: none"> possible cracks missing bolts loose bolts. 	
Bridge gearboxes	10% 12	Inspect the gearboxes. <ul style="list-style-type: none"> Check that the fastenings are secure Look for possible signs of leakage Inspect oil level if possible Verify the tightness of the gearbox output shaft fastening to the wheel shaft. 	
Bridge wheels	10% 12	Inspect the bridge wheels. Check wheels for possible flange wear. Lubricate the bridge wheels.	

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Bridge rail sweeps	10% 12	Check the condition of bridge rail sweeps for any signs of wear and replace them if necessary.	

Bridge electrics

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Bridge travel limits	10% 12	Check the operation of Slowdown and Stop Travel Limits of the bridge.	
Bridge power supply	10% 12	Check the festoon cable system. <ul style="list-style-type: none"> • Check that the cable is not worn • Verify that the cable is running smoothly from one end of the bridge to the other end, indicating that the cable carrier is not damaged and the cable is not running into any obstacles • Check that the pull cable is secure and working properly, relieving strain on the cable when the trolley is pulling • Check that the festoon arm is secure. 	
Bridge disconnect switch	10% 12	Verify that the bridge disconnect switch on the bridge panel turns on and off the power.	

Electrics

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Emergency stop	10% 12	Check that the emergency button is clean and not damaged. Push in the emergency button. Test that no movement activates. Verify that the main contactor is off. If the emergency stop is equipped with key locking, remove the key and test that it is not possible to release the emergency stop.	
Main switch for hoist	10% 12	Check that the main switch is clean, clearly marked and not damaged. Test manually that the main switch switches off the hoist.	Main isolation switch
Wiring	10% 12	Inspect the condition of wiring and the connections. <ul style="list-style-type: none"> • Follow the power supply and visually check the potential areas for damages • Pull on the wiring at the terminals • Check the wiring for any signs of wear, crushing, breaks, or cuts • Check visually that the cable bushings are tight • Check visually that the connectors are not damaged • Test by hand that the cable bushings are tight • Test by hand that the connectors are tight • Check randomly the tightness of screws at the terminal blocks and at the connections of other components. Note that the terminals can cause a heat damage to the insulation and/or to the connections.	
Hoist cubicle	10% 12	Check that the electrical cubicle is securely fastened with a trolley or a bridge. Verify that the doors are closing properly and the locking devices are functioning. Check the door sealing. Check that the cubicle is clean. Inspect the air conditioning and filters. Inside the electrical cubicle: <ul style="list-style-type: none"> • Check that the electrical components and their fastenings are secure. • Check that all the electrical protection guards are in place. 	

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Contactors Condition monitoring unit warning "Control"	Control warning 12	<p>Check that all the movements are operational in the hoist, in the trolley and in the bridge.</p> <p>Check visually that the contactors are clean and there are no visible damages.</p> <p>When the condition monitoring unit indicates the "Control" warning, one of the start counters 2-7 (ST up), 2-8 (ST down) or 2-9 (ST fast), has reached the set design limit (the default value is 640,000 operations) which is defined with parameter 6-19 (Max Control) that calculates the life-time of the contactors.</p> <p>When the design limit has been reached, replace the contactors (Up, Down, Slow, Fast and Brake Contactors). If a brake contactor contains an auxiliary contact block or a time delay auxiliary contact block, replace that part as well.</p> <p>After the replacement, calculate a new value for parameter 6-19. See instructions in chapter "Contactors".</p> <p>If the condition monitoring unit is not used with the hoist, replace the contactors after six years of operation according to the designed duty cycle.</p>	Contactors
Over-current protectors	10% 12	Check the adjustment of the over-current protectors.	
Fuses	10% 12	Inspect visually that the fuse holder and the fuses are clean and there are no visible damages. Check the correct amperage rating.	
Braking resistors (with some frequency converter models)	10% 12	Clean all dust or dirt from the braking resistors.	
Hoisting frequency converter	10% 12	Check that wires are securely fastened. Check fault code records. Inspect the operation and cleanliness of the cooling fan.	See further instructions in the equipment-specific "Service Manual for Frequency Control System"
Traveling frequency converter	10% 12	Check that wires are securely fastened. Check fault code records. Inspect the operation and cleanliness of the cooling fan.	See further instructions in the equipment-specific "Service Manual for Frequency Control System"
Frequency controller	10% 12	Check fault code records. Verify that the frequency converter fan is working. Check that the frequency drive is clean from dust or dirt.	See further instructions in the equipment-specific "Service Manual for Frequency Control System".
VARIATOR LM / VARIATOR LA2 Condition monitoring unit warning "Control"		When the condition monitoring unit indicates the "Control" warning, the design limit (the default value is 640,000 operations) has been reached. Replace the brake timer block, the brake contactor as well as the brake control PC board that contains the brake relay (in VARIATOR LM / VARIATOR LA2 frequency converters, replace the B board).	
Radio receiver	10% 12	Check that the radio receiver is working normally.	

Motors and gears

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Hoisting motor	10% 12	Inspect for any unusual noise or vibration. Drive and check that the hoisting motor operates properly when loaded. Verify that the cooling fan is working properly. Clean the cooling ribs surface from dust and dirt. <p>Check that all motor fastenings are tight and the motor is properly on its position.</p> If the bolts are loose, tighten them to the proper torque.	Hoisting motor Maintenance of hoisting motor

Component	Interval	Inspection and maintenance task	See further instructions
Traveling motor	10% 12	Interval is SWP% reduction or calendar months Inspect for any unusual noise or vibration. Verify that the cooling fan is working properly. Clean the cooling ribs surface from dust and dirt. Check that all motor fastenings are tight and the motor is properly on its position. If the bolts are loose, tighten them to the proper torque.	Traveling motor
Hoisting brake	10% 12	Check that there is no visible damage. Check that the outside surface of the brake is clean. Drive with nominal load and test that lifting and lowering brake smoothly and the braking time and distance is acceptable. Disassemble the hoisting brake: <ul style="list-style-type: none"> • Measure disk pad thickness • Inspect the center hub teeth for cracks or any wear. Replace it if worn • Replace the disk when its condition is not complying with specifications • Clean the inner side of the brake from dust and dirt. When the maximum allowed number of braking actions has taken place (CID Warning: Br SWP %), replace the hoisting brake and the hoisting coupling. Check also the condition of coupling splines in the motor shaft and in the gear shaft.	Hoisting brake Replacement of a hoisting brake
Traveling brake	10% 12 20% 24	Inspect that there is no visible damage. Check that the outside surface of the brake is clean. Drive with load and test that brake operates smoothly and the braking time and distance is acceptable. Disassemble the traveling brake: <ul style="list-style-type: none"> • Measure the air gap, clean, and adjust the brake if needed • Measure the brake pad. Replace it if necessary. 	Construction of compact brake for traveling motor MF06 Construction of DC brake for motor MF06LB* or MF06 two-speed Construction of DC brake for motors MF07 and MF10 Maintenance of traveling brake, compact brake Maintenance of traveling brake, DC brake for motor MF06 Maintenance of traveling brake, DC brake for motors MF07 and MF10
Hoisting gear	10% 12	Check that the gearbox fastenings are secure. Inspect the gearbox for possible lubrication leakage. If there is an excessive leakage, open the gearbox and replace the sealings. Test the gear running sound and vibrations with load. Check that the breather-plug is free of dust and dirt. Check the temperature of the hoisting gearbox by hand. Check the oil level if an oil-filled hoisting gear.	Hoisting gearbox Lubrication
Traveling gear	10% 12	Check that the gearbox fastenings are secure. Inspect the gearbox for possible lubrication leakage. Check visually the torque support mounting and the rubber bushing if present. Test the gear running sound and vibrations with load. Check that the breather-plug is free of dust and dirt. Check the temperature of the traveling gearbox by hand. Check the oil level if an oil-filled traveling gear. Open transmission: <ul style="list-style-type: none"> • Inspect the open transmission visually for wear • Lubricate the open transmission. 	Traveling machinery Maintenance of traveling machinery unit Lubrication

Component	Interval	Inspection and maintenance task	See further instructions																					
		Interval is SWP% reduction or calendar months																						
Motor/gear coupling	*)	<p>Investigate the condition of the coupling between the motor and the gear.</p> <p>The coupling must be replaced if there is any visible damage or rust inside the coupling or if the o-rings have any visible damage or signs of aging.</p> <p>Lubricate the coupling and motor splines carefully.</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="3">*) Interval</th> </tr> <tr> <th>Hoist classification</th> <th>M5/M6</th> <th>M3/M4</th> </tr> </thead> <tbody> <tr> <td></td> <td colspan="2" style="text-align: center;">Hoists with CID</td> </tr> <tr> <td>SWP% reduction</td> <td style="text-align: center;">40%</td> <td style="text-align: center;">80%</td> </tr> <tr> <td>Calendar period. Years</td> <td style="text-align: center;">8</td> <td style="text-align: center;">8</td> </tr> <tr> <td></td> <td colspan="2" style="text-align: center;">Hoists without CID</td> </tr> <tr> <td>Calendar period. Years</td> <td style="text-align: center;">5</td> <td style="text-align: center;">5</td> </tr> </tbody> </table>	*) Interval			Hoist classification	M5/M6	M3/M4		Hoists with CID		SWP% reduction	40%	80%	Calendar period. Years	8	8		Hoists without CID		Calendar period. Years	5	5	Hoisting gearbox Maintenance task for hoisting gear Lubrication
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Hoist classification	M5/M6	M3/M4																						
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	Hoists without CID																							
Calendar period. Years	5	5																						

Mechanical component

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Rope drum	10% 12	<p>Rotation of a rope drum and the condition of bearings:</p> <p>Check the proper rotation of a drum and the condition of bearings. Drive with and without load. Pay attention to the running sound of the rope drum bearings and check that the rope drum does not touch with the machinery end plates or other parts.</p> <p>Lubricate the drum bearings on both sides of the drum if not life- time lubricated.</p>	Rope drum Maintenance tasks for rope drum Drum wear inspection Rope clamps Lubrication
	10% 12	<p>Inspect the condition and cleanliness of rope drum.</p> <p>Check visually the grooves of the drum. Measure the groove wear if needed.</p> <p>Clean and lubricate the drum surface.</p>	
	10% 12	<p>Axial locking part on certain frame sizes:</p> <p>Inspect the condition and operation of the axial locking part.</p> <p>The axial locking part must be replaced when worn 5 mm or more.</p> <p>Clean and lubricate the locking part groove.</p>	
	10% 12	<p>Inspect the fixing of the connection rods:</p> <p>Check visually that the connection rods are straight and the fixing screws are tight.</p>	
	10% 12	<p>Check the gear rim.</p> <p>Check the gear rim for possible unusual noise during operation.</p> <p>Lubricate the gear rim.</p>	
	10% 12	<p>Inspect the condition and correct fastening of rope clamp.</p> <p>Check that the rope clamp bolts are tight.</p> <p>Ensure that there are friction turns when the hook is at the lowest position.</p> <p>Ensure that the rope end protrudes from the last clamp to the specified length.</p>	
Rope guide	10% 12	<p>Inspect the condition of the rope guide.</p> <p>Test the proper operation of the rope guide.</p> <p>Inspect the rope guide for loose or missing fittings.</p> <p>Check the condition of the pressure bearing if present.</p> <p>Clean the rope guide guiding rod.</p> <p>Replace the worn parts.</p> <p>Lubricate the rope guide and the rope guide guiding rod.</p>	Rope guide Replacing an old style rope guide with a heavy-duty rope guide Lubrication

Component	Interval	Inspection and maintenance task	See further instructions
Wire rope	10% 12	Inspect the condition of the rope. Inspect the rope for <ul style="list-style-type: none"> • broken wires • kinks • wear • dryness (lubricate if necessary). 	Wire rope Maintenance of wire rope Replacing the wire rope Discard criteria of wire rope Lubrication
Rope anchorage on drum	10% 12	Inspect the condition and correct position of a rope anchorage. Check that the rope clamp nuts are tight. Ensure that the rope has not slipped in the rope anchorage by comparing to the nominal measurements. Make sure that the rope end protrudes from the rope anchorage as specified. Inspect the condition of the wire rope near the rope anchorage. Inspect the anchorage shaft locking.	Rope anchorage Inspections and criteria for rope anchorage
Rope anchorage on dead end	10% 12	Inspect the condition of a rope sheave support and a rope anchorage support. Check that the sheave support shaft(s) are correctly in their slots and correctly locked. Lubricate the pivot bearing surfaces of the rope anchorage if needed. Ensure that the rope is assembled inside the rope anchorage correctly. Check that the wire rope clips have correct tightness and proper orientation.	
Rope reeving	10% 12	Inspect the rope reeving assembly. Lift up the hook and lower it down. Pay attention to the following issues: <ul style="list-style-type: none"> • Check if the hook block tries to rotate (remove the rotation by reassembling the end fixing and by rotating to the opposite direction) • Inspect that the reeving balancing tilts freely (in two rope systems) • Verify that the rope moves smoothly over all sheaves and trough the rope guide • Ensure that the rope is tight and properly laid on drum grooves. In true lift hoists, it is normal that the hoisting causes the hook block to rotate.	Rope reeving system
Rope sheaves (upper sheaves)	10% 12	Inspect the condition of rope sheaves. Measure the rope sheaves to check if any wear. Inspect during operation if any unusual sound is coming from sheave bearings. Check the condition of the rope sheave support structure. Check that the sheave support shafts are correctly in their slots and correctly locked. Inspect the sheave support shaft fixing plate for any cracks (some Low Headroom Trolley models). Replace the support shaft by the latest construction/parts if not done yet (some Low Headroom Trolley models).	Wear inspection of sheaves Maintenance of rope sheaves Sheave support and rope anchorage support
Hook block	10% 12	Check the operation and condition of the hook block. Check the following: <ul style="list-style-type: none"> • The labels/stickers exist and are readable • The covers are not bent or damaged and do not touch to sheaves or rope • Lubricate all lubrication points. • Lift an empty hook and test that: <ul style="list-style-type: none"> • The hook does not rotate. • The empty hook does not tilt. • Test that the rope runs smoothly on sheaves with and without load.	Hook block
Cross bar	10% 12	Check the condition of the cross bar hinge by tilting the hook forging. Check the condition of the hook thrust bearing by rotating the hook forging. Lubricate the cross bar hinge bearings using the grease nipples (hinged cross bars only). Lubricate the hook thrust bearing using the grease nipple, or open the cross bar if there is no grease nipple.	Lubrication
Hook safety latch	10% 12	Test by hand that the safety latch is not damaged and the spring keeps it closed.	

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Hook latch trigger (magnet operated)		Test the operation of the latch trigger. Adjust the trigger play (movement) with the adjustment screw if necessary. Clean the magnet when dirty.	Hook block
Hook forging	10% 12	Inspect the condition of hook forging. Measure the hook forging opening if needed.	Hook opening
Trolley wheels	10% 12	Inspect the condition and cleanliness of trolley wheels. Check the trolley wheels for possible wear in the trolley wheel surfaces and flanges. Check the adjustment of rail width or rail gauge and measure. Clean the wheel and its running surfaces from grease and oil. Replace the worn parts.	Construction of single girder trolley wheels Construction of double girder trolley wheels Maintenance of single girder trolley wheels
		Test trolley wheel operation. Drive the trolley with and without load. Pay attention to the running sound of bearings. If necessary, lift the trolley and test by hand the free and smooth rotation of trolley wheels. Check that the wheels are correctly aligned and inspect for possible wear that is caused by misalignment. Lubricate the bearings if needed and possible.	Maintenance of double girder trolley wheels Wearing limits of single girder trolley wheels Wearing limits of double girder trolley wheels
Trolley rail sweeps	10% 12	Check the condition of trolley rail sweeps for any signs of wear and replace them if necessary.	
Load carrying structures	10% 12	Check the condition of bolted joints and load carrying structures. Visually check the bolted and welded connections of the security and backup components like a derailment catch.	Trolley Maintenance of double girder trolley structures Maintenance of single girder trolley structures

Anti-collision devices

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Photoelectric anti-collision device	10% 12	Inspect the condition and operation of the photoelectric anti-collision device. Clean the optical interfaces. Check the screw connections. Check the plug-in connections. Inspect the operation of the photoelectric anti-collision device.	
Ultrasonic anti-collision device	10% 12	Inspect the condition and operation of the ultrasonic anti-collision device. Clean the sensor off thick layers of dirt and caked-on dirt. Inspect the operation of the ultrasonic anti-collision device.	

Controls

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Pendant	10% 12	Check the condition and functionality of push buttons and switches. Check all markings and signs that they are readable. Drive all movements. Test all functions. Change buttons/joystick or the whole pendant if needed.	

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Radio	10% 12	Check the condition and functionality of push buttons and switches. Check all markings and signs that they are readable. Drive all movements. Test all functions. Change buttons/joystick or the whole pendant if needed. Replace the battery if needed.	

Options

Component	Interval	Inspection and maintenance task	See further instructions
		Interval is SWP% reduction or calendar months	
Drum brake	10% 12	Inspect the condition and cleanliness of the drum brake. <ul style="list-style-type: none"> • Check that the brake bands are in correct position. • Check that the cam spring is in good shape. • Check that the actuator mechanism is clean and moves freely. Test that the cam operates correctly when lifting and lowering. Test that the limit switch stops the motions. Lubricate the actuator and the cam mechanism if necessary.	Construction of holding brake Construction of overspeed brake Maintenance of holding brake Maintenance of overspeed brake Service after an emergency braking – In case an overspeed occurs
Second brake	10% 12	Inspect the condition and cleanliness of the second brake. Inspect that there is no visible damage in the brake. Check that the outside surface of the brake is clean. Test that the second brake operates after the main brake. Check that lifting and lowering brake smoothly and braking time and distance is acceptable. If needed, inspect the brake disc and clean the brake. Note the correct torque of the fixing screws of the brake.	Second brake Maintenance of second brake Appendix: tightening torques
Manual brake release for hoisting motor	10% 12	Check that the manual brake release tools are available. Check that the operating instructions are available.	Manual brake release for hoisting motor
Manual crank	10% 12	Check that the manual crank and brake release tools are available. Check that the operating instructions are available.	Manual crank
Hook operated hoisting limit switch	10% 12	Inspect the condition of a hook operated limit switch. Inspect the wiring. Test the proper operation of the hook operated hoisting limit switch.	

6.2 Lubrication

6.2.1 General Lubrication Instructions



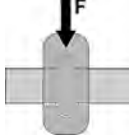



Note: Most of the bearings in the product have lifetime lubrication. There is no need to add lubricant to the life time lubricated bearings under normal operating conditions.



Note: If transmission oil has to be topped up, make sure that the lubricant being added is compatible. If transmission oil has to be replaced, flush out the gearbox before refilling.

The following table provides advice on the lubrication procedures which should be followed.

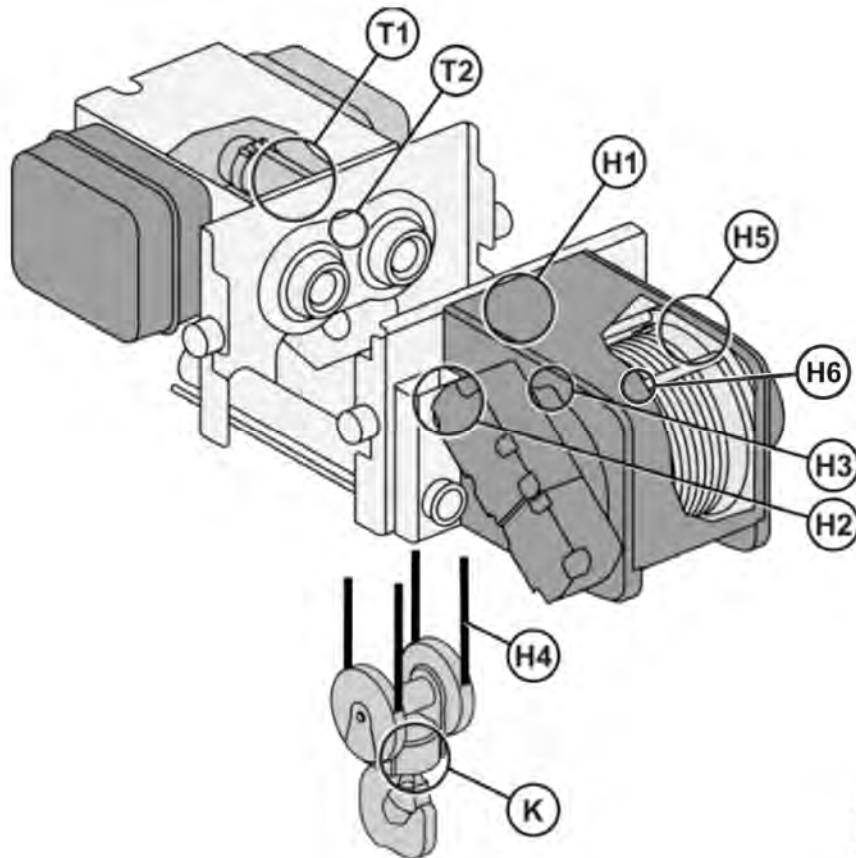
<p>1</p>	<p>Usage of a low grade or incompatible lubricant can damage the gearing or bearings. Use only lubricants recommended by the product's manufacturer. See the lubricant tables for more information.</p> <p>Use only fresh oil/grease. Different kinds of lubricants shall not be mixed.</p> <p>Information about each chemical's safe handling , risks and handling as waste are described in the Safety Data Sheet that is available from manufacturer of the lubricant.</p> <p>Note: equipment may have synthetic lubricant as a factory installed lubricant. Please refer to order confirmation.</p>	
<p>2</p>	<p>Handle lubricants carefully. Prevent leakages to waters, sewers, cellars and other closed places.</p>	
<p>3</p>	<p>Keep lubricants away from heat and open fires. Do not smoke when handling lubricants.</p>	
<p>4</p>	<p>Avoid contact with skin. Protection gloves and safety goggles shall be worn when handling lubricants. Hands shall be washed thoroughly after lubrication.</p>	
<p>5</p>	<p>Keep lubricants away from food and drink. Do not inhale any fumes or swallow lubricants.</p>	
<p>6</p>	<p>Used lubricant shall be handled as hazardous waste following local legal requirements.</p> <p>Store used lubricant in containers indicated for the purpose and dispose by a licensed company.</p>	
<p>7</p>	<p>Keep grease nipples clean.</p>	

8	All slide bearings must be depressurised for the grease to be able to penetrate.	
9	While lubricating, check the functioning of the bearings and observe whether there is any bearing slackness.	
10	The specified lubrication periods apply in favourable conditions and normal use. More frequent lubrication is recommended in more demanding conditions and in heavy use, particularly of the slide bearings.	
11	Verify that the gear teeth of the open gear transmission are entirely lubricated.	



Note: Do not use excessive lubricant. Excessive grease may cause bearing to overheat and reduces the lifetime of the bearings.

6.2.2 Lubrication Charts (Low headroom trolley)

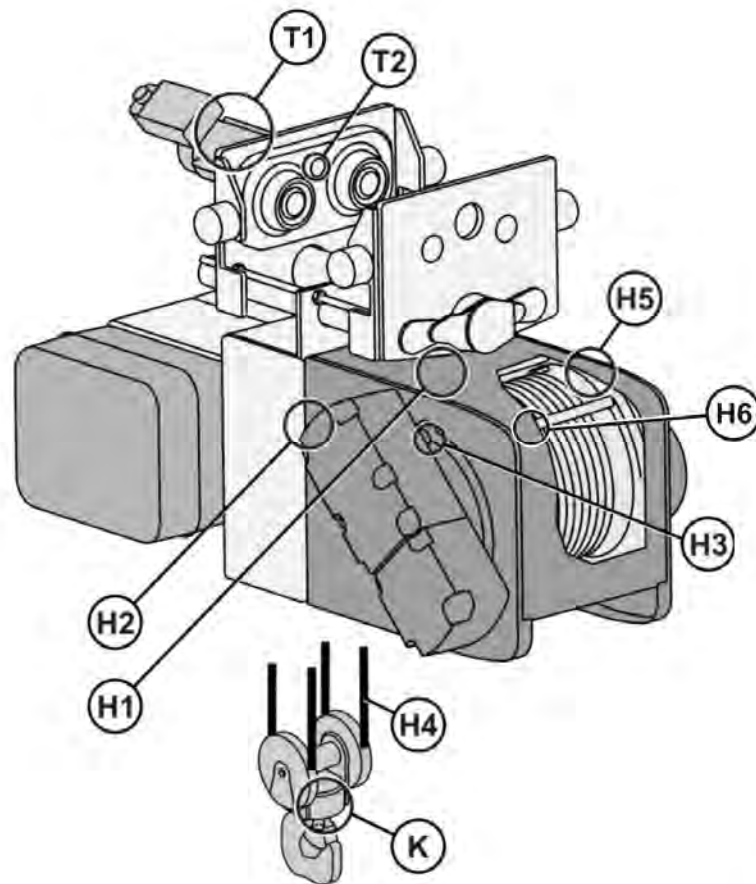


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Pos.	Component	Intervals
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H1	Rope anchorage	Annual
H2	Hoisting gear	Lifetime lubricated
H3	Hoisting transmission	Annual
H4	Rope	Monthly-Annual
H5	Rope drum bearings	Annual if not life time lubricated
H6	Rope guide	Annual
K	Hook thrust/slide bearings	Annual if not life time lubricated
T1	Travelling gear	Lifetime lubricated
T2	Travelling transmission	Annual

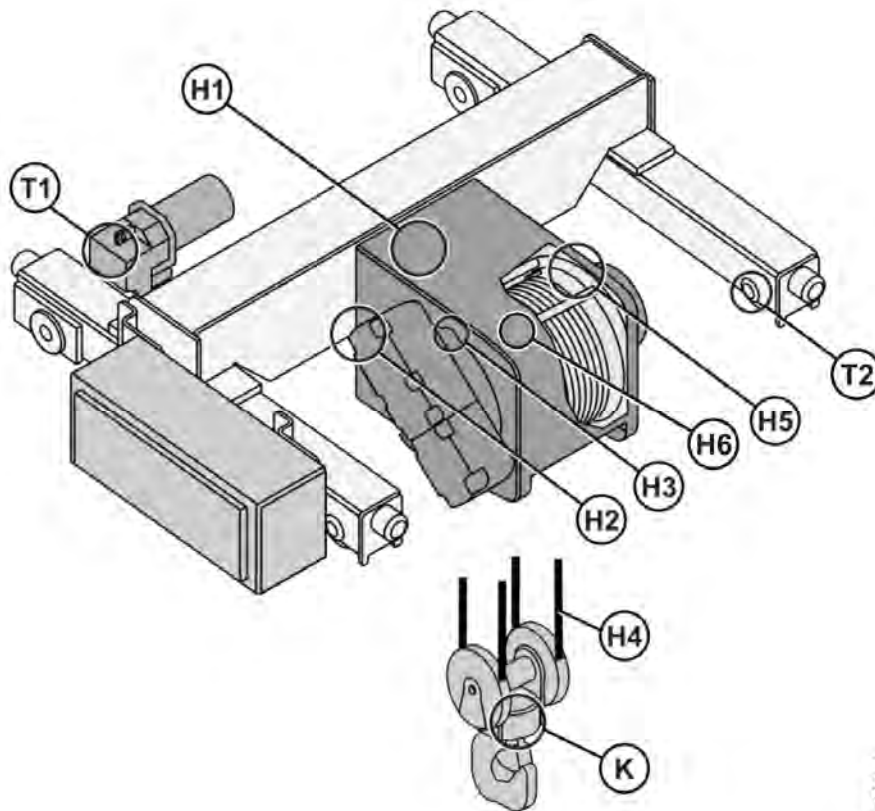
6.2.3 Lubrication Charts (Normal headroom trolley)



CD005802_1

Pos.	Component	Intervals
H1	Rope anchorage	Annual
H2	Hoisting gear	Lifetime lubricated
H3	Hoisting transmission	Annual
H4	Rope	Monthly-Annual
H5	Rope drum bearings	Annual if not life time lubricated
H6	Rope guide	Annual
K	Hook thrust/slide bearings	Annual if not life time lubricated
T1	Travelling gear	Lifetime lubricated
T2	Travelling transmission	Annual

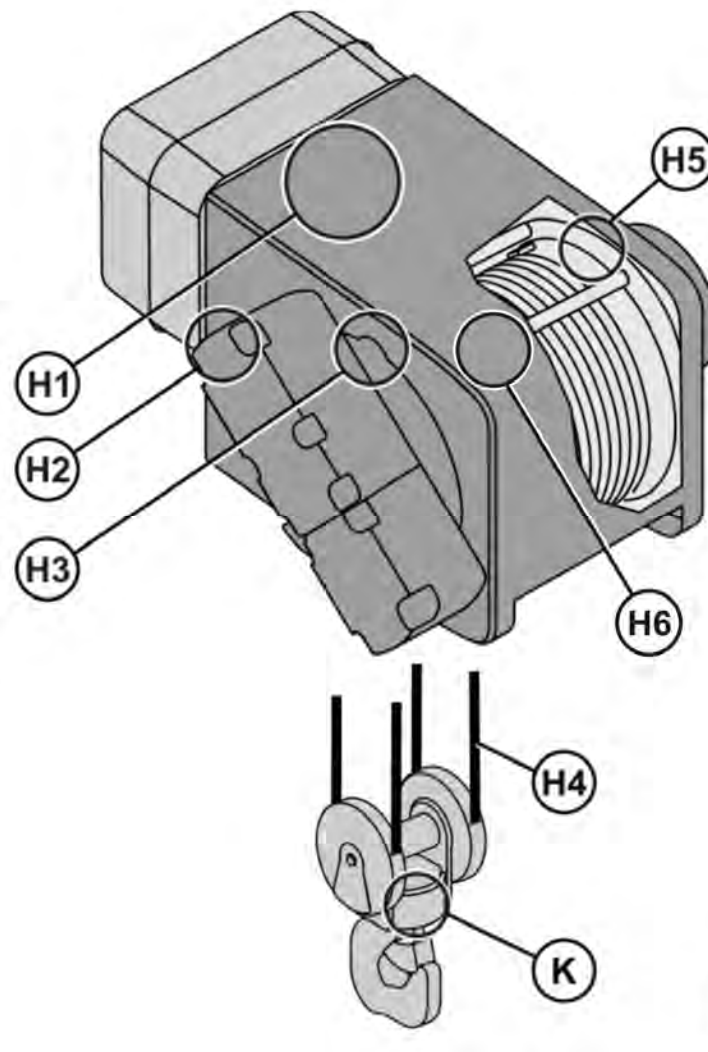
6.2.4 Lubrication Charts (Double girder trolley)



CD005803_1

Pos.	Component	Intervals
H1	Rope anchorage	Annual
H2	Hoisting gear	Lifetime lubricated
H3	Hoisting transmission	Annual
H4	Rope	Monthly-Annual
H5	Rope drum bearings	Annual if not life time lubricated
H6	Rope guide	Annual
K	Hook thrust/slide bearings	Annual if not life time lubricated
T1	Travelling gear	Lifetime lubricated
T2	Travelling transmission	Annual

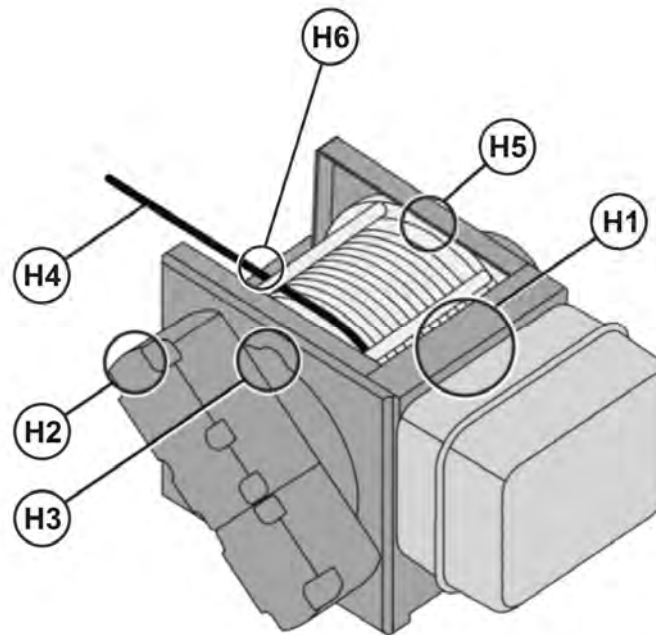
6.2.5 Lubrication Charts (Fixed hoist)



CD005804_1

Pos.	Component	Intervals
H1	Rope anchorage	Annual
H2	Hoisting gear	Lifetime lubricated
H3	Hoisting transmission	Annual
H4	Rope	Monthly-Annual
H5	Rope drum bearings	Annual if not life time lubricated
H6	Rope guide	Annual
K	Hook thrust/slide bearings	Annual if not life time lubricated

6.2.6 Lubrication Charts (Machinery Hoist)



CD005805_1

Pos.	Component	Intervals
H1	Rope anchorage	Annual
H2	Hoisting gear	Lifetime lubricated
H3	Hoisting transmission	Annual
H4	Rope	Monthly-Annual
H5	Rope drum bearings	Annual if not life time lubricated
H6	Rope guide	Annual

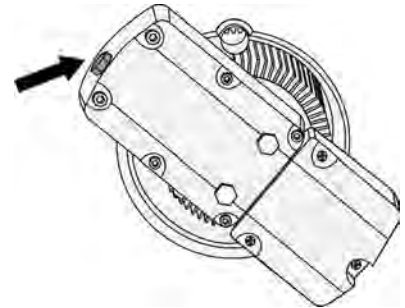
H1	<p>Rope anchorage</p> <ul style="list-style-type: none"> Lubricate the pivot joint of the lever mechanism, the suspension support of the rope anchorage and the rocker bushings of the support beam with suitable thin oil. <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Installation</th> <th>Trade name and number</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Mobilith SHC460</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S5 V220</td> </tr> <tr> <td>Alternative</td> <td>Neste Synlix</td> </tr> <tr> <td>Alternative</td> <td>Castrol S</td> </tr> </tbody> </table>	Installation	Trade name and number	Factory installed	Mobilith SHC460	Alternative	Shell Gadus S5 V220	Alternative	Neste Synlix	Alternative	Castrol S	
Installation	Trade name and number											
Factory installed	Mobilith SHC460											
Alternative	Shell Gadus S5 V220											
Alternative	Neste Synlix											
Alternative	Castrol S											

H2	<p>Hoisting gear</p> <ul style="list-style-type: none"> Check magnetic plug for metallic particles. Check that breather is functional. If any abnormalities, contact service. <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Installation</th> <th>Trade name and number</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Mobilux EP 004</td> </tr> <tr> <td>Alternative</td> <td>Shell Alvania EP00</td> </tr> <tr> <td>Alternative</td> <td>Shell Tivela Compound A</td> </tr> <tr> <td>Alternative</td> <td>Neste Center Grease 00 EP</td> </tr> <tr> <td>Alternative</td> <td>Castrol EPL 00</td> </tr> <tr> <td>Alternative</td> <td>Mobilith SHC 007</td> </tr> </tbody> </table>	Installation	Trade name and number	Factory installed	Mobilux EP 004	Alternative	Shell Alvania EP00	Alternative	Shell Tivela Compound A	Alternative	Neste Center Grease 00 EP	Alternative	Castrol EPL 00	Alternative	Mobilith SHC 007	
Installation	Trade name and number															
Factory installed	Mobilux EP 004															
Alternative	Shell Alvania EP00															
Alternative	Shell Tivela Compound A															
Alternative	Neste Center Grease 00 EP															
Alternative	Castrol EPL 00															
Alternative	Mobilith SHC 007															

H2 Hoisting gear

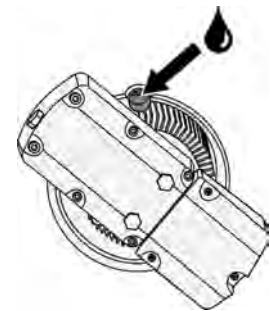
- Check oil leakages, check oil level. If any abnormalities, contact service.

Installation	Trade name and number
Factory installed	Mobil SHC 634
Alternative	Neste Vaihteisto S 460 EP
Alternative	Shell Gear Oil HDS 460



H3 Drum gear rim

Installation	Trade name and number
Factory installed	Almagard 3752
Alternative	Shell Gadus S3 High Speed Coupling Grease
Alternative	Neste Avora



H3 Drum gear rim

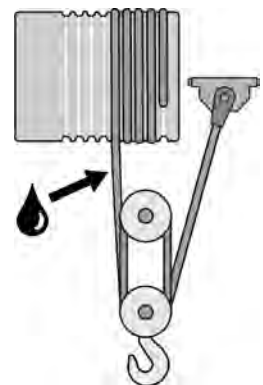
Installation	Trade name and number
Factory installed	Almagard 3752
Alternative	Shell Gadus S3 High Speed Coupling Grease
Alternative	Neste Avora



H4 Rope

- To extend rope lifetime, lubrication is recommended.
- Lubrication interval varies from one month to one year depending on usage.
- Lubrication shall be done before signs of corrosion or dryness.
- Lubricate the rope with suitable lubrication. Lubricant for wire rope shall be water resistant, non-adhesive, transparent thin oil, which is able to penetrate into the rope.
- Only lubricate the rope lightly, excessive lubrication may cause dribbling

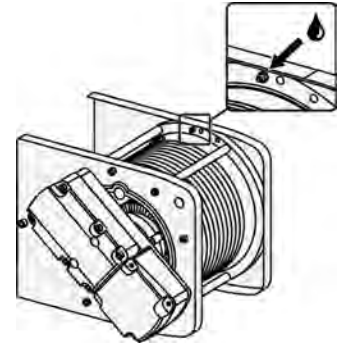
Installation	Trade name and number
Factory installed	-
Alternative	Elaskon 30
Alternative	Lubriplate
Alternative	ORAPI Nanolubricant



H5 Rope drum bearings

- Lubricate only the greasing points A (upper points) or B (lower points), but not both.
- During lubrication, the drum MUST rotate at least two complete rounds.
- Do not use excessive grease, as that may damage the bearings. Approximately two pumps of grease will suffice.

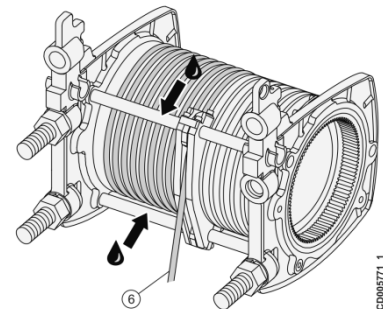
Installation	Trade name and number
Factory installed	Mobilith SHC460
Alternative	Shell Gadus S5 V220
Alternative	Neste Synlix
Alternative	Castrol S



H6 Rope guide for hoist frame size VTs

- Lubricate the both intermediate shafts.

Installation	Trade name and number
Factory installed	Mobilith SHC460
Alternative	Shell Gadus S5 V220
Alternative	Neste Synlix
Alternative	Castrol S



H6 Rope guide for hoist frame size VT1, VT2, VT3

- Lubricate the connector rod.

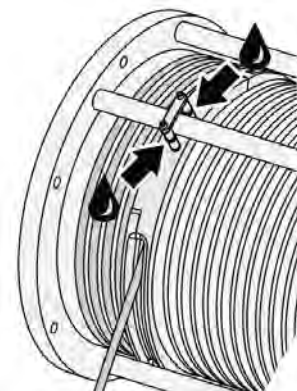
Installation	Trade name and number
Factory installed	Mobilith SHC460
Alternative	Shell Gadus S5 V220
Alternative	Neste Synlix
Alternative	Castrol S




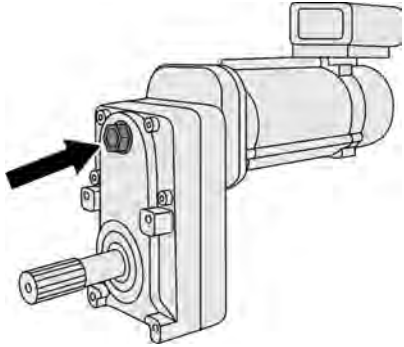
H6 Rope guide for hoist frame size VT4, VT5


- Lubricate the rotation support bearings locating at the both sides of the intermediate shaft.

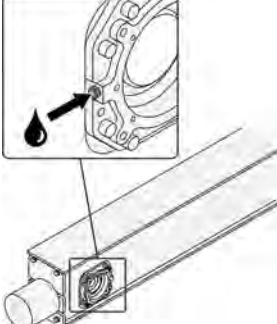
Installation	Trade name and number
Factory installed	Mobilith SHC460
Alternative	Shell Gadus S5 V220
Alternative	Neste Synlix
Alternative	Castrol S



K	Hook thrust/slide bearings <ul style="list-style-type: none"> Lubricate all lubrication points <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Installation</th> <th>Trade name and number</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Mobilith SHC460</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S5 V220</td> </tr> <tr> <td>Alternative</td> <td>Neste Synlix</td> </tr> <tr> <td>Alternative</td> <td>Castrol S</td> </tr> </tbody> </table>	Installation	Trade name and number	Factory installed	Mobilith SHC460	Alternative	Shell Gadus S5 V220	Alternative	Neste Synlix	Alternative	Castrol S	
Installation	Trade name and number											
Factory installed	Mobilith SHC460											
Alternative	Shell Gadus S5 V220											
Alternative	Neste Synlix											
Alternative	Castrol S											

T1	Traveling gear <ul style="list-style-type: none"> Travelling machinery is grease lubricated and no oil changes are required. The breather plug can be used as a filling hole if it becomes necessary to top up the grease. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Installation</th> <th>Trade name and number</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Mobilux EP 004</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S1 Low Speed Coupling Grease</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S2 V220</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S5 V142W</td> </tr> <tr> <td>Alternative</td> <td>Neste Center Grease 00 EP</td> </tr> <tr> <td>Alternative</td> <td>Castrol EPL 00</td> </tr> <tr> <td>Alternative</td> <td>Mobilith SHC 007</td> </tr> </tbody> </table>	Installation	Trade name and number	Factory installed	Mobilux EP 004	Alternative	Shell Gadus S1 Low Speed Coupling Grease	Alternative	Shell Gadus S2 V220	Alternative	Shell Gadus S5 V142W	Alternative	Neste Center Grease 00 EP	Alternative	Castrol EPL 00	Alternative	Mobilith SHC 007	
Installation	Trade name and number																	
Factory installed	Mobilux EP 004																	
Alternative	Shell Gadus S1 Low Speed Coupling Grease																	
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Alternative	Shell Gadus S5 V142W																	
Alternative	Neste Center Grease 00 EP																	
Alternative	Castrol EPL 00																	
Alternative	Mobilith SHC 007																	

T2	Travelling transmission <ul style="list-style-type: none"> Remove the plug and grease open transmission. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Installation</th> <th>Trade name and number</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Almagard 3752</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S3 High Speed Coupling Grease</td> </tr> <tr> <td>Alternative</td> <td>Neste Avora</td> </tr> </tbody> </table>	Installation	Trade name and number	Factory installed	Almagard 3752	Alternative	Shell Gadus S3 High Speed Coupling Grease	Alternative	Neste Avora	
Installation	Trade name and number									
Factory installed	Almagard 3752									
Alternative	Shell Gadus S3 High Speed Coupling Grease									
Alternative	Neste Avora									

T2	Traveling wheel bearings <ul style="list-style-type: none"> There are grease nipples on both sides of each wheel. Lubricate the grease nipples so that fresh grease penetrates all of the lubrication points. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Installation</th> <th>Trade name and number</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Mobilith SHC460 *)</td> </tr> <tr> <td>Alternative</td> <td>Shell Gadus S5 V220 *)</td> </tr> <tr> <td>Alternative</td> <td>Neste Synlix *)</td> </tr> <tr> <td>Alternative</td> <td>Castrol S *)</td> </tr> <tr> <td colspan="2">*) Synthetic</td> </tr> </tbody> </table>	Installation	Trade name and number	Factory installed	Mobilith SHC460 *)	Alternative	Shell Gadus S5 V220 *)	Alternative	Neste Synlix *)	Alternative	Castrol S *)	*) Synthetic		
Installation	Trade name and number													
Factory installed	Mobilith SHC460 *)													
Alternative	Shell Gadus S5 V220 *)													
Alternative	Neste Synlix *)													
Alternative	Castrol S *)													
*) Synthetic														

6.2.7 Lubricant volumes, hoisting gears

Drum size	Gear type	Volume	
φ 243 mm	GEN0	300 ml	10.6 fl.oz (Imperial)
φ 303 mm	GEN1	600 ml	21.1 fl.oz (Imperial)
φ 355 mm	GEN2	900 ml	31.7 fl.oz (Imperial)
φ 406 mm	GEN3	1400 ml	49.3 fl.oz (Imperial)
φ 608 mm	GEN4	2500 ml	88.0 fl.oz (Imperial)

6.2.8 Lubricant volumes, drum rim gear

Drum diameter	Volume	
φ 243 mm	50 ml	1.8 fl.oz (Imperial)
φ 303 mm	70 ml	2.5 fl.oz (Imperial)
φ 355 mm	100 ml	3.5 fl.oz (Imperial)
φ 406 mm	150 ml	5.3 fl.oz (Imperial)
φ 608 mm	500 ml	17.6 fl.oz (Imperial)

6.2.9 Lubricant volumes, traveling gears

Hoist trolley type	Drum size	Gear type	Volume	
Low headroom Normal headroom	all	GEK1	20 ml	0.7 fl.oz (Imperial)
Double girder	φ 303 mm	GS2/GS3	400 ml	14.1 fl.oz (Imperial)
Double girder	φ 355/406/608 mm	VES3	250 ml	8.8 fl.oz (Imperial)
Double girder	φ 608 mm	VES4	500 ml	17.6 fl.oz (Imperial)
Double girder	φ 608 mm	VES5	1000 ml	35.2 fl.oz (Imperial)



Note: If you are unsure of the gear type, refer to the hoist's certificate.

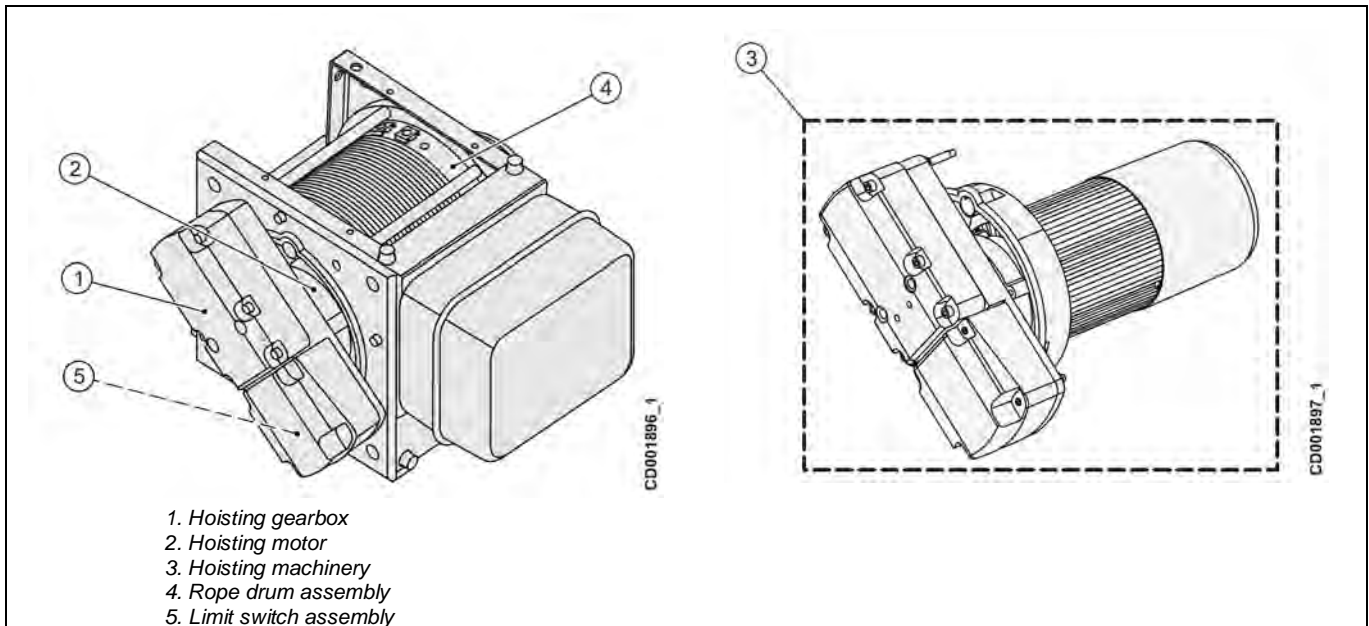
7 MAINTENANCE INSTRUCTIONS

7.1 Hoisting machinery




7.1.1 Hoisting machinery

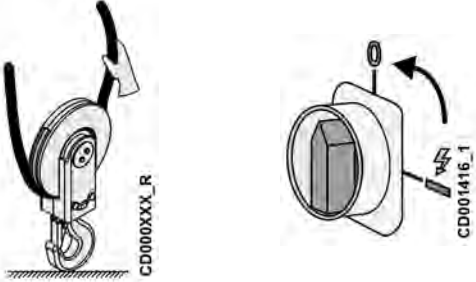
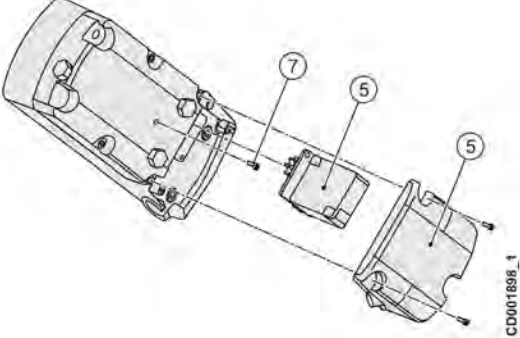
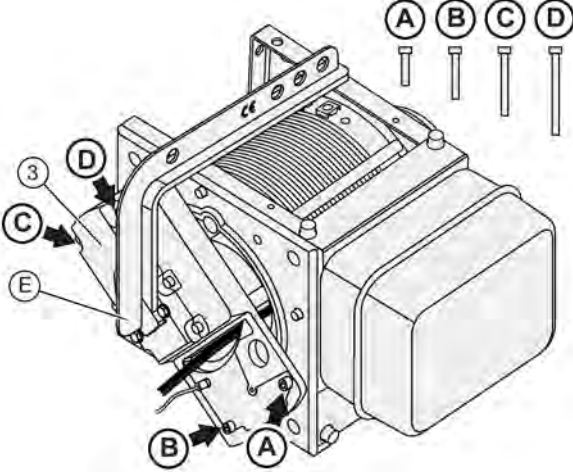
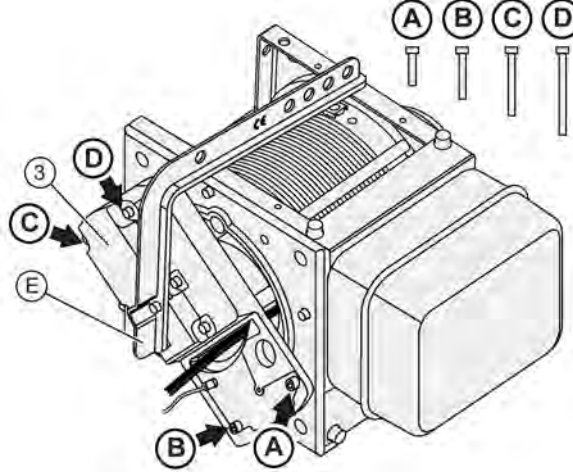
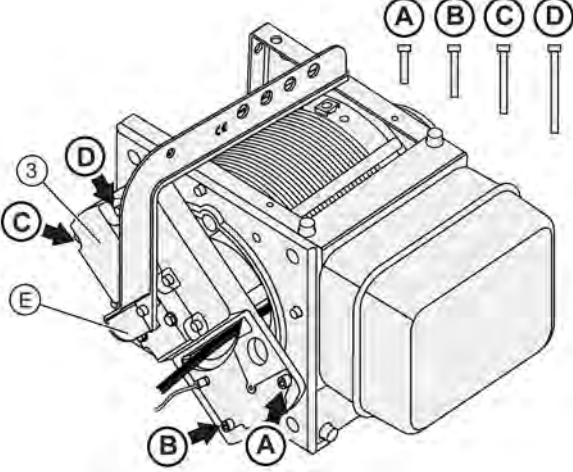
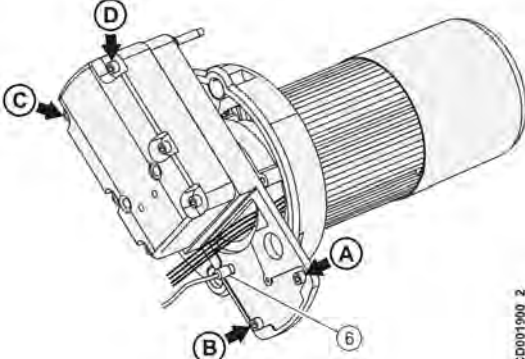
The hoisting machinery consists of the subassemblies: hoisting gearbox and hoisting motor. Details about hoisting gearbox and motor can be found in their respective sections.

Hoisting machinery, Frame size: VTs, VT1, VT2, VT3.



Disassembly

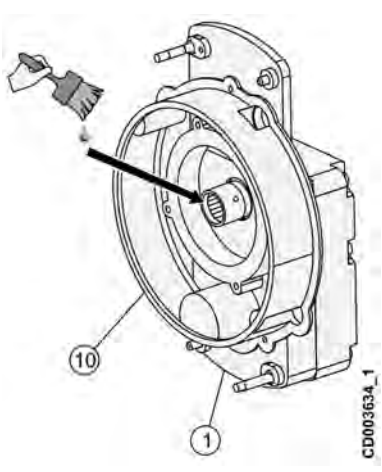
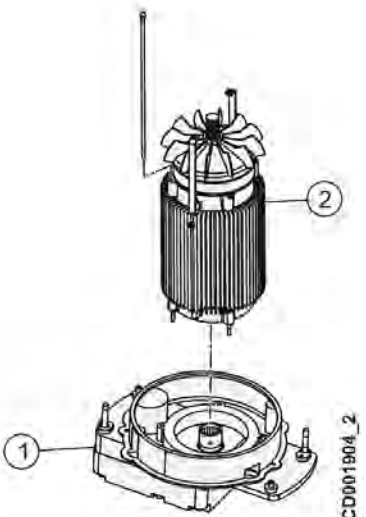
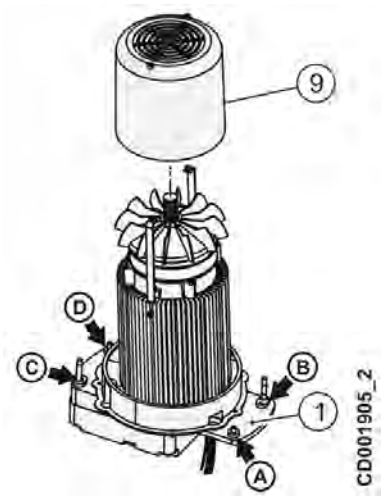
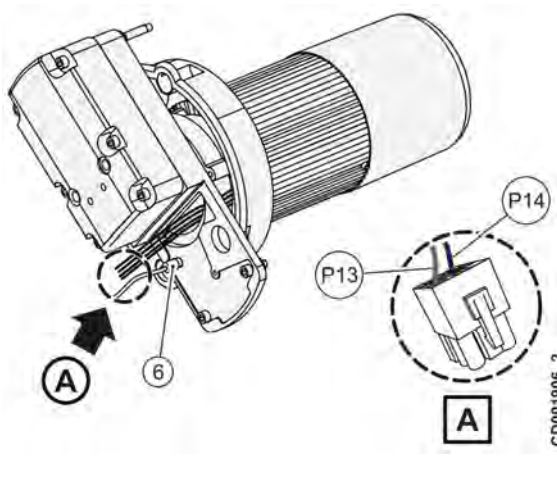
 WARNING	<p>Lock the rope drum to prevent it from rotating when hoisting brake is detached. The weight of falling rope can rotate the unlocked drum and cause hazardous situation.</p>
 WARNING	<p>The hoisting machinery is heavy. You need a lifting device when disassembling the hoisting machinery.</p>
 CAUTION	<p>It is recommended to replace the coupling each time when you detach the hoisting motor from the gear. If you find any rust or other visible marks of wear in the coupling, you must replace the coupling with new one.</p>
CAUTION	<p>Be careful when removing the hoisting machinery not to damage the grease cover.</p>

<p>1</p>	 <p>Lower the hook to the ground. Switch OFF the power supply of the hoist. Remove the protective cover of the hoisting machinery. Lock the rope drum with, for example, a wooden wedge, in order to prevent it from rotating.</p>	<p>2</p>  <p>Remove hoisting limit switch assembly and cover (5). Remove the screw (7) so that the lifting device can be attached.</p>
<p>3a</p>	 <p>VT1: Install the lifting device (E) to the hoisting gearbox. Remove the mounting screws (A,B,C,D) and remove the hoisting machinery (3) from the drum end plate using the lifting device.</p>	<p>3b</p>  <p>VT2: Install the lifting device (E) to the hoisting gearbox. Remove the mounting screws (A,B,C,D) and remove the hoisting machinery (3) from the drum end plate using the lifting device.</p>
<p>3c</p>	 <p>VT3: Install the lifting device (E) to the hoisting gearbox. Remove the mounting screws (A,B,C,D) and remove the hoisting machinery (3) from the drum end plate using the lifting device.</p>	<p>4</p>  <p>Remove the bushing (6) around the brake cable. Detach the brake cable from the connector so that it can be removed easily while removing motor.</p>

5	<p style="text-align: right; font-size: small;">CD001901_2</p>	6	<p style="text-align: right; font-size: small;">CD001902_2</p>
	<p>Remove the fan cover (9). Remove the screws in order to remove the hoisting motor (2) from the gearbox (1).</p>		<p>Remove the coupling (11) and remove the 3 screws in order to detach the grease cover (10).</p>

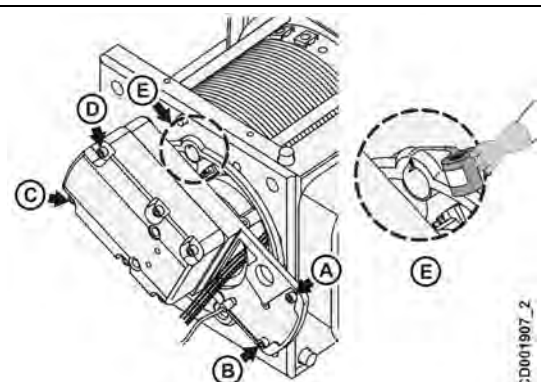
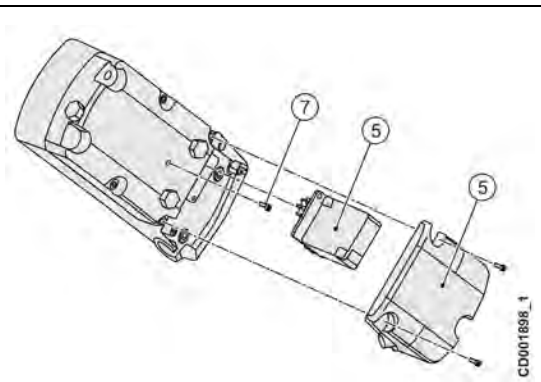
Reassembly

1	<p style="text-align: right; font-size: small;">CD001903_2</p>	2	
	<p>Grease the axle and inner surface of the coupling (11) thoroughly with a brush.</p>		<p>A coupling that has a groove outside MUST be installed with the groove facing the gear. Couplings in some gears of bigger size do not have any groove outside and they can be installed in both ways.</p>

<p>3</p>	 <p>CD00363A_1</p> <p>Grease the motor side coupling teeth after the coupling is installed. Install the grease cover (10) to the gearbox (1) with three screws.</p>	<p>4</p>  <p>CD001904_2</p> <p>Lift the hoisting motor (2) above the gearbox. Pass the power cables and the brake cable through the holes in the hoisting gear.</p>
<p>5</p>	 <p>CD001905_2</p> <p>Ensure the motor shaft engages with the coupling and the screw holes align. Install the four mounting screws (A, B, C and D) and washers to the gearbox (1). Tighten them to the recommended torque (see "Appendix: tightening torques"). Reassemble the fan cover (9) with screws.</p>	<p>6</p>  <p>CD001906_2</p> <p>Tighten the bushing (6) on the brake cable. Insert the brake cable wires into the connector (A). Pin 13 (P13) = Brown wire Pin 14 (P14) = Blue wire</p>



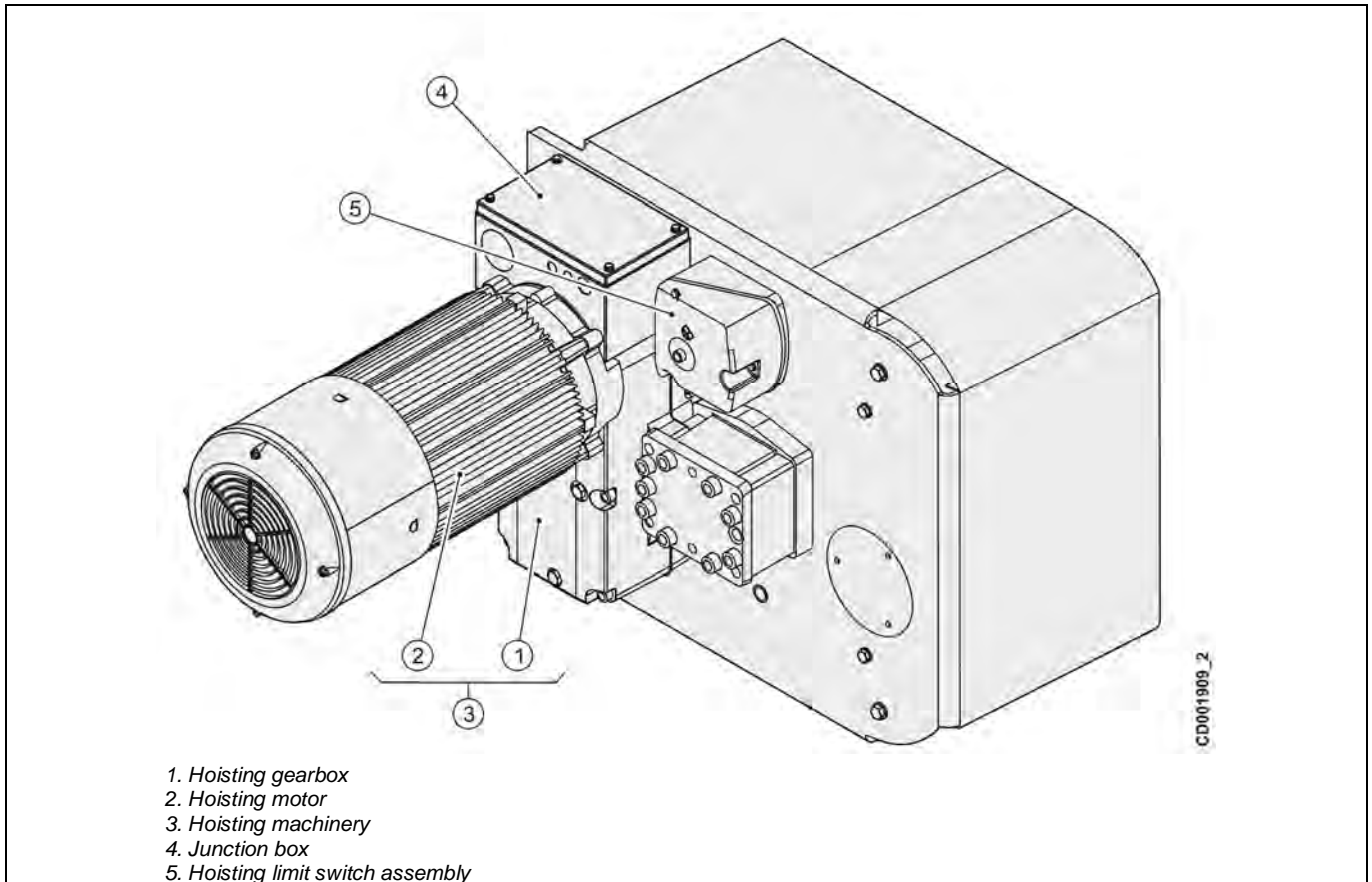
Note: When hoisting motor is placed check the installation by checking the hoisting motor and gear joint. The faces of joint must be completely attached to each other.

<p>7</p>	 <p>CD001907_2</p>	<p>8</p>  <p>CD001898_1</p>
-----------------	-------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------

Install the hoisting machinery with the mounting screws (A, B, C,D) and grease the gear rim through the opening in the grease cover (E).

Install the countersunk screw (7). Install the hoisting limit switch assembly (5) with the cover.

Hoisting machinery, Frame size: VT4, VT5.



Disassembly



WARNING

Lock the rope drum to prevent it from rotating when hoisting brake is detached. The weight of falling rope can rotate the unlocked drum and cause hazardous situation.



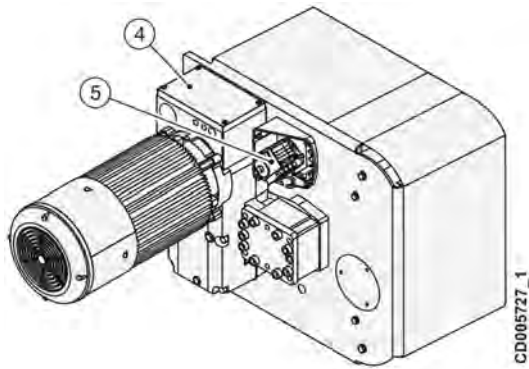
WARNING

The hoisting machinery is heavy. You need a lifting device when disassembling the hoisting machinery.



CAUTION

It is recommended to replace the coupling each time when you detach the hoisting motor from the gear. If you find any rust or other visible marks of wear in the coupling, you must replace the coupling with new one.

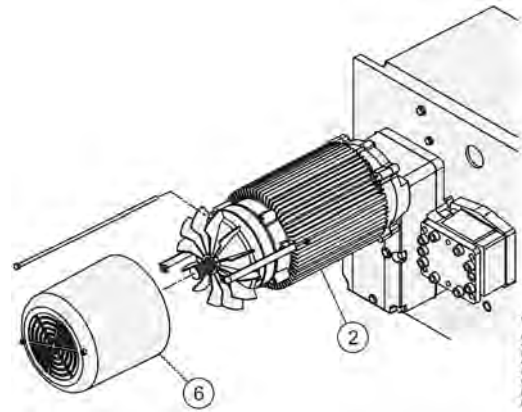
1


CD0005727_1

If you must disassemble both the hoisting motor and the hoisting gearbox from the drum assembly, start by disassembling the junction box and the cabling inside the junction box (4).

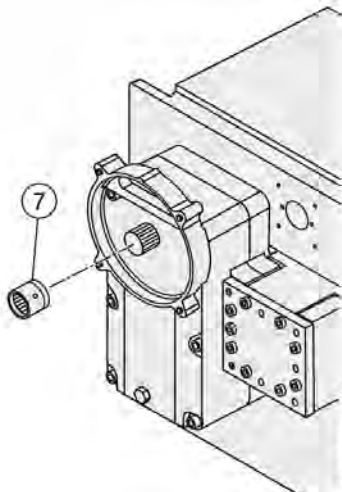
If you must disassemble the hoisting limit switch assembly (5), open first the switch cover and disassemble the wiring, before removing the whole limit switch assembly.

If you disassemble only the hoisting motor, it is possible to detach only the motor part and pull out some of the motor cabling, without disassembling the junction box.

2


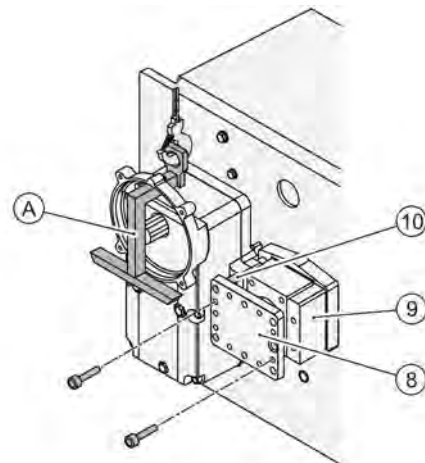
CD001916_2

Remove fan cover (6). Remove the motor (2) by removing the screws holding it to the hoisting gear.

3


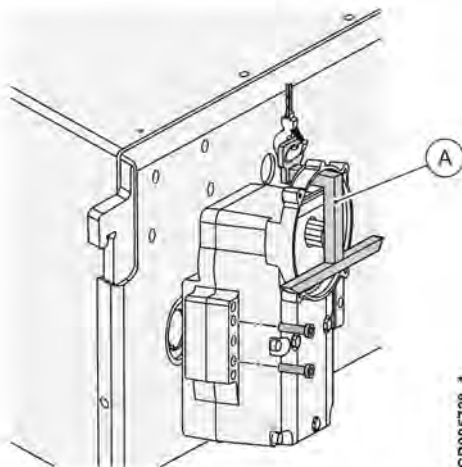
CD001917_2

Remove the coupling (7) on the reducer gear shaft.

4a


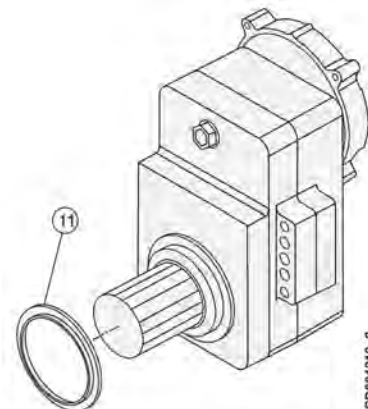
CD001918_2

Attach the lifting device (A) and remove the mounting screws, the connecting plate (8), and shim plate (9). Remove also the two dowel pins (10) along with the connecting plate.

4b


CD0005728_1

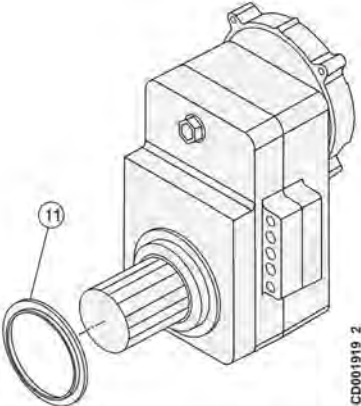
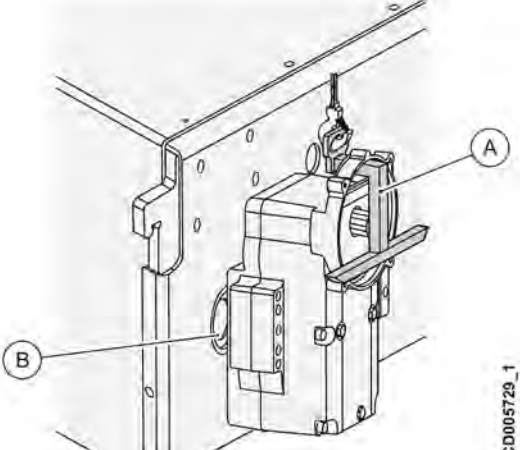
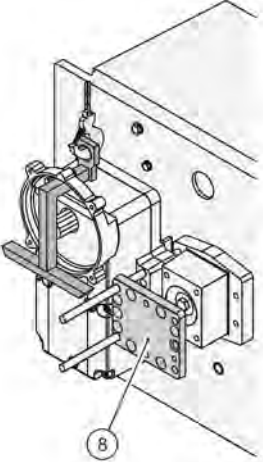
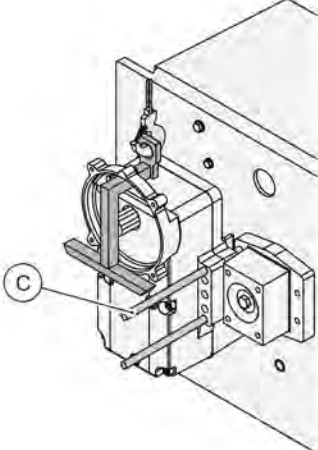
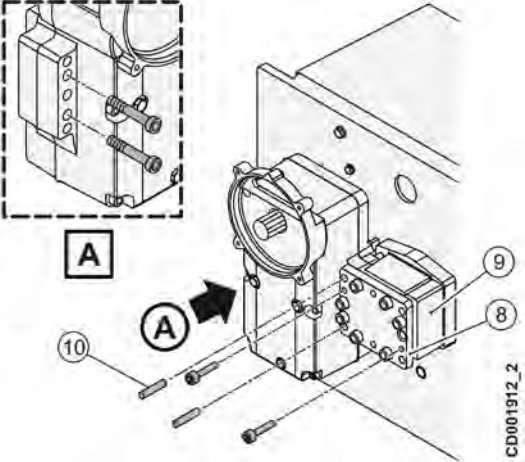
Remove the mounting screws also from the left side of the gear.

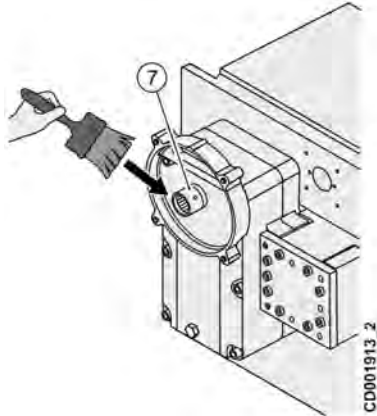
5


CD001919_2

Remove the sleeve (11) from the hoisting gear axle, in case it remains there after removing the gearbox with a lifting device.

Reassembly

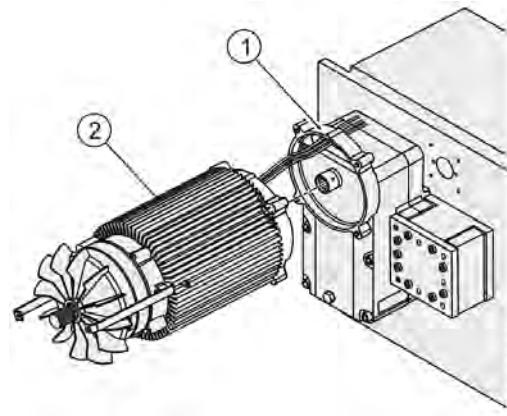
<p>1</p>	 <p style="text-align: right;">CD001919_2</p> <p>Place the sleeve (11) at the base of the hoist axle. Apply silicone adhesive on the seal plate and end plate joint and on the sleeve.</p>
<p>2a</p>	 <p style="text-align: right;">CD005729_1</p> <p>Use the lifting device (A) to install the gearbox. Align the gearbox axle carefully on the gear rim (B).</p>
<p>3a</p>	 <p style="text-align: right;">CD005731_1</p> <p>Place the connecting plate (8) with the help of the metal rods.</p>
<p>2b</p>	 <p style="text-align: right;">CD005730_1</p> <p>Check the alignment of the holes and correct the alignment by using metal rods (C), if necessary</p>
<p>3b</p>	 <p style="text-align: right;">CD001912_2</p> <p>Place the shim plate (9) under the connecting plate (8) and fasten the gear to its place by using the mounting screws. Fasten also the mounting screws to the left side (A) of the gear. Install the two dowel pins (10) top and bottom corners of the connecting plate.</p>

4


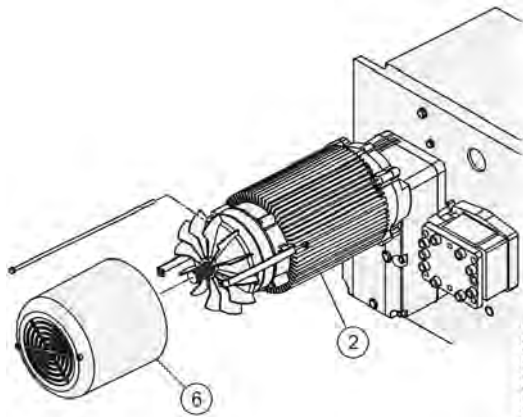
Install and grease the gear rim and coupling (7) thoroughly on the reducer gear shaft.

A coupling that has a groove outside **MUST** be installed with the groove facing the gear.

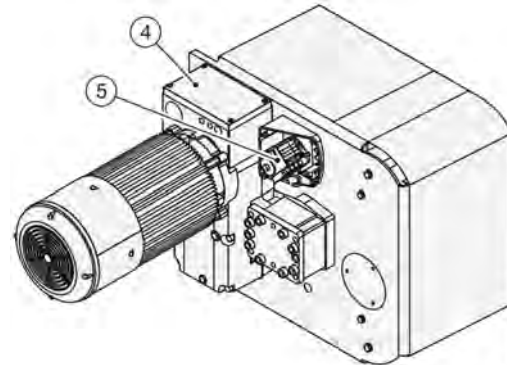
Couplings in some gears of bigger size do not have any groove outside and they can be installed in both ways.

5


Lift the hoisting motor (2) and align motor shaft with the coupling. Pass the motor power cables through the hole in the hoisting gear (1).

6


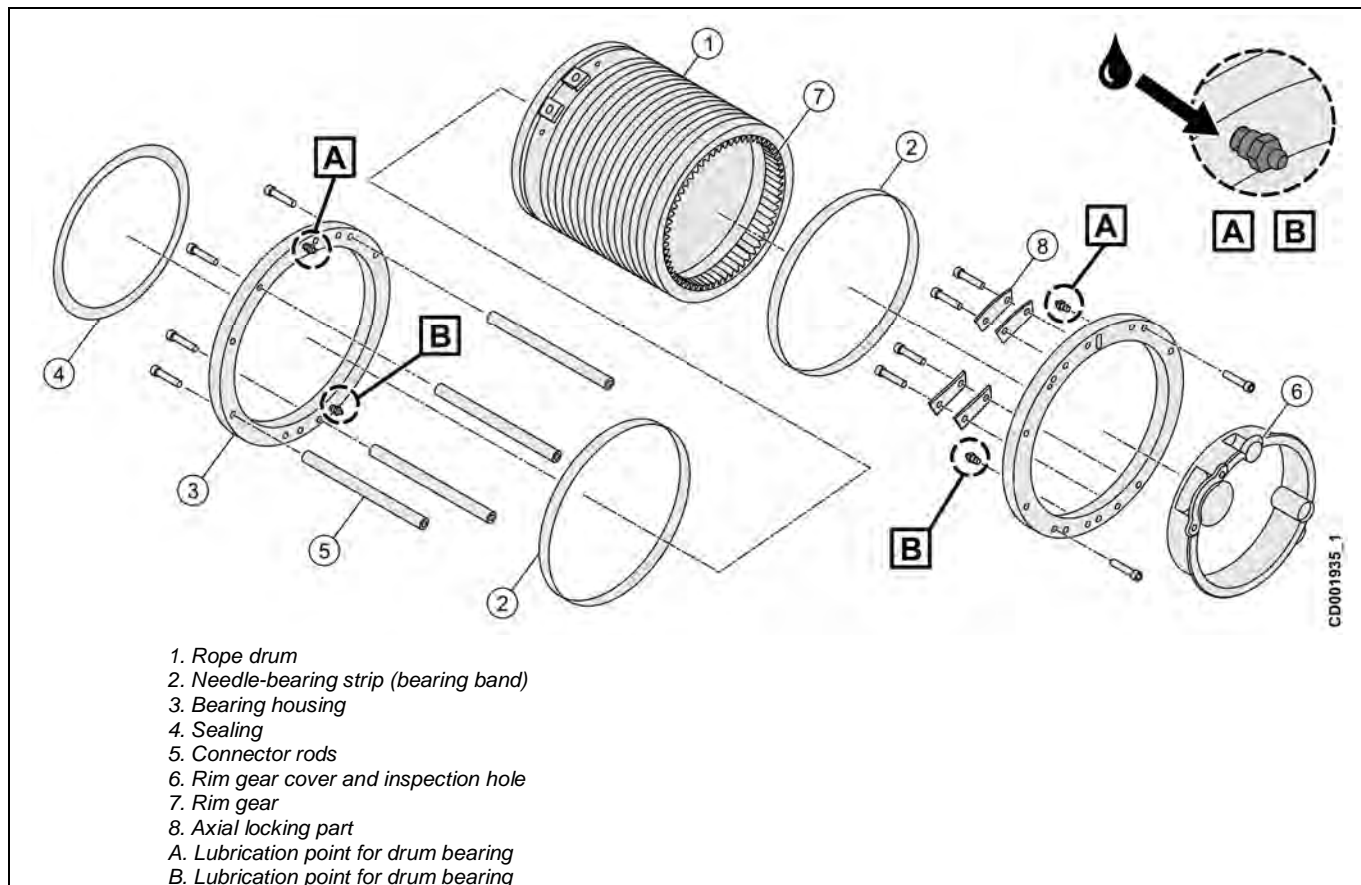
Install the hoisting motor (2) with screws. Tighten the screws to the recommended torque. Reassemble the fan cover (6) and screws.

7


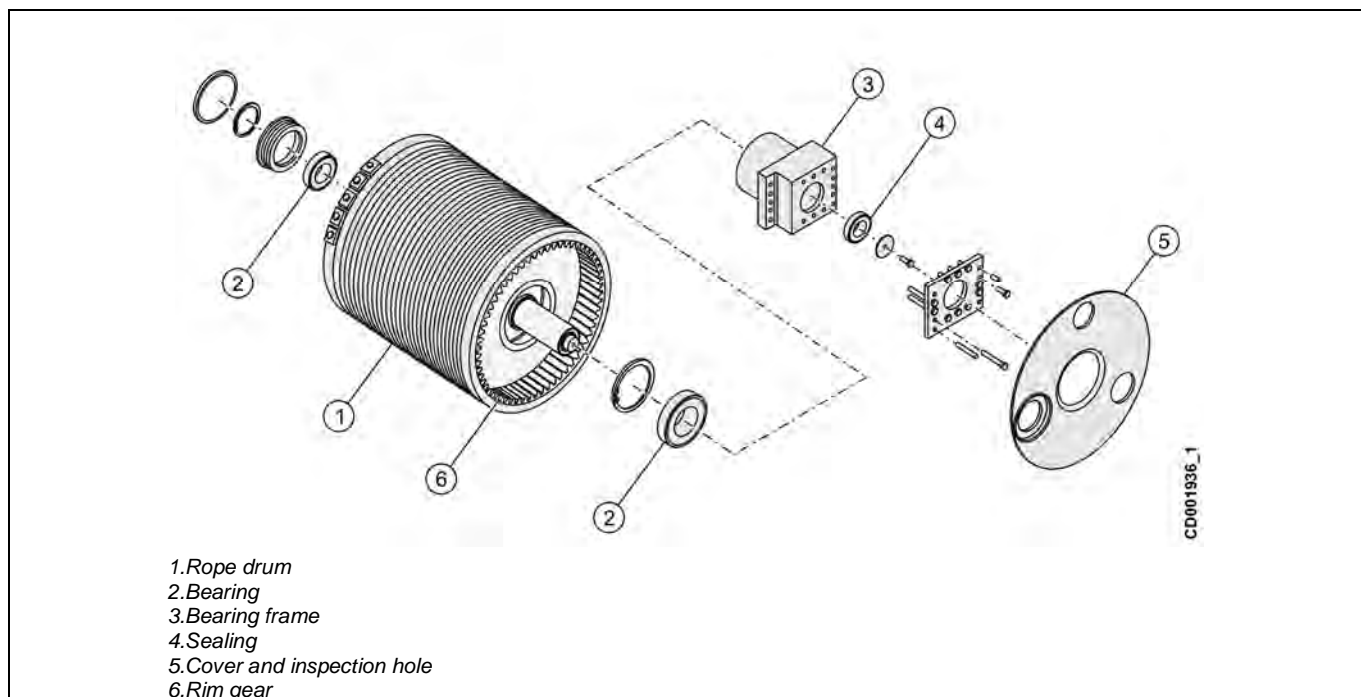
Connect the motor cabling and install the junction box (4). Install the hoisting limit switch assembly (5) and place the limit switch assembly cover box.

7.1.2 Rope drum

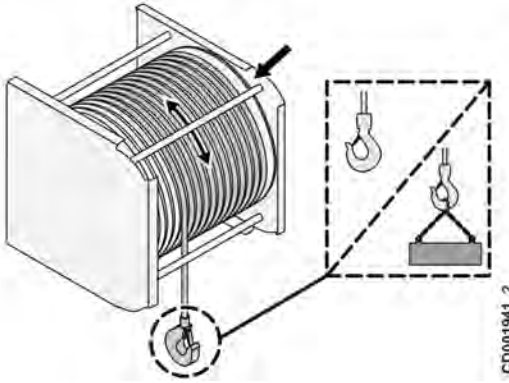
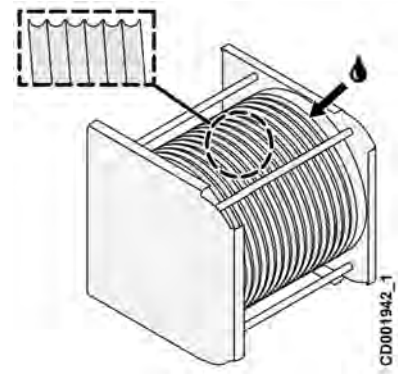
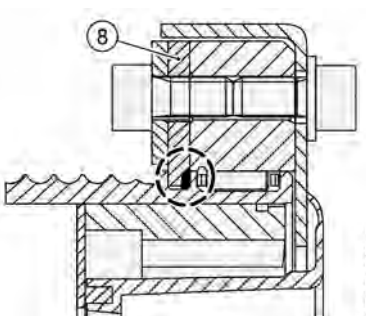
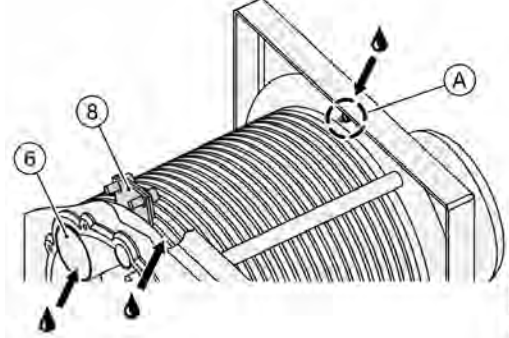
7.1.2.1 Construction of rope drum for hoist frame size: s, VT1, VT2, VT3



7.1.2.2 Construction of rope drum for hoist frame size: VT4, VT5



7.1.2.3 Maintenance tasks for rope drum

1	 <p>Check the proper rotation of rope drum with and without load. Pay attention to running sound of rope drum bearings and check that the rope drum does not touch with machinery end plates.</p>	2	 <p>Lower the hook to the ground and check the grooves of the drum. Healthy grooves are smooth and do not have sharp edges. If any doubt, unwind some more rope from the drum and compare the used grooves with unused grooves. Measure the groove wear if needed. Lubricate the drum surface.</p>
3	 <p>Hoist frame size: VTs, VT1, VT2, VT3 Check the drum axial locking parts (8) for wear. If you notice any visible marks of wear (max. 2 mm), replace the axial locking part with new one. Lubricate groove in the drum, in which the axial locking part (8) is located.</p>	4	 <p>Inspect visually and lubricate:</p> <ul style="list-style-type: none"> • The gear rim through the inspection hole (6). <p>Hoist frame size: VTs, VT1, VT2, VT3</p> <ul style="list-style-type: none"> • The drum bearing through the lubrication point (A) or (B) <p>When lubricating the drum, it is recommended to mark the starting point in order to know when one rotation is complete.</p>

CAUTION	<p>Only lubricate the greasing points A OR B, but not both. During lubrication, the drum MUST rotate at least two complete rounds. Do not use excessive grease, as that may damage the bearings. Approximately two pumps of grease are sufficient.</p>
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CAUTION	<p>Use only the spare parts that are provided by the original manufacturer(s).</p>
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7.1.2.4 Drum wear inspection

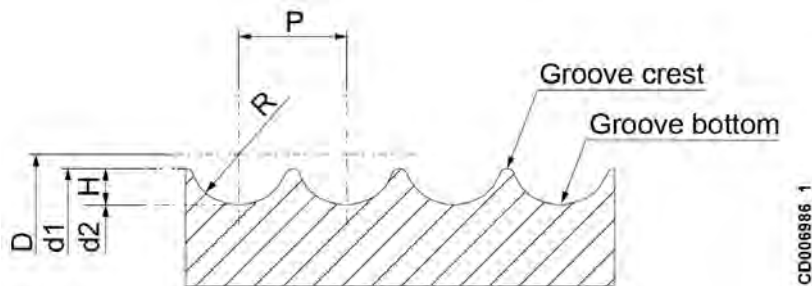
The rope drum must be replaced if:	Inspection method:
The groove wear is more than allowed.	Measurement, see the following figures and the table. See also "General Overhaul Instructions".
A crest of the drum is bent towards groove.	Visual. A sharpened crest is allowed if it is not bent towards the groove (the sharp area can be removed by filing if the crest wear dimension is still acceptable after filing).
The wear of the teeth of the drum rim gear is visible.	Visual. Teeth are broken or missing, or they have sharp endings or are otherwise clearly worn out.
Drum frame size: s, VT1, VT2, VT3: the wear of the drum bearing running surface is more than allowed.	Measurement. See the figure and the table as follows. See also "General Overhaul Instructions".
Drum frame size: s, VT1, VT2, VT3: drum bearing housing has sharp edges that cannot be filed down, or is otherwise damaged.	Visual.

Measuring drum groove wear



Clean the rope drum grooves before you start measuring groove wear.

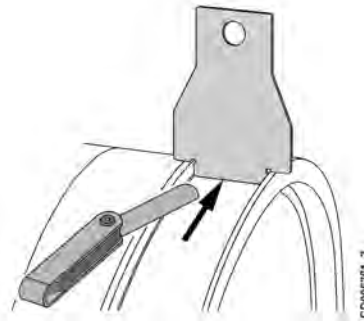
1	<p style="text-align: right; font-size: small;">CD006263_2</p>	2	<p style="text-align: right; font-size: small;">CD006263_3</p>
	<p>Place the drum groove gauge on top of the grooves on the non-worn area of the rope drum. Measure the clearance between the groove and the drum groove gauge with a wire feeler gauge.</p> <p>Instead of a wire feeler gauge, you can also use a steel wire of same size.</p>		<p>Place the drum groove gauge on top of the grooves on the worn area of the rope drum. Measure the clearance between the groove and the drum groove gauge with a wire feeler gauge.</p> <p>Compare the measurement result with the result from the non-worn area, and see the acceptance criteria in the following diagram and table.</p>



Hoist frame size	VT1	VT2	VT3	VT3	VT4	VT4	VT5
Rope diameter	6.4 mm**	8.0 mm	11 mm (one rope)	8 mm (two ropes)	15 mm (one rope)	11 mm (two ropes)	15 mm (two ropes)
Nominal dimension	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Drum nominal diameter (D)	303	355	406	406	608	608	608
Drum diameter at groove crest (d1)	301.8	353	403.2	404	604.2	605.2	604.2
Drum diameter at groove bottom (d2)	297	347	395	398	593	597	593
Groove pitch (P)	7.2	9.1	12.5	9.1	17.1	12.5	17.1
Groove depth (H)	2.4	3.0	4.1	3.0	5.6	4.1	5.6
Groove radius (R)	3.4	4.2	5.8	4.2	8.0	5.8	8.0
Acceptance criteria	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
The difference between the worn area and non-worn area in groove depth and radius:	1.0	1.0	<1.0	<1.0	<1.5	<1.0	<1.5

**) In some hoist models 6.2 (old default rope) or 6.5 (heavy-duty rope) or 6.7 (rotation resistant rope).

Measuring drum bearing running surface wear (drum frame size: s, VT1, VT2, VT3)



Hoist frame size	VT1	VT2	VT3	VT3
Rope diameter	6.4 mm**	8.0 mm	11 mm (one rope)	8 mm (two ropes)
Acceptance criteria	[mm]	[mm]	[mm]	[mm]
The clearance between the drum bearing groove gauge and the bearing running surface	<0.2	<0.2	<0.2	<0.2

***) In some hoist models 6.2 (old default rope) or 6.5 (heavy-duty rope) or 6.7 (rotation resistant rope).

7.1.3 Rope clamps

The rope is fixed to the rope drum with rope clamps. The number of rope clamps varies with the type of hoist.

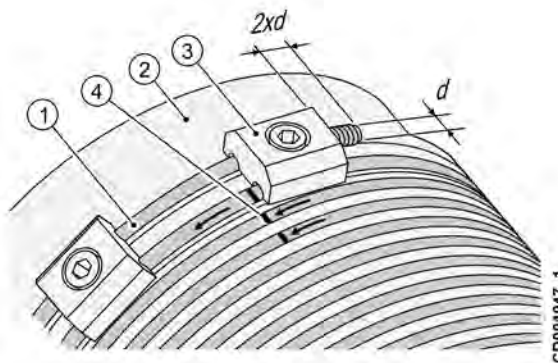


WARNING

In addition to the clamps on the rope ends, there must always be at least two full turns of rope on the drum when the hook is at its lowest position in order to provide friction.

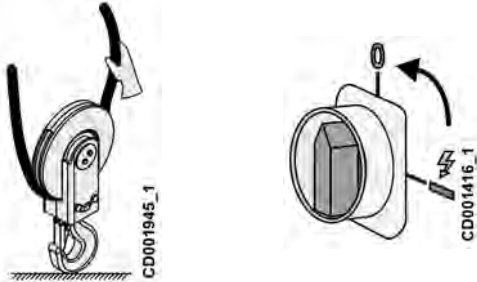
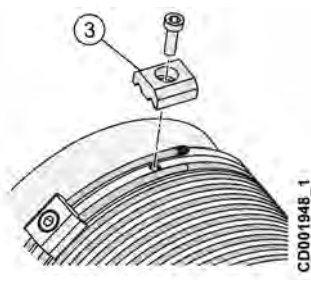
CAUTION

For hoist frame size VTs there must always be at least five full turns of rope on drum when hook is at its lowest position in order to provide friction and prevent interference between rope guide and clamp.



1. Rope
2. Rope drum
3. Rope clamps
4. Friction wraps (at least two full wraps)

Disassembly

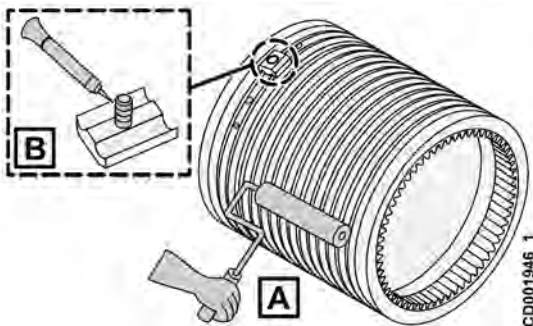
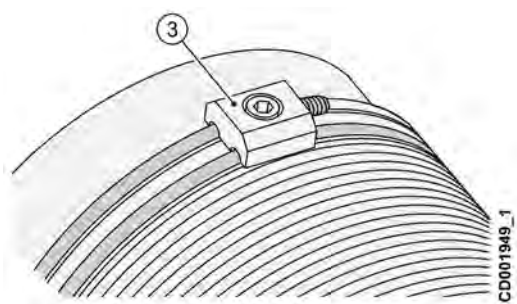
1	 <p>Lower the hook to the ground and drive the rest of the rope out. Switch OFF the power supply to the hoist.</p>	2	 <p>Remove the rope guide. Open the rope clamps (3) and remove the rope.</p>
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CAUTION

Take into account the weight of falling rope when removing the clamps.

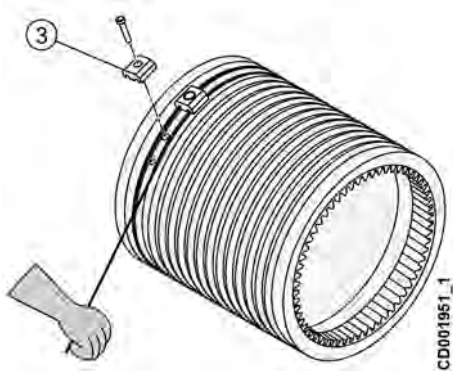
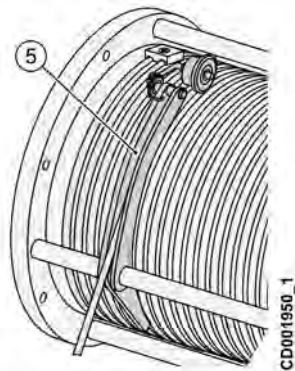
Reassembly

1	 <p>A: Lubricate the drum surface. B: Apply the thread locking to bolts. Start reeving placing one wrap around the drum.</p>	2	 <p>Attach the first rope clamp (3) keeping the rope tail length twice the rope diameter past the clamp. Tighten the clamp slightly.</p>
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WARNING

On assembly use thread-locking compound Weicon Lock AN302-43 or equivalent for all screws.

3	 <p>Tighten the rope on the drum by pulling the rope a few times. After the rope sits tightly against the drum, install the remaining rope clamps (3).</p>	4	 <p>Tighten the rope clamps to the specified torque. Reeve the rope and guide it into the grooves. Install the rope guide (5) (See topic "Rope guide"). Install the machinery covers. Switch on power to the hoist and raise the hook off the ground.</p>
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7.1.4 Rope guide

The rope guide ensures that the wire rope winds on the drum correctly and prevents the wire rope from jumping into the wrong groove.



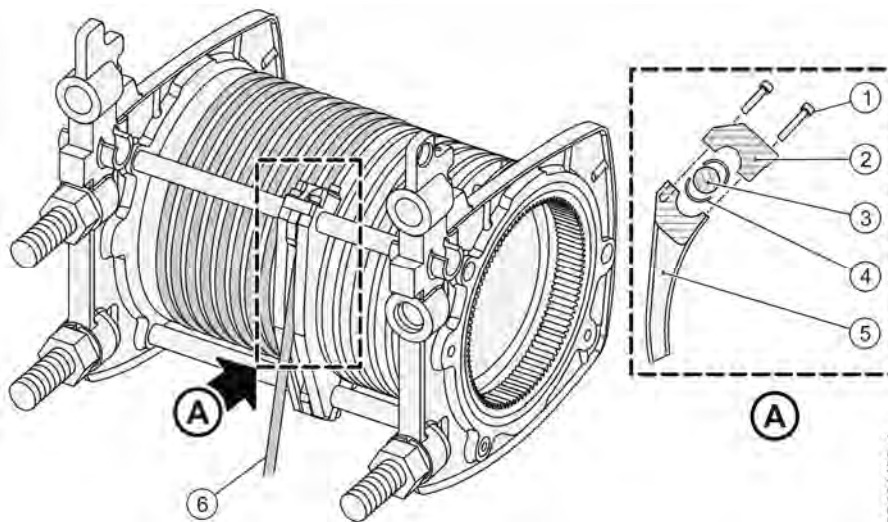
CAUTION

Check the correct installation.

When installing a rope, install a left-hand lay on the right-hand groove and a right-hand lay on the left-hand groove.

When installing a rope guide, install always a right-hand guide on the right-hand groove and a left-hand guide on the left-hand groove.

7.1.4.1 Construction of rope guide for hoist frame size: VTs

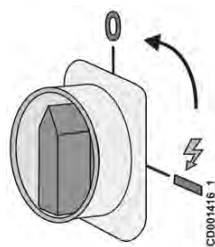


1. Fixing screws
2. Bearing housing
3. Intermediate shaft
4. Sleeve half
5. Rope guide
6. Rope

CD001453_1

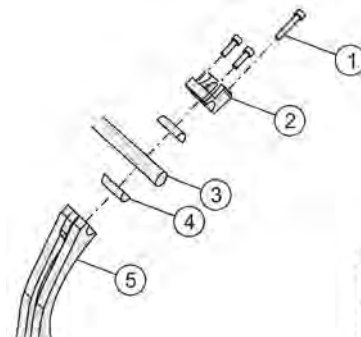
Disassembly

1



Switch OFF the power supply to the hoist. Remove the machinery cover.

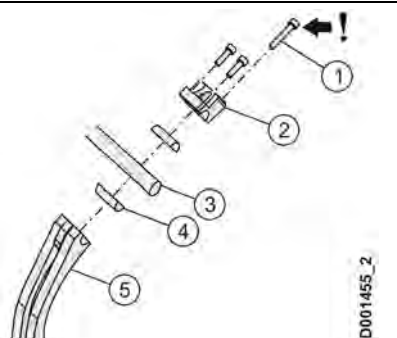
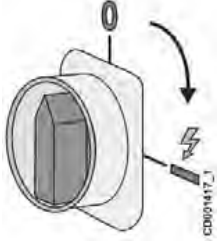
2



Loosen fixing screws (1) to remove bearing housing (2) and second half of sleeve (4) on both ends of rope guide (5). Remove the rope guide (5) from the intermediate shaft (3) and remove first halves of sleeves (4).

CD001454_1

Reassembly

1	 <p style="text-align: right; font-size: small;">CD001455_2</p>	2	 <p style="text-align: right; font-size: small;">CD001457_1</p>
	<p>Put the rope guide (5) on the intermediate beams (3) placing the first half of bearing sleeves (4) between the rope guide (5) and the intermediate shaft (3). Put the second half of bearing (4) to the upper intermediate beam and install the bearing housing (2) and the fixing screws (1). Do the same to lower bearing.</p>		<p>Switch ON the power supply to the hoist, test the rope guide, and install the machinery covers.</p>



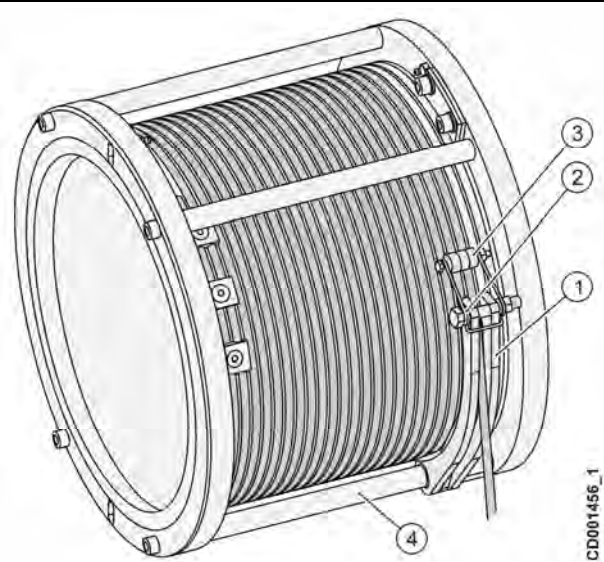
Note: One of the three screws is longer than others; the longest screw must be located closest to the drum.



CAUTION

Tighten the fixing screws and fixing nuts on all rope guides to the correct tightening torque. Refer to the section “Appendix: Tightening torques”. Inadequate or exceeded tightening may cause rope guide to failure in operation.

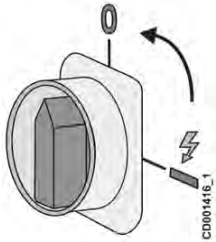
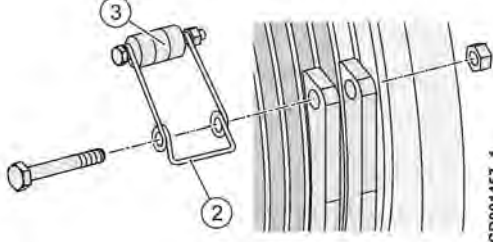
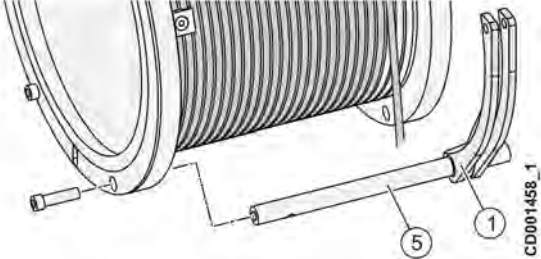
7.1.4.2 Construction of rope guide for hoist frame size VT1, VT2, VT3



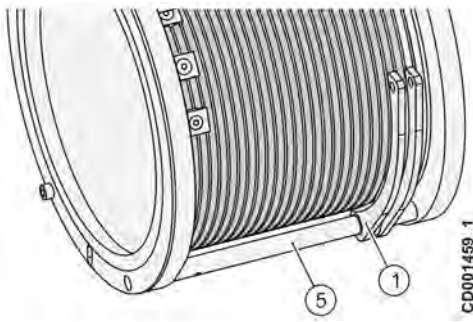
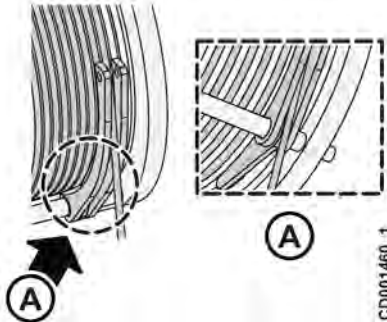
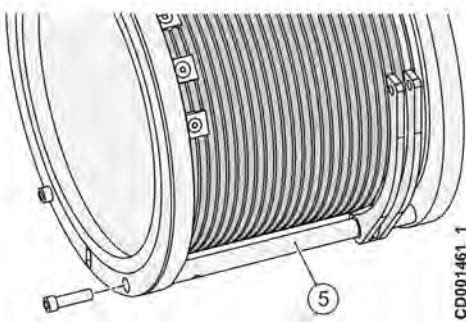
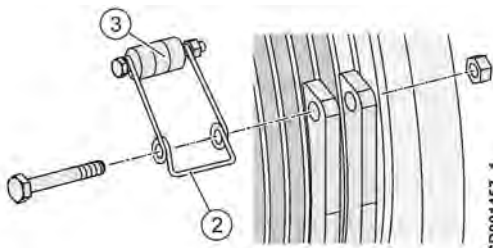
CD001456_1

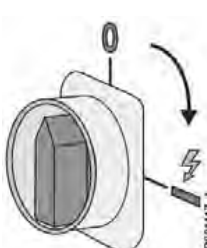
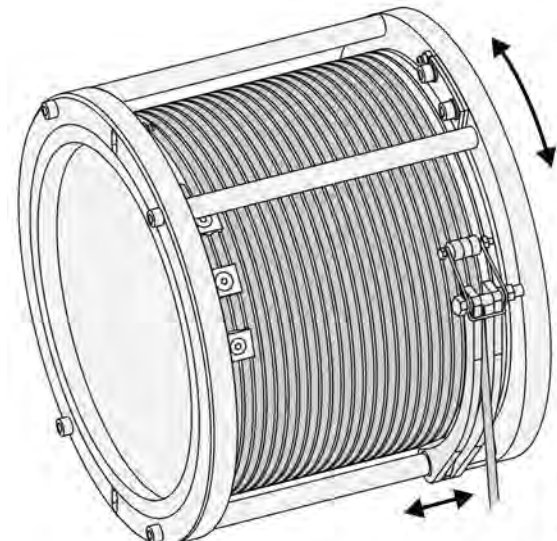
1. Rope guide
 2. Roller spring
 3. Pressure roller
 4. Connector rod for end flanges of hoisting machinery (drum flange connector rod)

Disassembly

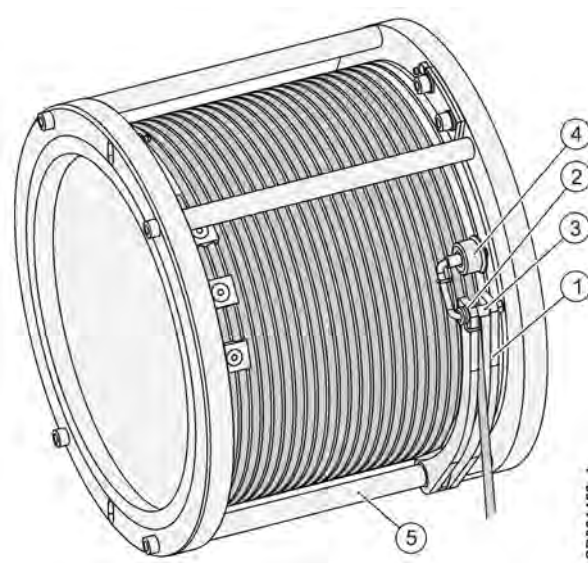
<p>1</p>	 <p>Switch OFF the power to the hoist, lower the hook to the ground and remove the machinery covers.</p>	<p>2</p>  <p>Remove the nut and then remove the roller (3) and roller spring (2)</p>
<p>3</p>	 <p>Remove the bolts in order to remove the connector rod (5) along with the rope guide (1).</p>	

Reassembly

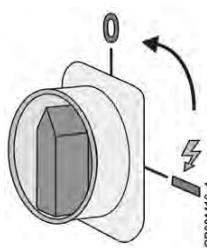
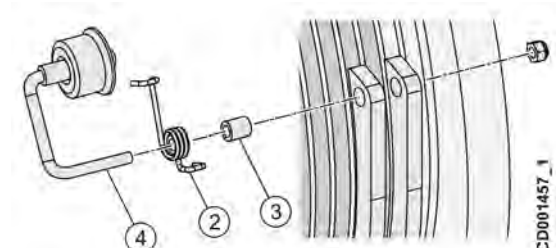
<p>1</p>	 <p>Insert the connector rod (5) into the rope guide (1). Install the connector rod (5) with the rope guide (1) on the drum.</p>	<p>2</p>  <p>Place the rope guide so that the rope passes through the slot in the rope guide and the guiding surface of the rope guide sits in the groove next to the last rope wrap on the drum.</p>
<p>3</p>	 <p>Insert one side of the connector rod (5) loosely with bolts. Place the other end of the connector rod (5) and insert the bolts. Tighten the bolts on both sides of the connector rod (5).</p>	<p>4</p>  <p>Check that there is operational clearance of 1...2 mm between the guide and the ropes. Install the pressure roller (3) and roller spring (2). Place the lower part of the spring on the rope guide and then press the spring until its holes align with holes of the rope guide. Then install and tighten the nut and screw.</p>

<p>5</p>  <p>Switch ON the power supply to the hoist.</p>	<p>6</p>  <p>Test the rope guide for smooth operation by running the hoist both directions. Install the machinery covers.</p>
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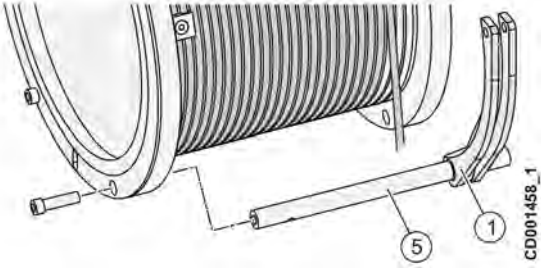
7.1.4.3 Construction of rope guide for hoist frame size: VT1, VT2, VT3 (On models before 2008)

	<ol style="list-style-type: none"> 1. Rope guide 2. Roller spring 3. Roller axle 4. Pressure roller 5. Connector rod for end flanges of hoisting machinery (drum flange connector rod)
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Disassembly

<p>1</p>  <p>Switch OFF the power to the hoist, lower the hook to the ground and remove the machinery covers.</p>	<p>2</p>  <p>Remove the nut and then remove the roller (4), roller spring (2), and roller axle (3).</p>
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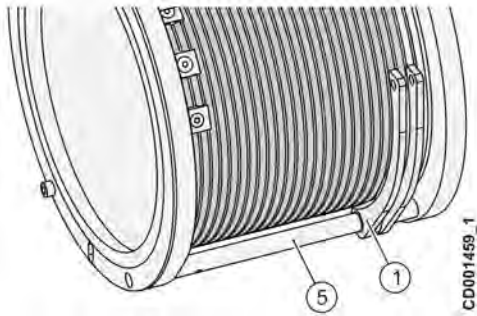
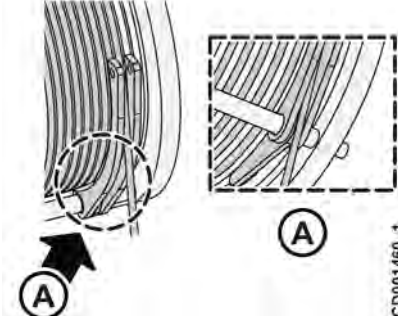
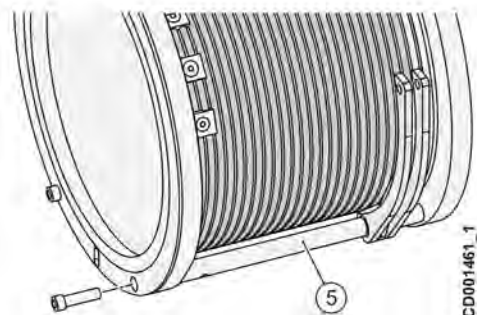
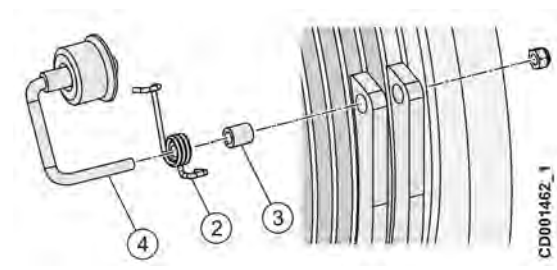
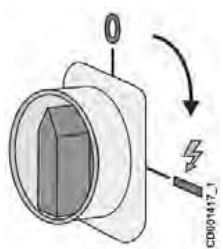
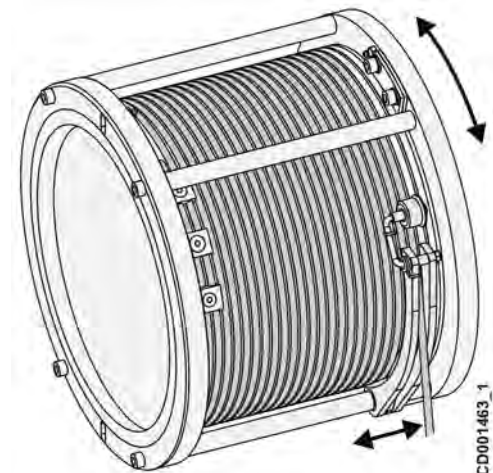
3



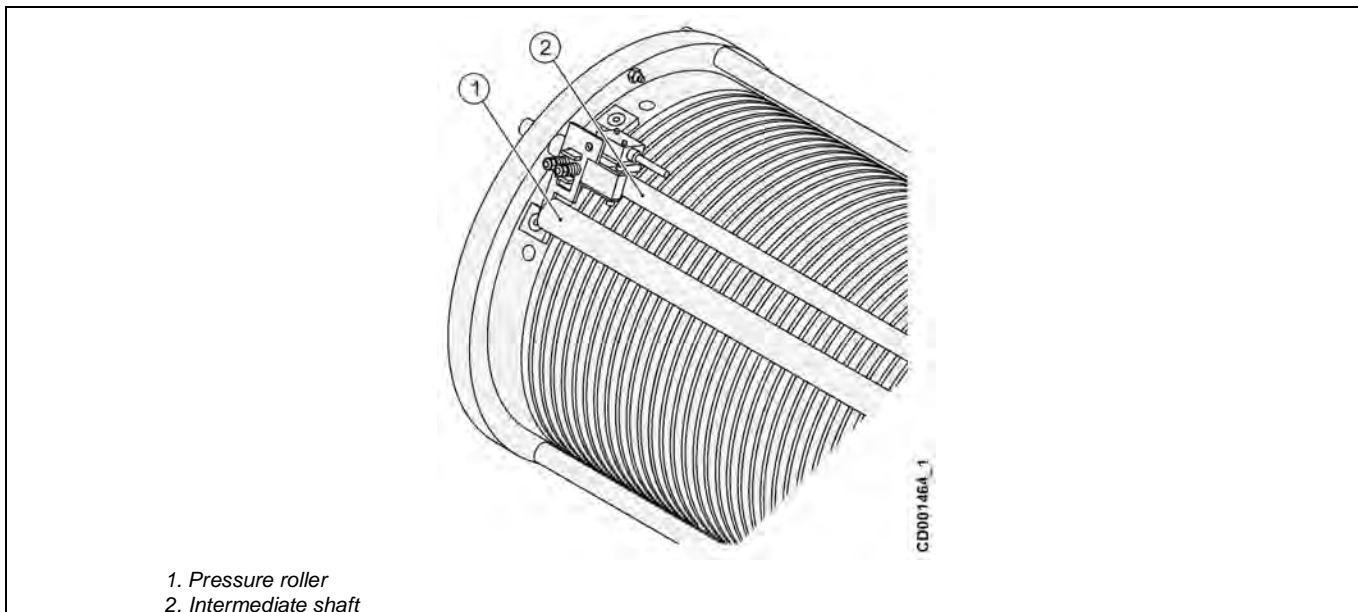
Remove the bolts in order to remove the connector rod (5) along with the rope guide (1).

CD001458_1

Reassembly

<p>1</p>  <p>Insert the connector rod (5) into the rope guide (1). Install the connector rod (5) with the rope guide (1) on the drum.</p> <p>CD001459_1</p>	<p>2</p>  <p>Place the rope guide so that the rope passes through the slot in the rope guide and the guiding surface of the rope guide sits in the groove next to the last rope wrap on the drum.</p> <p>CD001460_1</p>
<p>3</p>  <p>Insert one side of the connector rod (5) loosely with bolts. Place the other end of the connector rod (5) and insert the bolts. Tighten the bolts on both sides of the connector rod (5).</p> <p>CD001461_1</p>	<p>4</p>  <p>Check that there is operational clearance of 1...2 mm between the guide and the ropes. Install the pressure roller (4), roller spring (2), and roller axle (3). Install first one loop of the spring and turn after that the second loop into place. Install and tighten the axle bolt.</p> <p>CD001462_1</p>
<p>5</p>  <p>Switch ON the power supply to the hoist.</p> <p>CD001467_1</p>	<p>6</p>  <p>Test the rope guide for smooth operation by running the hoist both directions. Install the machinery covers.</p> <p>CD001463_1</p>

7.1.4.4 Construction of pressure roller for hoist frame size: VT1, VT2, VT3

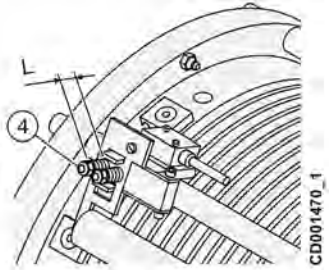
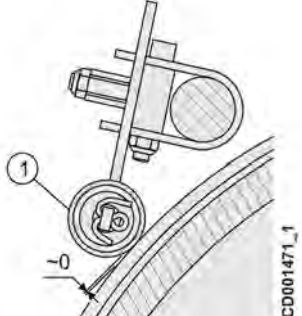
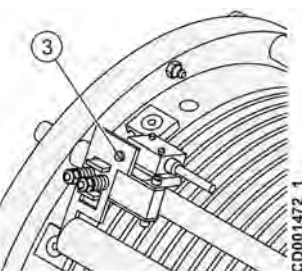
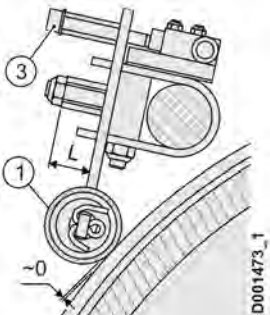
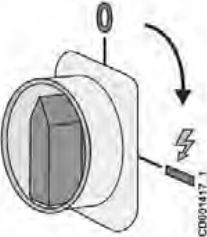


Disassembly

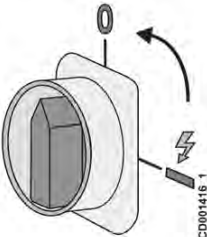
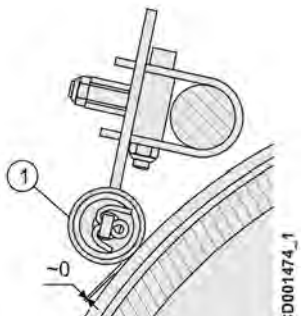
<p>1</p> <p>CD001446_1</p>	<p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	<p>2</p> <p>CD001465_1</p>	<p>Remove the adjustment screw (3) which is touching the limit switch.</p>
<p>3</p> <p>CD001466_1</p>	<p>Remove the springs and fixing nuts (4) from the locking screws and remove the pressure roller (1) from the fixing plate.</p>	<p>4</p> <p>CD001467_1</p>	<p>Remove the nuts and bolts in order to remove the fixing plate (6) from the support plate (7).</p>

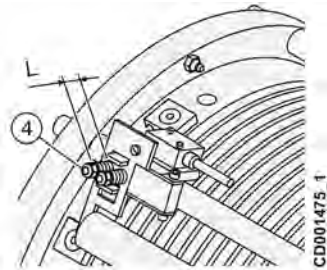
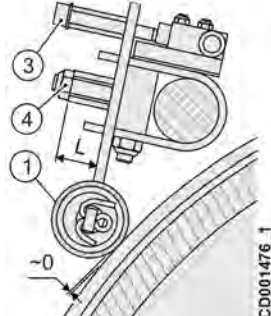
Reassembly

<p>1</p> <p>CD001468_1</p>	<p>2</p> <p>CD001469_1</p>
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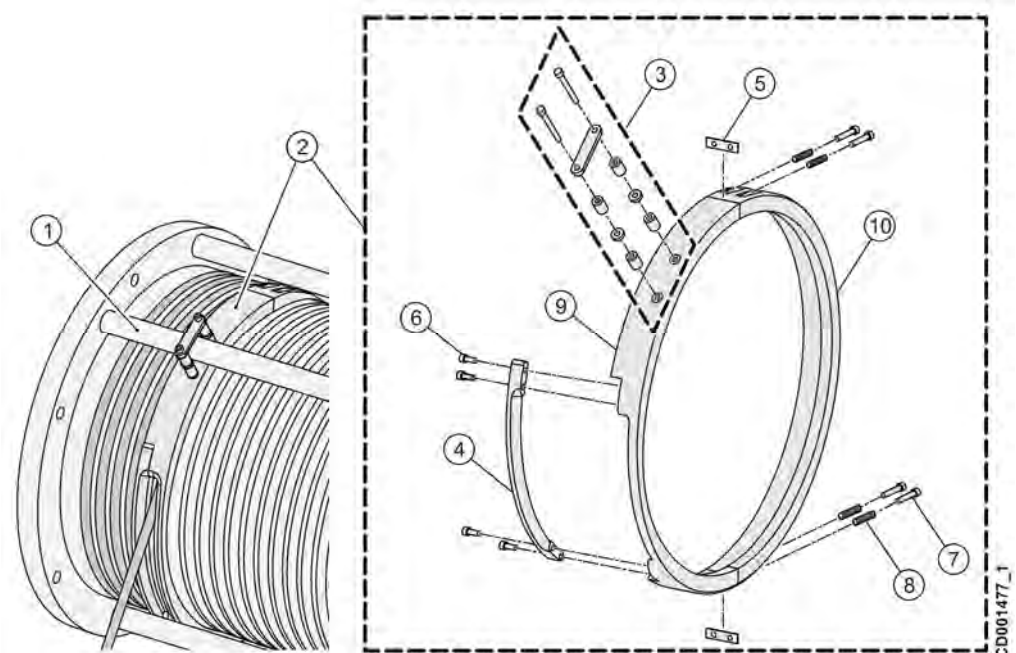
	Install the fixing plate (6) to the support plate (7) and install the nuts and bolts.		Install the pressure roller (1) to the fixing plate. Place the springs and the fixing nuts (4) around the fixing screws.
3	 <p>Adjust the spring pre-stress to length (L) = 14 mm by tightening the nuts (4) on the fixing screws. L = 14 mm</p>	4	 <p>Adjust the pressure roller (1) to rope level so that roller just touches the rope. Roller (1) must rotate lightly with finger tips.</p>
5	 <p>Insert adjustment screw (3) in to the pressure roller plate.</p>	6	 <p>Adjust the screw (3) so the raising the roller (1) by 3...4 mm activates the limit switch. L = 14 mm</p>
7	 <p>Install the machinery covers. Switch ON the power supply to the hoist.</p>		

Adjustment

1	 <p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	2	 <p>Adjust the pressure roller (1) to rope level so that roller just touches the rope. Roller (1) must rotate lightly with finger tips.</p>
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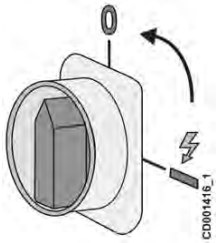
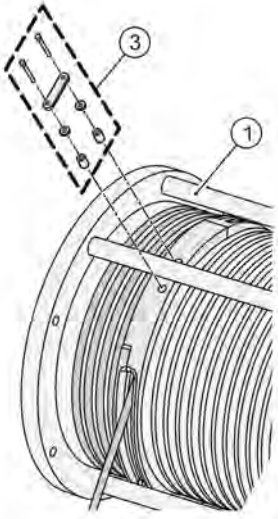
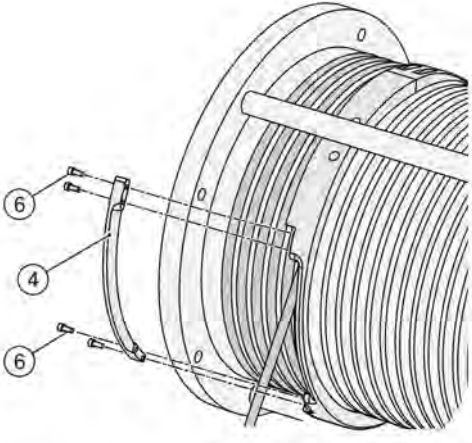
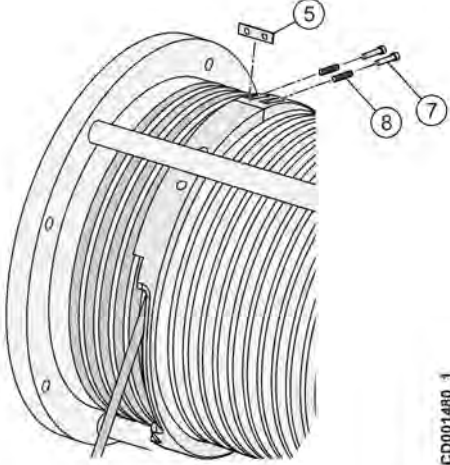
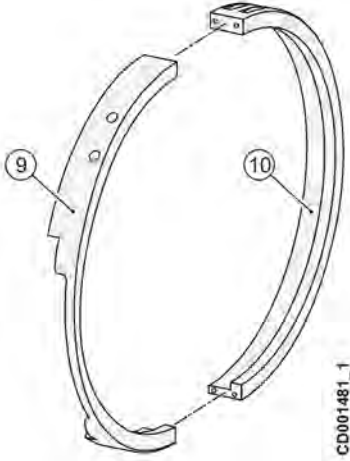
3	 <p>Adjust the spring pre-stress to length (L) = 14 mm by tightening the nuts (4) on the fixing screws. L = 14 mm</p>	4	 <p>Adjust the screw (3) so the raising the roller by 3...4 mm activates the limit switch. Adjustment is done by tightening or loosening the fixing screws. L = 14 mm</p>
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7.1.4.5 Construction of rope guide for hoist frame size: VT4, VT5.

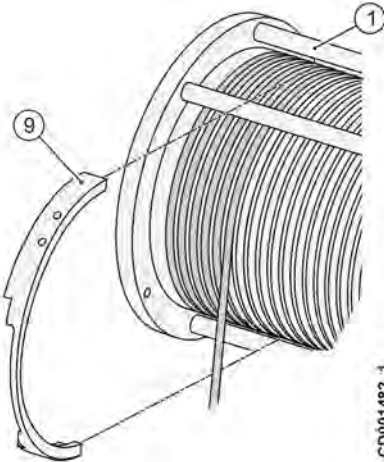
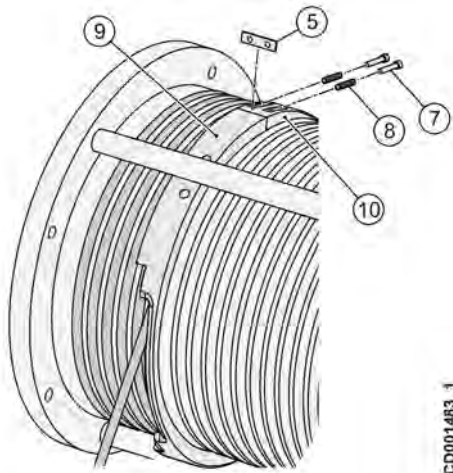


1. Connector rod for end flanges of hoisting machinery
2. Rope guide assembly
3. Guide bearings
4. Rope exit gate
5. Spacer
6. Locking bar fixing screws
7. Tension screws
8. Springs
9. Rope guide, front half
10. Rope guide, rear half

Disassembly

<p>1</p>	 <p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	<p>2</p>  <p>Remove the guide bearings (3) on the rope guide. Remove one intermediate shaft (1) from the hoisting unit. It is recommended to remove the shaft that is at the top corner, opposite to the side where the rope leaves the drum.</p>
<p>3</p>	 <p>Remove the rope exit gate (4) and screws (6)</p>	<p>4</p>  <p>Remove the rope guide tension screws (7). When the screws are off, remove the springs (8) and the spacers (5).</p>
<p>5</p>	 <p>Remove the rear half of the rope guide (10) and then the front half of the rope guide (9).</p>	

Reassembly

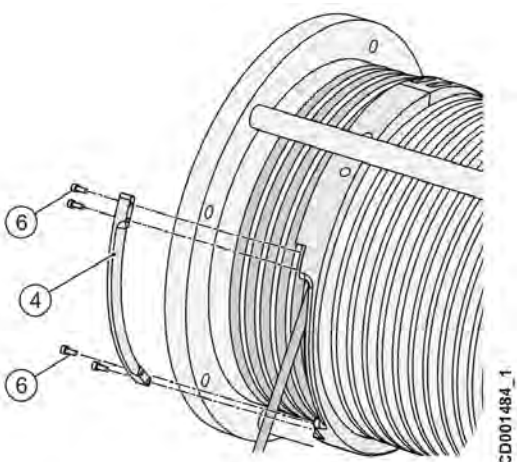
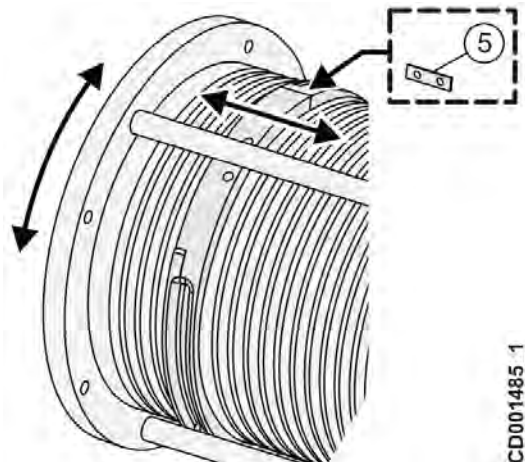
1	 <p style="text-align: right; font-size: small;">CD001482_1</p>	2	 <p style="text-align: right; font-size: small;">CD001483_1</p>
	<p>Dismount one intermediate shaft (1) and place the front half of the rope guide (9) on rope drum so that the grooved side is pointing away from the rope fixing clamps.</p>		<p>Place the rear half of the rope guide (10) on the rope drum so that the fixing holes align and fix the rope guide halves (9), (10) together with the screws (7) and springs (8). Make sure that there are at least 2.5 mm of spacer plates (5) between the rim halves at both ends. Tighten the screws until the springs are compressed to a length of 15 mm.</p>



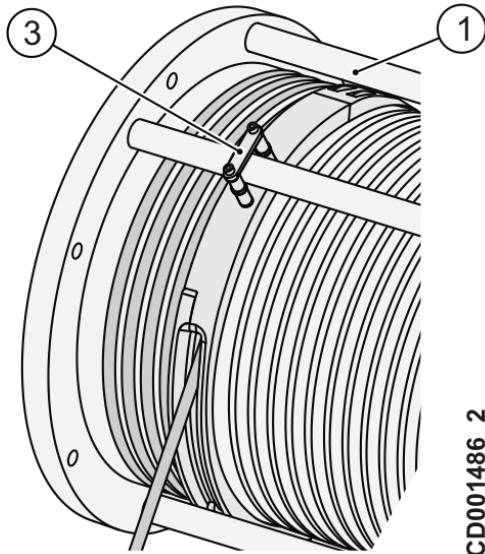
Note: It is recommended to remove the shaft that is at the top corner, opposite to the side where the rope leaves the drum.



Note: Position the rope guide so that the rope leaving from the drum comes through the slot at the front. The rope must be in the middle of the guide to be correct.

3	 <p style="text-align: right; font-size: small;">CD001484_1</p>	4	 <p style="text-align: right; font-size: small;">CD001485_1</p>
	<p>Install the rope exit gate (4) in place with four screws (6). Tighten the screws.</p>		<p>Test the tightness of the rope guide by grabbing it by hand and rotating it around the rope drum and moving it back and forth in the drum axial direction.</p> <ul style="list-style-type: none"> The rope guide should slide without effort on the rope drum. <p>If the rope guide feels too tight on the drum (that is, no axial movement), add or remove the spacers (5) between the rope guide halves until proper tightness is achieved.</p>

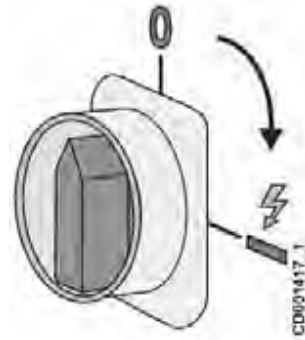
5



CD001486_2

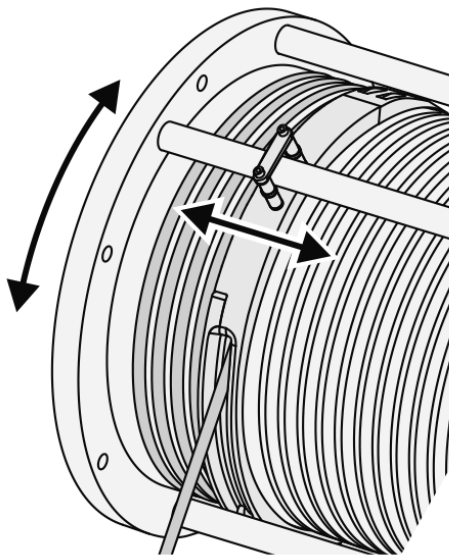
Reinstall the dismantled intermediate shaft (1) and install the guide bearings (3) on the rope guide.

6



Switch ON the power supply to the hoist.

7



CD005640_1

Test drive the hoist while observing the rope guide travel through the whole height of lift. Test the tightness of the rope guide at both the upper and lower hoisting limit to make sure that there is no binding at either end. Adjust if necessary.

8

Install the machinery covers.



Note: Friction between the rope guide and drum causes wear on the drum and the guide.

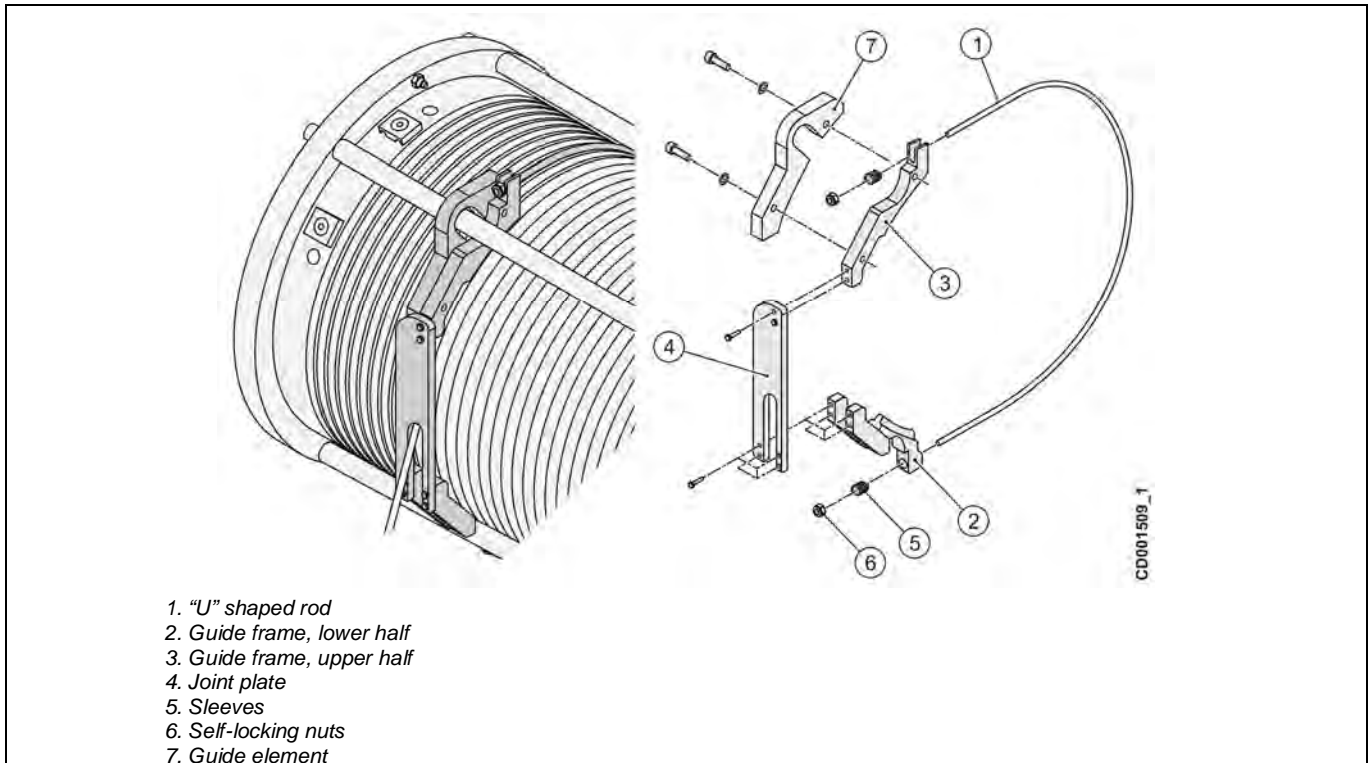


Note: The rope guide should be allowed to move axially 1...3 mm. In this way, it is loose enough not to bind on the drum and tight enough not to rise up or jump to a wrong drum groove.

7.1.4.6 Construction of rope guide for hoist frame size: VT4, VT5 (On models before 12.2006)

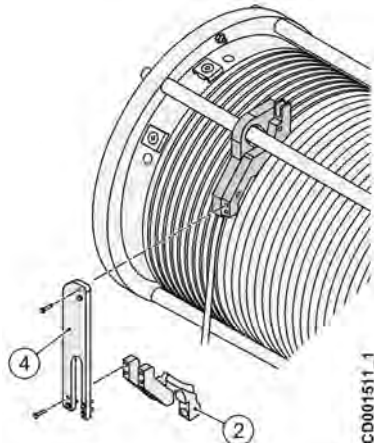
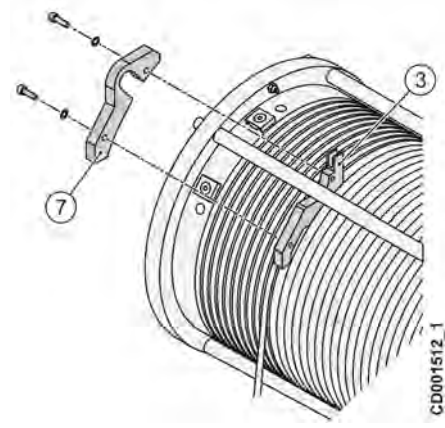
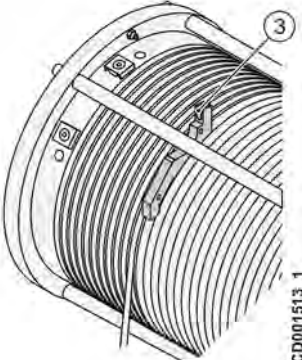


Note: It is recommended to change the rope guide into a newer model.

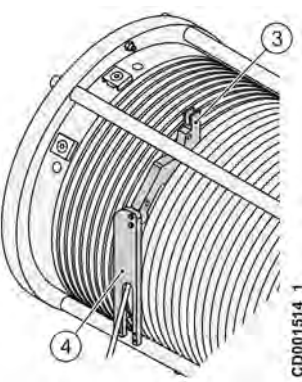
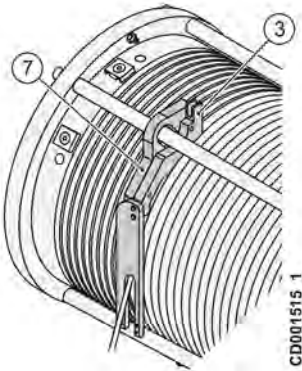


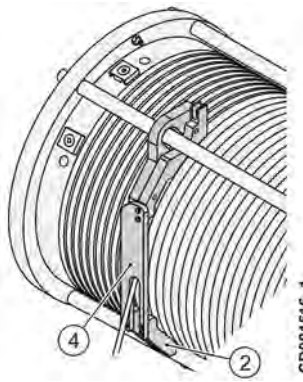
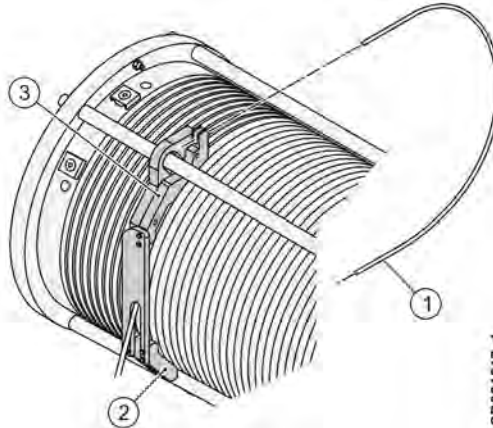
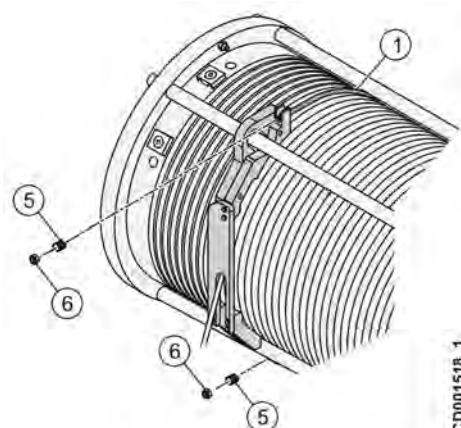
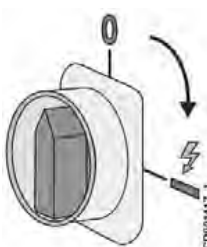
Disassembly

1	<p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	2	<p>Remove the two self-locking nuts (6). Pull out the sleeves (5) and "U" shaped rod (1) from the sockets in the frame halves.</p>
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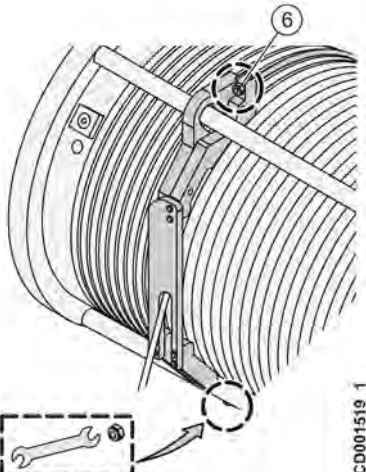
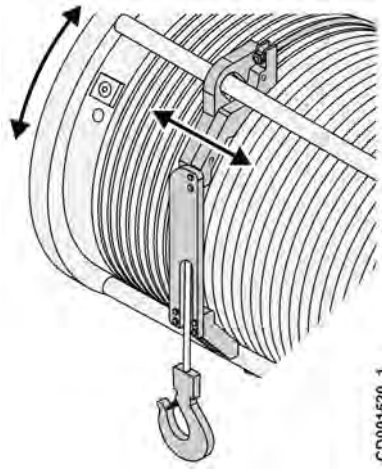
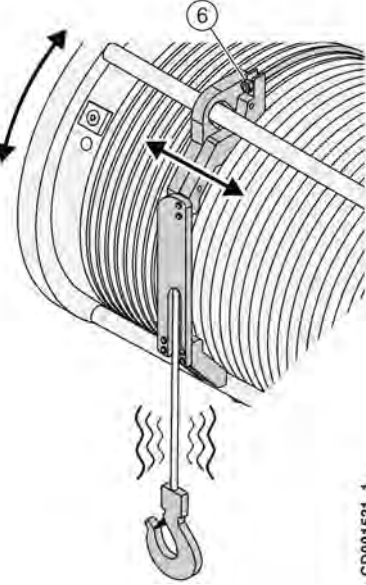
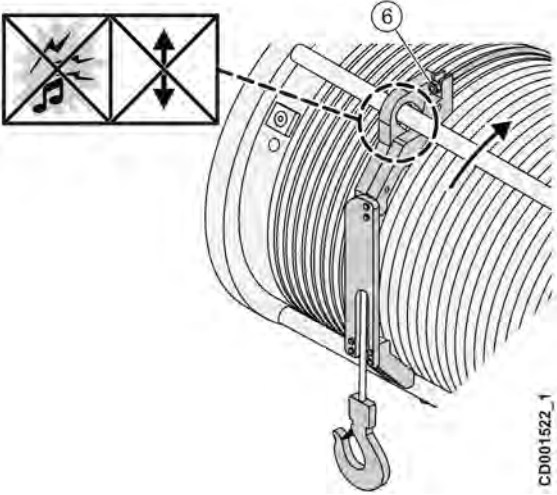
<p>3</p>	 <p>Remove two screws in order to remove the joint plate (4). Remove the lower half (2) of the guide frame from the drum groove.</p>	<p>4</p>  <p>Remove two screws in order to remove the guide element (7) from the hoist intermediate shaft and remove it from the upper half (3) of the guide frame.</p>
<p>5</p>	 <p>Remove the upper half (3) of the guide frame from the drum groove.</p>	

Reassembly

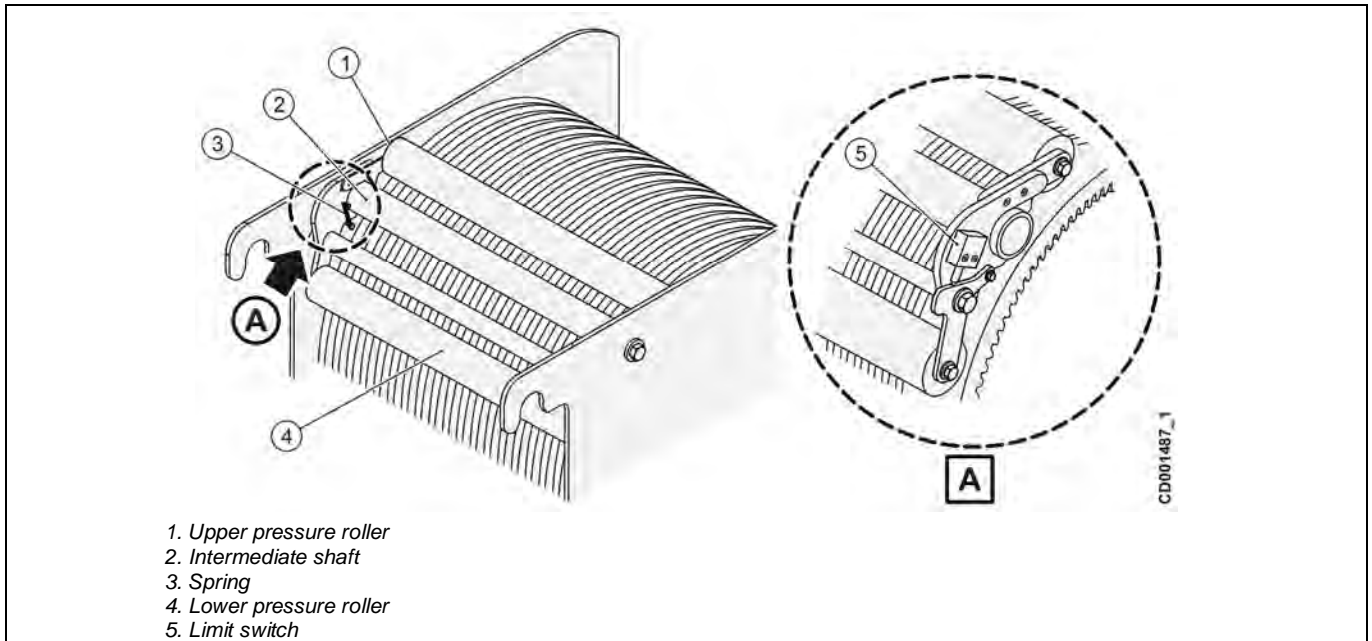
<p>1</p>	 <p>Place the upper half (3) of the guide frame against the drum groove. The correct groove is the first empty groove next to the rope. Fix the joint plate (4) to the upper half (3) of the guide frame with two screws. The edge that has the rounding must point towards the rope fixing clamps.</p>	<p>2</p>  <p>Place the plastic guide element (7) over the intermediate shaft and fix it to the upper half (3) of the guide frame with two screws. The plastic part must be on the side of the rope fixing clamps.</p>
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<p>3</p>	 <p>Pass the rope through the joint plate (4) and place the lower half (2) of the guide frame against the drum groove next to the groove from which the rope leaves the drum. With the rope passing through both the joint plate (4) and the lower half (2) of the guide frame, fix the joint plate and the lower half together with four screws.</p>	<p>4</p>  <p>Pass the "U" shaped rod (1) around the rope drum and into the groove that travels around the rope drum from the upper half (3) to the lower half (2) of the guide frame. Pass the ends of the rod through both frame halves.</p>
<p>5</p>	 <p>Pass the ends of the rod (1) through the sleeves (5) and press the sleeves into the sockets in the frame halves. Fix the rod in place with the two self-locking nuts (6). Follow the adjustment instructions in order to get the nuts to the proper tightness.</p>	<p>6</p>  <p>Install the machinery covers. Switch ON the power supply to the hoist.</p>

Adjustment

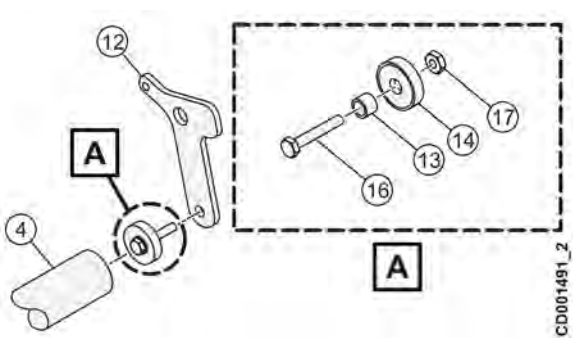
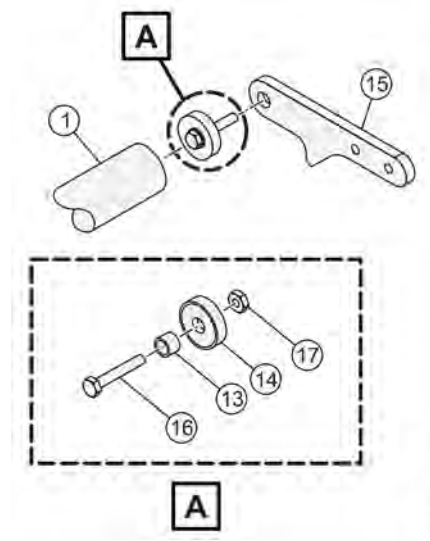
<p>1</p>	 <p>Rope guide initial adjustment Tighten the two self-locking nuts (6) evenly until the rope guide is snug against the rope drum and the rod ends go through the frames in a straight line. If either nut is tightened more than the other, the rod gets bent or misaligned. Adjust the nuts so that the guide does not rotate around the drum by gravity alone, but it rotates if extra force of 20 N...30 N is applied in the up or down direction.</p>	<p>2</p>  <p>Rope guide test drive and final adjustment Test drive the hoist in both up and down direction and check that the rope guide travels through the whole height of lift without evidence of strong vibrations or excessive wear on the drum.</p>
<p>3</p>	 <p>Rope guide too tight: If the rope guides vibrate strongly, it is likely that they are too tight against the drum. Loosen the upper self-locking nut (6) by a quarter turn and retry. If the guides are still too tight, loosen the lower self-locking nut (6) by a quarter turn and retry. Continue loosening the nuts in turns until the vibrations disappear.</p>	<p>4</p>  <p>Rope guide too loose: If the rope guides become too loose against the drum, they will begin to rotate around the drum by gravity causing in an audible clanking noise each time the hoist stops after upward motion. This is a result of gravity pulling the loose guides against the intermediate shaft. If the clanking noise occurs, tighten the self-locking nuts (6) in turns until the guides no longer rotate around the drum by gravity.</p>

7.1.4.7 Rope pressure roller for hoist frame size VT4, VT5

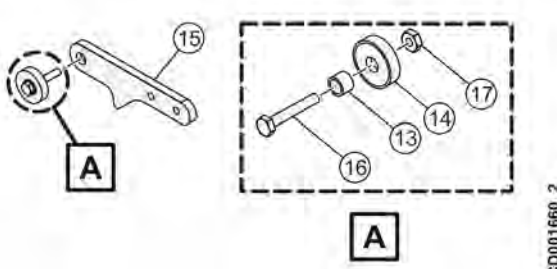
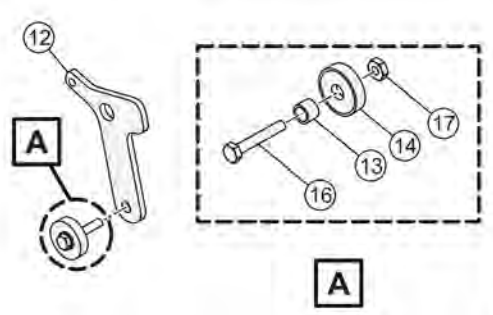
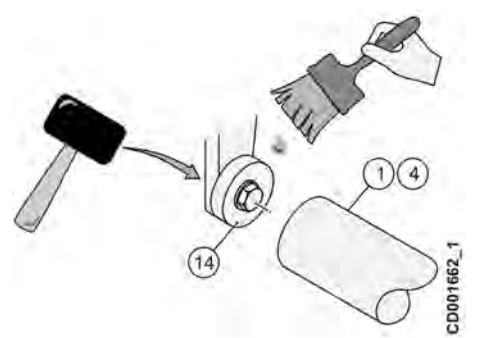
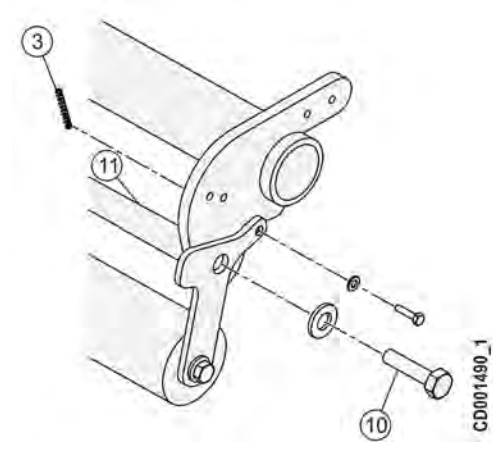


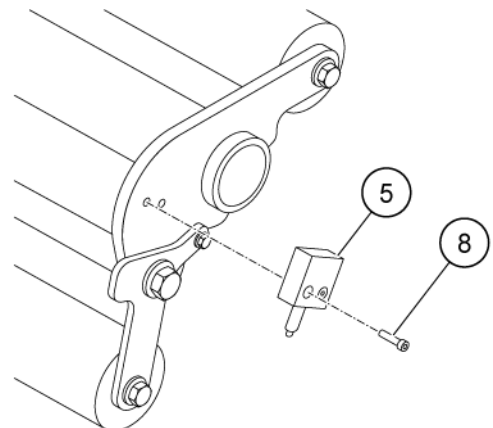
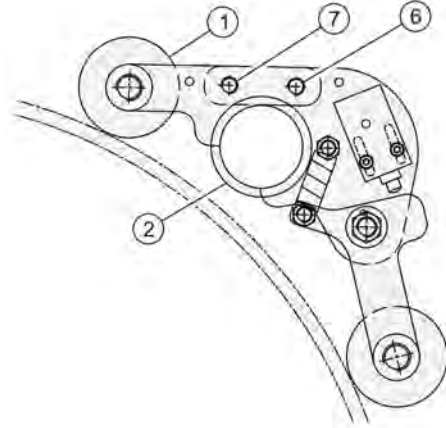
Disassembly

<p>1</p> <p>CD001416_1</p>	<p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	<p>2</p> <p>CD002758_1</p>	<p>4</p> <p>CD001490_1</p>
<p>3</p> <p>CD001490_1</p>	<p>Remove the screws (8) to remove the limit switch (5).</p>	<p>Remove the screw and washer to remove the spring (3). Remove the screws (10) and washers to remove the lower pressure roller assembly and the shaft (11).</p>	

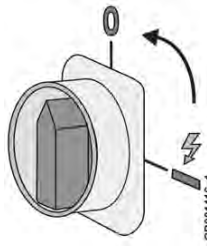
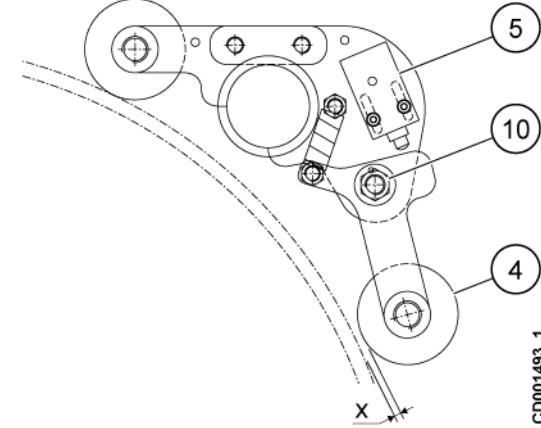
<p>5</p>  <p>CD001491_2</p> <p>Remove the lower pressure roller (4) from the bearing assembly on the torque arm (12). Then remove the bearing assembly from the fixing plate to separate the sleeve (13) and the bearing (14).</p>	<p>6</p>  <p>CD001492_2</p> <p>Remove the upper pressure roller (1) from the bearing assembly on the fixing plate (15). Then remove the bearing assembly from the fixing plate to separate the sleeve (13) and the bearing (14).</p>
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Reassembly

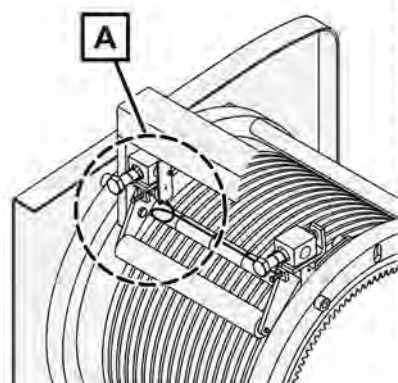
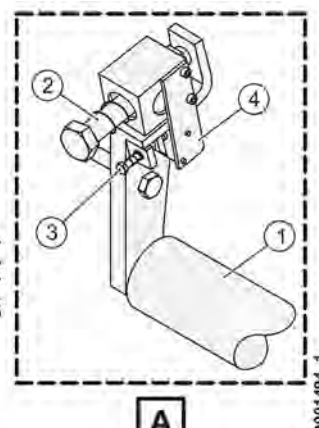
<p>1</p>  <p>CD001660_2</p> <p>Assemble the bearing assembly (A) including the sleeve (13) and the bearing (14). Install this assembly on the fixing plate (15) with the screw (16) and the nut (17).</p>	<p>2</p>  <p>CD001661_2</p> <p>Assemble the bearing assembly (A) including the sleeve (13) and the bearing (14). Install this assembly on the fixing plate (15) with the screw (16) and the nut (17).</p>
<p>3</p>  <p>CD001662_1</p> <p>Clean and lubricate the surfaces of upper and lower bearings (14) on both ends of the pressure rollers (1) and (4). Press the bearings into the correct end of the guide rollers with a rubber hammer.</p>	<p>4</p>  <p>CD001490_1</p> <p>Install the lower pressure roller assembly and the shaft (11) to the upper pressure roller assembly with screws (10). Install the screw and the washer and place the spring (3) over the screw. Tighten the screw.</p>

5	 <p style="text-align: right; font-size: small;">CD0001490_1</p>	6	 <p style="text-align: right; font-size: small;">CD0002758_1</p>
	<p>Install the limit switch (5) to the pressure roller assembly with the screws (8).</p>		<p>Install the screw (6) lightly without tightening. Tilt the upper pressure roller (1) and place the assembly over the intermediate shaft (2). Install the screw (7). Tighten both screws (6) and (7).</p>

Adjustment

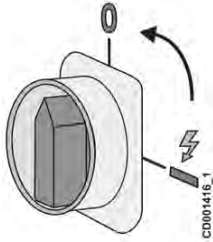
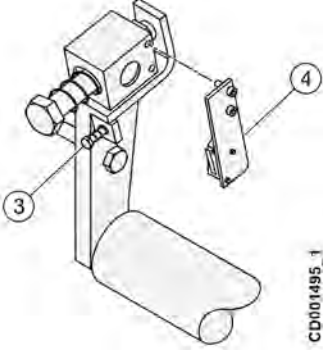
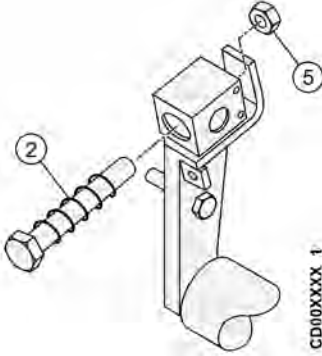
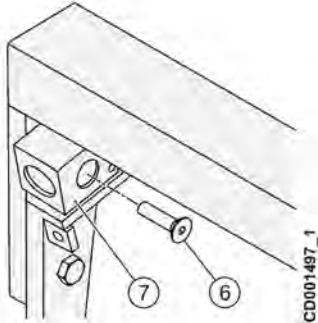
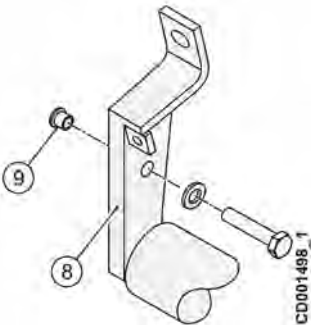
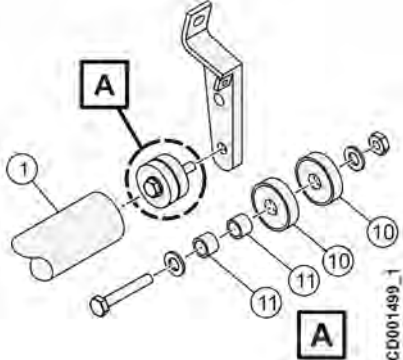
1	 <p style="text-align: right; font-size: small;">CD0004416_1</p>	2	 <p style="text-align: right; font-size: small;">CD0001493_1</p>
	<p>Lower the hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>		<p>Loosen the screw (1+) and adjust the roller (4) so that there is a gap of $x = 1 \dots 2$ mm between the roller and the rope. Tighten the screw (10). Adjust the limit switch (5) so that if pressure roller (4) rises 4 mm from top surface of rope the limit switch activates.</p>

7.1.4.8 Construction of rope pressure roller for hoist frame size VT4, VT5 (On models before 2011)

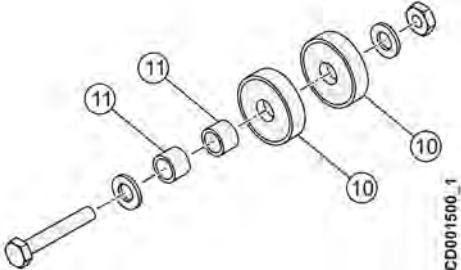
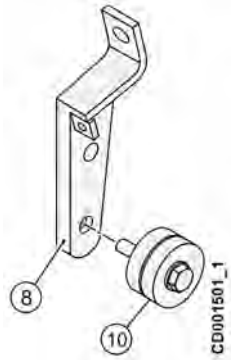
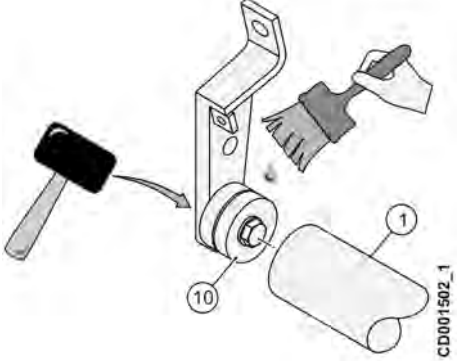
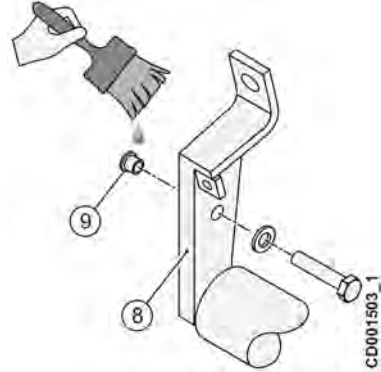
	 <p style="text-align: right; font-size: small;">CD0001494_1</p>
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1. Pressure roll
2. Roller adjustment screw
3. Limit switch adjustment screw
4. Limit switch

Disassembly

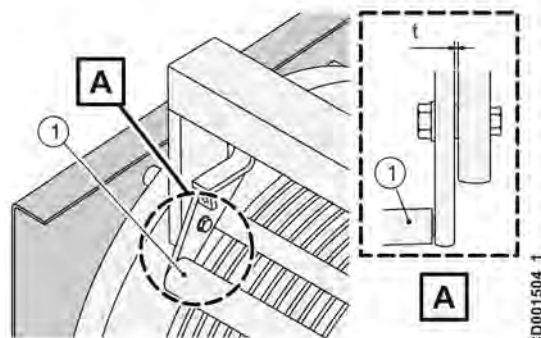
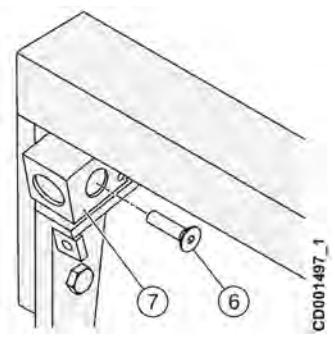
<p>1</p>	 <p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	<p>2</p>  <p>Unscrew the limit switch adjustment screw (3) a few turns and remove the limit switch (4) along with the attachment plate.</p>
<p>3</p>	 <p>Loosen the nut (5) and remove the roller adjustment screw (2) with the spring.</p>	<p>4</p>  <p>Remove the screw (6) and remove the housing (7).</p>
<p>5</p>	 <p>Unscrew the bolts from both torque arms (8) and remove the pressure roller from the end plates. Remove the sleeve bearing (9) from the torque arm.</p>	<p>6</p>  <p>The pressure roller bearings are press-fitted inside the roller tube (1). Tap gently with a rubber hammer to remove the bearings.</p> <p>Unscrew the nut to remove the bearings (10), the sleeves (11), and the washers from the bolt.</p>

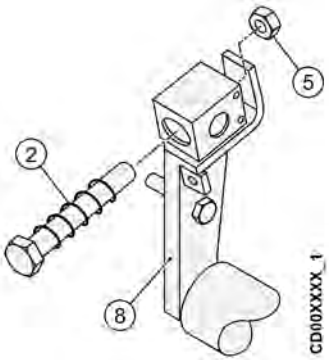
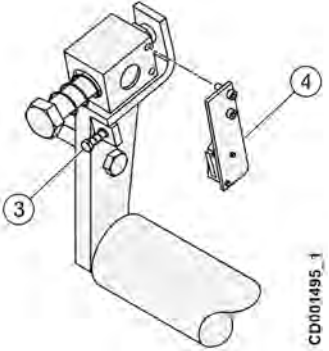
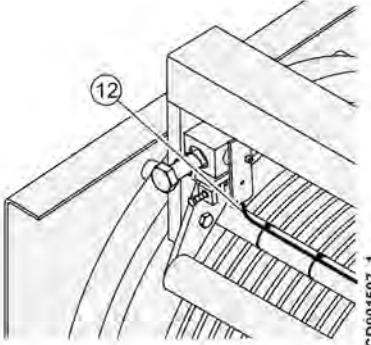
Reassembly

<p>1</p>	 <p>Install the washer sleeves (11) on the screw. Put the bearings (10) on the sleeves (11), place the washer on the bearings (10), and lock it with a nut.</p>	<p>2</p>	 <p>Fasten the screw with the bearing (10) to the torque arm (8).</p>
<p>3</p>	 <p>Clean and lubricate the bearing (10) surfaces on both ends of the pressure roller (1). Press the correct torque support to the correct end of the guide roller with a rubber hammer.</p>	<p>4</p>	 <p>Brush grease on the sleeve bearings (9) and place them into the torque arms (8). Push bolts with washers through the sleeve bearings.</p>

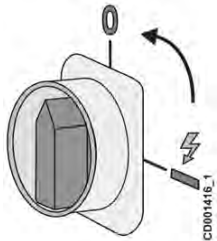
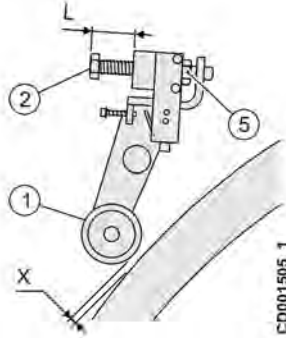
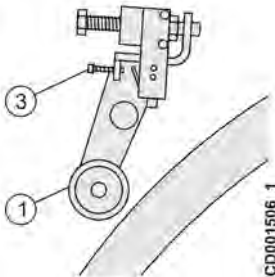


Note: Roller guide installation direction depends on the hoist type.

<p>5</p>	 <p>Place the pressure roller (1) between the hoist end plates. Push the locking bolts through the frame. Make sure the clearance (t) between the torque arm and the frame is max. 2 mm.</p>	<p>6</p>	 <p>Place the bolts (6) into the housing (7). Oil the bolt heads lightly with installation oil. Install the housing to the end plates and lock them into position with the bolts, nuts, and washers.</p>
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<p>7</p>	 <p>CD00XXXX_1</p> <p>Place the spring over the roller adjustment screw (2). Insert the screw (2) through the housing and thread it in to the torque arm (8). Lock into position with nut (5).</p>	<p>8</p>	 <p>CD001495_1</p> <p>Install the limit switch (4) to the attachment plate. Insert the limit switch adjustment screws (3) with springs into the torque arm threaded holes.</p>
<p>9</p>	 <p>CD001507_1</p> <p>Attach the limit switch wires (12) with cable ties on the housing and the spacer bar. Adjust the pressure roller as far as possible from the drum surface for the test run. Adjust the roller according to the procedure given in "Adjustment".</p>		

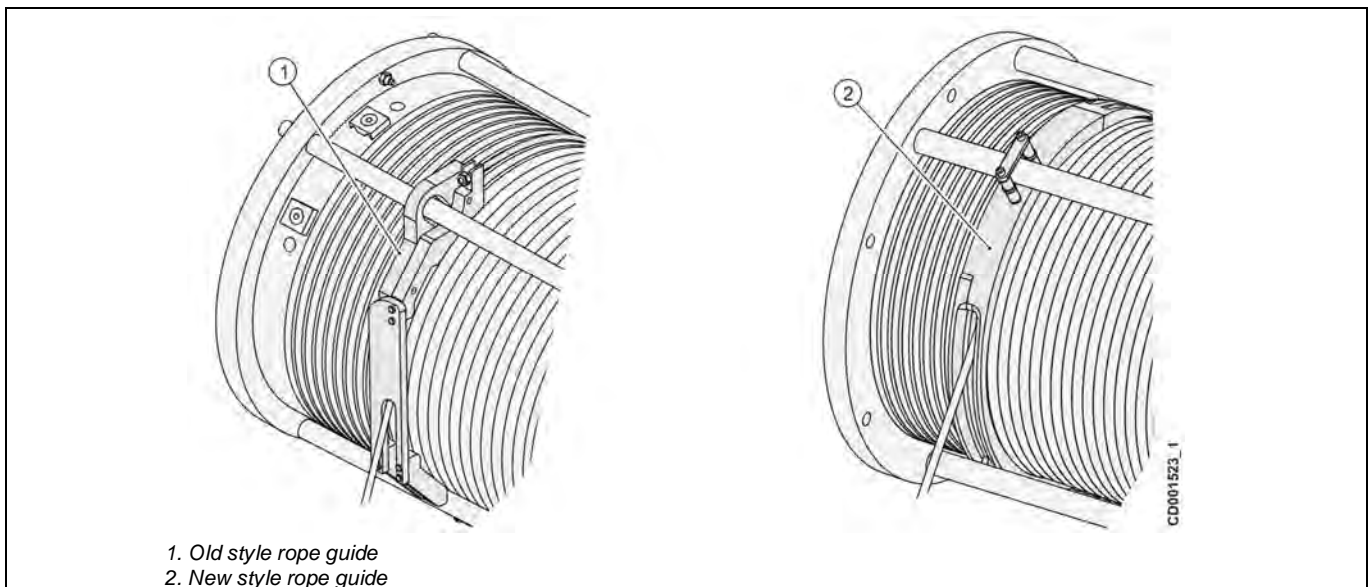
Adjustment

<p>1</p>	 <p>CD001416_1</p> <p>Lower hook to the floor and switch OFF the power supply to the hoist. Remove the machinery covers.</p>	<p>2</p>  <p>CD001505_1</p> <p>Adjust the pre-stress on the spring by holding the nut (5) on place and turning the roller adjustment screw (2) so that length (L) = 47...49 mm.</p> <p>Adjust screw (2) to adjust the gap (X) between the pressure roller (1) and the rope to 0...1 mm</p> <p>L = 47...49 mm X = 1 mm</p>
<p>3</p>	 <p>CD001506_1</p>	

Adjust the limit switch adjustment screw (3) so that if the pressure roller (1) rises half of the rope diameter the limit switch activates.

7.1.4.9 Replacing an old style rope guide with a heavy-duty rope guide

When replacing an old style rope guide with a new style rope guide in a true vertical lift hoist or in a machinery hoist, the hoisting limit switch setting for the hook lower position may need readjusting to ensure safe operation. See the following drawing to identify the type of rope guide you have on the hoisting unit.



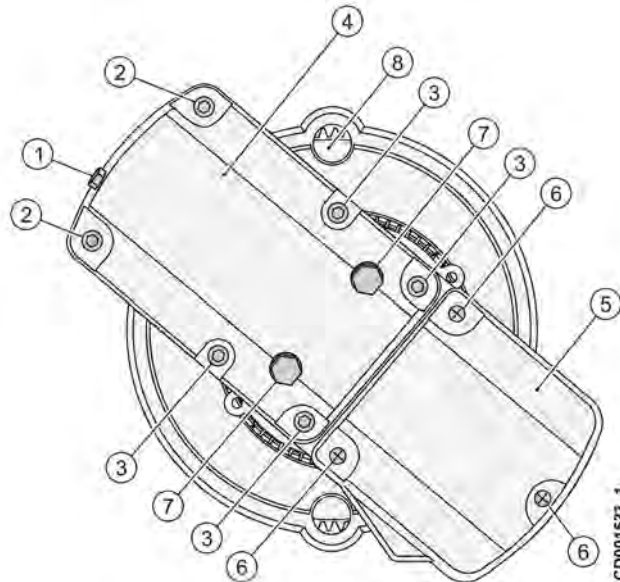
The heavy-duty rope guide cannot travel as close to the rope fixing clamps on the rope drum as the old style rope guide. It takes approximately 10 mm more space in that direction. After installing the heavy-duty rope guides, adjust the hoisting limit switch so that there is a minimum of 15 mm gap between the rope guides and the rope fixing clamps when the hook is in its lowest position. Test-drive the hoist and readjust if necessary.

7.1.5 Hoisting gearbox

The hoisting gearbox comprises multistage helical gear transmission. The lubricant for the hoisting gear is semi-fluid grease. When used in conformance with the operating group classification of the hoist, the gearbox lubricant is not changed during the Safe Working Period (SWP). If the hoist is operated in extremely cold conditions, the factory-installed grease must be replaced with synthetic transmission grease.

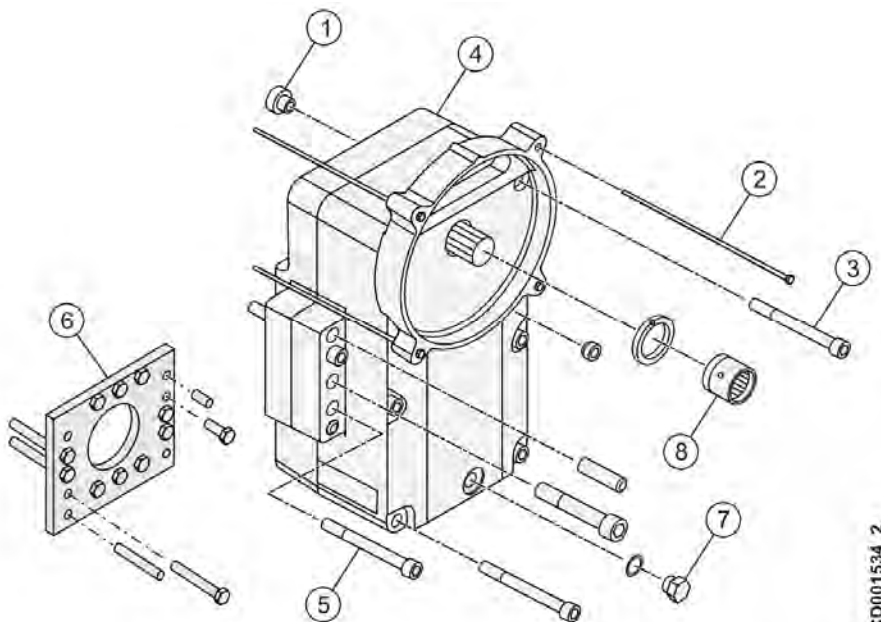
Refer to chapter "Lubricants" for further instructions.

Hoisting gearbox for hoist frame size: VTs, VT1, VT2, VT3.



1. Breather plug
2. Fixing screws for hoisting machinery
3. Fixing screws for gearbox cover
4. Gearbox cover
5. Cover of connection box
6. Fixing screws for cover of connection box
7. Gearbox plug
8. Inspection hole for gear rim

Hoisting gearbox for hoist frame size: VT4, VT5.



1. Breather plug
2. Fixing screws for hoisting motor
3. Fixing screws for gearbox cover
4. Gearbox cover
5. Fixing screws for gearbox
6. Fixing plate for gearbox
7. Gearbox plug
8. Coupling

7.1.5.1 Replacement of a sealing set for the hoisting gearbox of frame size VTs, VT1, VT2, VT3

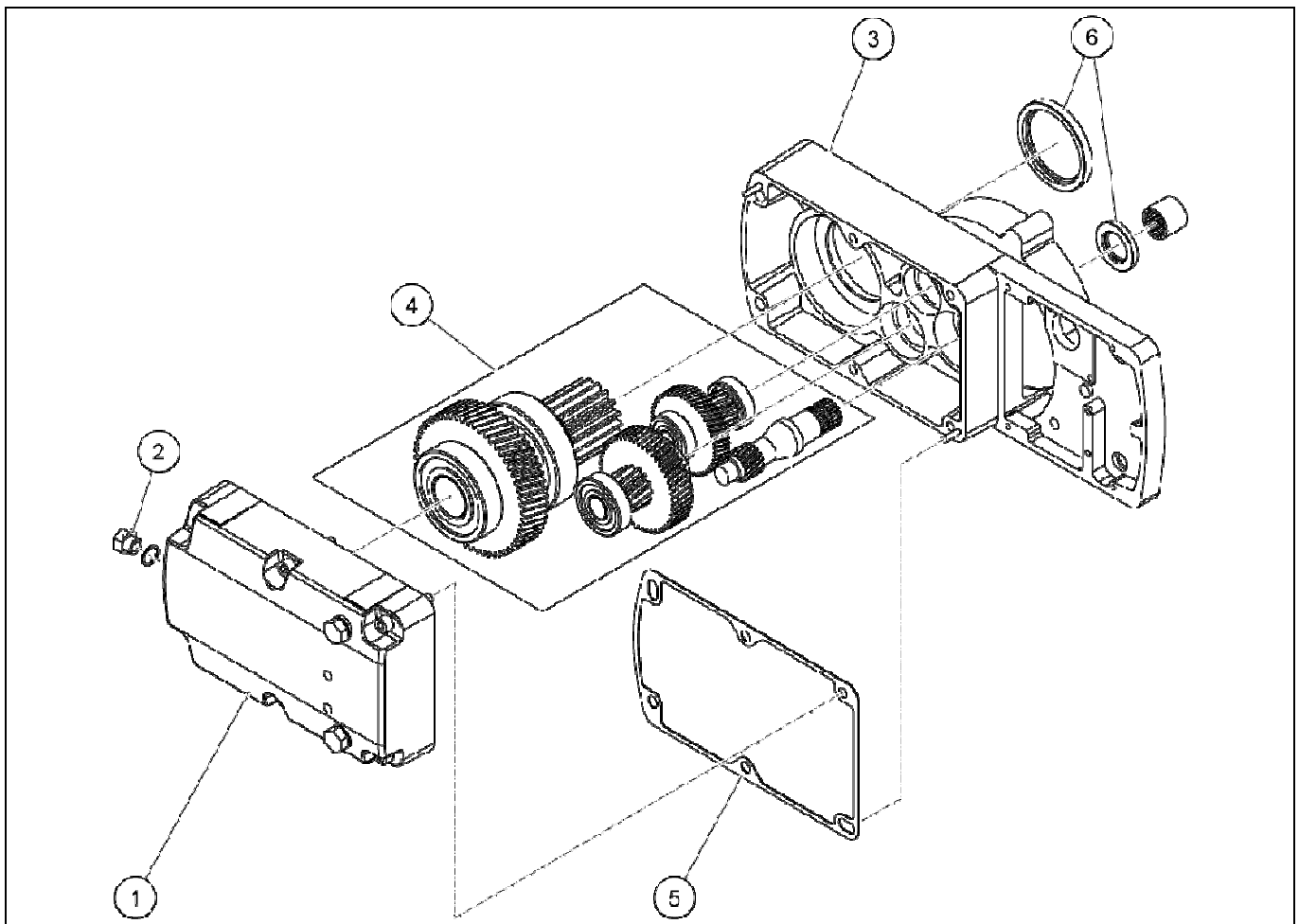
If the gearbox shows signs of excessive lubrication leakage, you must replace the sealings in the gearbox. In this context, you may also need to change the lubrication inside the gearbox.

CAUTION

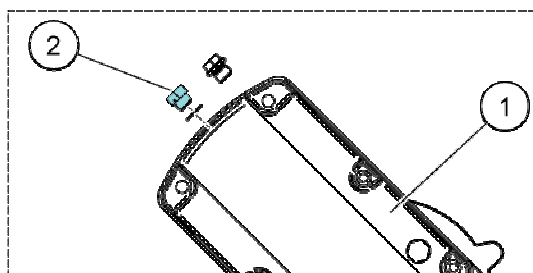
Be careful when opening the gearbox and replacing the sealings. There is also a risk for damaging the equipment or the sealings in the reassembly phase.

CAUTION

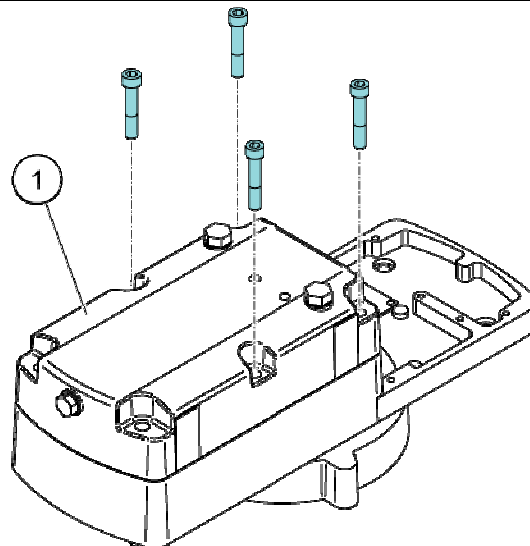
Ensure that the lubrication does not leak to the breather plug. Before disassembling the gearbox from the hoist, replace the breather plug with a blind plug to keep the breather clean.



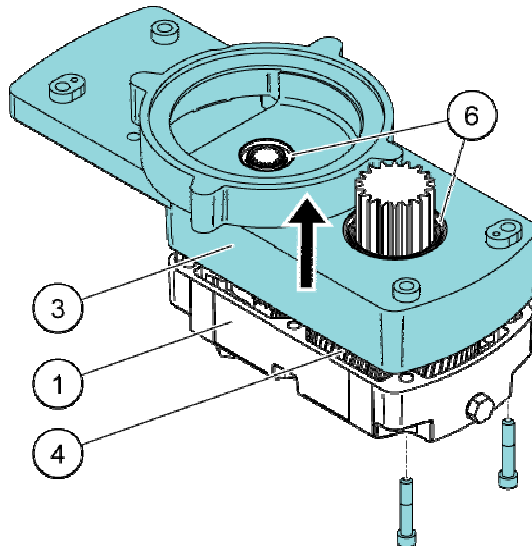
1. Gearbox cover
2. Breather plug
3. Gear housing
4. Shaft assemblies
5. Paper sealing
6. Lip sealings

1

Replace the breather plug (2) with a blind plug before disassembling the gearbox from the hoist and the motor.

2

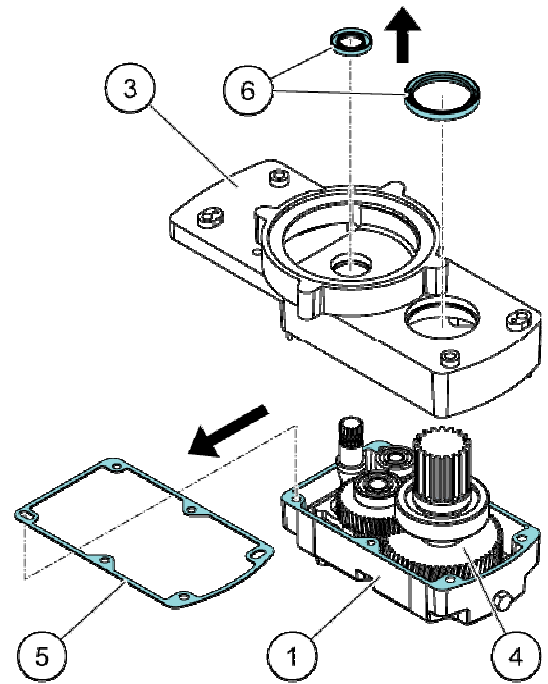
Set the gearbox on a working surface carefully with the cover (1) on top. Unscrew the four screws that keep the two gearbox halves together, but do not detach the halves from each other at this phase.

3


By keeping the halves yet together, turn the gearbox around so that the gear housing half (3) is now on top.

Detach the halves from each other. Be careful with the shaft assemblies (4) inside the gearbox when lifting the gear housing half (3), taking into account the lip sealings (6).

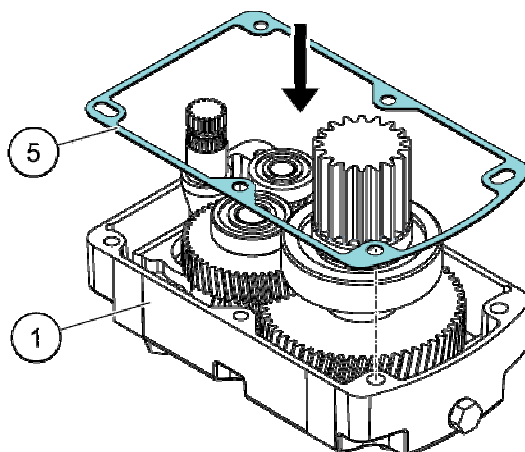
Avoid spilling out the lubrication, keep it on the cover (1) or collect it to a separate container.

4


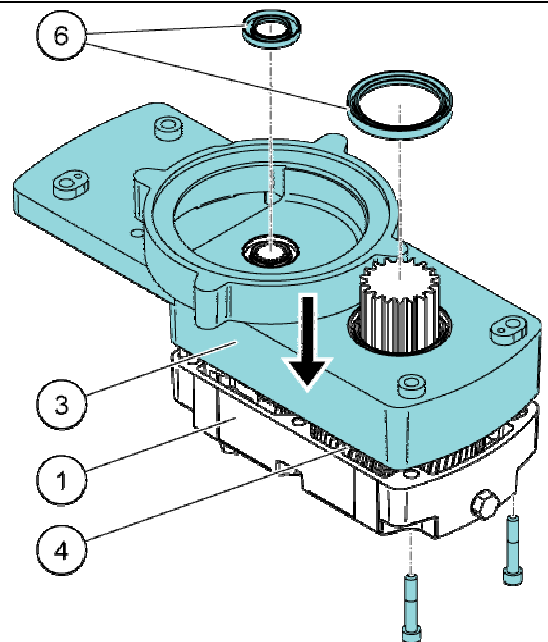
Remove the paper sealing (5) and clean the sealing surfaces in both gearbox halves. Check that the surfaces are not damaged.

Add or replace the lubrication if necessary. Ensure that the shaft assemblies (4) are properly installed on the cover half (1).

Remove the lip sealings (6) from the bearing housing half (3).

5


Install a new paper sealing (5) on the cover half (1).

6


Reassemble the gearbox halves together.

Once the halves are attached to each other, install the new lip sealings (6). Be careful with the installation so that the sharp edges of the shafts do not damage the new sealings.

7		8	
	<p>Turn the gearbox around with the cover (1) on top, and mount the four screws to fasten the halves together.</p>		<p>After reassembling the gearbox back on the hoisting machinery, remove the blind plug and reinstall the breather plug (2).</p>

7.1.5.2 Maintenance task for hoisting gear of frame size VT4, VT5

1		2	
	<p>Check the gearbox visually for leakage. In case the gearbox shows signs of excessive leakage, open the gearbox and find the reason for the leakage. Change the sealings and lubrication, and replace the worn part, or the complete gearbox.</p>		<p>Check the breather-plug (1) breaths freely and clean if needed. Check for any excessive vibration or noise.</p>



Note: If the factory-installed grease is topped up with a different lubricant, ensure that the lubricant is compatible. Refer to the section “Lubricants” for further instructions.

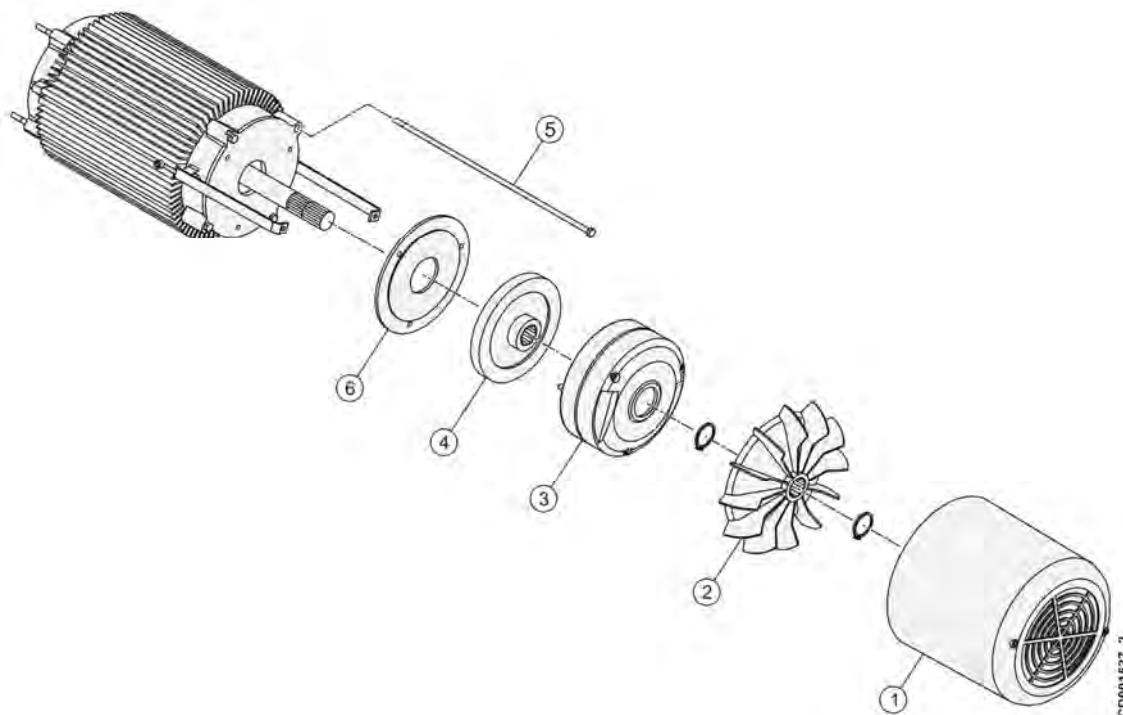
Assembly

See Chapter “Hoisting machinery” for details.

7.1.6 Hoisting motor

Standard hoists are equipped with two-speed squirrel-cage motors, which are especially designed and manufactured for hoisting duty. The motors incorporate a cylindrical rotor and class F insulation, and are conform to the protection standard IP54/DIN40050.

Optionally, the hoist can be equipped with a frequency converter and specially designed motors for this duty. These are one-speed squirrel-cage motors with increased insulation of the windings. In addition, these motors are equipped with a speed sensor as a standard.



- 1. Fan cover
- 2. Fan
- 3. Brake
- 4. Brake disc
- 5. Fixing screws for motor
- 6. Friction disc

Assembly

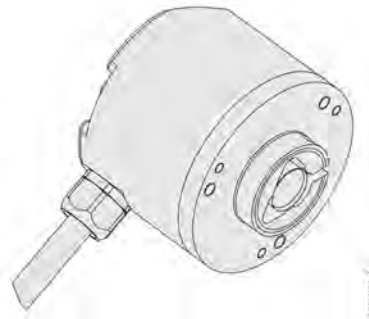
See section "Hoisting machinery assembly" for details.

7.1.6.1 Maintenance of hoisting motor

1		2	
	<p>Check that the hoisting motor operates properly when loaded. Check for any excessive noise, vibration and/or heat.</p>		<p>Clean the cooling-ribs surface when needed.</p>

7.1.6.2 Hoisting motor supplied with encoder

The encoder is a precision device coupled to the hoist motor shaft. It measures the rotation speed of the hoist motor. Encoders are required in the motors of type S that are controlled by the frequency converters in a closed loop. When a hoist motor is operated, the coupled encoder normally outputs 600 square wave pulses per revolution.



The pulses are measured by the frequency converter and are monitored for:

- load overspeed in the down direction
- speed difference where the actual speed of the motor is compared to the frequency supplied to the motor
- no pulses, indicating a stall situation.

In overspeed, speed difference or stall situations, the mechanical brake is closed immediately and power to the motor is switched off.

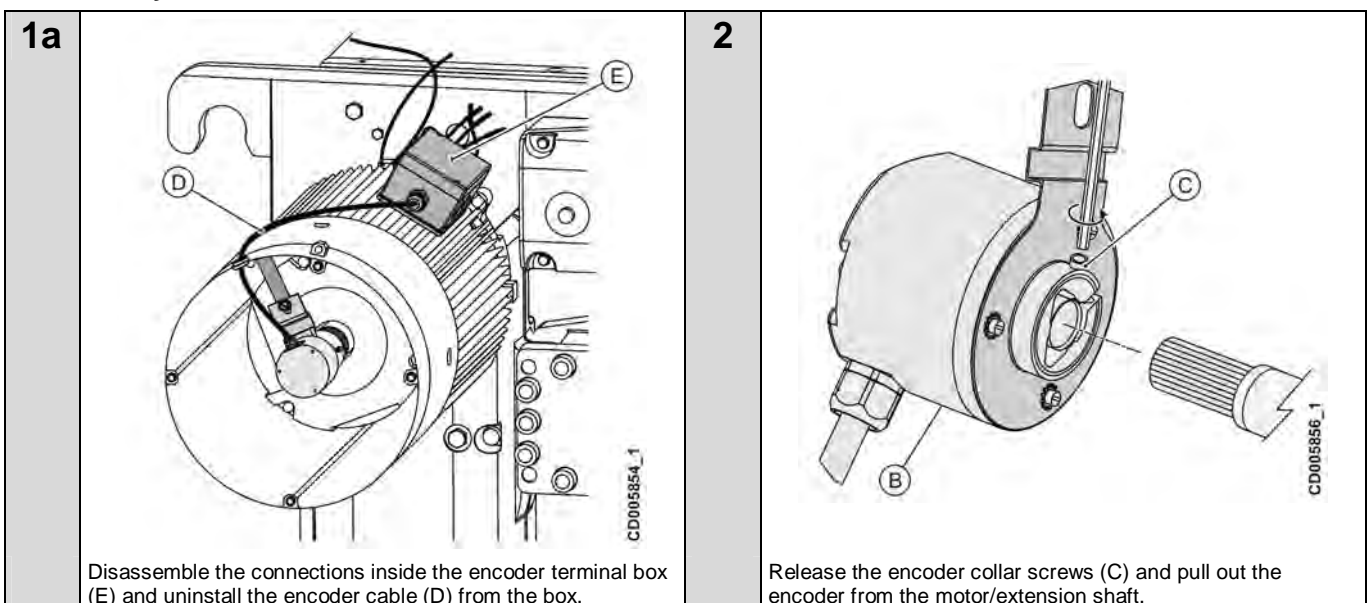
Note that the encoders are not used with hoisting motors of type A which have a built-in bearing sensor to create pulses for the frequency converter to detect overspeed.

You need to disassemble the encoder from the motor/extension shaft, for example, when servicing a motor brake. A faulty encoder must always be replaced with new one.

CAUTION

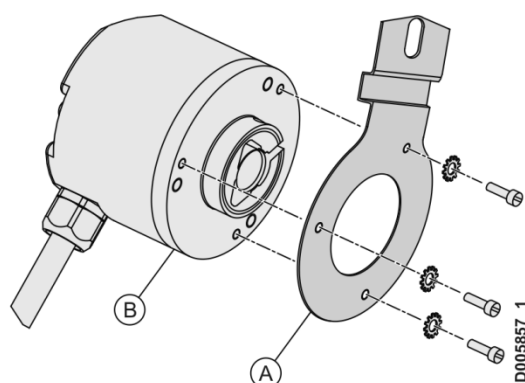
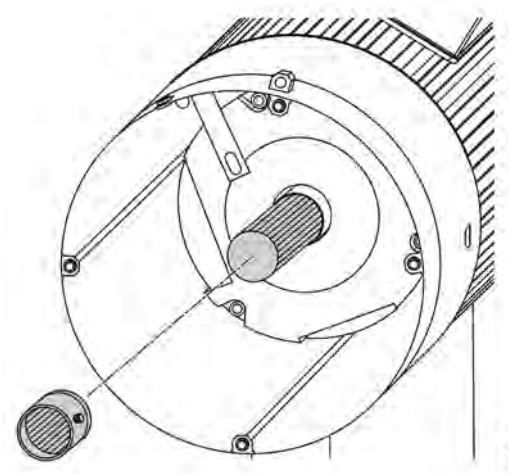
Closed loop speed control is very sensitive to encoder pulse defects. Faulty encoder connections and disturbance in encoder pulses may cause wrong operation or frequency converter faults.

Disassembly



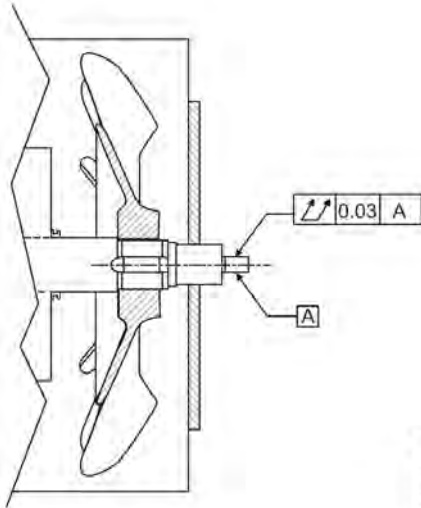
Disassemble the connections inside the encoder terminal box (E) and uninstall the encoder cable (D) from the box.

Release the encoder collar screws (C) and pull out the encoder from the motor/extension shaft.

3		4	
	<p>Uninstall the encoder support (A) by removing the screws and the serrated washers.</p>		<p>Disassemble the coupling sleeve if necessary by removing the screws and the sleeve from the motor shaft. Use pullout screws if necessary; tighten the pullout screws little by little until the sleeve comes off the motor shaft.</p>

Reassembly

CAUTION	The encoder cable must not be installed in such way that it mechanically causes load towards encoder.
CAUTION	The encoder cable must not be bent sharply, as in this way, the cable is easily damaged.
CAUTION	The encoder cable must not be placed too close to the motor cables. The recommended distance is 20 cm.

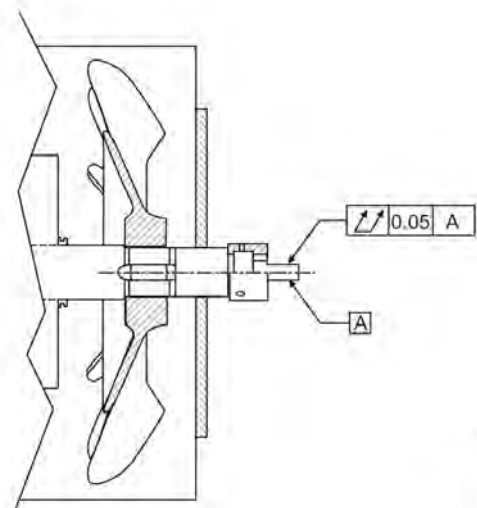
1a


CD005859_1

Motors without a separate coupling sleeve:

You should measure the shaft end eccentricity before installing a new encoder if the previous encoder has been damaged and no reason for the damage known.

The eccentricity (A) of the rotor surface in relation to the bearing surfaces must not be greater than 0.03mm. If the eccentricity of the shaft end is greater than 0.03mm, the shaft rotor must be straightened.

1b


CD005860_1


Motors with a coupling sleeve:

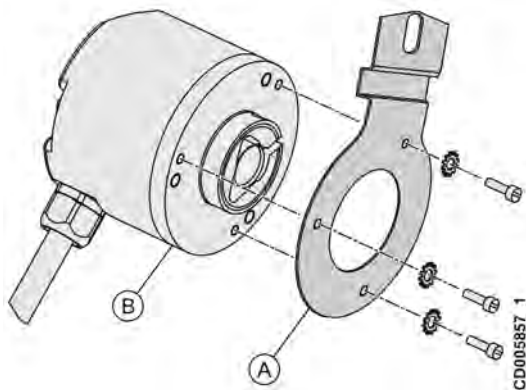
The coupling sleeve becomes an extension shaft for the encoder when it is mounted onto the motor shaft.

You should measure the eccentricity before installing a new encoder if the previous encoder has been damaged and no reason for damage known.

Before mounting the coupling sleeve, the eccentricity of the rotor surface in relation to the bearing surfaces must not be greater than 0.03mm. Same eccentricity limit applies for the shaft end.

After mounting the coupling sleeve, check the eccentricity of this extension shaft. Maximum allowed eccentricity (A) for the shaft is 0.05mm. If the extension shaft eccentricity is greater than 0.05mm, it has to be straightened, remounted, or changed.

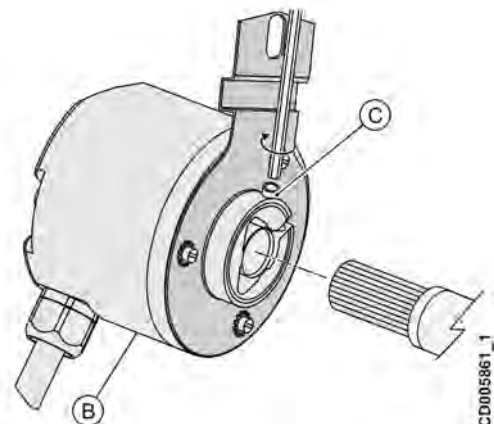
 The extension shaft must not be straightened without confirming first that the motor shaft end eccentricity is max 0.03mm.

2


CD005857_1

Install the support to the encoder.

The support (A) is not pre-installed on the encoder (B) by the manufacturer. It is mounted with three screws and serrated washers. Tightening torque for the screws is 2.5 Nm.

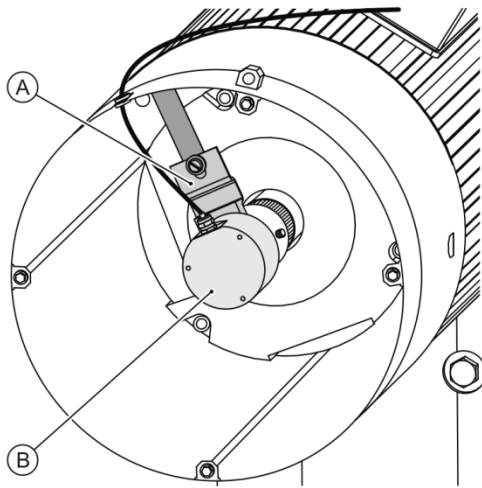
3


CD005861_1

Install the encoder onto the motor shaft/extension shaft manually.

The encoder (B) is installed in such way that the shaft goes all the way into the encoder. After this, the encoder is pulled out 1...2 mm.

The encoder is firmly attached to the shaft by tightening the encoder collar screws (C) with key SW2. Tightening torque is 1.5 Nm. Use also a thread-locking compound (soft or medium, which enables also reopening) to secure the tightening.

4


CD005862_1

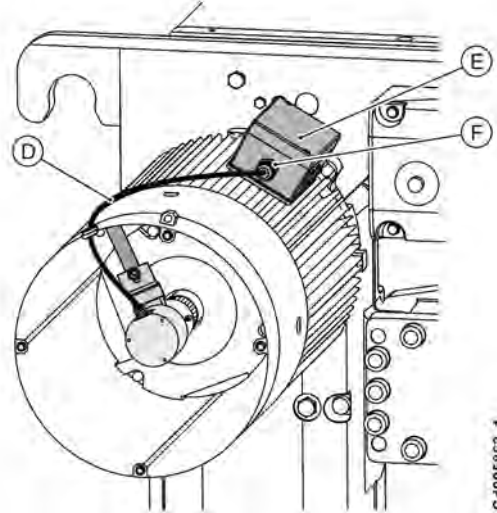
Adjust the encoder support.

The bearings of the encoder (B) can be damaged due to continuous radial force causing overheating. Therefore the encoder support must be adjusted so that it causes very minimal radial load to the encoder. The support (A) must be straight, not bent.

However, the support cannot have any clearance, so all the support screws must be tightened carefully.



When the encoder is mounted, the maximum allowed radial movement is 0.1 mm (measured from the encoder body).

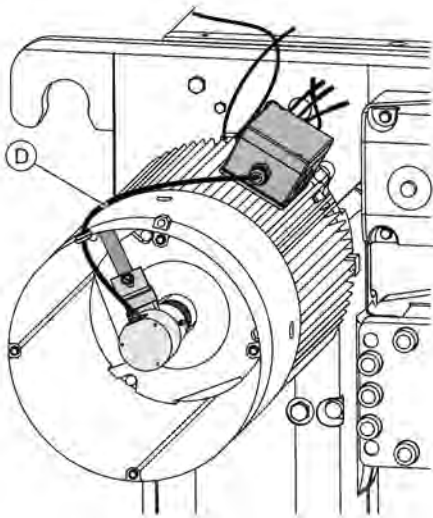
5a


C4005863_1

Install the encoder cable to the terminal box.

The encoder cable (D) must be a shielded round cable and grounded 360 degrees at both ends. Ensure that the cable shield grounding to the terminal box (E) is made so that the claws of the cable gland (F) are in touch with the shielding of the cable.

Connect the wiring inside the terminal box according to the instructions given by the manufacturer.

5b


CD005864_1

The encoder cable (D) must be as far from the motor cables as possible (the recommended distance is 20 cm).

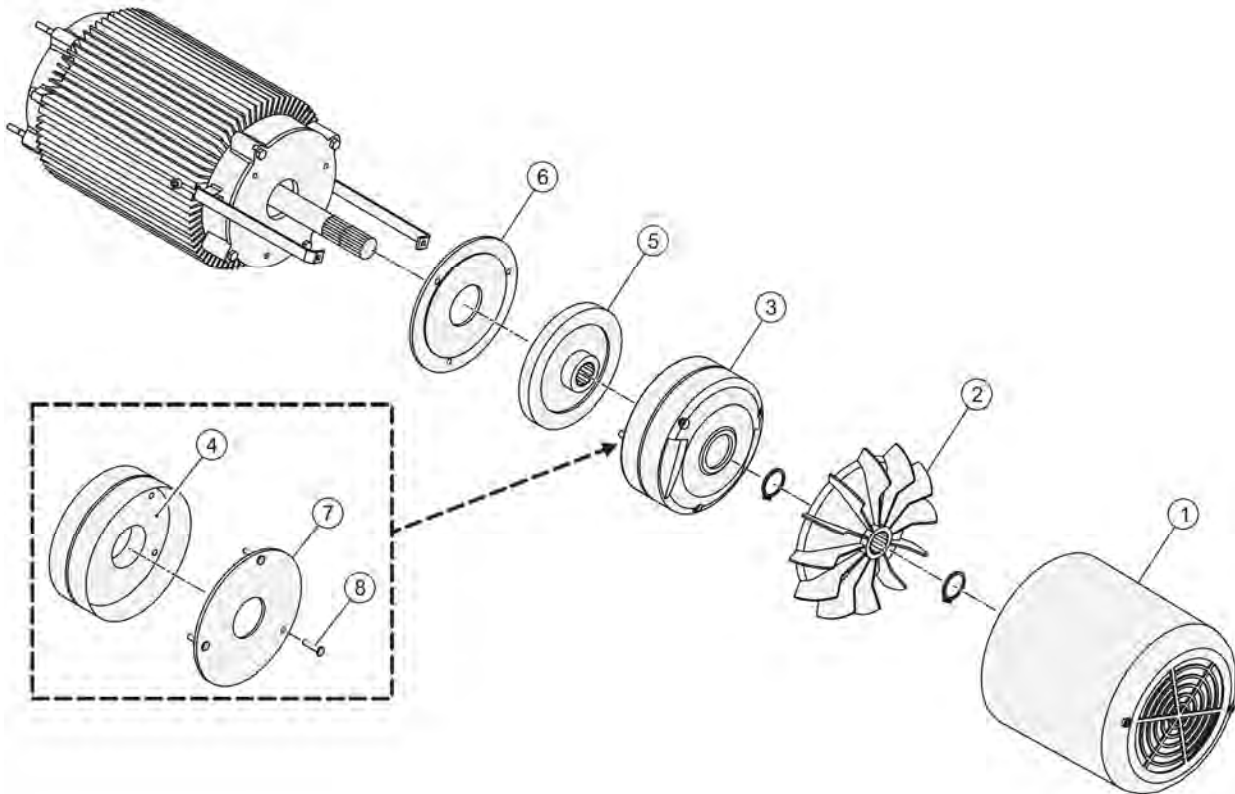
7.1.7 Hoisting brake

Standard hoists are equipped with two-speed squirrel-cage motors, which are especially designed and manufactured for hoisting duty. The motors incorporate a cylindrical rotor and class F insulation, and are conform to the protection standard IP54/DIN40050.

The hoisting brake is an electromagnetic safety brake that is closed by spring force.

WARNING

When the maximum allowed number of braking actions has been used, CID raises a warning (Br SWP%) indicating that the design limit for the hoisting brake has been reached and the brake must be replaced. Replace also the motor coupling at the same time.

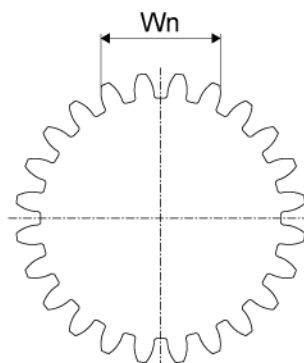


1. Fan cover
2. Fan
3. Brake
4. The inner side of the brake with springs
5. Brake disc
6. Friction disc
7. Anchor plate
8. Screw
9. Fixing screws

Replacement of a hoisting brake

When the hoisting brake has reached its designed lifetime, the condition monitoring unit sends a warning (Br SWP %) that the hoisting brake design limit has been reached (the default limit value is 1,000,000 brakings).

Replace the brake immediately with a new one. Replace also the motor coupling at the same time, and check the condition of coupling splines in the motor shaft and in the gear shaft, see the acceptance criteria in the following tables.



Limits for the wear of the brake splines on motor shaft

Motor	MF10	MF11	MF13
Module [mm]	1.25	1.25	1.25
Number of teeth	18	26	26
New Wn max [mm]	13.48	17.35	17.35
New Wn min [mm]	13.46	17.32	17.32
Change limit in GO Wn [mm]	13.4	17.2	17.2
Final rejection limit Wn [mm]	13.3	17.1	17.1
Number of teeth in measurement Wn	4	5	5

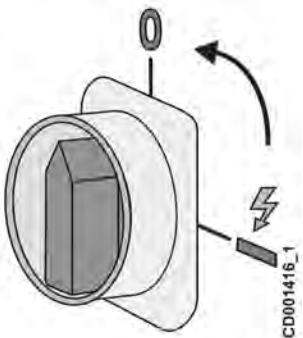
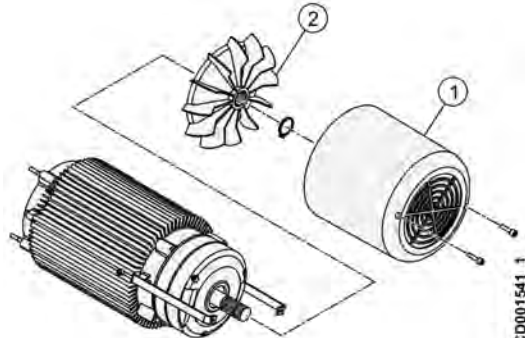
Limits for the wear of the coupling splines on motor and gear shaft

Motor	MF10	MF11	MF13	MF13
Module [mm]	1.0	1.5	1.5	2.0
Number of teeth	23	18	21	18
New Wn max [mm]	7.66	6.98	11.47	15.23
New Wn min [mm]	7.62	6.94	11.43	15.19
Change limit in GO Wn [mm]	7.5	6.7	11.2	15.0
Final rejection limit Wn [mm]	7.4	6.5	11.0	14.8
Number of teeth in measurement Wn	3	2	3	3

After the replacement, reset the hoisting brake SWP value by setting parameter 7-24 (Br Count) to zero (0)."

Disassembly

 WARNING	<p>Lock the rope drum to prevent it from rotating when hoisting brake is detached. The weight of falling rope can rotate the unlocked drum and cause hazardous situation.</p>
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1	 <p>Lower the hook to the ground. Switch OFF the power supply to the hoist. Remove the protective cover of the hoisting machinery. Lock the rope drum with a wooden wedge to prevent it from rotating.</p>	2	 <p>Remove the fan cover (1) and fan (2).</p>
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Note: Place your fingers behind the fan and carefully pull the fan off the shaft.

3		4	
	<p>Remove the fixing screws for the brake. Detach the brake (3), brake disc, (5) and friction disc (6).</p> <p style="text-align: right; font-size: small;">CD001542_2</p>		<p>Remove the brass screws (9), but be careful with the springs (8) and the anchor plate (7) that spring out from the inside of the brake (4) due to the spring (8) pressure.</p> <p style="text-align: right; font-size: small;">CD001545_1</p>

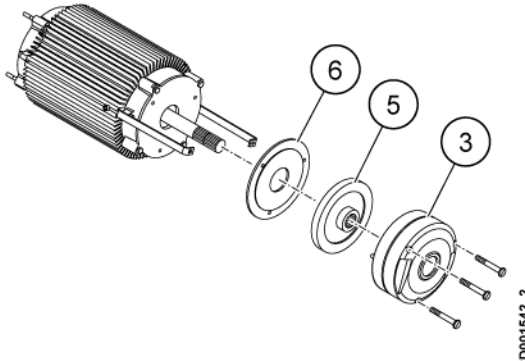
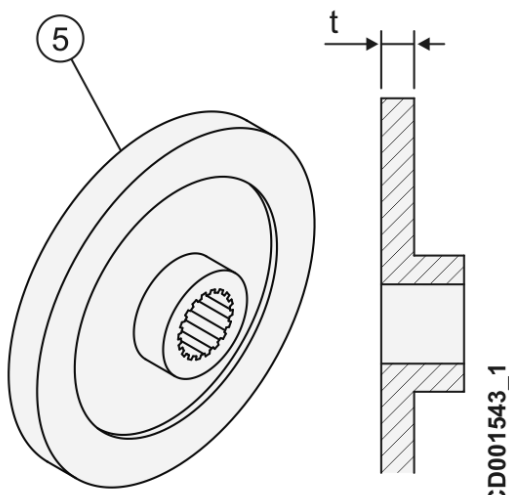
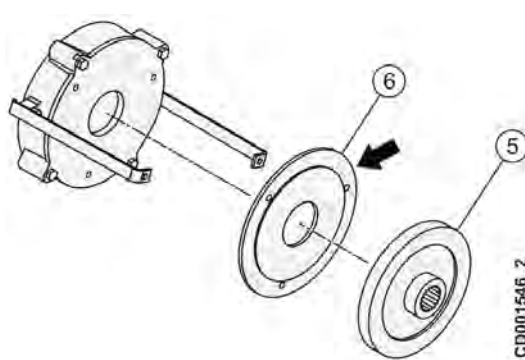
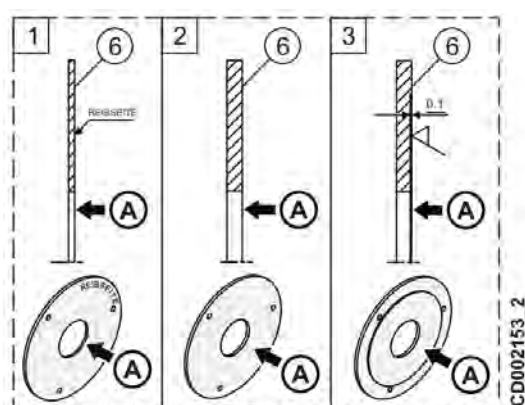
CAUTION

Open the brake cautiously due to spring pressure. Do not let the springs fall out in uncontrolled manner as each spring should be placed into its original indent in the reassembly.

Reassembly

1		2	
	<p>Install the springs (8) into the spring indents of the brake body (4). Place the anchor plate (7) on the springs and feed the brass screws (9) through the holes in the anchor plate.</p> <p style="text-align: right; font-size: small;">CD001545_1</p>		<p>Install the brake disc (5) and the friction disc (6). Install the brake (3), and apply proper tightening torque on the screws.</p> <p style="text-align: right; font-size: small;">CD001542_2</p>
3			
	<p>Install the fan (2), secure with snap ring and then install the fan cover (1). Release the rope drum locking. Install the protective cover to the hoisting machinery and switch ON the power supply to the hoist.</p> <p style="text-align: right; font-size: small;">CD001541_1</p>		


Maintenance of hoisting brake

1	 <p>Disassemble the brake and clean the brake disc (5) and the friction disc (6).</p>	2	 <p>Check the brake type on the rating plate that is fixed to the brake. Measure the thickness of the brake disc (5). Replace the brake disc if the thickness (t) is less than the recommended thickness for brake disc change as according to the below table.</p>
3	 <p>If there has been a problem in brake operation, change the brake disc (5) and the friction disc (6). Install the machined surface of the friction disc (6) against the brake disc (5).</p>	4	 <p>There are three different types of friction discs (6). If there have been problems in the operation of the brake, it is recommended to change also the friction disc to the latest type with a machined surface (option 3 in the picture above). A = brake disc side</p>

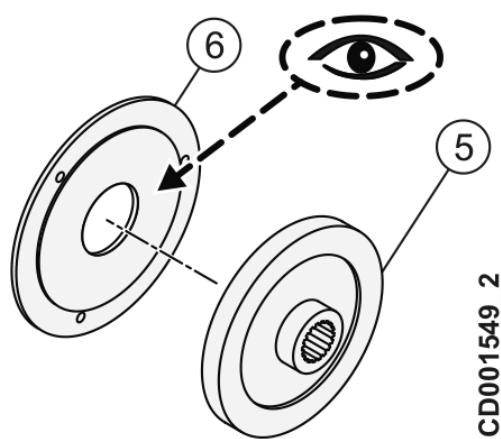
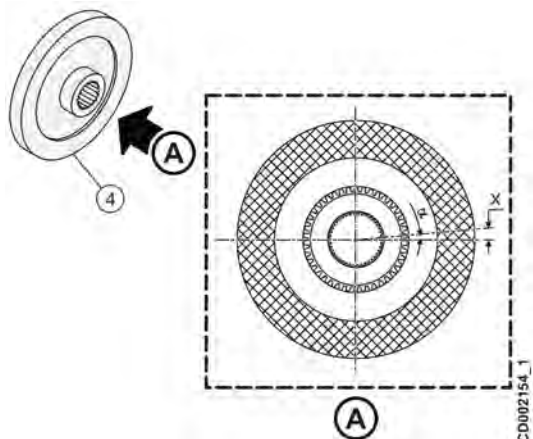
Brake type and size	Original thickness of the brake disc [mm]	Recommended thickness for brake disc change [mm]	Minimum thickness of the brake disc [mm]	Tightening torque for brake fixing screws [Nm] / [lbf.ft]	Tightening torque for anchor plate screws [Nm] / [lbf.ft]
NM39972NR#	7.00	6.8	6.6	5.0 / 3.7	3.5 / 2.6
NM38721NR#	8.00	7.8	7.6	9 / 6.6	2.0 / 1.5
NM38720NR#	8.00	7.8	7.6	9 / 6.6	2.0 / 1.5
NM38730NR#	10.40	10.2	10.1	9 / 6.6	2.0 / 1.5
NM38740NR#	11.15	10.6	10.4	22 / 16.2	3.5 / 2.6
NM38741NR#	11.15	10.6	10.4	22 / 16.2	3.5 / 2.6
NM38751NR#	14.00	13.4	13.2	22 / 16.2	8.0 / 5.9
NM38753NR#	14.00	13.8	13.6	22 / 16.2	8.0 / 5.9
NM40940NR#	11.15	10.6	10.0	22 / 16.2	3.5 / 2.6
NM40951NR#	14.00	13.4	13.0	22 / 16.2	8.0 / 5.9
NM40980NR#	15.50	14.4	14.0	22 / 16.2	8.0 / 5.9

NM41040NR#	11.15	10.6	10.0	22 / 16.2	3.5 / 2.6
NM41051NR#	14.00	13.4	13.0	22 / 16.2	8.0 / 5.9

	CAUTION	Friction material of NM409 brakes (red stamp: RSM-X) is different from the NM387 series brakes (red stamp: RSM-H or RSM). These brake discs must not be mixed.
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	CAUTION	Do NOT use any lubricant with brake disc teeth. This may cause brake malfunctioning.
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NOTICE	Friction disc is not used in MF13 type motors.
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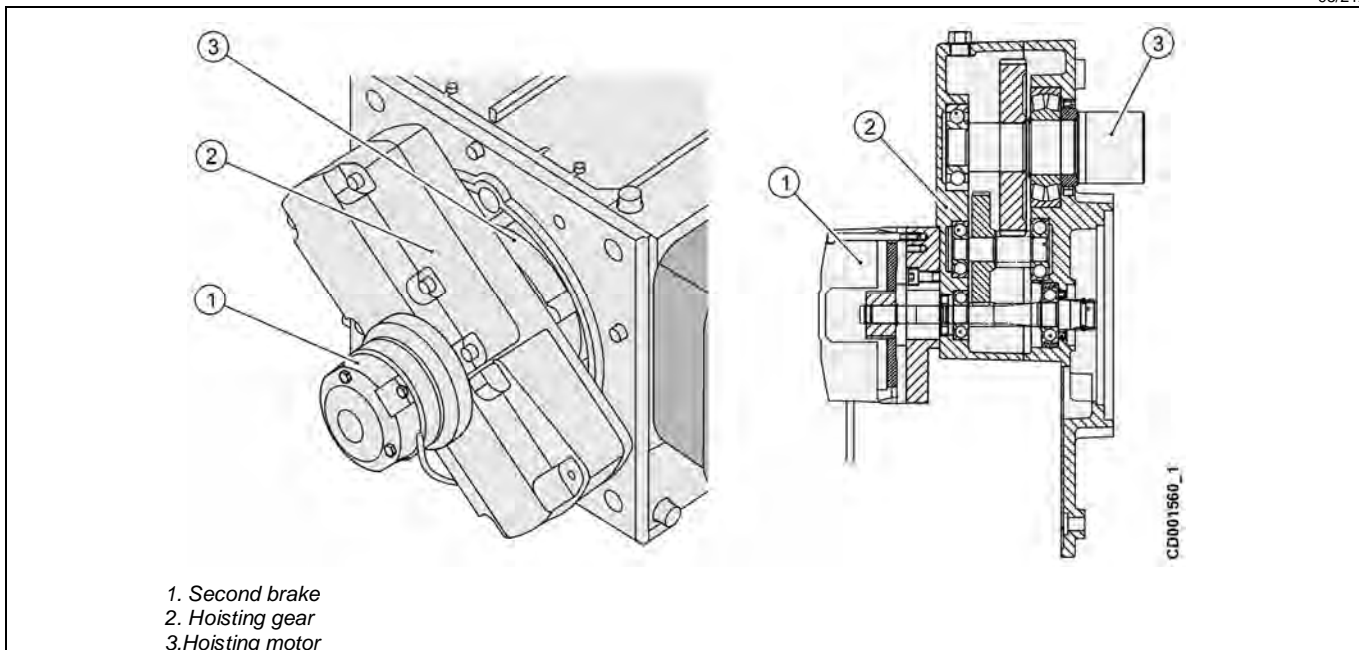
3	 <p style="text-align: right; font-weight: bold;">CD001549_2</p> <p>The friction disc (6) must be smooth with no grooving for proper braking. Replace the friction disc if there is grooving on its surface or it is bent more than 0.05 mm.</p>	4	 <p style="text-align: right; font-weight: bold;">CD002154_1</p> <p>Check the physical condition of teeth on the brake disc (4). If any visible wear is found in any of the teeth, replace the brake disc with a new one. Note that lubricant shall not be used.</p>
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7.1.8 Second brake, Frame size: VTs, VT1, VT2, VT3.

The second brake (1) is an electromagnetic safety brake, which is closed by spring force. The second brake operates as holding brake when the motion has stopped and the main brake has closed.

The second brake closes with a small delay and opens simultaneously with the main brake.

The second brake is attached to the primary shaft of the hoisting gear (2), whereas the hoisting motor (3) with the main brake is attached to the other end of the shaft.

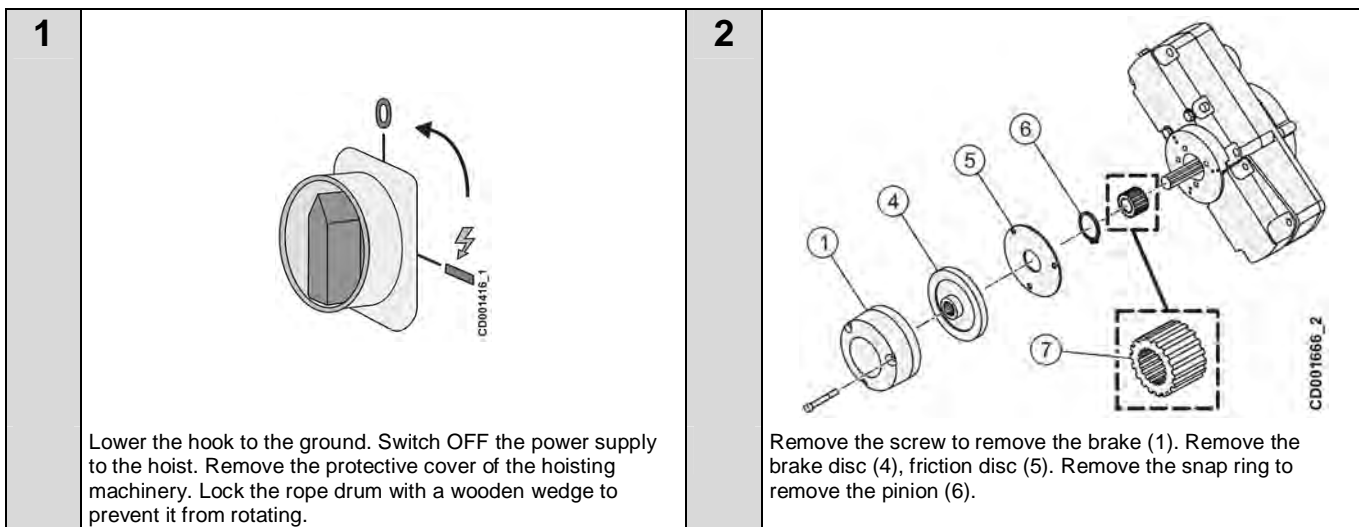


Disassembly

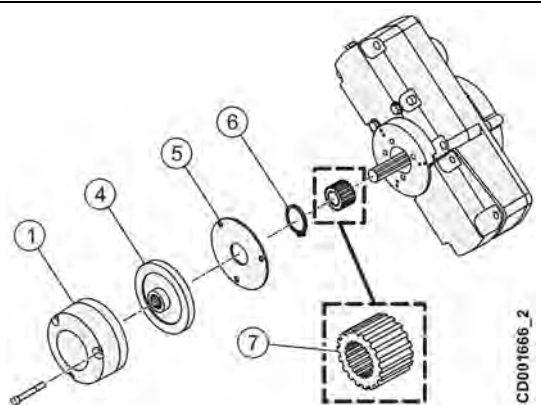
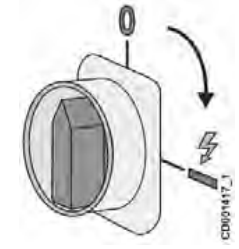


WARNING

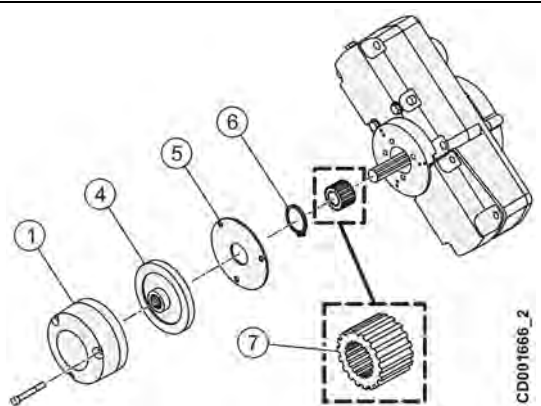
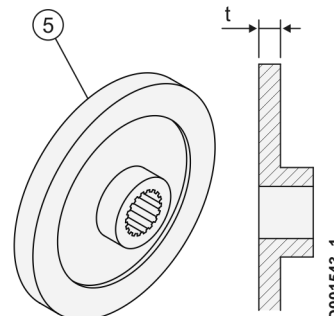
Lock the rope drum to prevent it from rotating when the hoisting brake is detached. The weight of a falling rope can rotate the unlocked drum and can cause a hazardous situation.



Reassembly

<p>1</p>  <p>CD001666_2</p> <p>Install the pinion (7) and secure in place with the snap ring (6). Install the brake disc (4), friction disc (5) and the brake (1) and secure it with screws.</p>	<p>2</p>  <p>CD001417_1</p> <p>Remove the wedge locking the drum. Install the protective cover to the hoisting machinery and switch ON the power supply to the hoist.</p>
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7.1.8.1 Maintenance of second brake

<p>1</p>  <p>CD001666_2</p> <p>Disassemble the brake and clean the brake disc (4) and the friction disc (5).</p>	<p>2</p>  <p>CD001543_1</p> <p>Check the brake type on the rating plate that is fixed to the brake. Measure the thickness of the brake disc (5). Replace the brake disc if the thickness (t) is less than the minimum thickness as according to the table below.</p>
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	CAUTION	Check the oil leakage. There must not be any oil leakage from the gear box to the brake.
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Brake type and size	Original thickness of the brake disc [mm]	Recommended thickness for brake disc change [mm]	Minimum thickness of the brake disc [mm]	Tightening torque for brake fixing screws [Nm] / [lbf.ft]	Tightening torque for anchor plate screws [Nm] / [lbf.ft]
NM39330NR#	10.40	10.2	10.1	9 / 6.6	2.0 / 1.5
NM39340NR#	11.15	10.6	10.4	22 / 16.2	3.5 / 2.6
NM39351NR#	14.00	13.4	13.2	22 / 16.2	8.0 / 5.9


	CAUTION	Friction material of NM409 brakes (identified with the manufacturer's red stamp: RSM-X) is different from the NM387 series brakes (identified with the manufacturer's red stamp: RSM-H or RSM). These brake discs must not be mixed.
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7.1.9 Drum Brake

The drum brake has been designed as an extra safety device to the hoist. To obtain the maximum safety, it operates mechanically and applies directly to the rope drum. Drum brake has three different configurations, that is, holding brake, overspeed brake, and a construction with both holding and overspeed brake functions.


	CAUTION	Drum brakes are tested and adjusted by the hoist manufacturer prior to delivery. Only qualified personnel, authorized by the manufacturer may install, adjust and service the drum brake.
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	CAUTION	Service and maintenance of the drum brake must be done at regular intervals as recommended by the manufacturer.
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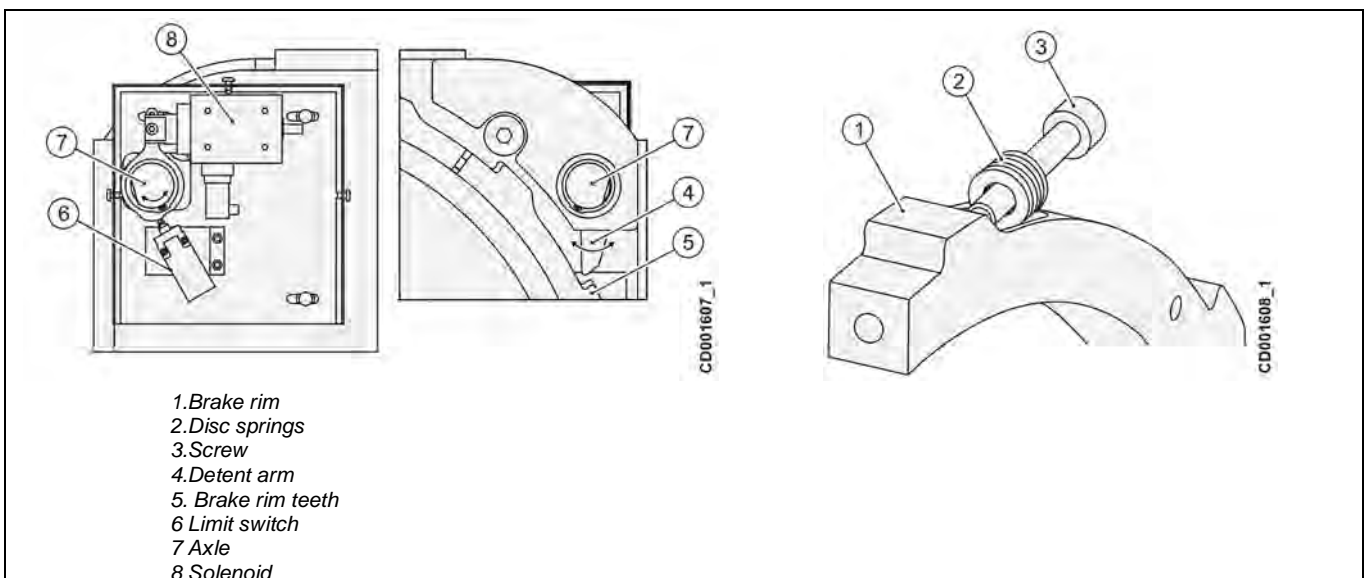
	CAUTION	The drum brake must always be kept clean. The braking torque reduces strongly if any grease or oil penetrates to the friction surfaces.
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7.1.9.1 Construction of Holding Brake

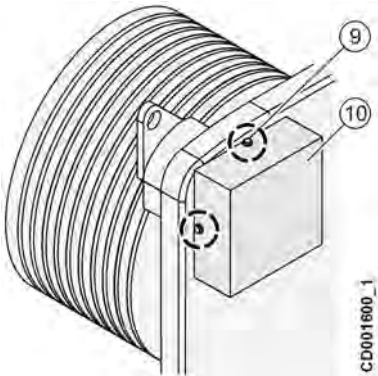
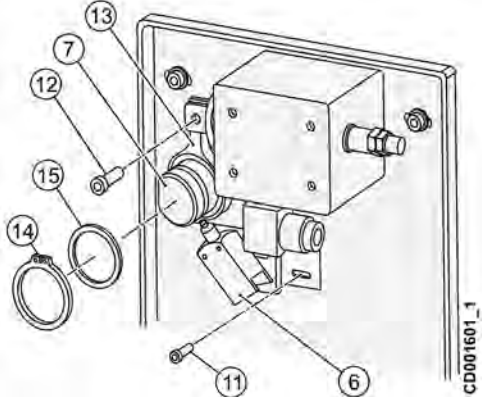
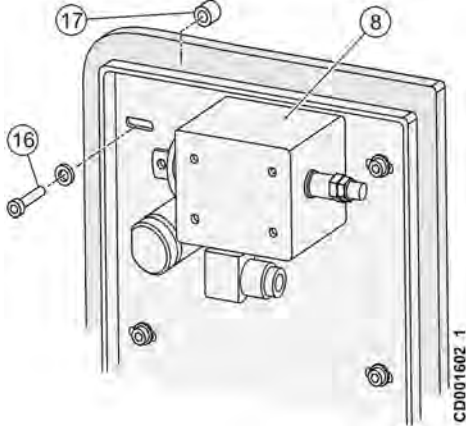
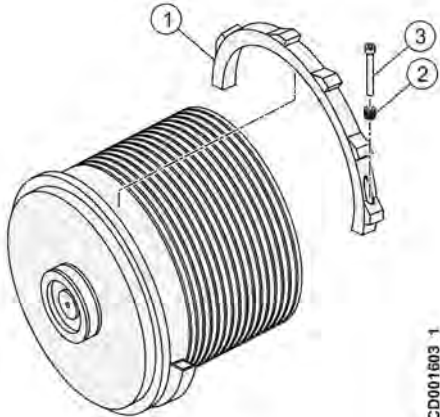
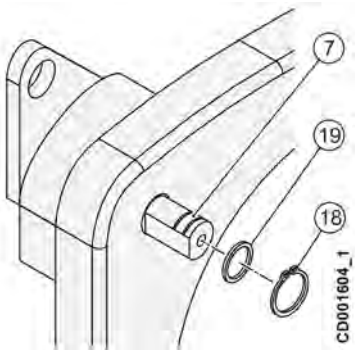
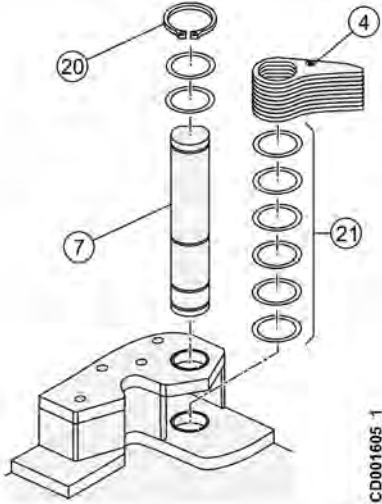
The holding brake acts as a second brake and mechanically locks the drum when the hoisting or lowering motion has stopped. When the operator starts hoisting or lowering, the holding brake is released and driving upwards or downwards is possible. However, in case the main brake has slipped during standstill, the cam may be locked against the brake rim (1) and the electromagnet is not able to release the cam. In this case, it is necessary to drive the hoist in upward direction to release the drum brake.

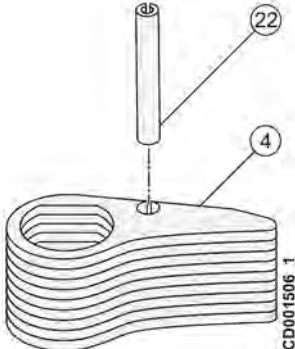
	CAUTION	Do not drive the hoist in the upper stop limit switch when handling heavy loads. Stop lifting as soon as the hoist enters the upper slow down limit.
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In case the holding brake locks frequently, it may indicate wear of the main brake.

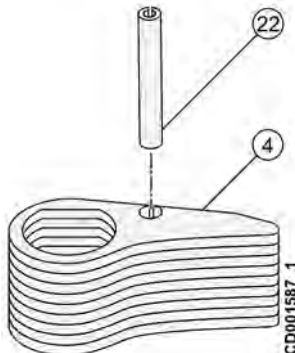


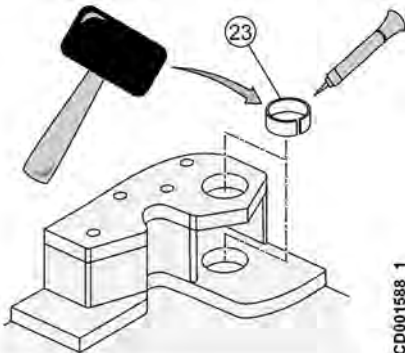
Disassembly

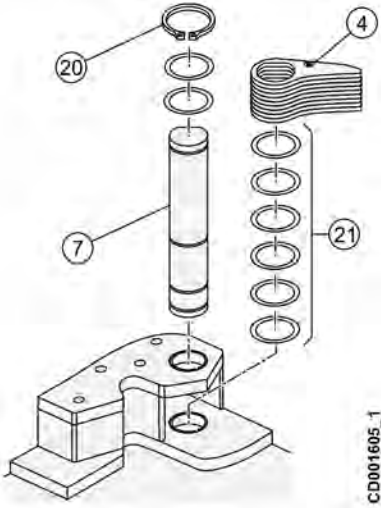
<p>1</p>	 <p>Remove the three nuts and bolts (9) to remove the cover (10) from the attachment plate.</p>	<p>2</p>  <p>Remove the screws (11) which hold the limit switch (6) to the attachment plate. Remove the screw (12) holding the lever (13) in the solenoid shaft groove. Remove the snap ring (14) and the washer (15) to remove the lever (13) on the axle (7).</p>
<p>3</p>	 <p>Remove the bolts (16), nuts and washers holding the attachment plate with the bushing (17) in between the attachment plate and the end plate. Remove the solenoid assembly (8) from the attachment plate.</p>	<p>4</p>  <p>Remove the bolts (3) and disc springs (2) holding the brake rim halves (1) together.</p>
<p>5</p>	 <p>Remove the snap ring (18) and the washer (19) on the axle (7) from the outer side of the end plate.</p>	<p>6</p>  <p>Remove the axle (7) with the snap ring (20) to remove the stack of detent arm (4) and washers (21).</p>

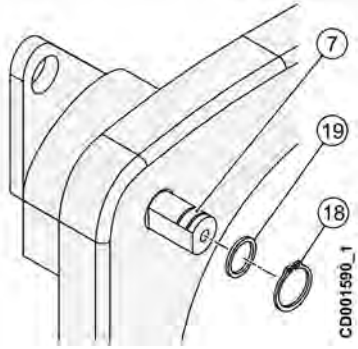
7	 <p>If necessary, remove the bushing in the axle holes in the end plate. Remove the spring pin (22) to separate the stack of detent arm (4) pieces.</p>
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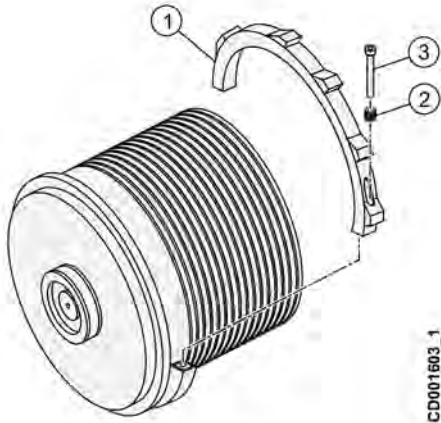
Reassembly

1	 <p>Take nine pieces of detent arm (4) and attach tightly against each other using a spring pin (22). Install the pin (22) so that the pin ends extend 1-2 mm past the outmost locking latches.</p>
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2	 <p>Clean the holding brake installation hole thoroughly. Brush the outside surface of the bearings (23) with thread-locking compound. Place the first sleeve bearing evenly on top of the upper axle hole. Place the impact bushing on top of the bearing and carefully tap the bearing into the hole with a hammer. Similarly tap the second sleeve bearing into the lower axle hole.</p>
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3	 <p>Install the snap ring (20) on the axle (7). Position the detent arm (4) as show in the illustration and adjust its position using shim washers (21). Place 2 shim washer (21) below the snap ring (20) on the axle (7). Guide the axle (7) through detent arm (4).</p>
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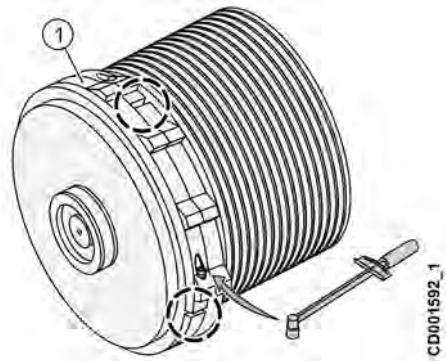
4	 <p>Fit the shim washer (19) and the snap ring (18) on the axle (7) from the other side of the end plate.</p>
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5


CD001603_1

Clean the rope drum holding brake surface thoroughly. Install the brake rim (1) halves on the drum groove. Install the disc springs (2) on the bolts (3) and screw the bolt into the brake rim (1).

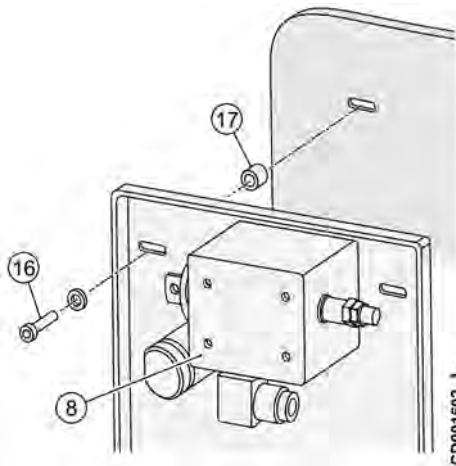
Tighten the two brake rims (1) together with the bolt (3) and disc springs (2).

6


CD001592_1

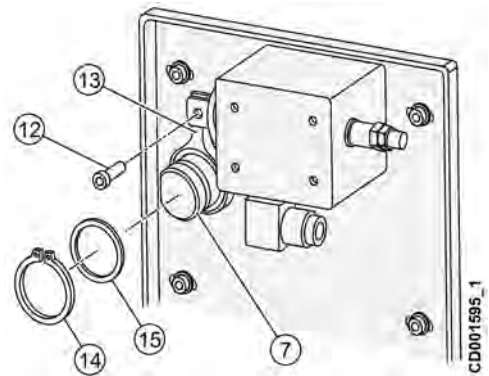
If there are two brake bands (1) ensure that the connection points of the halves of both rims is not aligned, they must be 90 degrees apart.

Tighten the brake band bolts evenly with a torque 60 Nm.

7


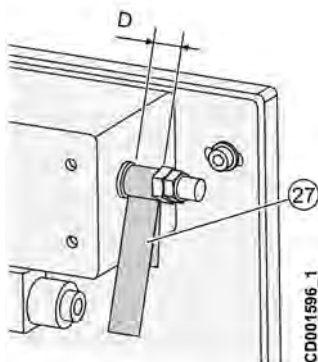
CD001602_1

Install the solenoid assembly (8) to the attachment plate. Install the attachment plate to the drum end plate with bolts (16) and washer and place bushings (17) on the bolts between the attachment plate and the end plate. Tighten the bolts lightly.

8


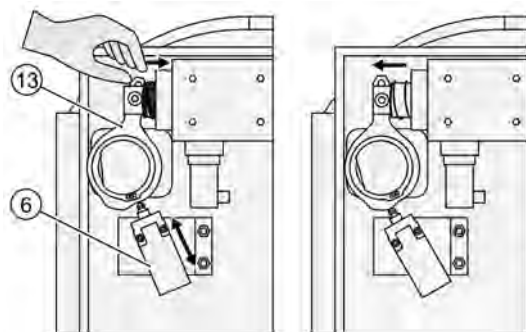
CD001595_1

Place the snap ring to its place to the second groove on the axle (7). Place one 2 mm washer and one 1 mm washer on the axle (7). Place the lever (13) on the axle (7) and washer (15) on the axle (7) and lock it in place with a snap ring (14). Insert the lever (13) into the solenoid shaft groove and lock them together with bolt (12) and nuts.

9


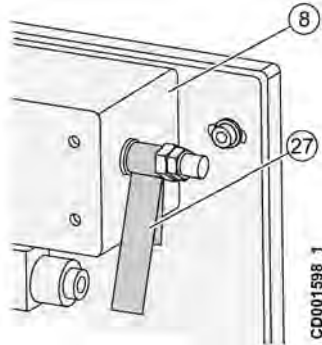
CD001596_1

Adjust the solenoid stroke to 16 mm. Do this with the help of the same width steel band (27).
D = 16 mm.

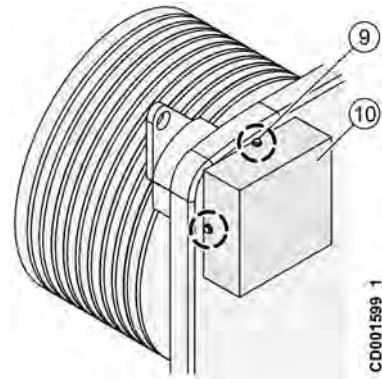
10


CD001597_1

Press the solenoid shaft in so that the latch is in open position. Adjust the limit switch (6) so that it is in open position. Release the solenoid shaft. The switching point must be just before the limit switch roller reaches the topmost part of the cam on the lever (13).

11


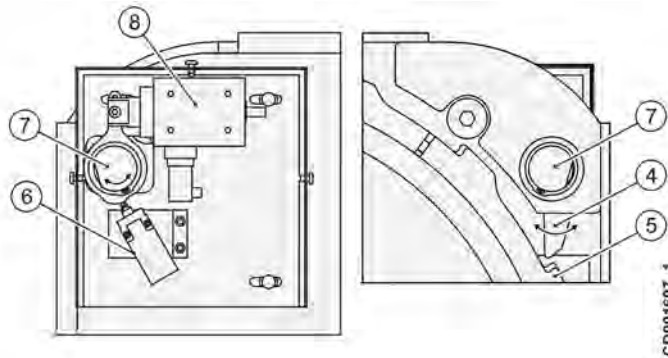
Lock the solenoid (8) in open position with the steel band (27) used earlier for the test run and rope reeving.

12


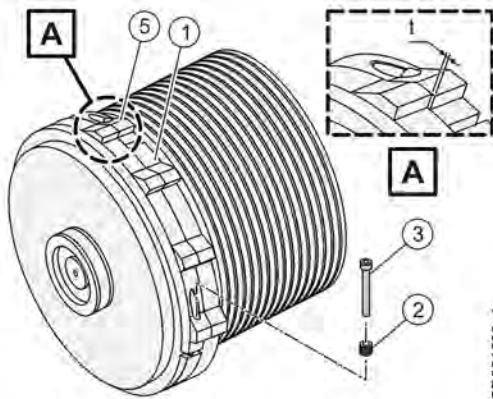
Attach the cover (10) to the attachment plate with three bolts (9) and washers. Tighten with a torque 6 Nm.

Attach the limit switch wire with a cable tie to the hoist end plate for the final electrification.

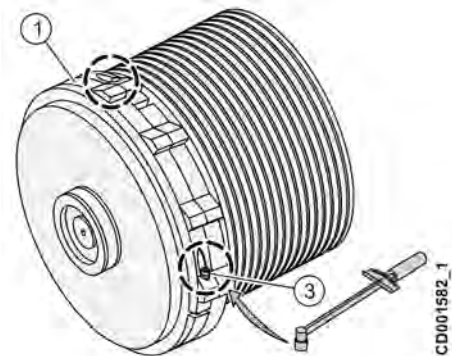
Adjustment



- 4. Detent arm
- 5. Teeth of brake rim
- 7. Shaft of the detent arm
- 6. Holding brake limit switch
- 8. Solenoid

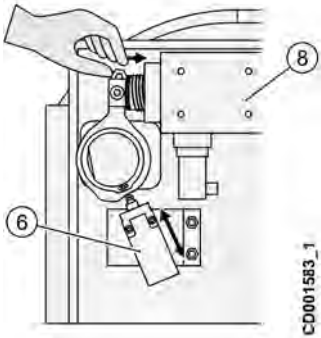
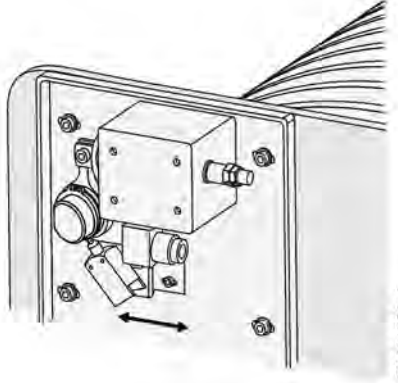
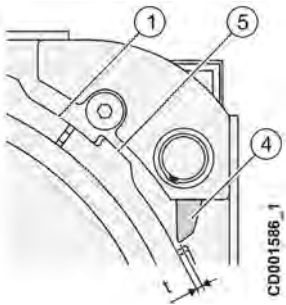
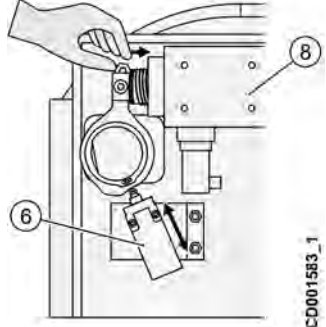
1


Assemble the brake rims (1) together with disc springs (2) and screws (3). Adjust the rims (1) so that there is a difference of 5 mm (0.2") between the teeth (5) of the two brake rims (1). The 5 mm difference is to allow one rim to begin the braking before the second rim engages to reduce the dynamic impact.


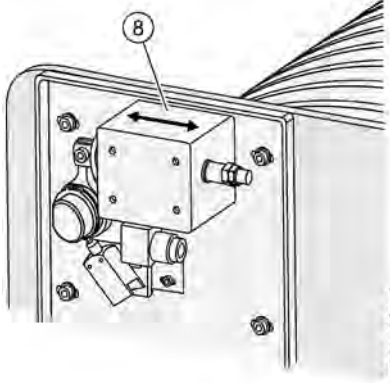
2


Tighten the brake rim screws (3) to a torque of 60 Nm (44 ft lb).

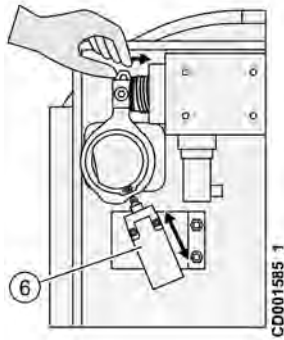
Check with the caliper that the gap between the brake rim halves (1) is the same on both sides. This is to ensure the even tooth to tooth distances over the brake rim connection.

<p>3</p>	 <p>CD001583_1</p> <p>Adjust the holding brake limit switch (6) to be mechanically activated by the cam of the detent arm, when the solenoid (8) de-energized.</p>	<p>4</p>  <p>CD001584_1</p> <p>Adjust the latch rest position by moving the solenoid attachment plate horizontally.</p>
<p>5</p>	 <p>CD001586_1</p> <p>Check that the gap (t) between the detent arm (4) and the brake rim (1) is within $t = 1...2$ mm when the hoist is idle. When the solenoid is activated, check that there is a clearance between teeth (5) and detent arm (4).</p>	<p>6</p>  <p>CD001583_1</p> <p>Manually activate the holding brake limit switch (6) pressing the solenoid (8) in when operating in the down direction and verify that hoisting is stopped in the down direction. The up direction should continue to operate.</p>

7.1.9.2 Maintenance of holding brake

<p>1</p>  <p>CD001580_1</p> <p>Check that the drum brake and surrounding surfaces are free from oil, grease, excessive dust and/or other substances that may reduce the effectiveness of the friction material of the drum brake.</p>		<p>2</p>  <p>CD001581_1</p> <p>Check that the solenoid (8) works properly.</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------

3



Manually activate the holding brake limit switch (6) when operating in down direction and verify that hoisting is stopped in the down direction. The up direction must continue to operate.

7.1.9.3 Construction of Overspeed Brake

Overspeed brake prevents the rope drum from an overspeed condition. Overspeed can occur when a component in the transmission or drive train fails and the load on the hook is heavy enough to cause an overspeeding of the drum.



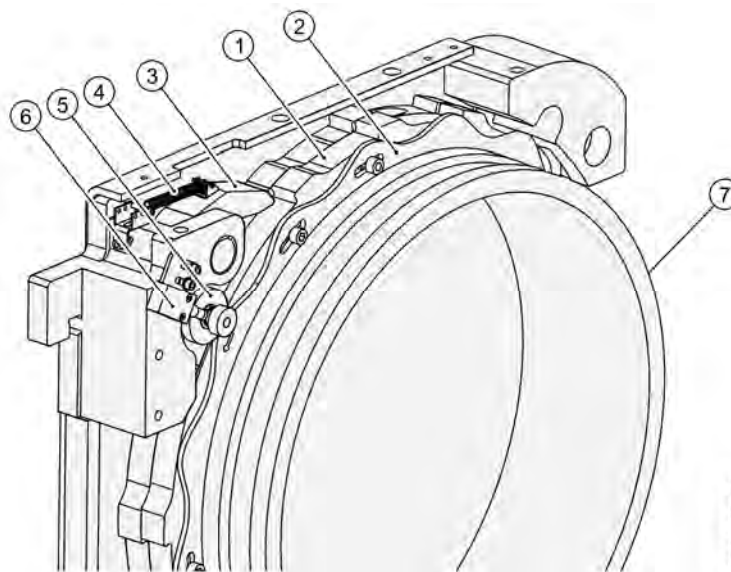
CAUTION

In case the drum brake activates due to overspeed, always contact a representative of the hoist manufacturer. The hoist must not be used before the cause for an overspeed has been found and repaired. The drum brake components must be checked for wear and damage and then adjusted per instructions.



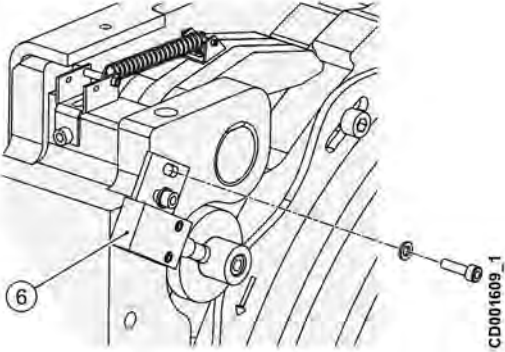
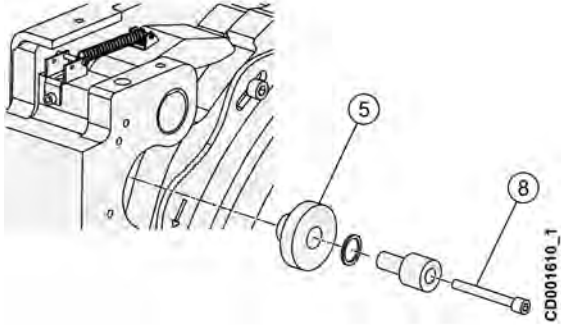
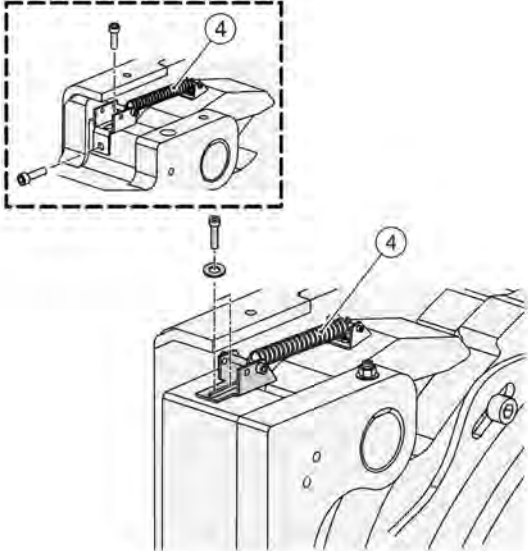
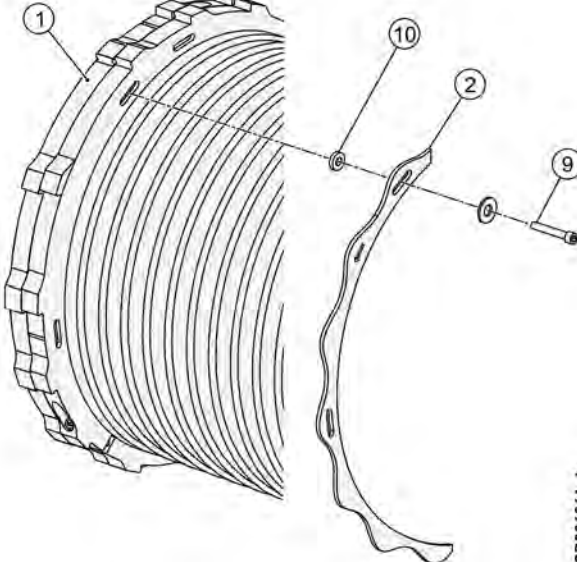
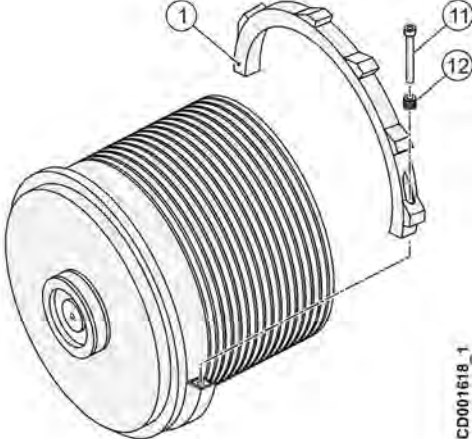
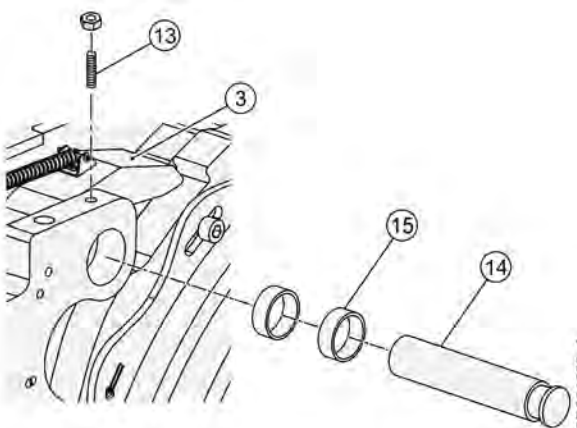
CAUTION

After the drum brake has been activated do not jumper any controls to lower the load using the hoist.

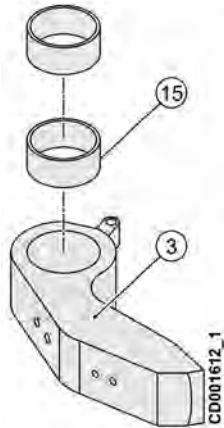
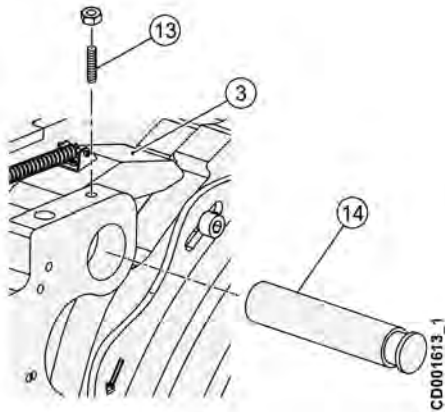
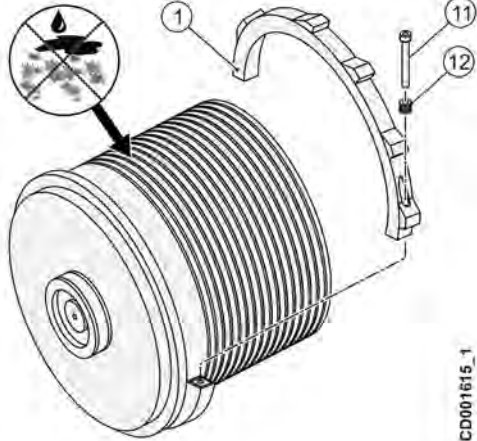
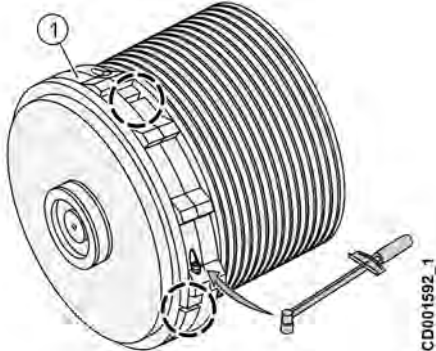


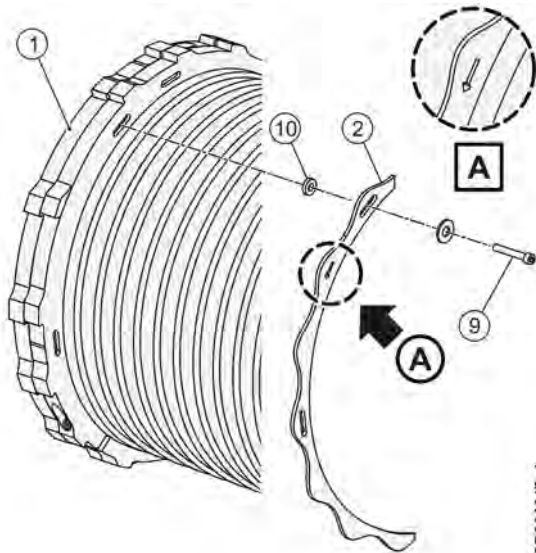
1. Brake rim
2. Cam wheel
3. Detent arm
4. Adjustment spring
5. Follower
6. Limit switch
7. Rope drum

Disassembly

<p>1</p>	 <p>Remove the limit switch (6) which is assembled to end plate with screw and washer.</p> <p>CD001609_1</p>	<p>2</p>  <p>Remove the bolt (8) to remove the follower wheel (5) with the axle.</p> <p>CD001610_1</p>
<p>3</p>	 <p>Remove fixing plate and the spring (4) by removing the fastenings holding them.</p> <p>CD001611_1</p>	<p>4</p>  <p>Remove cam ring halves (2) from the brake rims (1) with the bolts (9) and washer and the bushings (10) between the cam ring (2) and brake rim (1).</p> <p>CD001614_1</p>
<p>5</p>	 <p>Remove the bolts (11) and disc springs (12) holding the brake rim halves (1) together.</p> <p>CD001618_1</p>	<p>6</p>  <p>Remove the locking screw (13) holding the axle (14) to remove the axle. Remove the detent arm (3) and the sleeve bearings (15) inside it.</p> <p>CD001622_1</p>

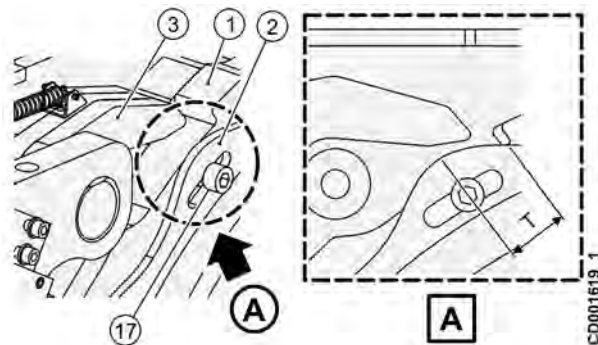
Reassembly

<p>1</p>	 <p>Clean the mounting holes in the end plate and the detent arm hole (3). Install the two sleeve bearing (15) in the detent arm hole (3) using impact bushing and a rubber hammer. If necessary, sharpen the detent arm teeth by grinding it before installation.</p>	<p>2</p>  <p>Position the detent arm (3) with required number of washers. The position depends upon the frame size. Brush a small amount of installation oil in the end plate holes and install the axle (14) When the top of the axle (14) is flush with the end plate lock it into place with a screw (13). Tighten the screw lightly.</p>
<p>3</p>	 <p>Clean the rope drum holding brake surface thoroughly. Install the brake rim halves (1) on the drum groove. Install the disc springs (12) on the bolts (11) and screw the bolt into the brake rim (1). Tighten the two brake rims (1) together with the bolt (11) and disc springs (12).</p>	<p>4</p>  <p>If there are two brake bands (1) ensure that the connection points of the halves of both rims are not aligned, they must be 90 degrees apart. Tighten the brake band bolts evenly with a torque 60 Nm. Fix the support bars and install the end plate to the drum.</p>

5


CD001617_1

Place one half of the cam ring (2) next to the inner brake rim (1). The arrow on the cam ring (2) must point to the drum rotation direction of lowering the hook. Place bushing (10) in between the cam (2) and the brake rim (1) and install the bolts (9) and washer for the cam.

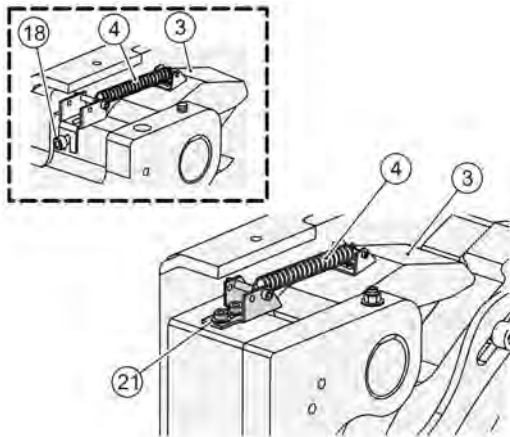
6


CD001619_1

Adjust the distance between the brake rim teeth (1) and the cam ring (2) wave peak to 36 mm.

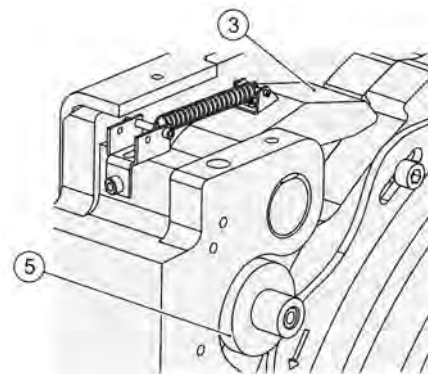
T = 36 mm.

Tighten the cam bolts (17). Install the second half of the cam ring (2) similarly. Ensure that the gap between the rings is same on both ends. Install the driven side end plate into its normal place.

7


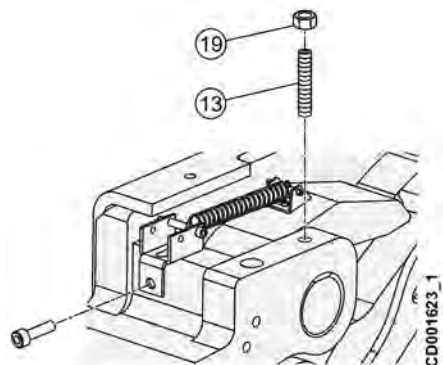
CD001620_1

Attach the adjustment spring (4) fixing parts to the detent arm (3) and the end plate. Align them to each other and install the fixing screws. Install the adjustment spring (4) to the fixing plates with screws and lock nut (18)/(21). Tighten lightly.

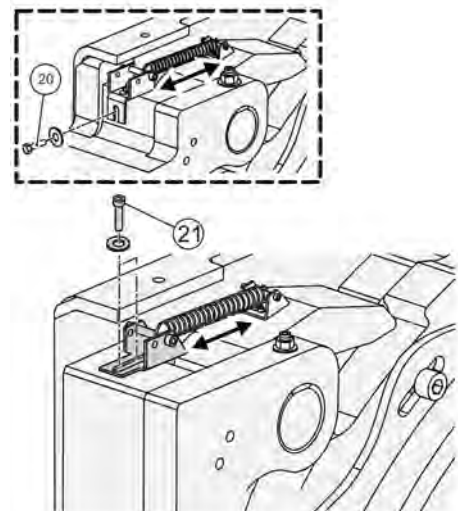
8


CD001621_1

Grease the axle of the follower (5) and install the washer and the follower wheel (5) on the axle. Install this assembly to the detent arm (3) with a bolt.

9


CD001623_1

10


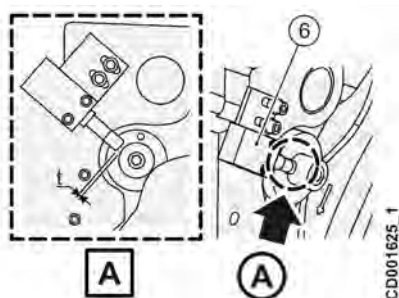
CD001624_1

Remove the screw (13) locking the detent arm axle and reinstall it after applying thread locking compound. Secure it in place with a nut (19).
Mark a black dot on the follower wheel to verify rotation and remove the screw holding the spring fixing plate to the end plate.

Rotate the rope drum so that the follower wheel is placed on the low point of the cam ring. Adjust the spring length by moving the fixing plate. Adjust the length for the corresponding reducer type according to the dimensions given in below table.

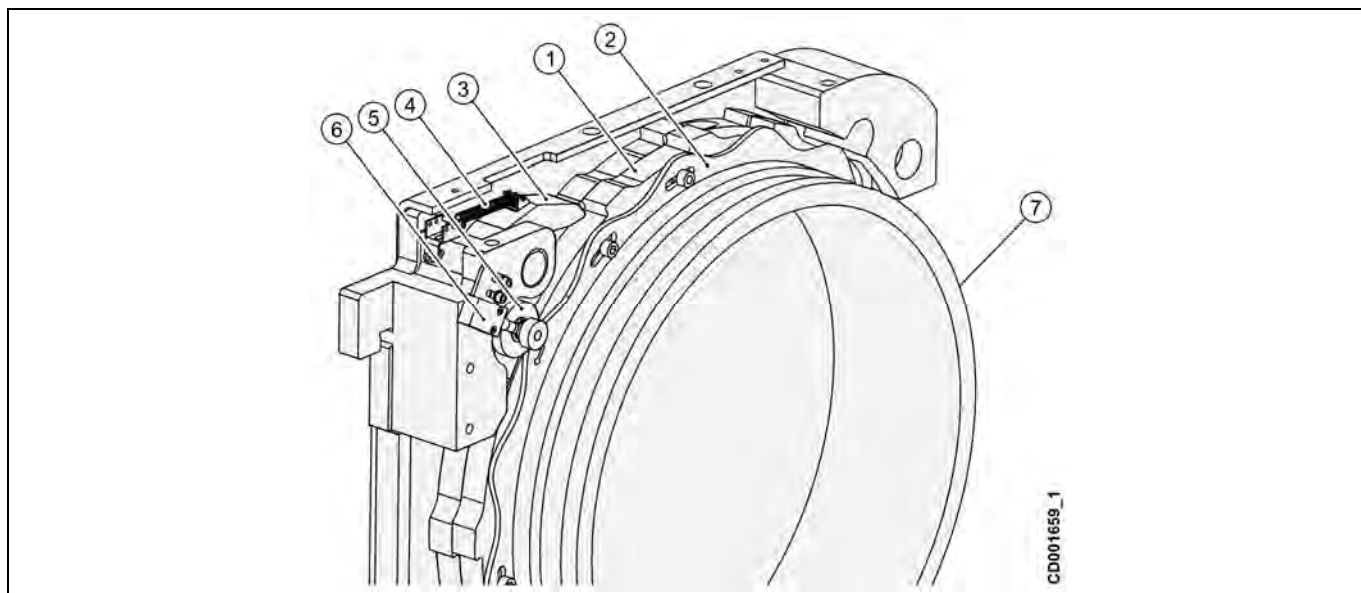
After the adjustment, install adequate number of washers between the fixing plate and the end plate and lock it with bolt (20)/(21). Write the adjusted spring length on the end plate.

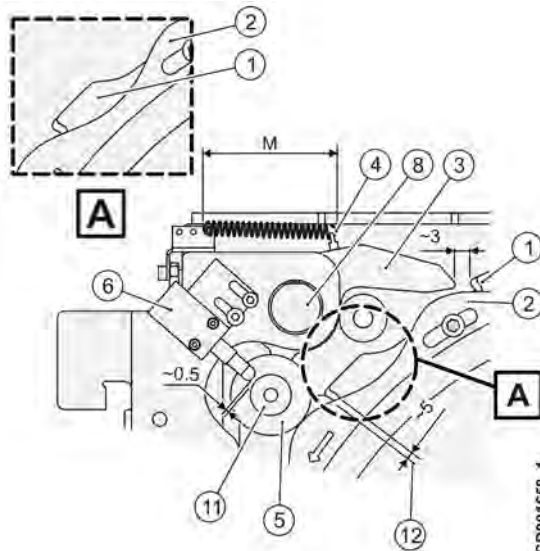
Hoist reducer type	Spring length (mm)
E	89...92
F	90...91
G	92...95
H	90
J	91...94

11


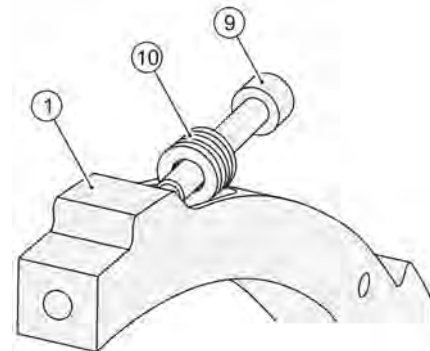
Install the limit switch (6) to the end plate with screws. Adjust the limit switch trigger points so that the limit switch triggers when the detent arm is 1...2 mm above the brake rim.
t = 1...2 mm.

Adjustment



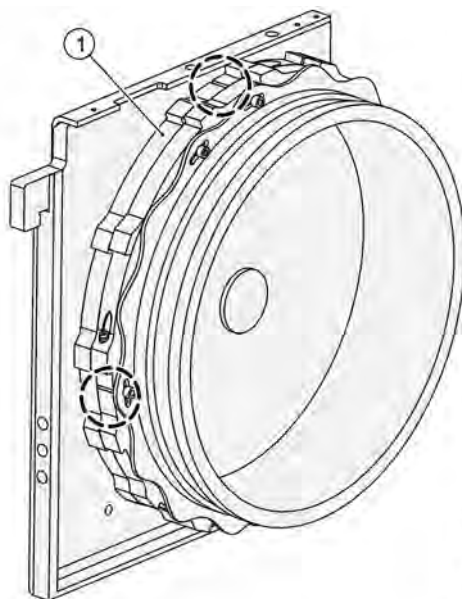


CD001658_1



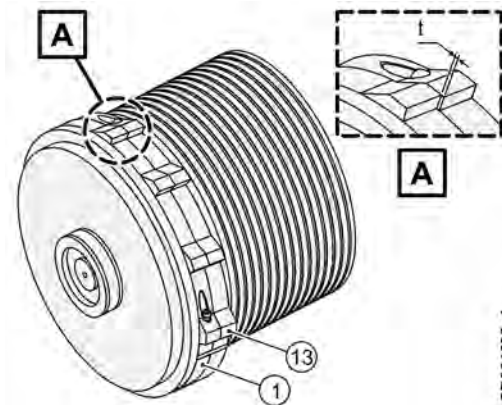
CD001655_1

1. Brake rim
2. Cam wheel
3. Detent arm
4. Helical spring
5. Follower roll
6. Over speed limit switch
7. Rope drum
8. Shaft of detent arm
9. Screw
10. Disc springs
11. Roll for limit switch
12. Only in models with drum diameter 608 mm with two hoisting motors

1


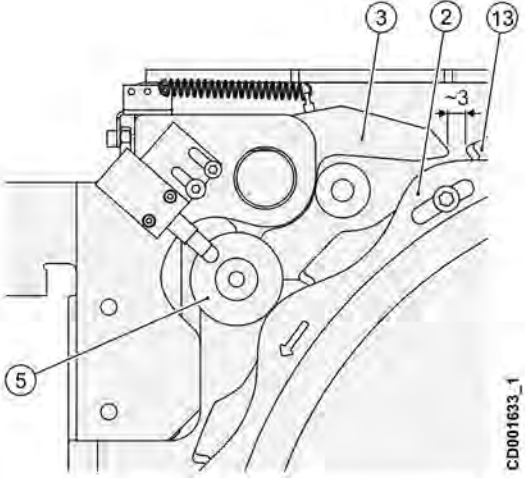
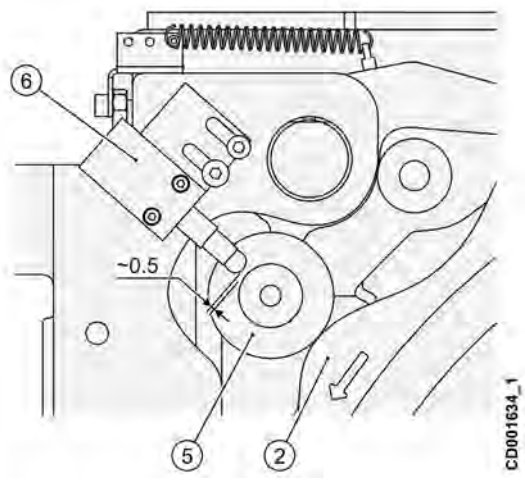
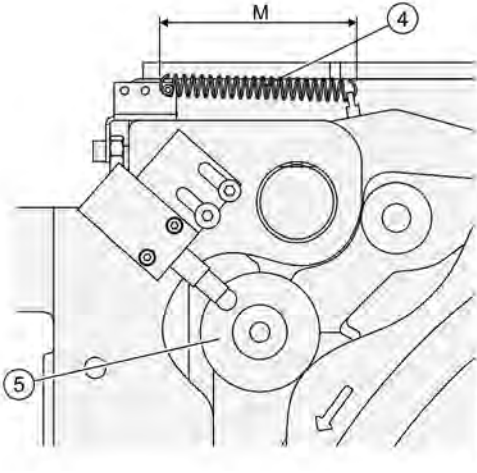
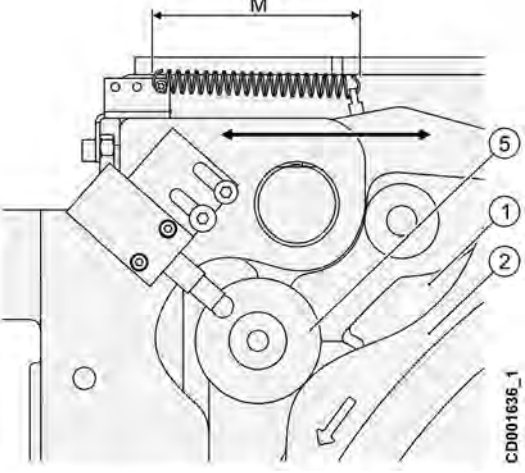
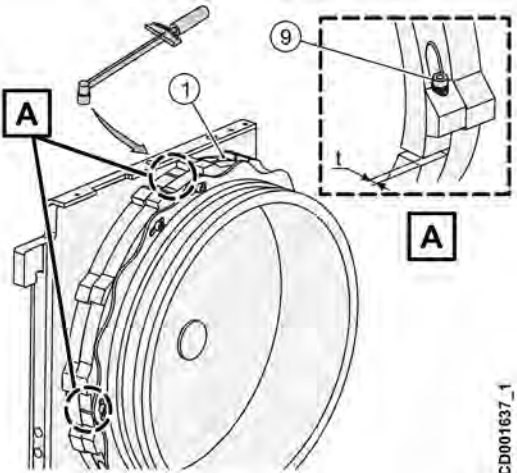
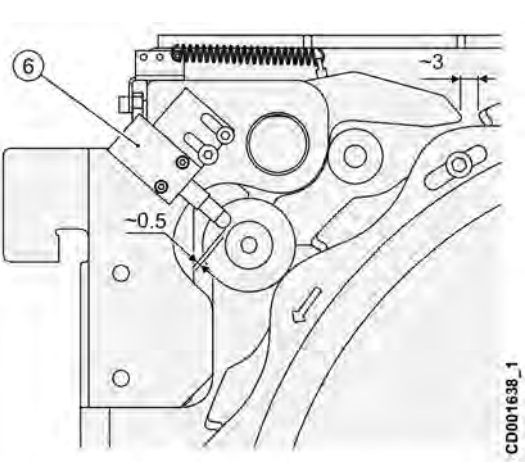
CD001631_1

In the two brake rim model, the connection points of the halves of both rims (1) must not be aligned, they must be 90 degrees apart. The 90 degrees placement is to reduce the risk of having two bolt connection teeth being contacted by the detent arm when an overspeed braking occurs.

2


CD001632_1

Adjust the rims (1) so that there is a difference of $t = 5 \text{ mm}$ (0.2") between the teeth (13) of the two brake rims (1). The 5 mm difference is to allow one rim to begin the braking before the second rim engages to reduce the dynamic impact.

<p>3</p>	 <p>Adjust the cam wheel (2) so that when the follower roll (5) is on the highest point of the cam wheel (2) there is a clearance of 3 mm (0.12") between the head of the detent arm (3) and the tooth of the brake rim (13). If the cam wheel (2) is replaced, position the cam wheel (2) by turning it until the distance between the brake rim teeth (13) and the cam ring wave peak is 36 mm.</p>	<p>4</p>  <p>Adjust the gap between the limit switch (6) and the roll (5) to 0.5 mm (0.02"). Make this adjustment when the follower roll (5) is on the highest level of the cam wheel (2).</p>
<p>5</p>	 <p>Adjust the length M of the helical spring (4) to the value recorded on the drum brake report that is included in the delivered hoist documentation. The follower roll (5) must be at the highest point on the cam wheel when the length of the spring is measured. Be aware that the spring must not be damaged. If damaged, replace the spring. Verify the spring type from the Q drum brake report.</p>	<p>6</p>  <p>Verify that the brake rim (1) screws are loose allowing the brake rims to slide freely on the drum during the following test. Test that the overspeed drum brake does not actuate when lowering the nominal load with full speed. If the drum brake activates, increase the M dimension to increase the follower roll (5) tension on the cam wheel (2) preventing premature drum braking action. Before repeating the test, verify that all rim and cam wheel (2) positioning marks are correct according to steps 3, 4 and 5.</p>
<p>7</p>		<p>8</p> 

After successful testing, tighten the brake rim screws (9) to a torque of 60 Nm (44 ft lb).

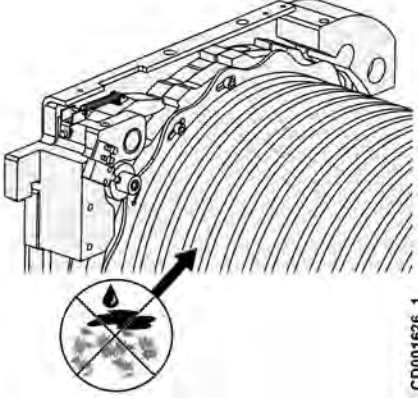
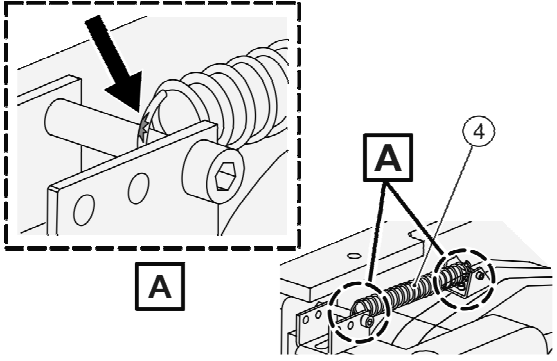
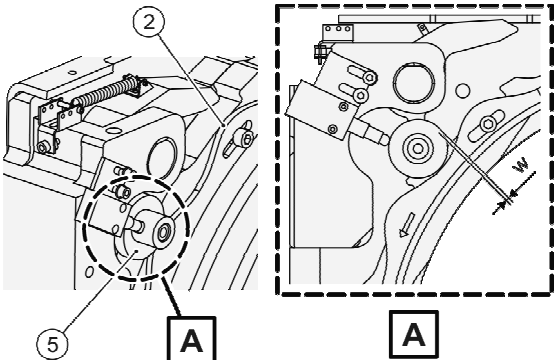
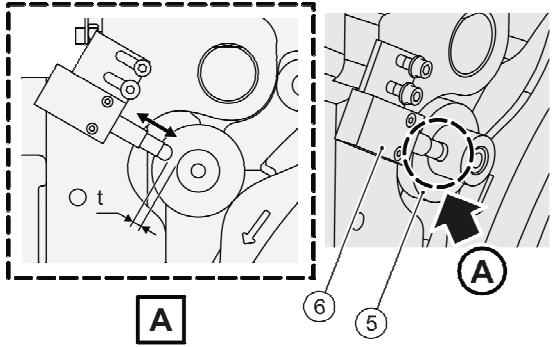
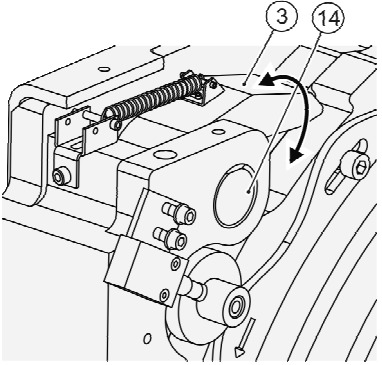
Check with the caliper that the gap (t) between the brake rim halves (1) is the same on both connections. This is to ensure the even tooth to tooth distances over the brake rim connection.

Manually activate the limit switch (6) when operating in down direction and verify that hoisting is stopped in the down direction. The up direction must continue to operate.

Gap between rim teeth and detent arm = 3 mm.

Gap between limit switch and follower wheel = 0.5 mm.

7.1.9.4 Maintenance of Over Speed Brake

<p>1</p>	 <p>Drum surface</p> <ul style="list-style-type: none"> • Check that the drum brake and surrounding surfaces are free from oil, grease, excessive dust and/or other substances that may reduce the effectiveness of the friction material of the drum brake.
<p>2</p>	 <p>Helical spring</p> <ul style="list-style-type: none"> • Check visually that there is no corrosion to the spring (4), and the spring (4) is not worn at connection points.
<p>3</p>	 <p>Follower roll</p> <ul style="list-style-type: none"> • Check visually that the roll (5) is not corroded. • Check that the roll (5) is not worn more than $W = 3$ mm of its original diameter. • Test that the roll (5) follows the cam ring (2) easily and it is fixed firmly to the detent arm.
<p>4</p>	 <p>Limit switch</p> <ul style="list-style-type: none"> • Check that the limit switch (6) is securely fastened. • Check that the positioning of the limit switch (6) is correct and the limit switch is contacted by the follower roll (5). The gap between the follower roll (5) and limit switch (6) is to be $t = 0.5$ mm measured on the cam wheel's (2) highest point. Refer to the "Adjustment" instructions. • Manually activate the holding brake limit switch when operating in down direction and verify that hoisting is stopped in the down direction. The up direction should continue to operate.
<p>5</p>	

Detent arm

- Check that the arm (3) rotates easily on its shaft (14).

7.1.9.5 Service after an emergency braking – In case an Overspeed occurs



CAUTION

In case the drum brake activates due to overspeed, always contact a representative of the hoist manufacturer. The hoist must not be used before the cause for an overspeed has been found and repaired. The drum brake components must be checked for wear and damage and then adjusted per instructions.



CAUTION

Extreme caution must be taken and the load must be removed from the hook of the hoist.

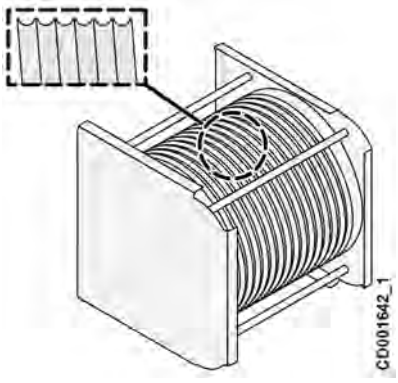
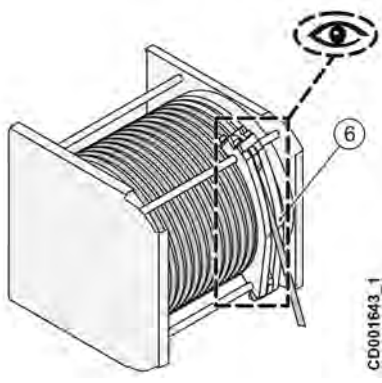
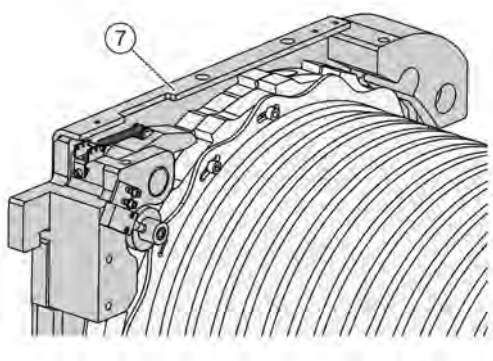
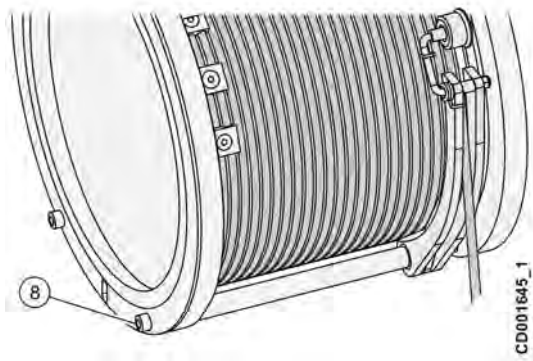
Overspeed Condition – Find Fault

Find the reason for drum brake emergency braking. An overspeed occurs because of a failure in the drive transmission system of the hoist. Possibilities - The hoist brake has worn (steel on steel) / a coupling has sheared / a gear in the gearbox has stripped / a drive shaft has broken.

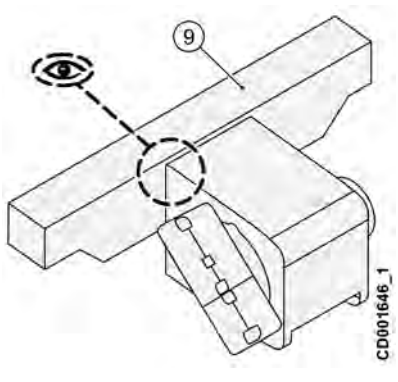
Hoisting unit inspection after overspeed

1	<p>CD001639_1</p> <p>Check the condition of the hoisting gear and drum gear rim (1)</p> <ul style="list-style-type: none"> • No abnormal noises when driving. • Check that the gear rim fitted inside the drum has not slipped. 	2	<p>CD001640_1</p> <p>Disassemble motor (2) and check the condition of the spline on the motor shaft (3) and on the gear primary shaft</p> <ul style="list-style-type: none"> • No deformations or broken teeth allowed.
3	<p>CD001641_1</p> <ul style="list-style-type: none"> • Change the coupling (4) between the motor and gear. • Change the motor fixing bolts (5). 		

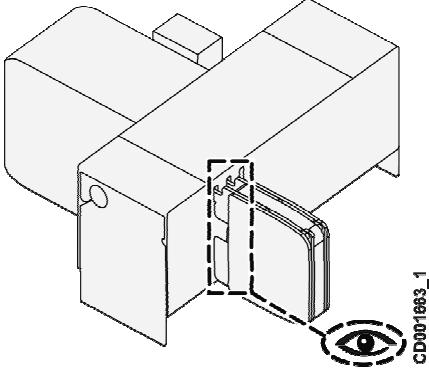
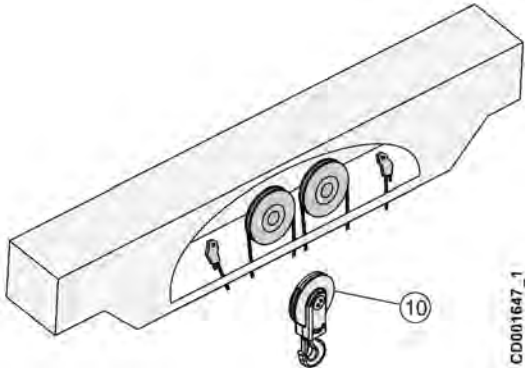
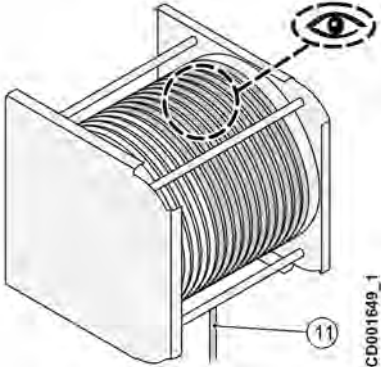
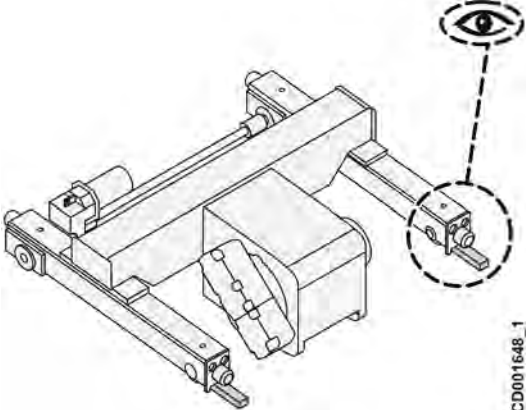
Hoisting Machinery inspection after overspeed

<p>1</p>	 <p>CD001642_1</p> <p>Check the rope drum</p> <ul style="list-style-type: none"> • Check the rope grooves visually for any markings from the rope guide or wire rope. • Check that there is no damage to rope end connection fixing parts. 	<p>2</p>	 <p>CD001643_1</p> <p>Check the rope guides (6) for damage</p> <ul style="list-style-type: none"> • Check the body of rope guide (6) for deformations • Check the guiding surface visually. <p>Change the drum end plate on hoisting machinery side.</p>
<p>3</p>	 <p>CD001644_1</p> <p>Check the drum end plate (7) on drum brake side</p> <ul style="list-style-type: none"> • Change drum end plate if any deformations or cracks are found. Pay special attention to hoisting unit support plates and to the area near the fixing point of the lower corner of the hoisting unit. If any bends or cracks are found, the support plates must also be changed. 	<p>4</p>	 <p>CD001645_1</p> <ul style="list-style-type: none"> • Change the hoisting unit fixing bolts (8). • Change the fixing bolts of intermediate beams.

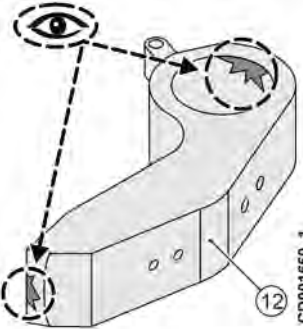
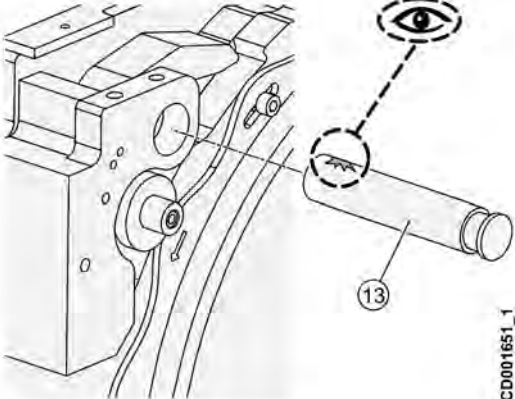
Load beam inspection after overspeed

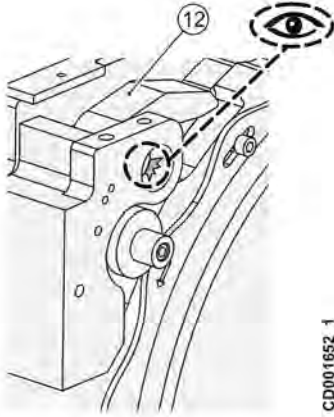
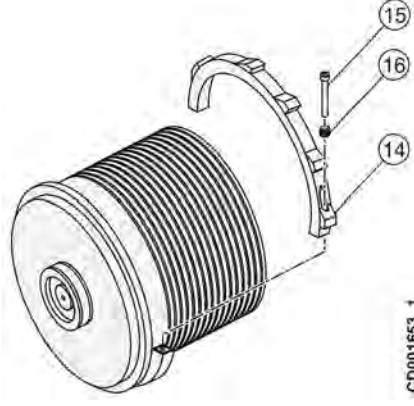
<p>1</p>	 <p>CD001646_1</p> <p>Check the load beam (9)</p> <ul style="list-style-type: none"> • Replace if deformations, cracks, broken welding seams, and so on, are found around the hoisting unit fixing places.
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Other components inspection after overspeed


<p>1</p>	 <p>CD001663_1</p> <p>Check the fixing of counterweights</p> <ul style="list-style-type: none"> No deformations, cracks, and so on, are allowed around the fixing places. 	<p>2</p>	 <p>CD001647_1</p> <p>Check visually the hook block (10) upper sheave block, overload device and rope anchorage</p> <ul style="list-style-type: none"> No deformations allowed – change accordingly.
<p>3</p>	 <p>CD001649_1</p> <ul style="list-style-type: none"> Inspect the rope (11). Check the overload device with a load. Check the operation of the hoist upper limit switch. 	<p>4</p>	 <p>CD001648_1</p> <ul style="list-style-type: none"> Check that the bridge and trolley wheels have not been damaged and are lying on the runway rails. Check the fixing of the machinery hoist.


Drum brake inspection after overspeed


<p>1</p>	 <p>CD001650_1</p> <p>Check the detent arm (12) for any damage</p> <ul style="list-style-type: none"> The edge should not be deformed out of shape. 	<p>2</p>	 <p>CD001651_1</p> <p>Check the shaft of the detent arm (13)</p> <ul style="list-style-type: none"> No deformation, cracks, and so on, should be on the shaft
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3	 <p style="text-align: right; font-size: small;">CD001652_1</p>	4	 <p style="text-align: right; font-size: small;">CD001653_1</p>
	<p>Check the fixing hole for the axle and the detent arm (12)</p> <ul style="list-style-type: none"> • No deformation, oval shape or cracks 		<ul style="list-style-type: none"> • Change the brake rim (14), screws (15) and disc springs (16) • Proceed with all other checks as in normal drum brake service • Adjust the brake. Refer to the manufacturer's hoist test report. • With every fifth emergency breaking the detent arm and its shaft has to be changed.


7.1.10 Manual brake release for hoisting motor

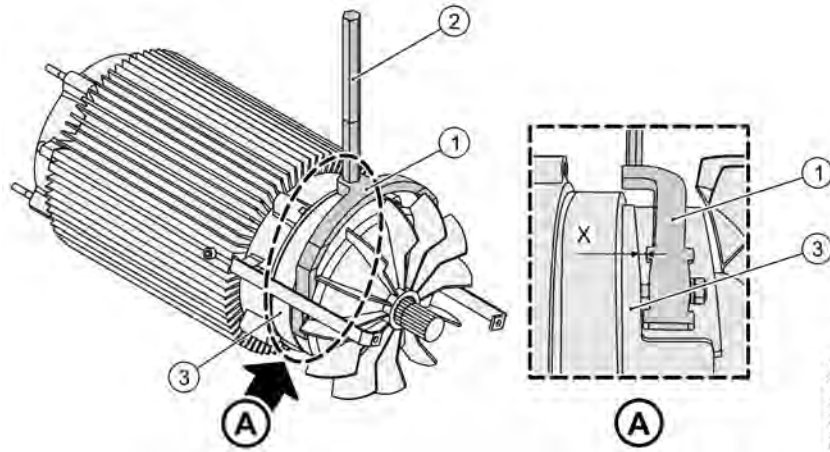
 CAUTION	<p>The manual brake release is allowed to use only in case of emergency.</p>
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 DANGER	<p>FOLLOW THE INSTRUCTIONS FOR USAGE CAREFULLY. POTENTIAL ENERGY OF LOAD WILL HEAT UP THE BRAKE RAPIDLY. OVERHEATED BRAKE CAN CAUSE UNCONTROLLED LOWERING, ACCELERATING ROTATION SPEED AND EXPLOSION OF MACHINERY. UNCONTROLLED LOWERING CAN RESULT SERIOUS INJURY OR DEATH.</p>
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 CAUTION	<p>It is recommended to contact a service agency authorized by the manufacturer if there is a need to use manual brake release. Especially trained personnel are able to ensure the safe lowering of the load.</p>
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 CAUTION	<p>In hoist models that are equipped with a second brake (optional), both brakes must be manually opened with levers simultaneously. This requires two persons to carry out the action.</p>
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 CAUTION	<p>In hoist models that are equipped with two hoisting motors (and thus two main brakes), both brakes must be manually opened with levers simultaneously. This requires two persons to carry out the action.</p>
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- 1. Fork lever (assembled to hoisting motor brake)
- 2. Lever arm
- 3. Brake frame
- A. Gap (X), (>1.8 mm)



Note: Gap (X) between fork lever (1) and brake frame (3) must be at least 1.8 mm.

Assembling the manual brake release

1	<p>Remove the fan cover (4) off the motor. Ensure that the fork lever (1) can move freely.</p>	2	<p>Screw the lever arm (2) into fork lever (1).</p>
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Note: In hoists with frame size VT3 and drum length equal or more than 1250 mm, the brake is installed in the end of gearbox. Fork lever and crank should be assembled here.

Brake release usage instructions



CAUTION

Secure the area under and around the hoist. Warn the personnel on the shop floor and the supervisors about the intended action.



CAUTION

Ensure that the area under the hoist is free of obstacles.



WARNING

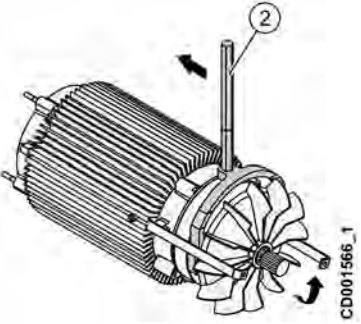
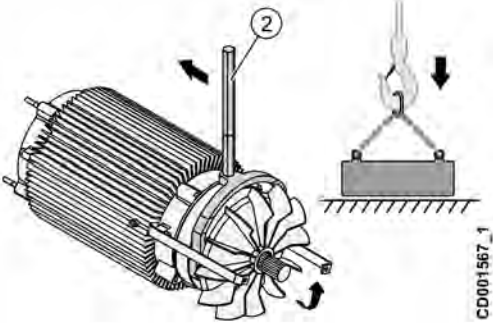
Beware that the motor rotational speed does not exceed the rated rotational speed.



Note: Overspeed activates the drum brake if equipped with an overspeed brakeVT3. If overspeed drum brake is activated, further lowering is rejected.

WARNING	Ensure that the brake temperature does not increase in an uncontrolled manner.
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Lowering the load

1	 <p>Pull the lever arm (2) carefully to open the brake and release immediately when motor starts to rotate. Pull and release a few times to study how the rotational speed is growing.</p>	2	 <p>Once known how the rotational speed behaves, open the brake shortly and close again before the rotational speed reaches the maximum using the lever arm (2). Repeat the procedure until the load is lowered safely to the floor.</p>
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CAUTION	Let the brake cool down for at least one minute after five times manually opening the brake.
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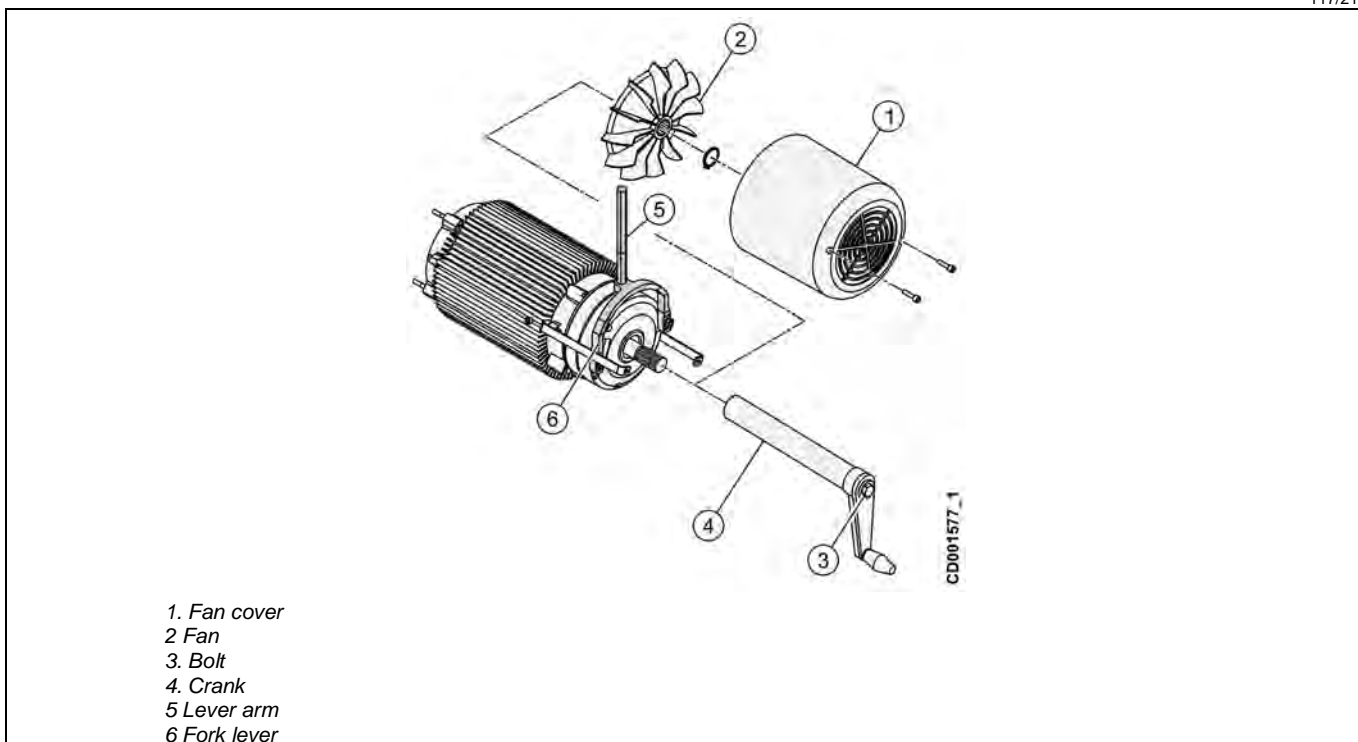
CAUTION	When the brake temperature exceeds 100°C (water drop boils), let it cool down for a longer period at higher intervals (for example, after 4 times opening the brake). Overheating the brake damages the friction material and the load may drop.
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7.1.11 Manual crank

Manual brake release and manual crank is used to move the load in case of power failure.



Note: In hoist models that are equipped with two hoisting motors (and thus with two main brakes), both brakes must be manually opened with levers simultaneously and both motors must be equipped with a crank. This requires two persons to carry out the action.



Assembly

<p>1</p> <p>CD001416_1</p> <p>Switch OFF the power supply to the hoist.</p>	<p>2</p> <p>CD001568_1</p> <p>Remove fan cover (1). Remove snap ring and fan (2).</p>
<p>3</p> <p>CD001569_1</p> <p>Install the crank (4) onto shaft gearing and tighten with bolt (3) to the shaft centre thread.</p>	<p>4</p> <p>CD001570_1</p> <p>Screw the lever arm (5) into fork lever (6).</p>



Note: In hoists with frame size VT3 and drum length equal or more than 1250 mm, the brake is installed in the end of gearbox. Fork lever and crank should be assembled here.

Operation



Note: It is preferred to use the manual crank only for lifting the load, or lowering very small loads. Lowering heavy loads should be done by the manual brake release only (without the crank).

1	<p>CD001571_1</p> <ul style="list-style-type: none"> Take strong hold to the crank (4) by one hand. 	2	<p>CD001572_1</p> <p>Pull releasing lever (5) carefully with the other hand while holding the crank (4).</p>
3	<p>CD001573_1</p> <p>Move load by rotating manual crank (4) while holding the lever (5).</p>		



WARNING

Do not pull the lever too much and too abrupt, but open the brake with care. A sudden unexpected rotation of the crank can cause serious injury.



WARNING

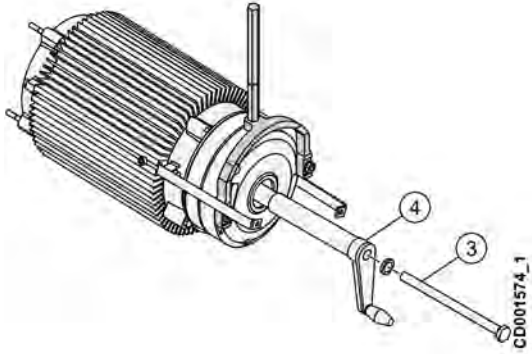
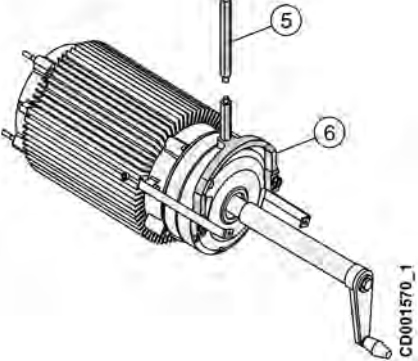
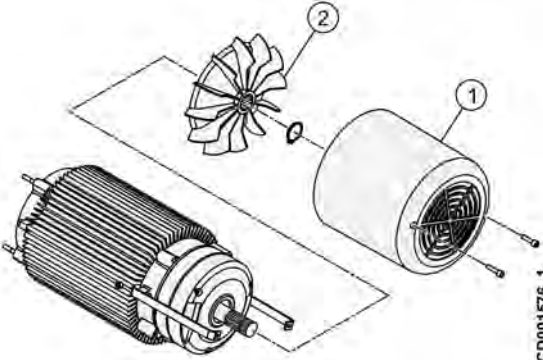
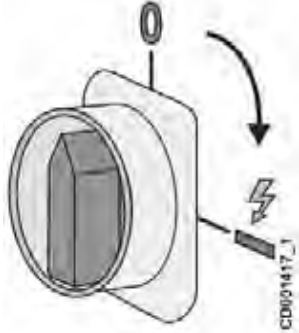
Do not let the motor gain too high speed. Release the lever immediately (closing the brake), in case the motor, and thus the crank, starts rotating too fast or when the load to the crank grows too big for you to hold the crank under control.



WARNING

Do not let go of the crank before the brake is closed.

Before normal operation of the hoist

<p>1</p>	 <p>Remove manual crank (4), washer and screw (3).</p>	<p>2</p>  <p>Remove the lever arm (5) from the fork lever (6).</p>
<p>3</p>	 <p>Install fan and retainer ring (2). Install fan cover (1).</p>	<p>4</p>  <p>Switch ON the power supply to the hoist.</p>

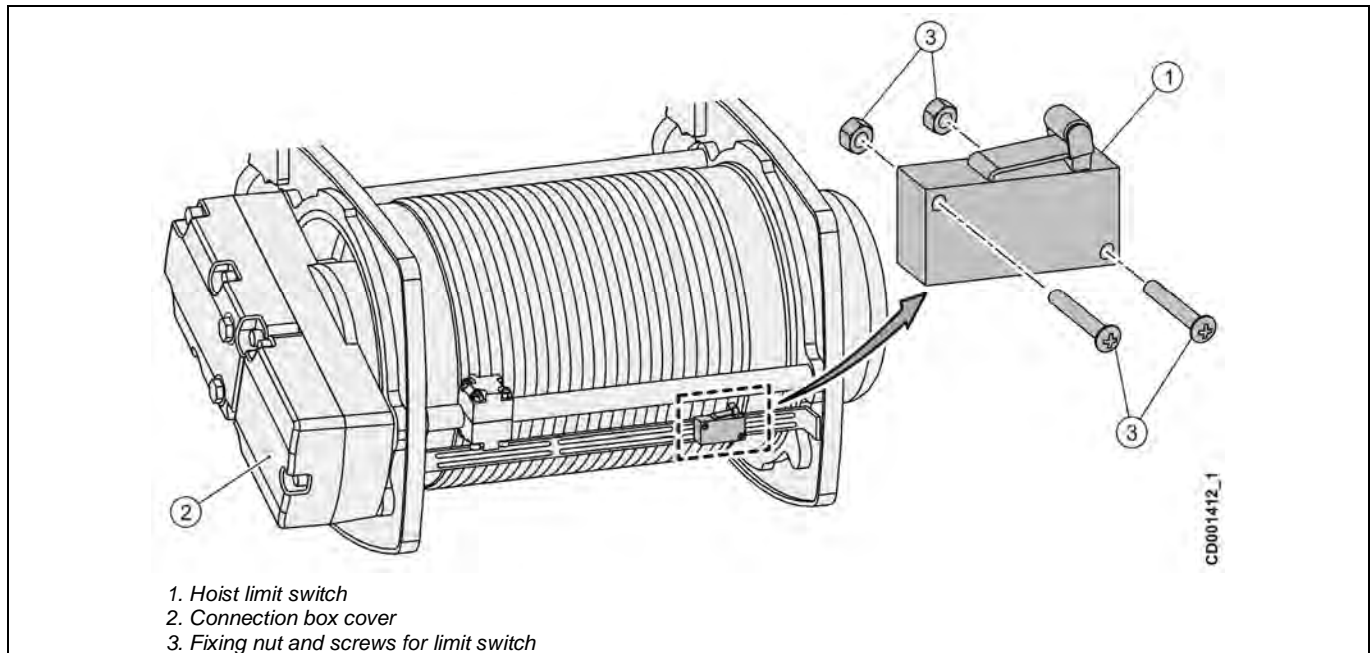
Assembly

For assembly instructions of the hoisting motor, refer to the section **“Hoisting machinery, assembly”** and follow the instructions for removing and reassembling the brake.

<p>CAUTION</p>	<p>In those models where the motor is located inside the drum, it is not possible to remove the brake wires without extracting the complete motor-gearbox subassembly from the drum. In this case, it is advised to cut the brake wires near the brake, and reconnect the wires to the new brake with a proper screw- or shrink-connector. Do not use a plug-connection.</p>
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7.1.12 Hoisting limit switch

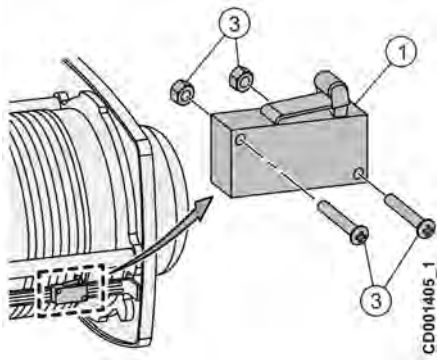
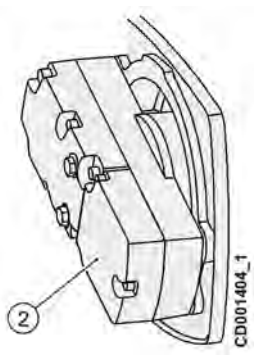
7.1.12.1 Construction of hoisting limit switch for hoist frame size: VTs.



Disassembly

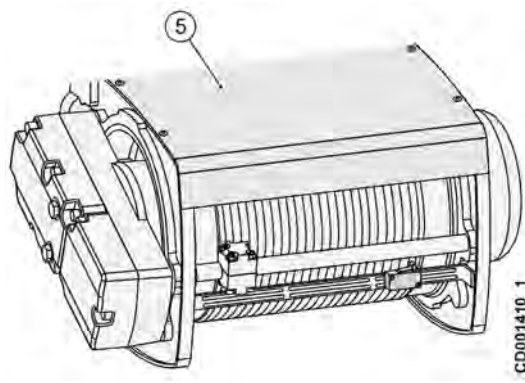
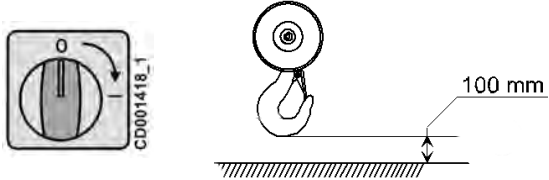
<p>1</p>	<p>Switch OFF the power supply to the hoist.</p> <p>CD001416_1</p>	<p>2</p> <p>Remove the connection box cover (2). Remove the wires from the limit switch connector in the connection box.</p> <p>CD001404_1</p>
<p>3</p>	<p>Remove the fixing screws (3). Extract the limit switch (1).</p> <p>CD001405_1</p>	

Reassembly

1	 <p>Fit the limit switch (1) carefully in its place, so that the roller lever is in correct position and in front of the limit switch fixing plate. Tighten the fixing screws (3).</p>	2	 <p>Reconnect the wires. Reassemble machinery cover and close the connection box cover (2).</p>
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Note: Use self locking nuts for fitting the limit switch. Self locking nuts can be reused no more than 5 times.

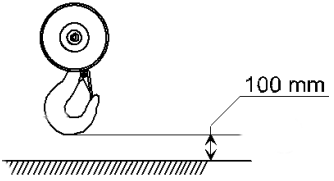
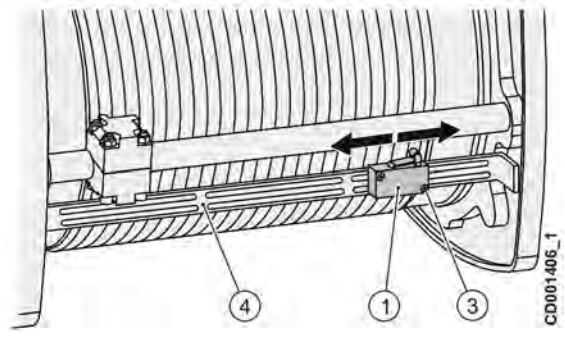
3	 <p>Fasten the cables to the support using cable ties. Fasten the machinery cover (5).</p>	4	 <p>Switch ON the power supply to the hoist and check the proper functioning of the limit switch.</p>
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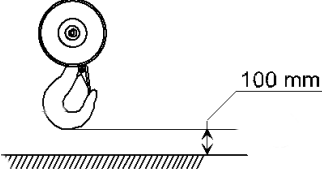
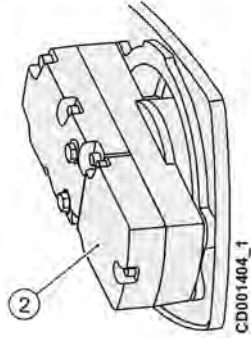


CAUTION

In many cases it is necessary to readjust the limit switch. Be aware of incorrect settings during testing the operation.

Adjustment

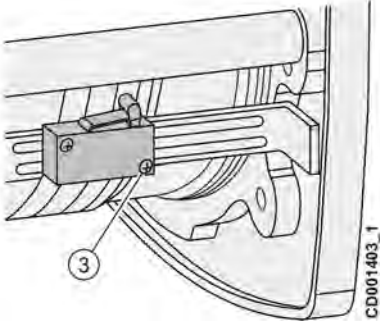
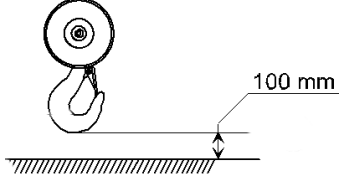
1	 <p>Lower the hook to approx. 100 mm above the floor.</p>	2	 <p>Loosen the fixing screws (3). Move limit switch (1) along the tie rod (4) until the limit roller lever switch is just activated.</p>
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3	 <p>Tighten the fixing screws and test the operation. The motion downwards must stop at the described distance. Repeat step 1...3 until the correct setting is achieved.</p>	4	 <p>Reassemble machinery cover and close the connection box cover (2).</p>
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CAUTION

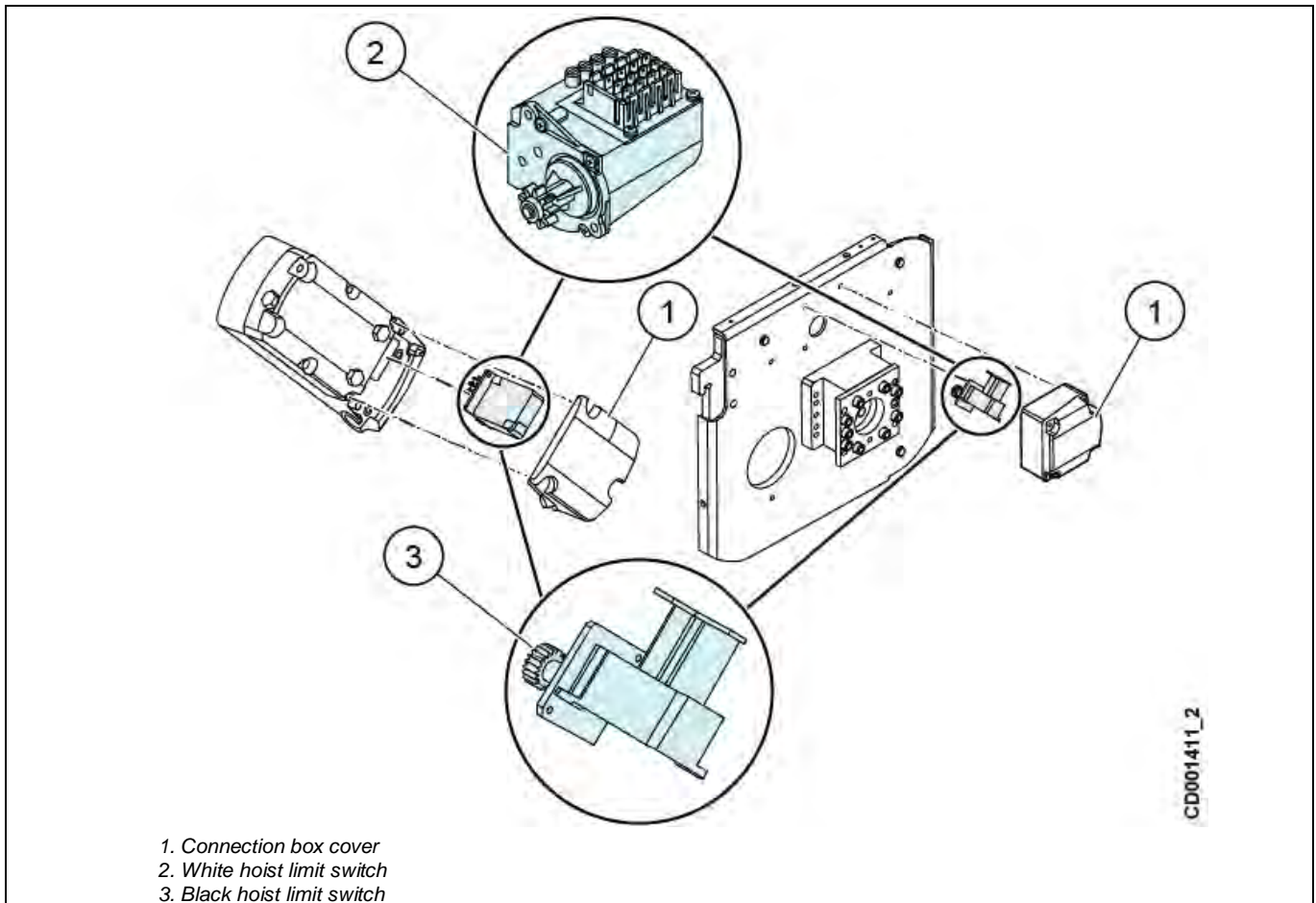
Make sure that there is at least five turns of the rope left on the drum when the hook is at the lowest position. Otherwise the rope guide and the rope clamp could interfere and damage.

7.1.12.2 Maintenance task for hoisting limit switch, hoist frame size: VTs.

1	 <p>Check that the locking screws (3) are tight. Check the wiring for loose connections.</p>	2	 <p>Check the proper tripping point of lower limit function. If the limit is not proper one, refer to the chapter "Adjustment" for correcting the limit.</p>
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7.1.12.3 Construction of hoisting limit switch for hoist frame size: VT1, VT2, VT3, VT4, VT5.

The rotary hoist limit switch contains four contacts, with the below described default functions. The rotary limit switch unit for hoisting is located in the connection box on the hoisting gearbox.



Note: The procedure is almost same for both black and white models. The marking used to identify difference in procedure is as follows:

Black model: indicates that it is applicable for black model only

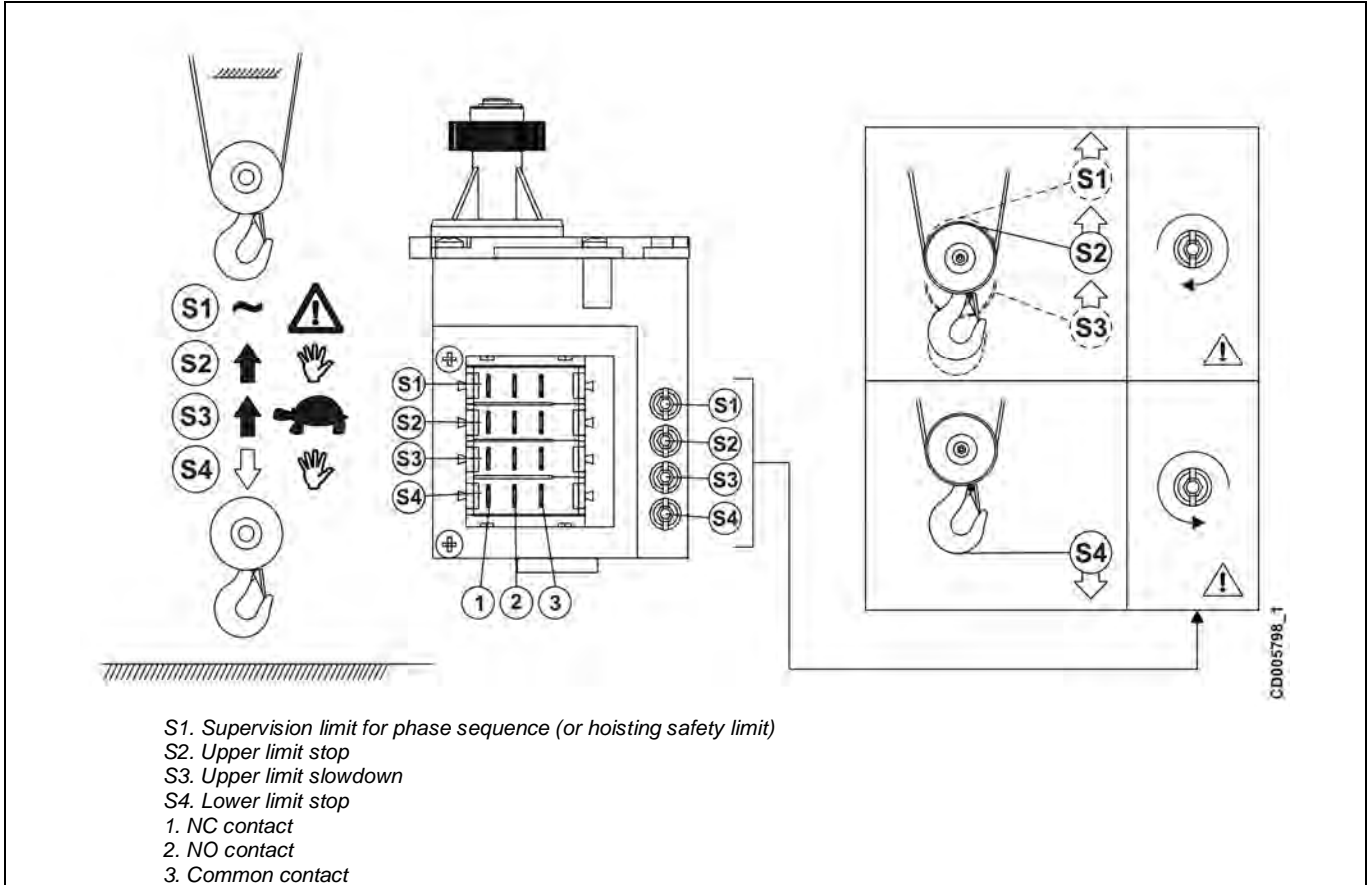
White model: indicates that is applicable for white model only

All: indicates that it is applicable for both models.

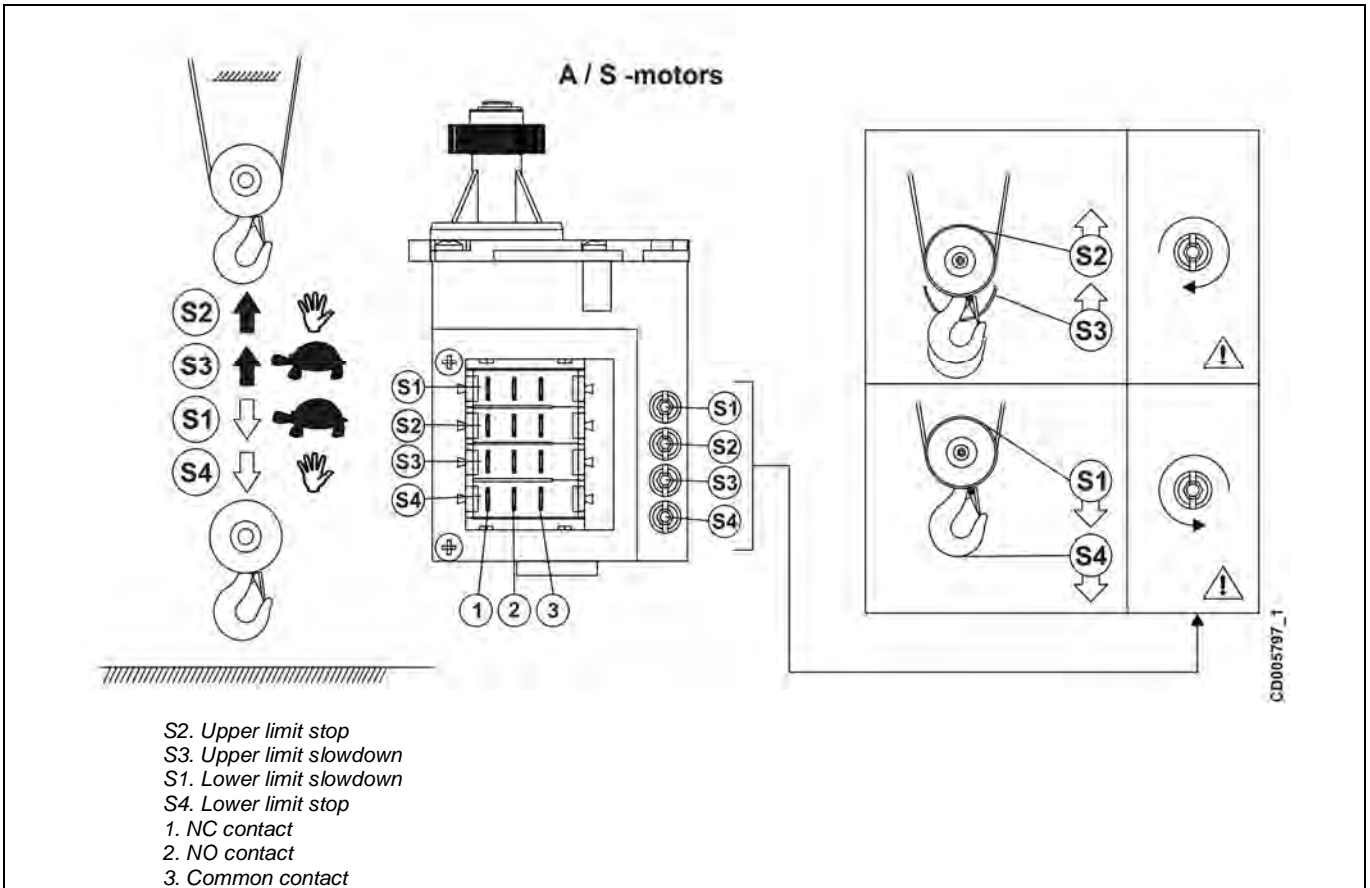


Note that the new limit switch is always a white hoist limit switch.

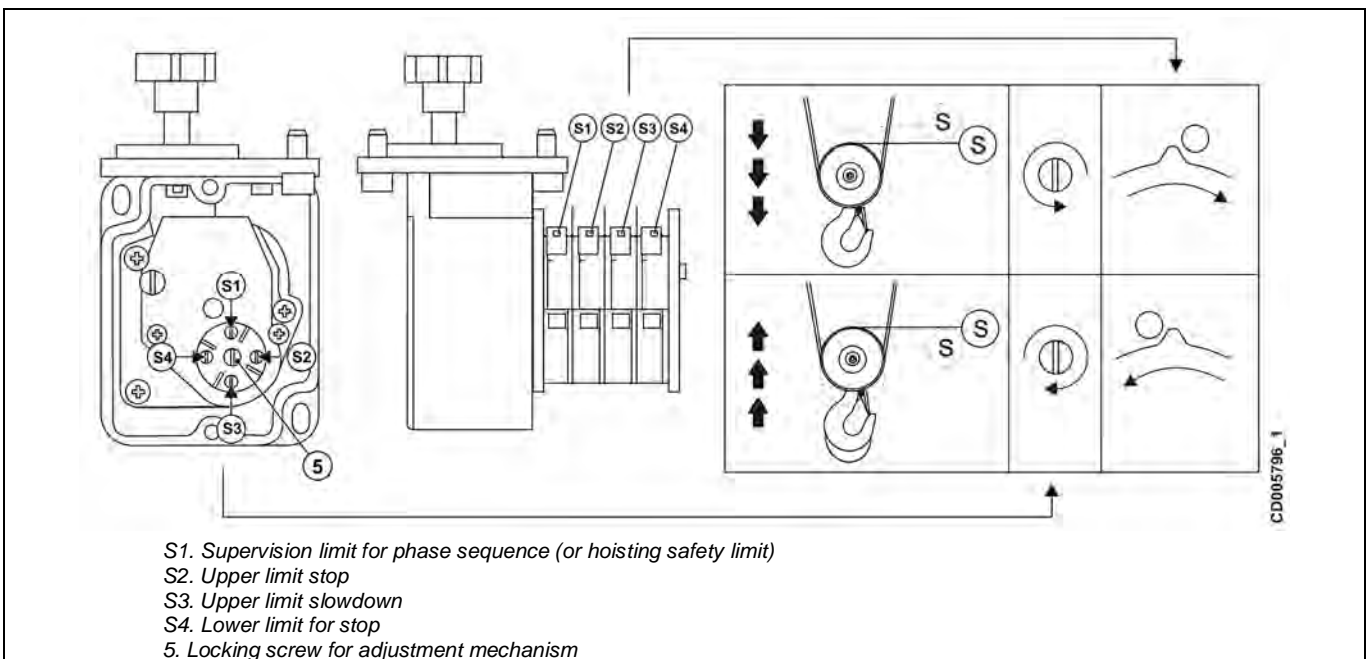
White model



White model with A/S motors

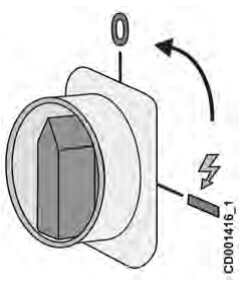
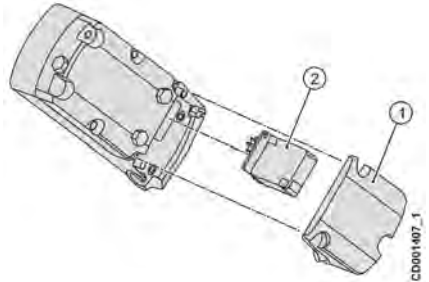


Black model

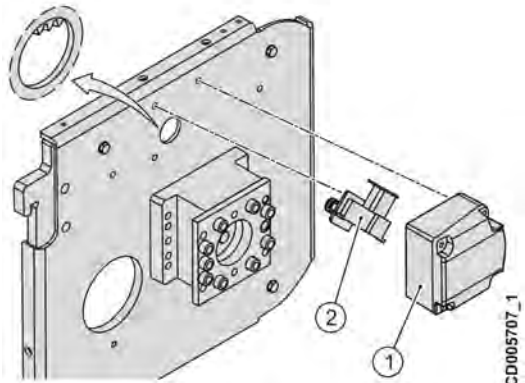
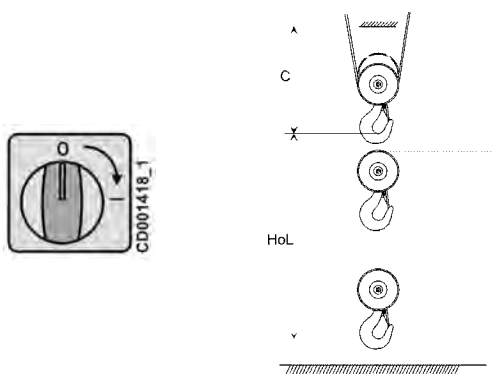


Notice the right direction of adjusting screw rotation.

Disassembly

1	 <p>Switch OFF the power supply to the hoist.</p>	2	 <p>Remove the connection box cover (1). Remove the fixing screws and the wires from the limit switch and extract the limit switch (2).</p>
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Reassembly

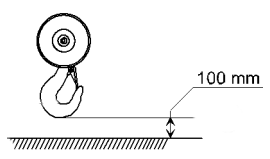
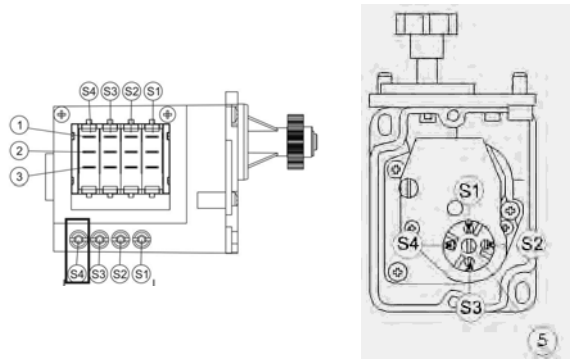
1	 <p>Fit the limit switch (2) carefully in its place, so that the pinion fits into the gear-rim of the drum. Tighten the fixing screws. Re-connect the wires. Close the connection box cover (1).</p>	2	 <p>Switch ON the power supply to the hoist and check the proper functioning of the limit switch.</p>
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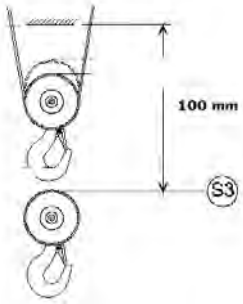
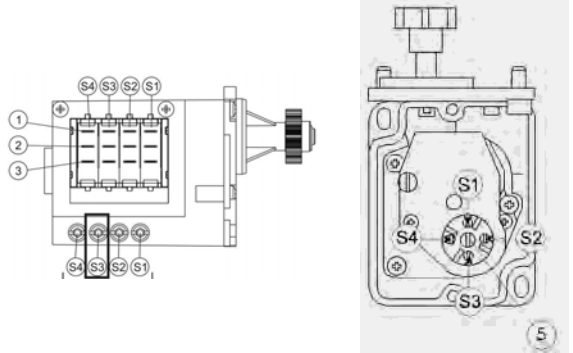
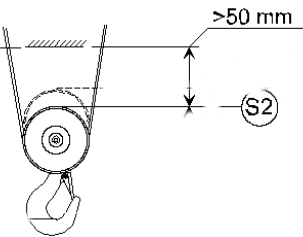
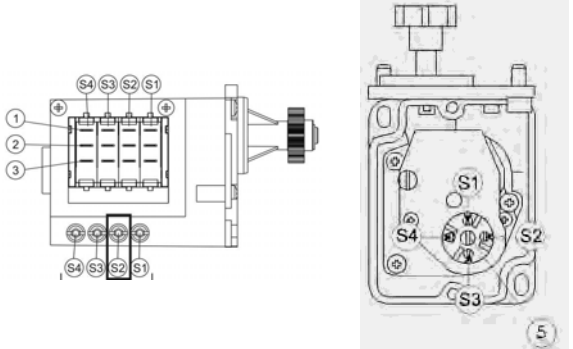
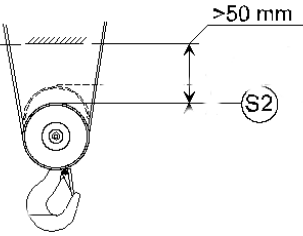
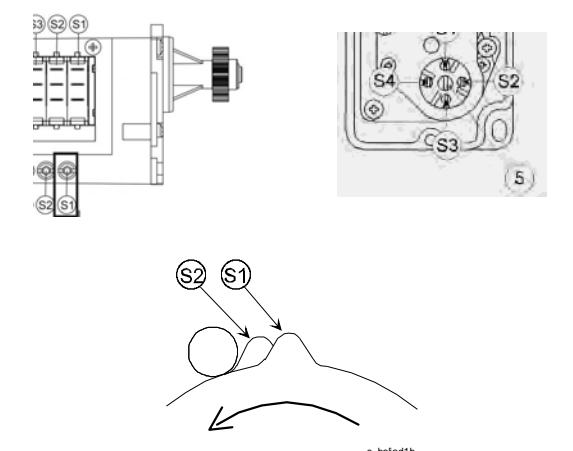


CAUTION

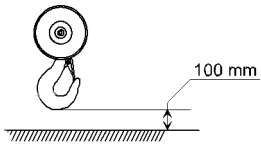
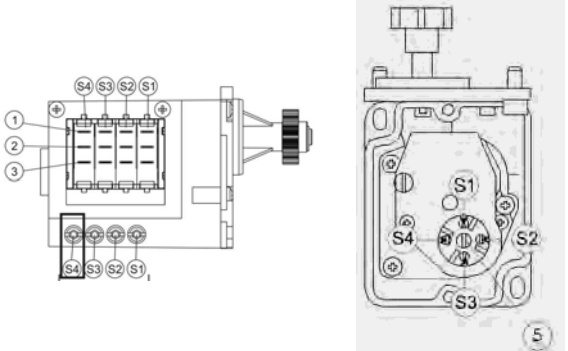
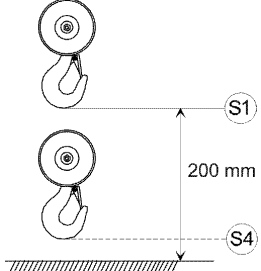
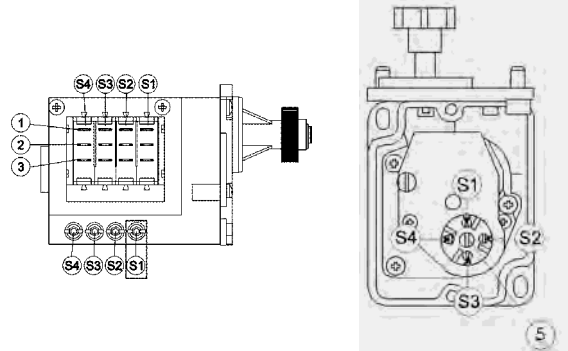
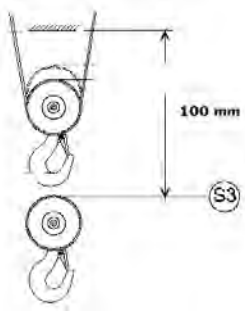
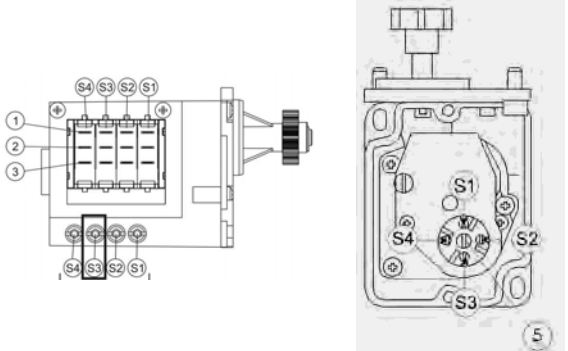
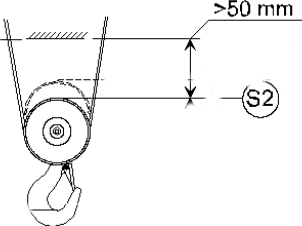
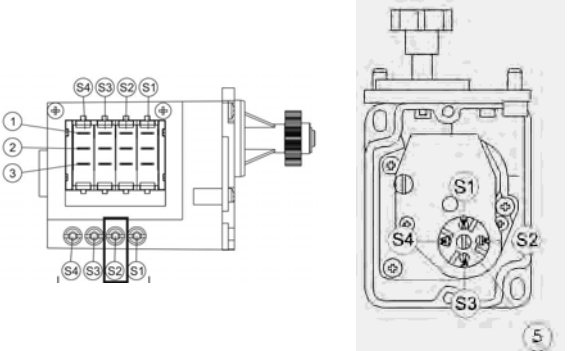
In many cases it is necessary to readjust the limit switch. Be aware of incorrect settings during testing the operation.

Adjustment

1	 <p>All: Lower the hook to approx. 100 mm above the floor.</p>	2	 <p>Black model: Loosen the locking screw (5) All: Turn the screw "S4" until the limit switch "S4" is just activated. All: Test the operation. The downward motion must stop at the described distance.</p>
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<p>3</p>	 <p>All: Raise the hook until it is minimum 100 mm below the specified C-dimension, or minimum 100 mm under any fixed steel structure.</p>	<p>4</p>  <p>All: Turn the screw "S3" until the limit switch "S3" is just activated. All: Test the operation. The upward motion must slow down to Low speed at the described distance.</p>
<p>5</p>	 <p>All: Raise the hook until it is at the specified C-dimension, or minimum 50 mm under any fixed steel structure.</p>	<p>6</p>  <p>All: Turn the screw "S2" until the limit switch "S2" is just activated. All: Test the operation. The upward motion must stop at the described distance.</p>
<p>7</p>	 <p>All: Raise the hook to the upmost position, until the motion is stopped by the upper limit switch "S2".</p>	<p>8</p>  <p>All: Turn the screw "S1" so that it will activate just after "S2" (in upwards direction). Black model: Tighten the locking screw (5) All: Close the connection box cover.</p>

Adjustment the white model with A/S motors

<p>1</p>	 <p>Lower the hook to approx. 100 mm above the floor.</p>	<p>2</p>	 <p>Turn the screw "S4" until the limit switch "S4" is just activated. Test the operation. The downward motion must stop at the described distance.</p>
<p>3</p>	 <p>Lower the hook to approx. 200 mm above the floor.</p>	<p>4</p>	 <p>Turn the screw "S1" until the limit switch "S1" is just activated. Test the operation. The downward motion must slow down to Low speed at the described distance.</p>
<p>5</p>	 <p>Raise the hook until it is minimum 100 mm below the specified C-dimension, or minimum 100 mm under any fixed steel structure.</p>	<p>6</p>	 <p>Turn the screw "S3" until the limit switch "S3" is just activated. Test the operation. The upward motion must slow down to Low speed at the described distance.</p>
<p>7</p>	 <p>Raise the hook until it is at the specified C-dimension, or minimum 50 mm under any fixed steel structure.</p>	<p>8</p>	 <p>Turn the screw "S2" until the limit switch "S2" is just activated. Test the operation. The upward motion must stop at the described distance.</p>



CAUTION

In Low Headroom models, the C-dimension depends on the wheel-gauge of the trolley. See Technical Guide; Dimensions.

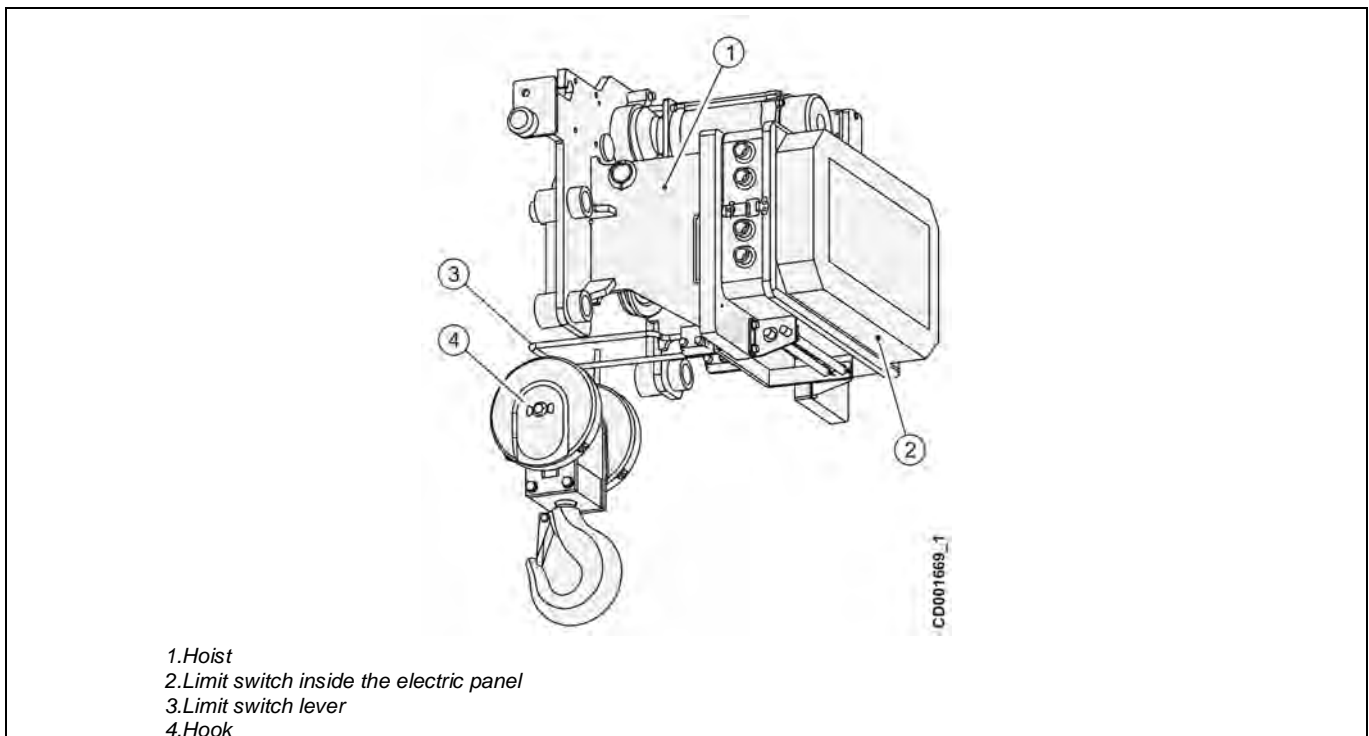
7.1.12.4 Maintenance task for hoisting limit switch, hoist frame size: VT1, VT2, VT3, VT4, VT5.

1	<p>Check the proper tripping point of all limiting functions.</p>	2	<p>Check the wiring for loose connections. Black model: Check that the locking screw (5) is tight.</p>
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7.1.13 Hook operated limit switch

7.1.13.1 Hook operated upper limit switch, Frame size: VTs.

Hook operated limit switch has two steps, normal limit switch and extra safety limit switch. In first step limit switch trips hoisting movement when hook reaches the adjustable lever. Hoisting movement is possible again after tripping as soon as hook has been lowered from the switching area. The safety switch cuts the main power if normal switch fails. In this case hoisting or lowering is not possible, until the reason for limit switch failure has been solved.

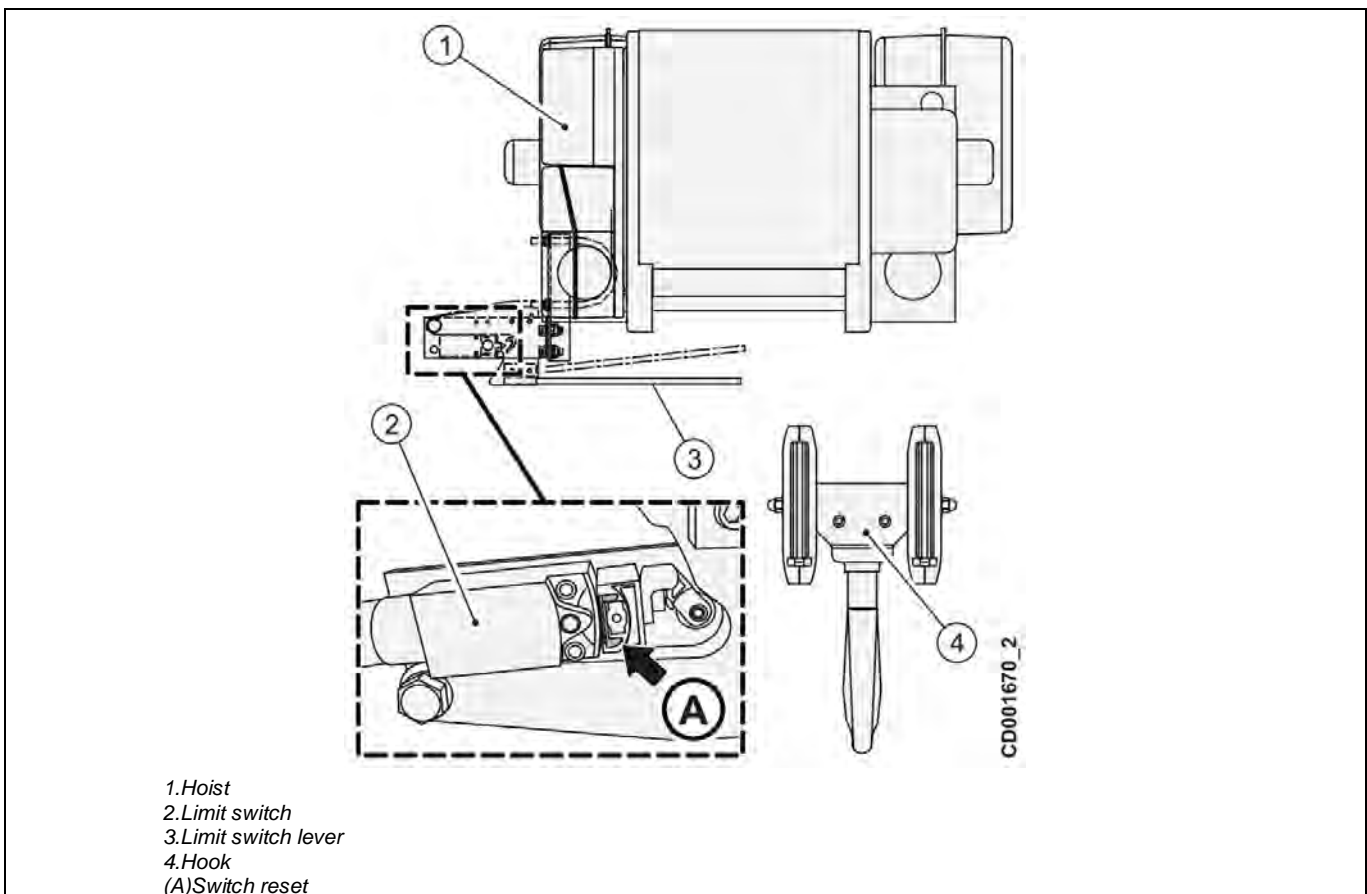


7.1.13.2 Hook operated control limit switch, Frame size: VT1, VT2, VT3, VT4.

The hook operated limit switch trips hoisting movement when the hook reaches the adjustable lever. The hook operated limit switch can be reset automatically or manually. With automatic reset, the hoisting movement is possible again after tripping as soon as the hook has been lowered from the switching area. The hook operated limit switch with automatic reset can be used as a working limit before the tripping height of the standard upper limit.

With manual reset, the hoisting movement is not possible before the limit switch has been manually reactivated. A hook operated limit switch with manual reset can be used as a backup switch for the standard upper limit switch. When a manual reset limit switch is used as a backup switch and this switch stops the hoisting movement, the function of the rotating limit switch has to be checked and corrected before using the hoist again.

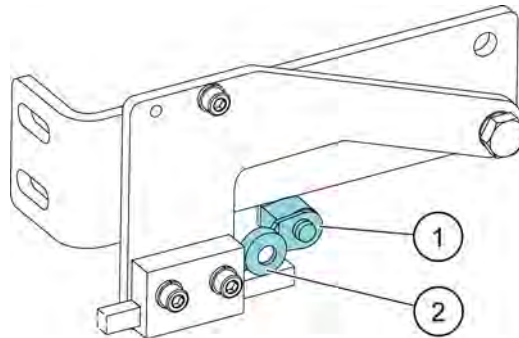
The hook operated control limit switch increases the hook approach (the hook-rail distance).



7.1.13.3 Hook operated control limit switch, Frame size: VT1, VT2.

The hook operated limit switch trips hoisting movement when the hook reaches the adjustable lever. The hook operated limit switch can be reset manually. With manual reset, the hoisting movement is not possible before the limit switch has been manually reactivated. In reset situation, the switch reset goes up, and the limit switch is reactivated by returning the switch reset back to its original position. The hook operated limit switch with manual reset can be used as a backup switch for the standard upper limit switch. When the manual reset limit switch is used as a backup switch and the switch stops the hoisting movement, the function of rotating limit switch has to be checked and corrected before using the hoist again.

The hook operated control limit switch increases the hook approach (the hook-rail distance).



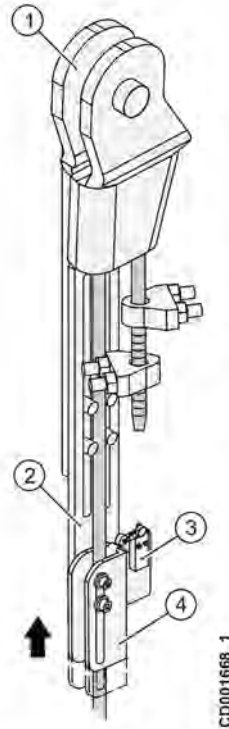
1. Limit switch
2. Limit switch reset

7.1.13.4 Hook operated control limit switch, Frame size: VT4, VT5.

The hook operated limit switch trips hoisting movement when the hook reaches the adjustable limit switch slide. The hook operated limit switch can be reset automatically or manually. With automatic reset, the hoisting movement is possible again after tripping as soon as the hook has been lowered from the switching area. The hook operated limit switch with automatic reset can be used as a working limit before the tripping height of the standard upper limit.

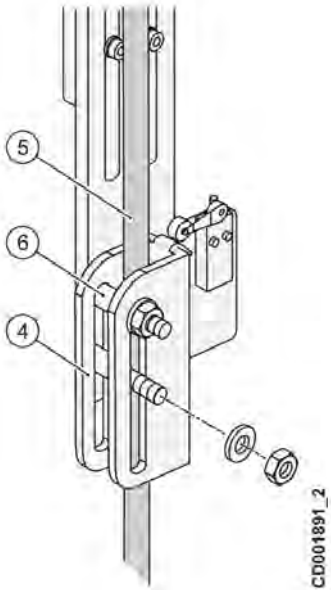
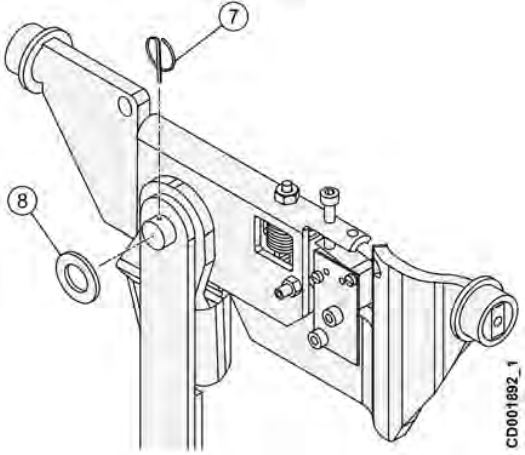
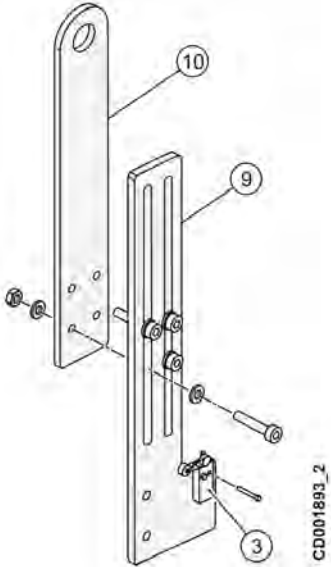
With manual reset, the hoisting movement is not possible before the limit switch has been manually reactivated. The hook operated limit switch with manual reset can be used as a backup switch for the standard upper limit switch. When the manual reset limit switch is used as a backup switch and the switch stops the hoisting movement, the function of rotating limit switch has to be checked and corrected before using the hoist again.

The hook operated limit switch increases the hook approach (the hook-rail distance).

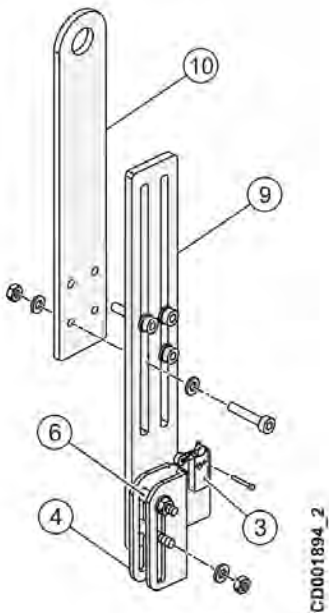
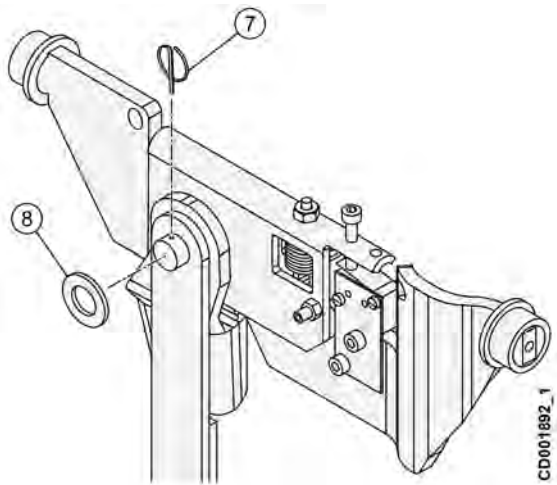
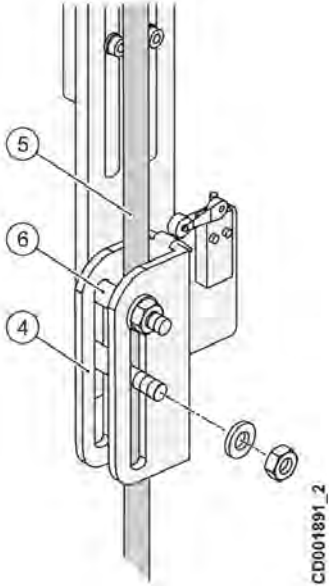
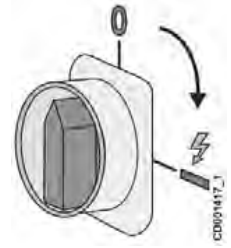


1. Rope anchor
2. Height adjustment plate
3. Limit switch
4. Limit switch slide

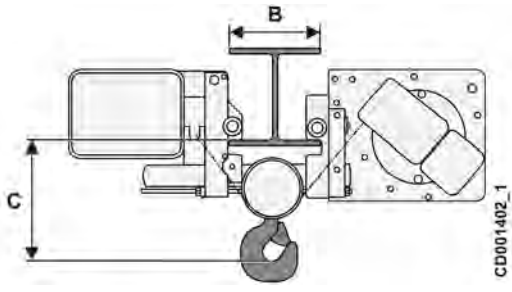
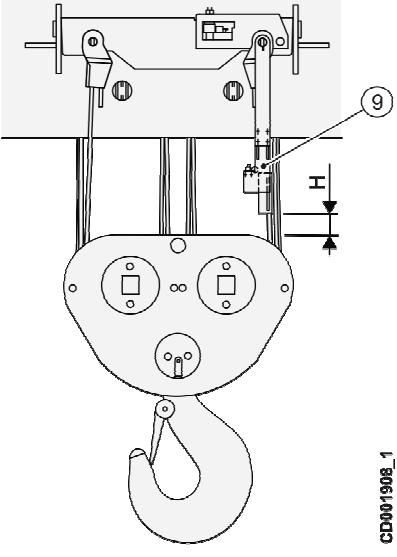
Disassembly

<p>1</p>	 <p>Switch OFF the power supply to the hoist. Open two screws and to remove rope (5) through the trigger (4). Remove the trigger (4) to get access to the bushes (6).</p>	<p>2</p>  <p>Open the overload device cover. Remove the washer (8), locking ring (7) and then remove the limit switch assembly from the shaft.</p>
<p>3</p>	 <p>Unscrew the screws to remove the limit switch (3). Remove the washers and screws to remove the mounting plate (9) base plate (10).</p>	

Reassembly

<p>1</p>	 <p>Place the bushings (6) on the screws. Install the trigger (4) with nuts and washers. Hand tighten the nuts. Install the limit switch (3) with screws. Fix the mounting plate (9) to the base plate (10) with screws and washers. Tighten the screws and test the mechanical action of the switch by raising up the trigger (4).</p>	<p>2</p>  <p>Hang limit switch assembly to the shaft and lock it in place with locking ring (7) and washer (8). Make sure that the locking ring is correctly assembled. Adjust the limit switch arm to correct length.</p>
<p>3</p>	 <p>Loosen the nuts and remove the trigger (4). Pass the rope (5) through the trigger (4) and reinstall it. Tighten the screws to torque value 45 Nm. Make sure that trigger slides freely on the limit switch support.</p>	<p>4</p>  <p>Install the machinery covers and switch ON the power to the hoist.</p>

Adjustment

1	 <p>Adjust the hook height so that it is at a distance of C below the girder. The value of C varies for every hoist and can be found in the topic "Hoisting limit switch".</p>	2	 <p>Loosen the screw of the mounting plate (9) and adjust its height so that there is H = 5 mm gap between the trigger and the hook. H = 5 mm</p>
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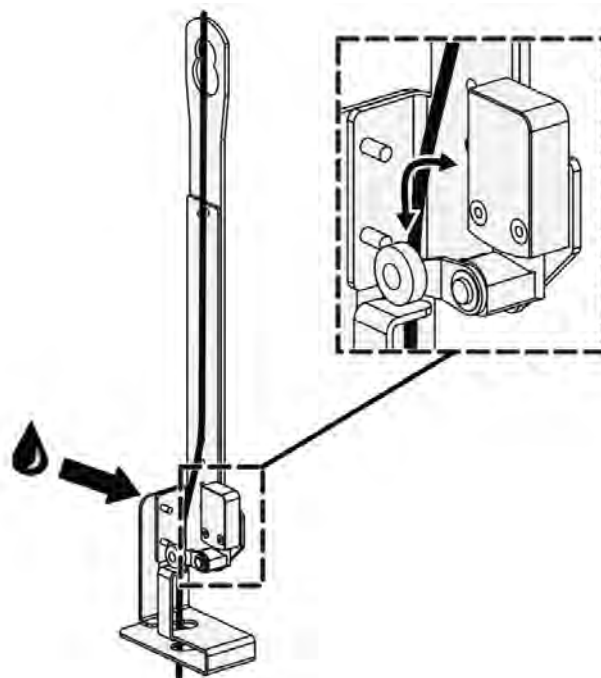
7.1.13.5 Hook operated control limit switch, Frame size: VT3, VT4, VT5 (new model)

The hook operated limit switch trips hoisting movement when the hook reaches the adjustable limit switch slide. The hook operated limit switch can be reset automatically or manually. With automatic reset, the hoisting movement is possible again after tripping as soon as the hook has been lowered from the switching area. The hook operated limit switch with automatic reset can be used as a working limit before the tripping height of the standard upper limit.

With manual reset, the hoisting movement is not possible before the limit switch has been manually reactivated. In reset situation, the switch reset (see the enlarged illustration window as follows) goes up, and the limit switch is reactivated by returning the switch reset back to its original position. The hook operated limit switch with manual reset can be used as a backup switch for the standard upper limit switch. When the manual reset limit switch is used as a backup switch and the switch stops the hoisting movement, the function of rotating limit switch has to be checked and corrected before using the hoist again.

The hook operated limit switch increases the hook approach (the hook-rail distance).

Lubricate the roller bearings in the slide plate when necessary to ensure the smooth operation of the limit switch



CD005732_1

7.2 Rope reeving system

A trolley with a hoist that has four or more rope falls is equipped with a rope sheave beam including one or more return sheaves.

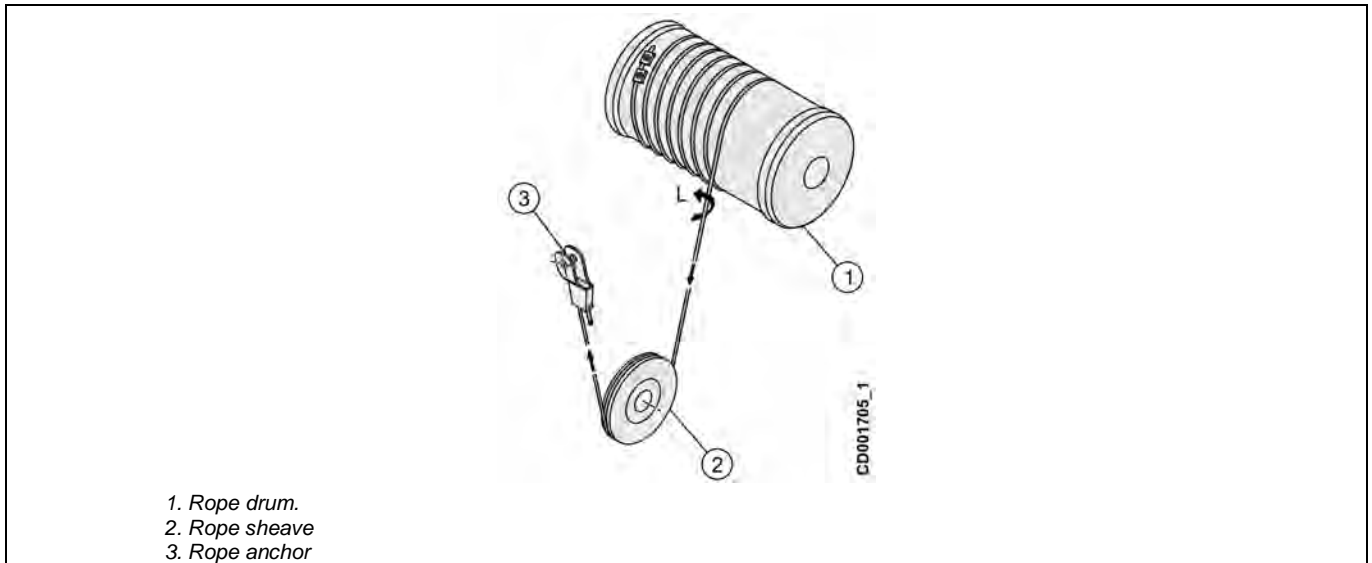
The reeving depends on the type of hoist, the amount of rope on the drum and the amount of rope falls. The reeving scheme is shown in the picture.

7.2.1 Standard reevings (one rope from drum)

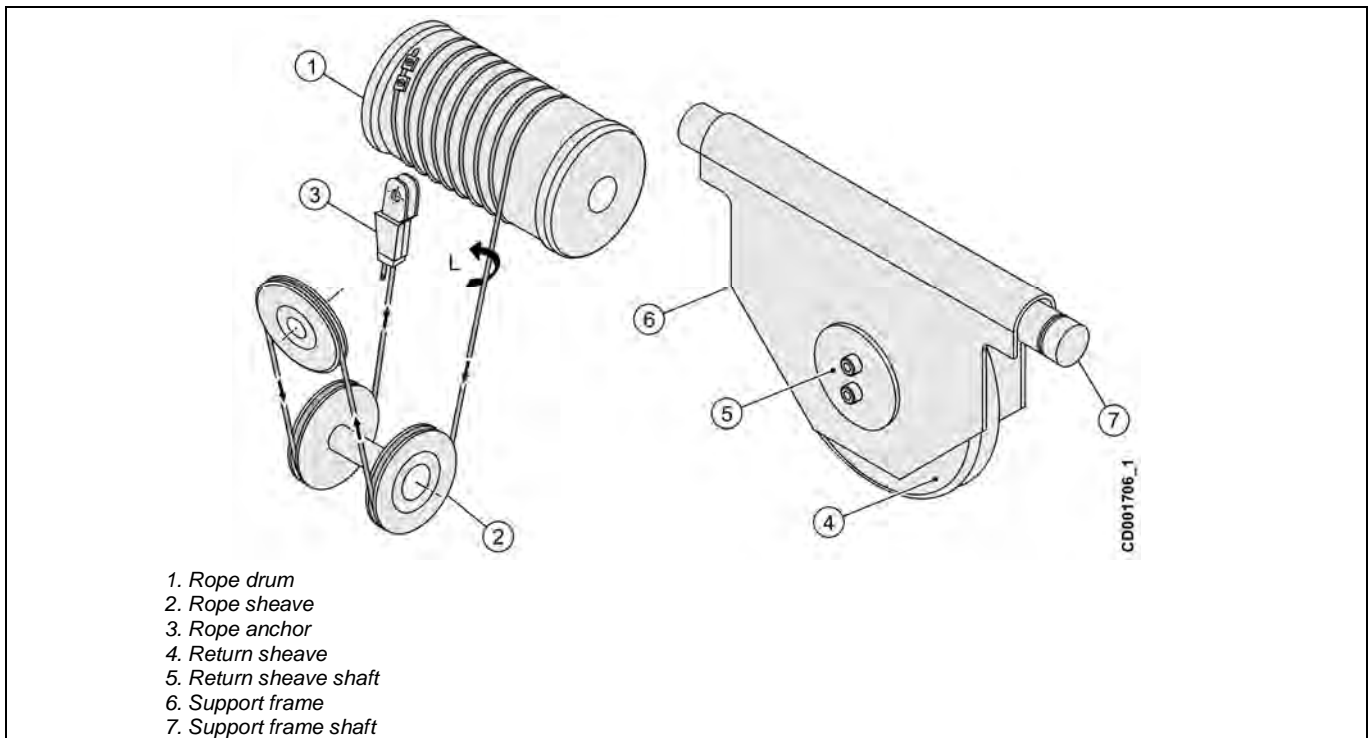


Note: a one-rope reeving has a tendency to rotate.

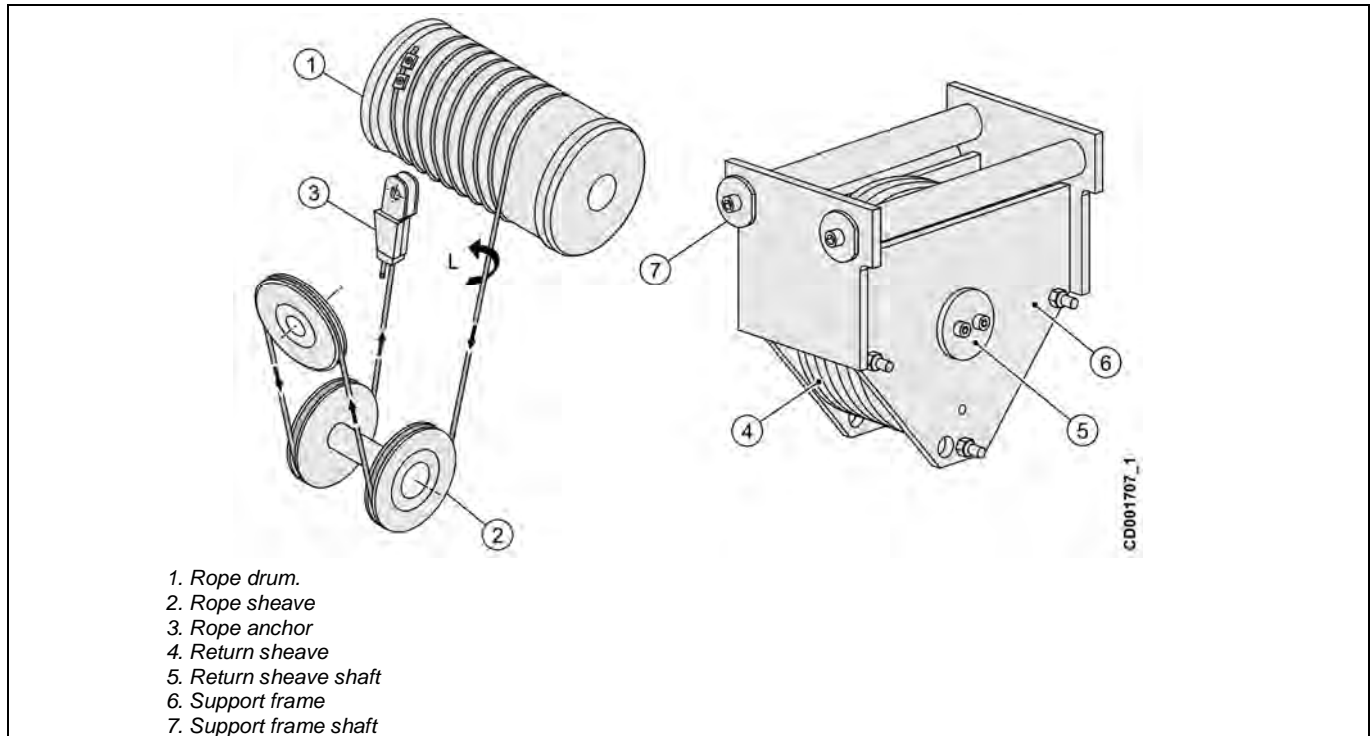
Rope reeving code: 02, hoist frame size: VT1, VT2, VT3, VT4.



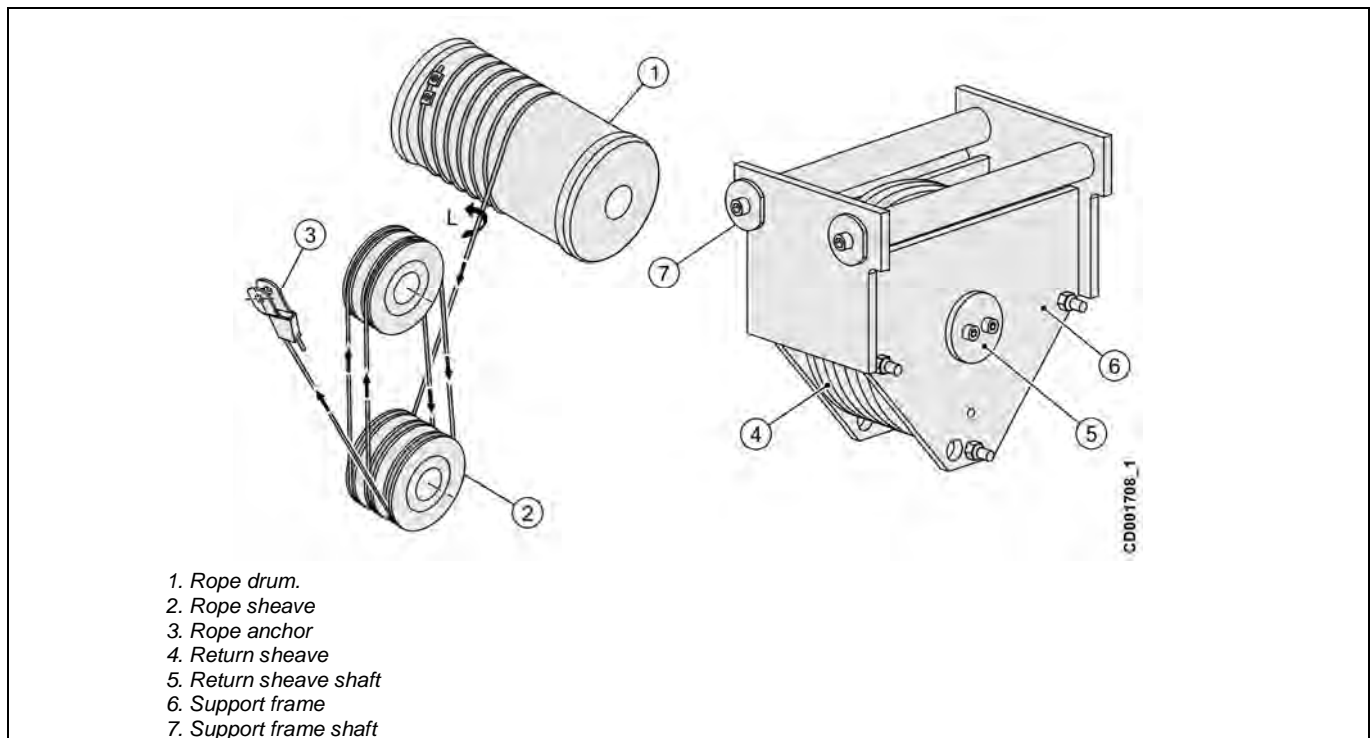
Rope reeving code: 04, hoist frame size: VT1, VT2, VT3.



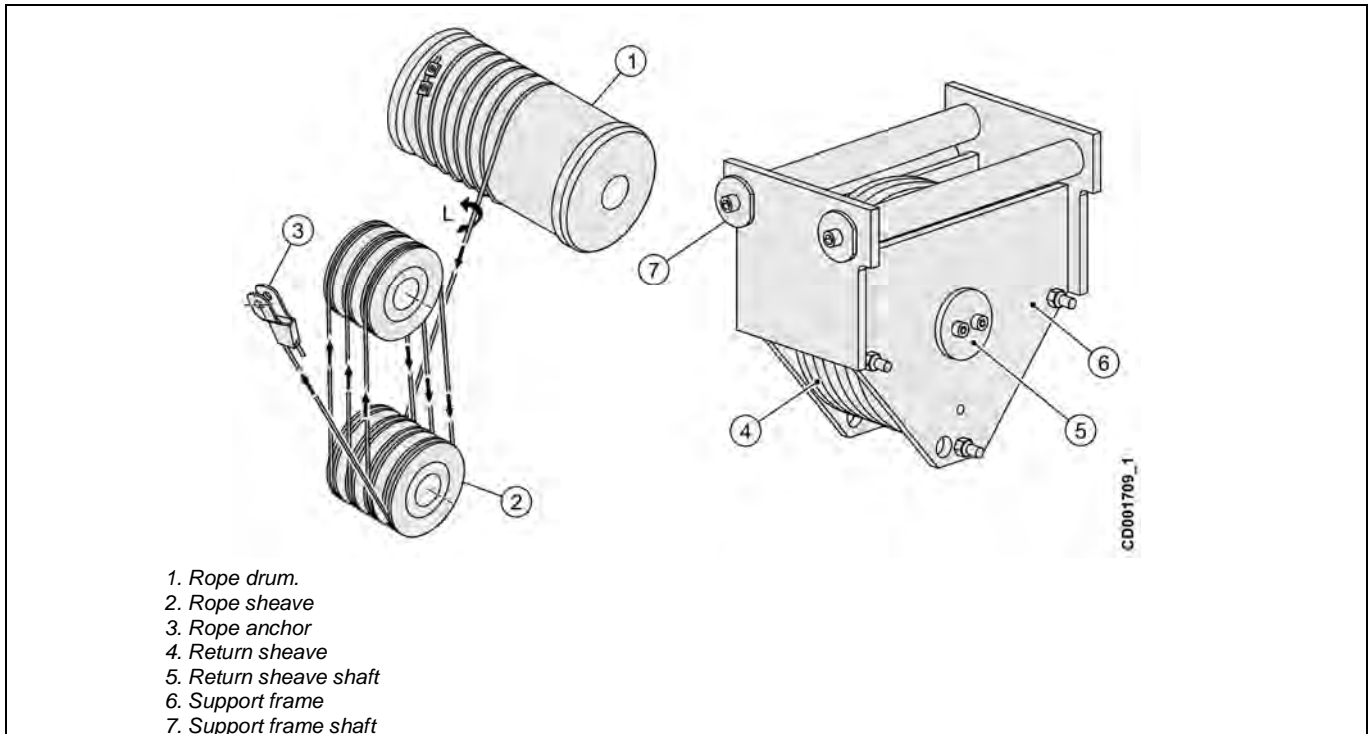
Rope reeving code: 04, hoist frame size: VT4.



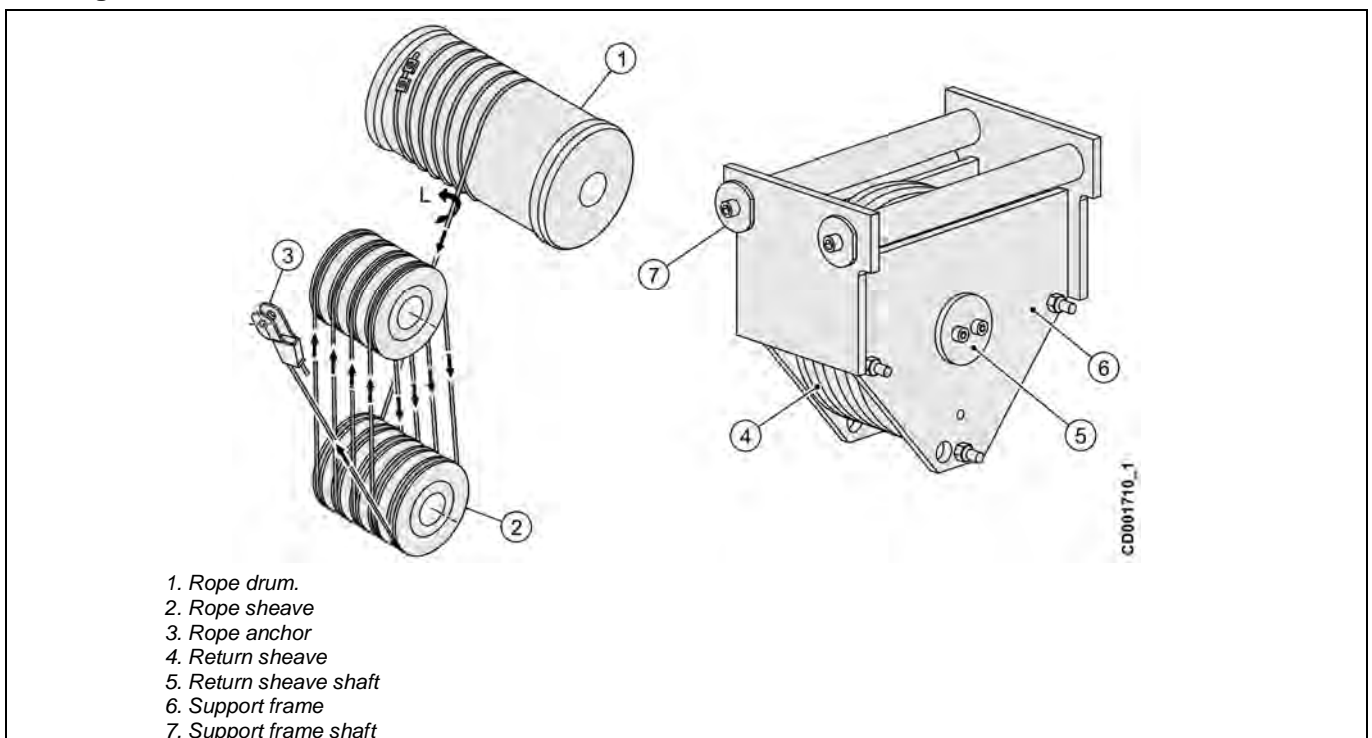
Rope reeving code: 06, hoist frame size: VT2, VT3, VT4.



Rope reeving code: 08, hoist frame size: VT2, VT3, VT4.

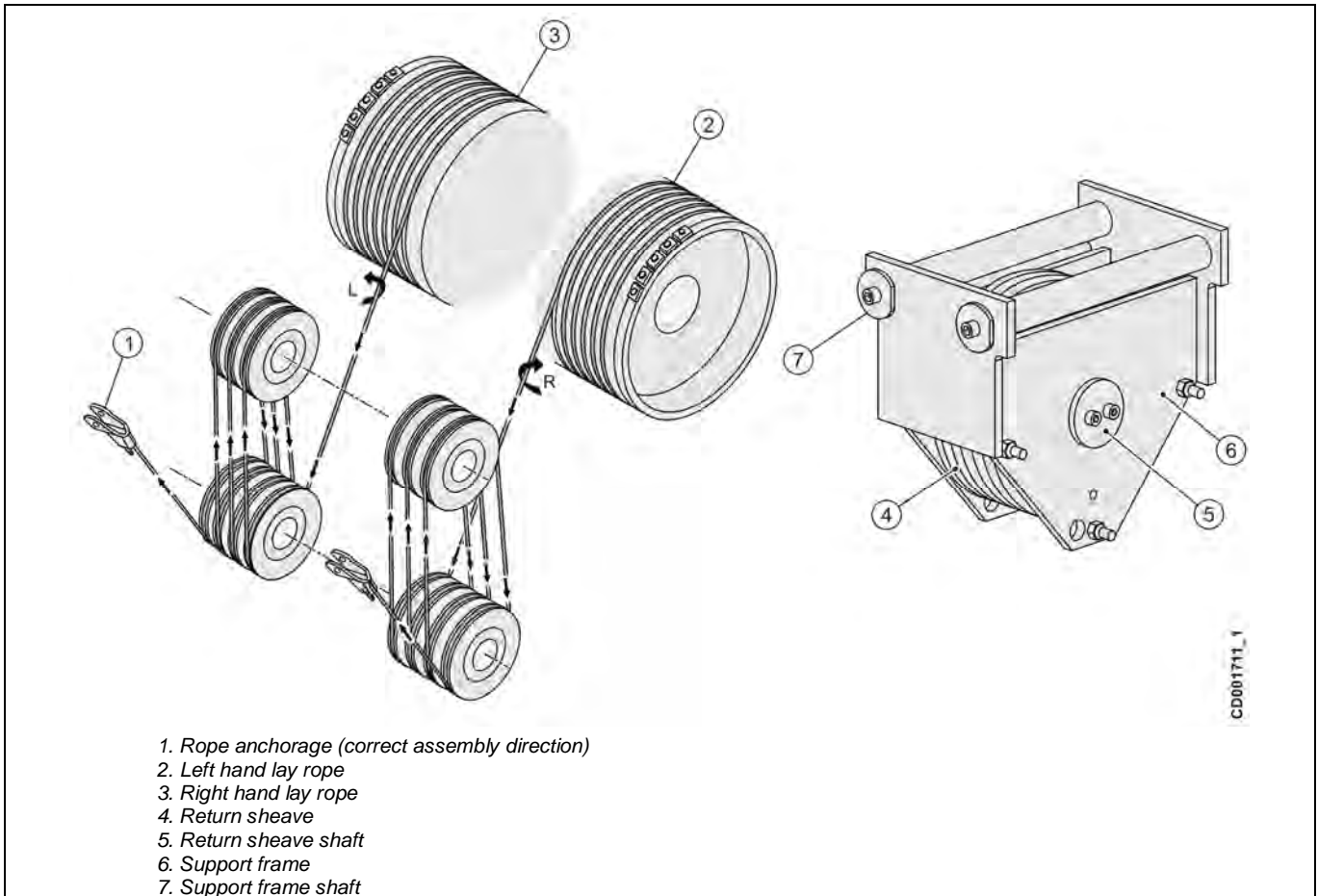


Reeving code 10, hoist frame size: VT4.



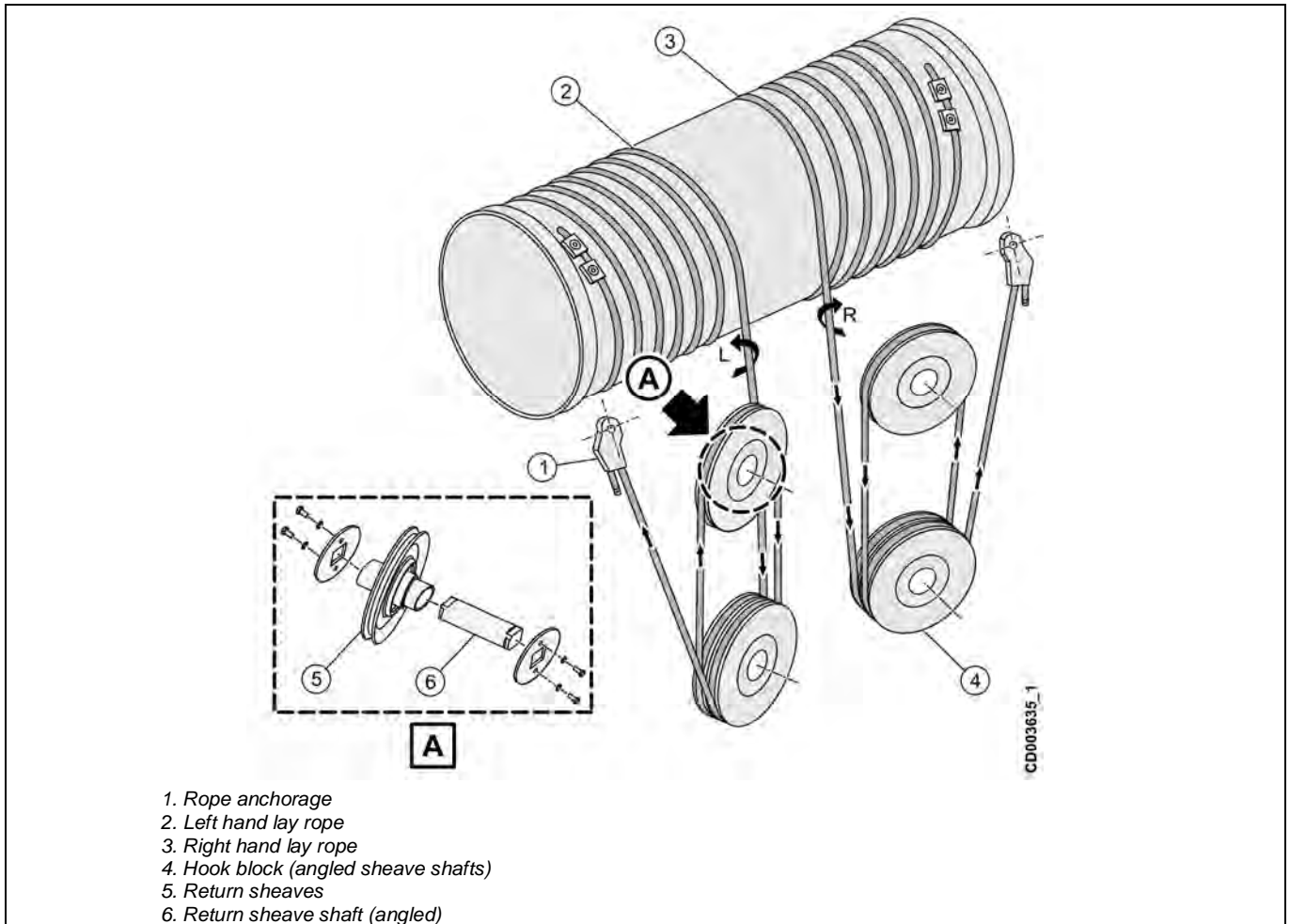
7.2.2 True vertical reevings (two ropes from drum)

Rope reeving code: 24, 26, 28, hoist frame size: VT3, VT4, VT5. Before year 2010 product update.

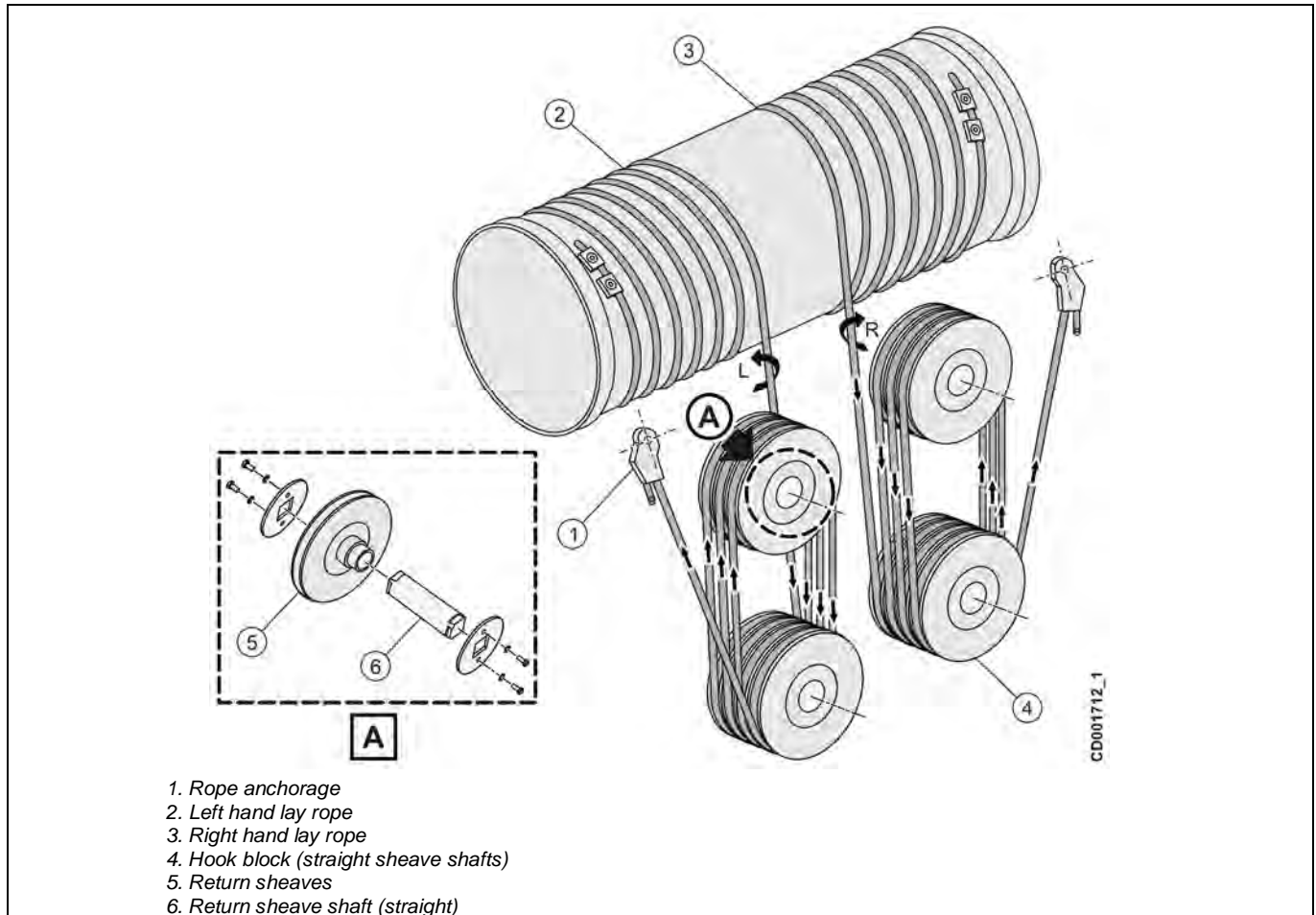


Note: It is important that the rope anchorage is correctly mounted in the overload device. See the picture for correct direction details of rope anchorage.

Reeving code: 24, hoist frame size: VT3, VT4, VT5. After year 2010 product update.



Reeving code: 26, 28, hoist frame size: VT3, VT4, VT5. After year 2010 product update.



Note: It is important that the rope anchorage is correctly mounted in the overload device or in the suspension. See the picture for correct direction details of rope anchorage.

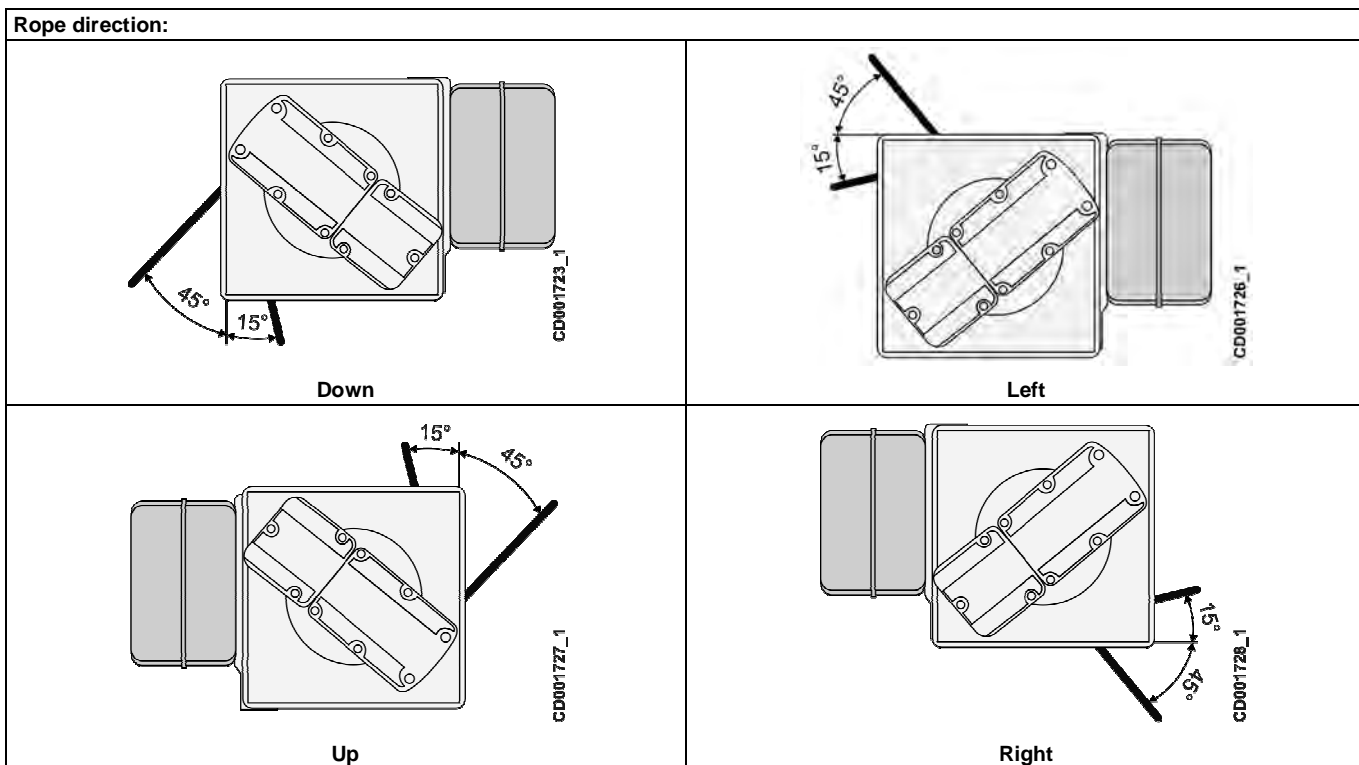
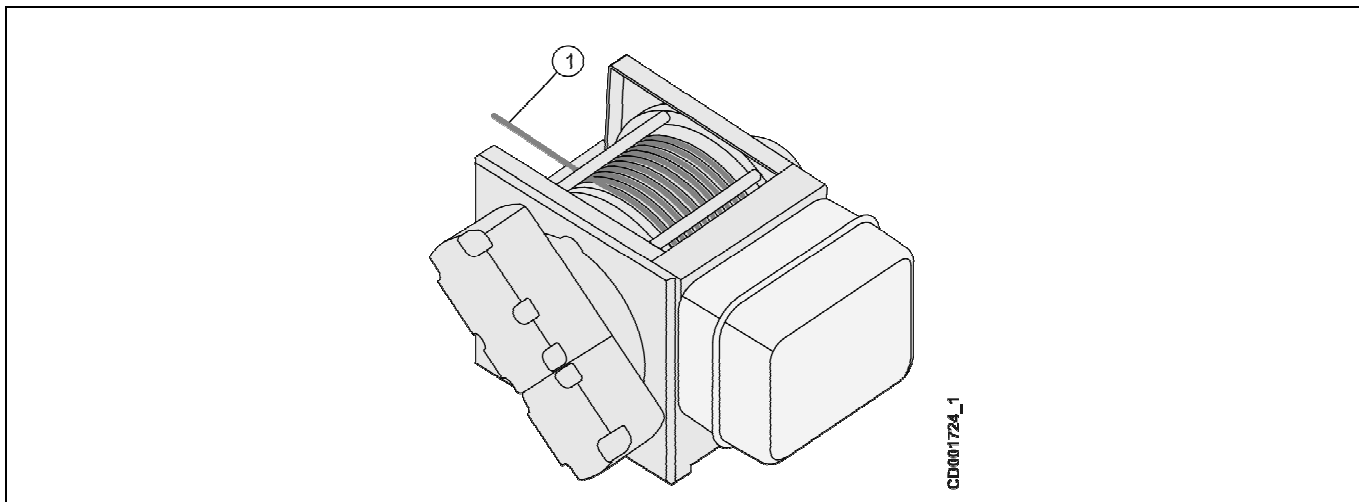


Note: Hook block sheaves are angled. It is important that hook block is assembled correctly. See the picture for correct direction details of hook block.

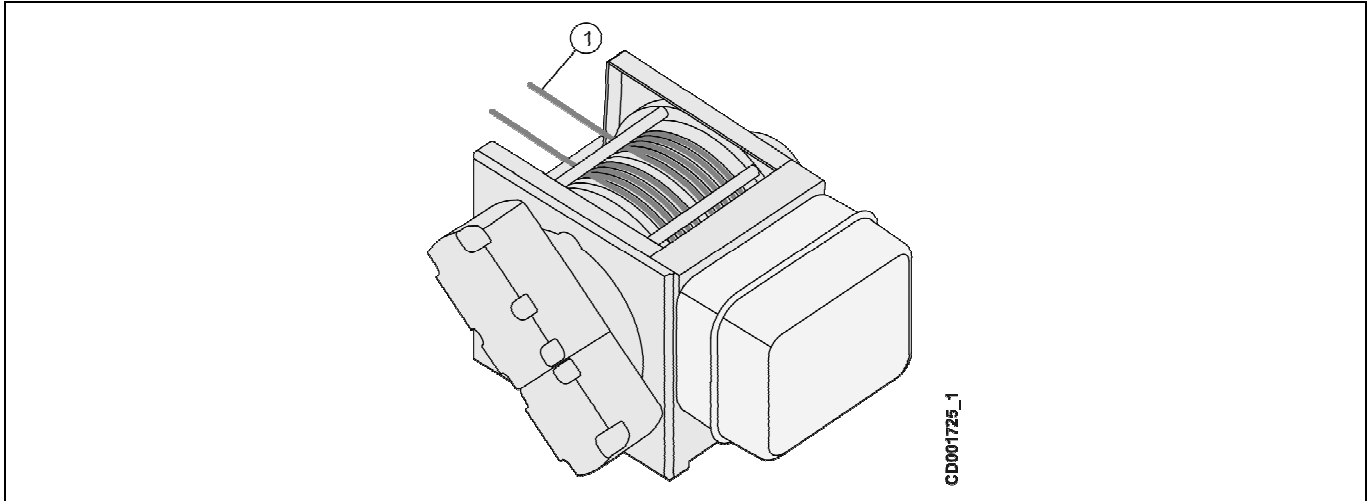
7.2.3 Machinery reevings

The reevings for machinery hoist does not have any hook or sheaves. The reeving can be 1-rope, 2-rope same direction or 2-rope opposite directions.

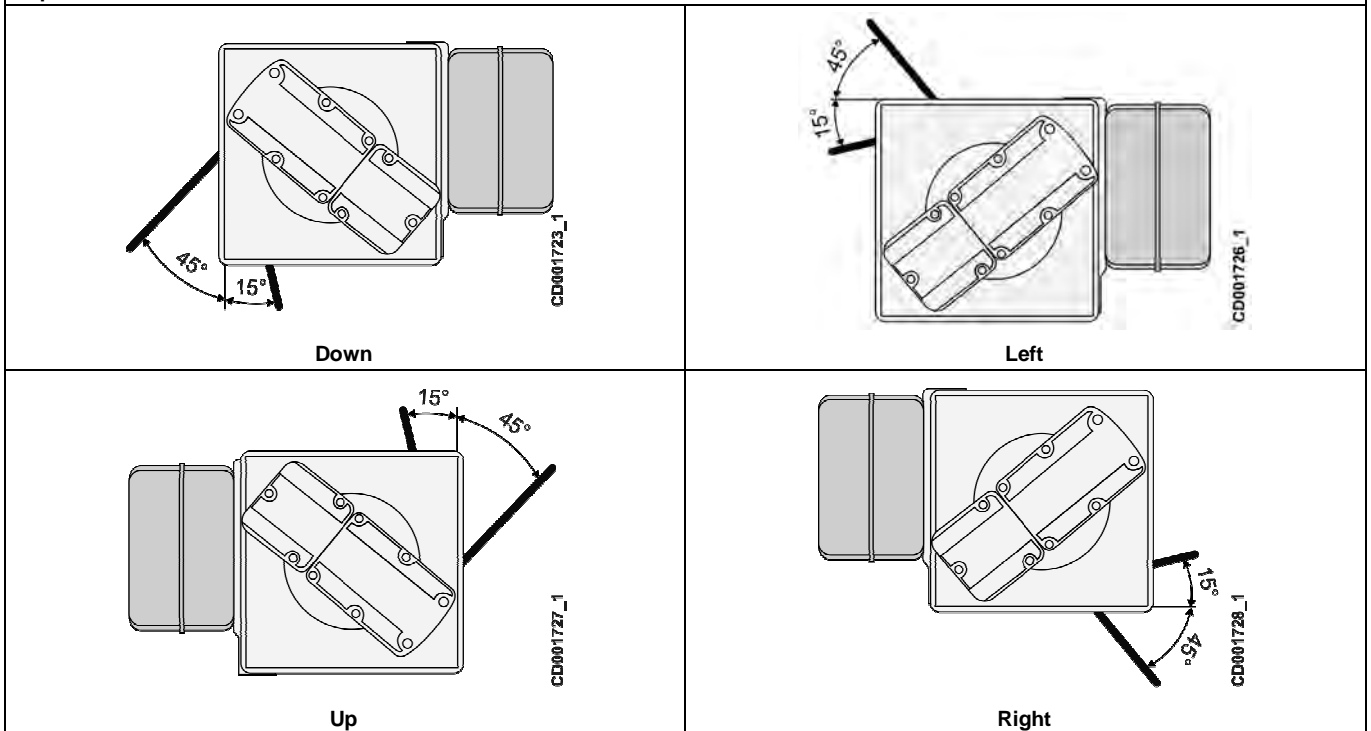
Rope reeving code: M1.



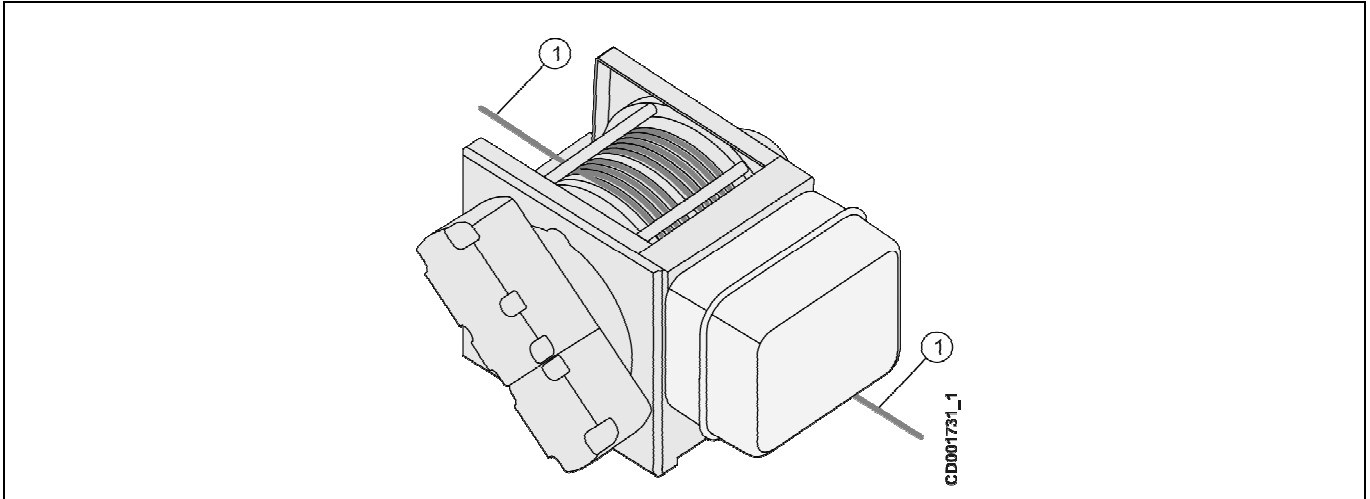
Rope reeving code: M2, ropes to same direction



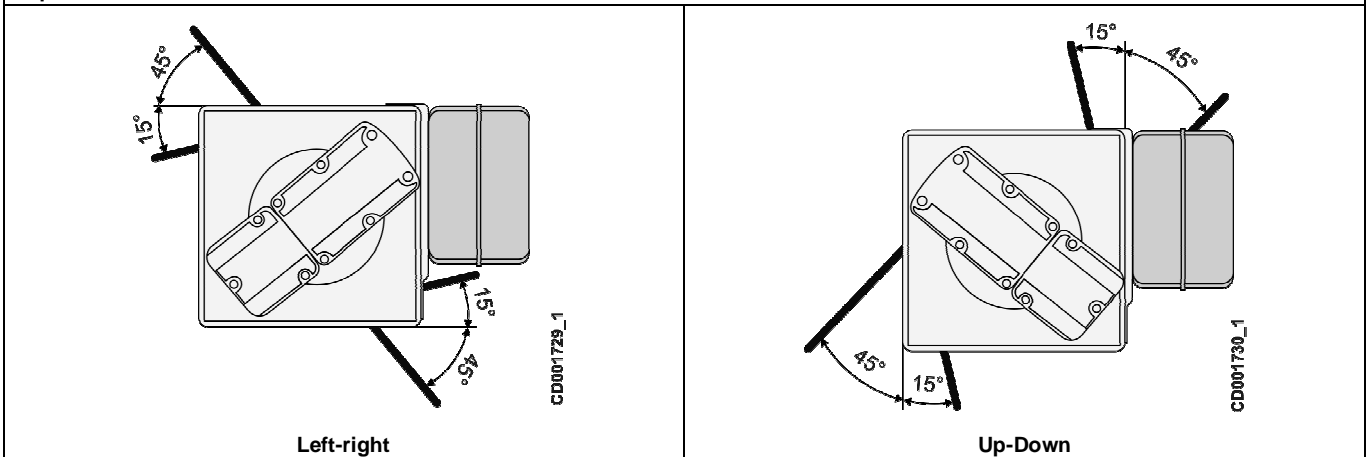
Rope direction:



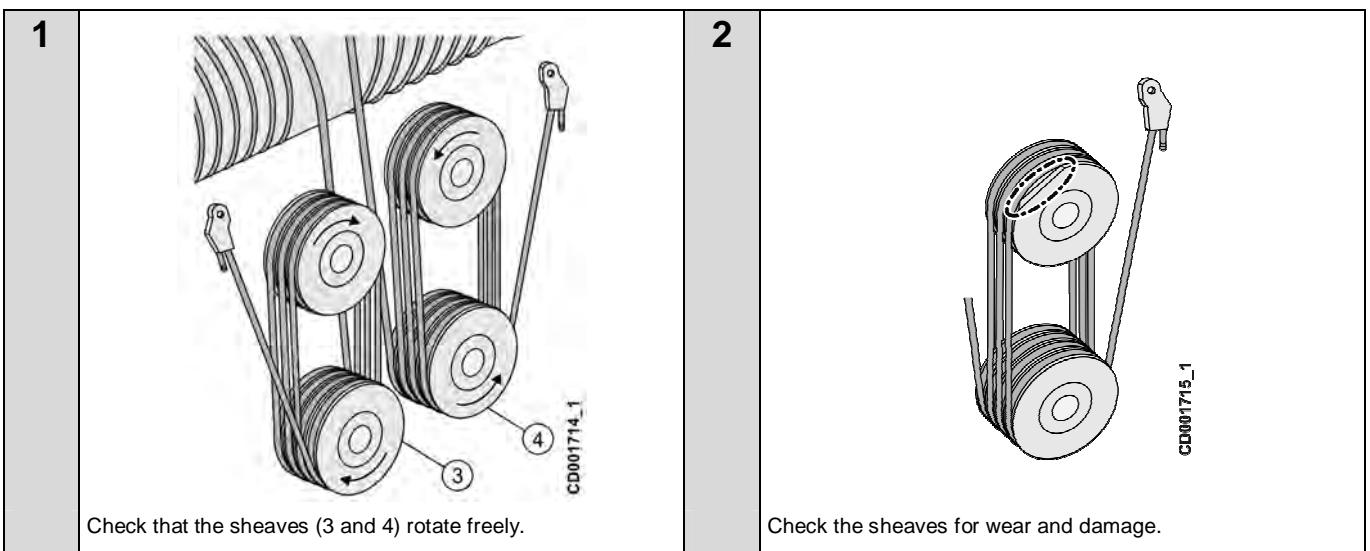
Rope reeving system: M2, ropes to opposite directions2



Rope direction:

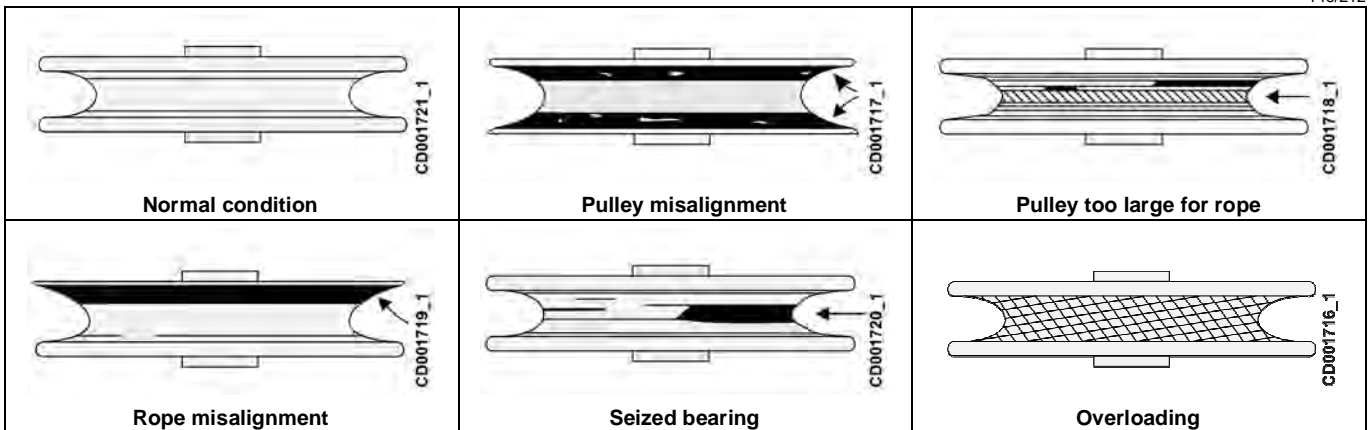


7.2.4 Rope sheave maintenance



Wear inspection of sheaves

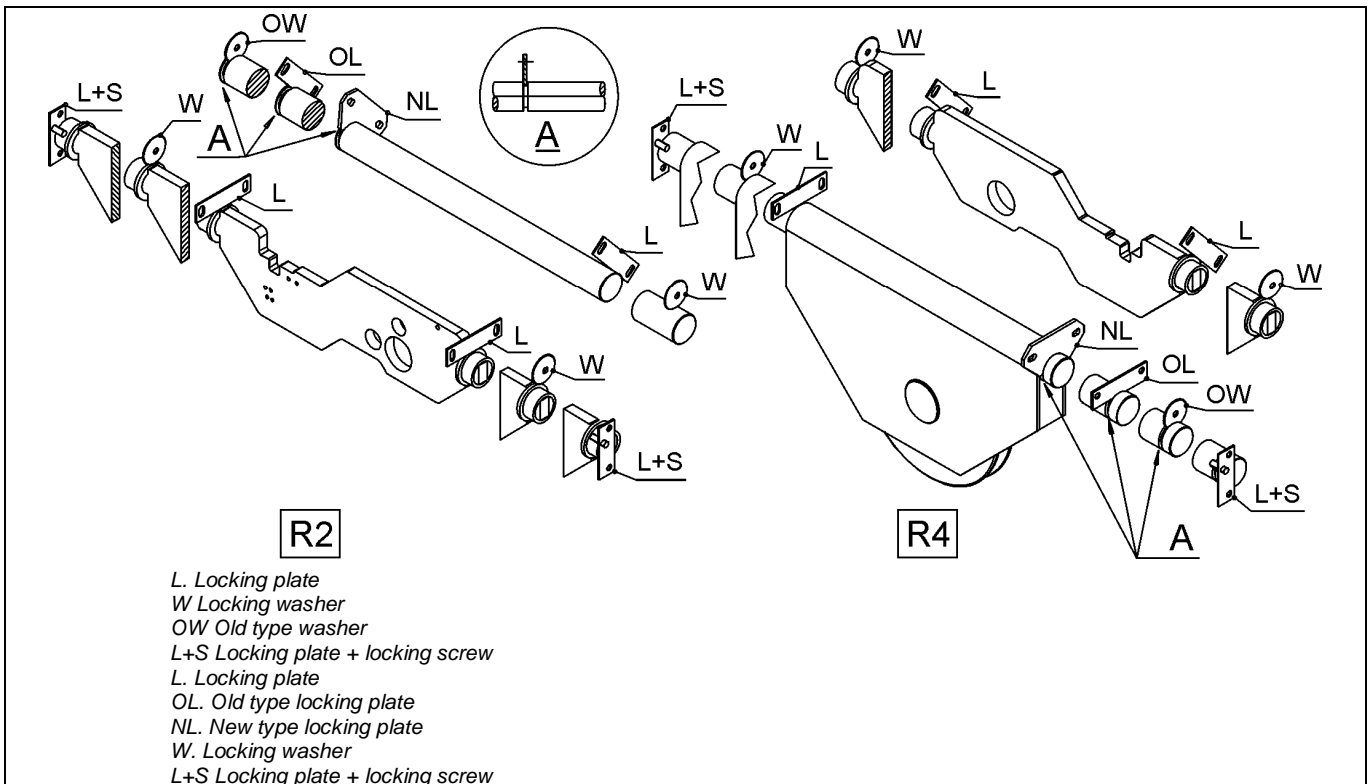
Example wear types.



Rope imprints can also be an indication that the hoist has been utilized beyond its design duty class. For measuring sheave groove wear and acceptance criteria, refer to "General Overhaul Instructions".

7.2.5 Sheave support and rope anchorage support

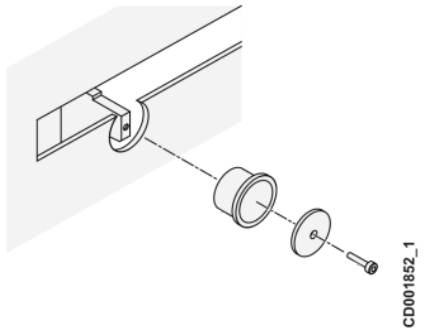

Support shaft locking, Low headroom trolley, and Normal headroom trolley. Reeving: 02 and 04.



Note: Replace locking washer (OW) or locking plate (OL) with the shaped locking plate (NL) if possible. Or replace locking washer (W) with the locking plate (L) if possible.

7.2.5.1 Maintenance of sheave support and rope anchorage support

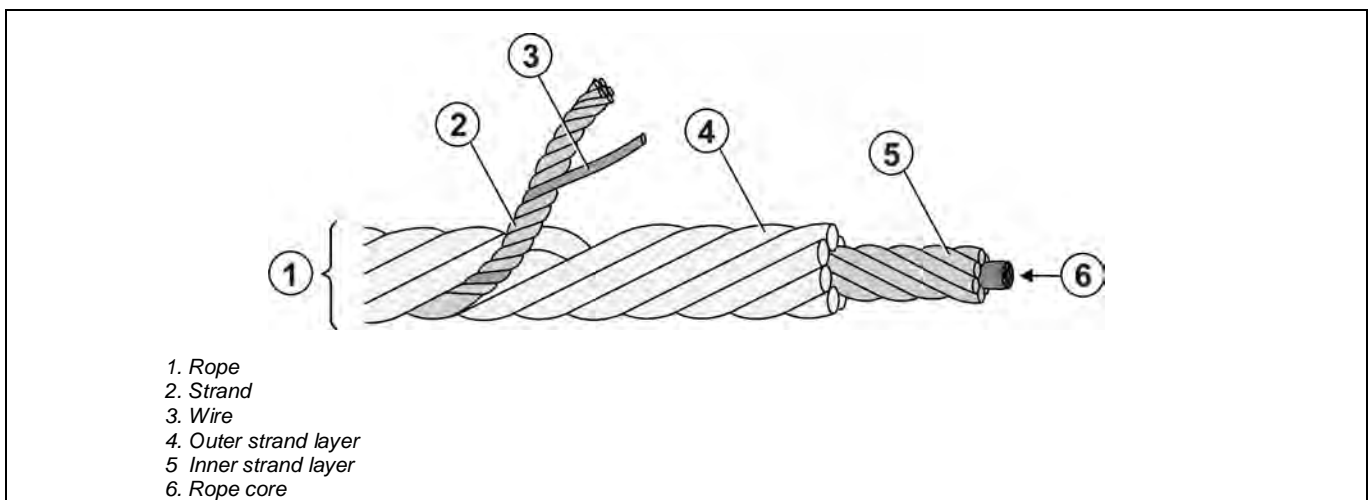
Low headroom trolley and Normal headroom trolley. Reeving: 02 and 04.

1	 <p>Check that the support shaft and the rope anchorage plate (or overload device) are correctly in their slots. Check that fixing screws are tight. Lubricate the load carrying surfaces in the ends of the shaft and the rope anchorage plate with a small amount of grease.</p>	2	 <p>Check that the locking part is in the groove of the shaft in cases which there is no other block against the shaft axial movement. Check that the sheave block and the rope anchorage can freely tilt with rope.</p>
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7.2.6 Wire rope

The rope of the hoist is a wearing, load-bearing part. In order to ensure safe and efficient operation of the hoist, it is essential to follow the safe working principles that are described in the safety instructions. Regular inspection of the rope is a vital safety procedure requirement.

Structure of wire ropes



Standard and heavy-duty wire ropes have eight outer strands and steel core. The steel core is covered by plastic in heavy-duty rope. The lay of the outer strands is left-handed in single rope hoists. True vertical hoists have two ropes, one with left hand lay and another with right hand lay. Rotation resistant ropes have more outer strands than standard ropes. Outer strands have left hand lay, while inner strands have right hand lay.

The lay of strands (wire rope) can be twisted either to the left or to the right. To determine whether the lay is left- or right-handed, examine the rope by looking up to the length of a rope whether the wires turn anti-clockwise (left-handed) or clockwise (right-handed).



Left hand lay of strands in the rope



Right hand lay of strands in the rope

7.2.6.1 Replacing the wire rope

Disassembly

<p>1</p>	<p>CD001524_1</p> <p>Adjust (or by-pass) the lower limit switch (1) so that the rope can be fully unwound from the drum</p>	<p>2</p> <p>CD001525_1</p> <p>Lower the hook onto a stable working-platform. Pull, with a gloved hand, the rope down from the drum, until the last turn. Remove the rope guide, see section "Rope guide, Assembly" for details.</p>
<p>3</p>	<p>CD001416_1</p> <p>Switch OFF the power supply to the crane.</p>	<p>4</p> <p>CD001530_1</p> <p>Extract the rope anchorage (2) from the overload device, see section "Rope anchorage, Assembly" for details and remove the rope from the anchorage.</p>
<p>5</p>	<p>CD001578_1</p>	

Pull the rope out from the hook block and return sheaves. Remove the rope clamps (3) from the drum and remove the rope.



CAUTION

Take account the weight of falling rope when removing the clamps.



Note: In some cases, it is possible to pull the new rope on to the hoist by using the old rope and a cable-sock. Pay special care when using this practice. Make sure that there is no risk for personal injuries and assure the new rope does not get damaged.

Reassembly

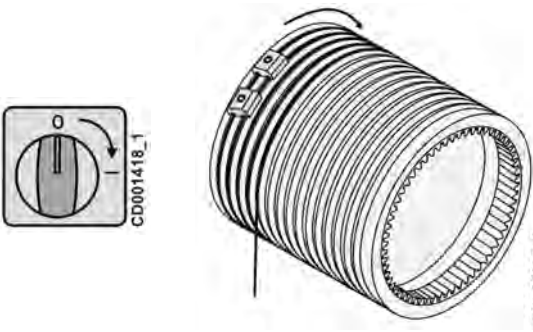
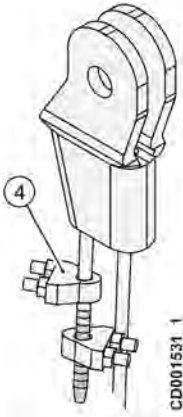
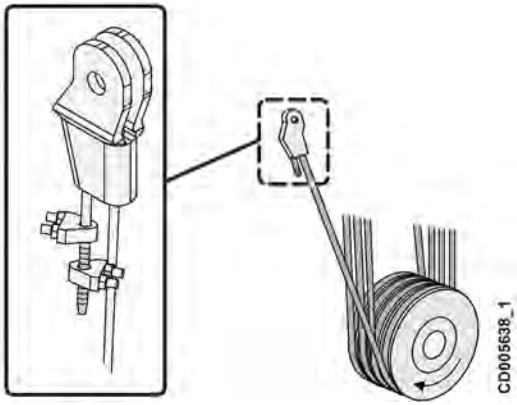
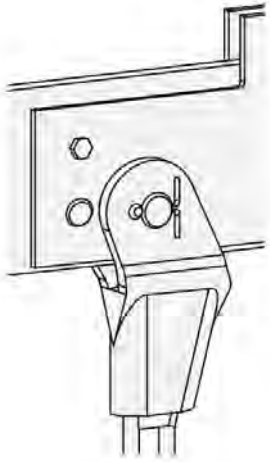


Note: In two-rope systems (True Vertical Lift), replace both ropes simultaneously. Ensure that both ropes are identical except right/left hand lay.



Note: In two-rope systems (True Vertical Lift), ensure that both ropes are of equal length. A small variation in length may cause the hook block and the balancing beam to tilt. Adjust the rope length by pulling one of the ropes further through the wedge housing, until the hook block hangs as straight as possible (the maximum of 5 degree tilt allowed).

1		2	
	<p>Check that the new rope is compatible with the hoist. Check the rope certificate to determine whether the rope is of the correct diameter and breaking load.</p>		<p>Unroll the cable (when delivered as a roll) or use a cable-reel stand (when delivered on a drum). Follow the principles as set out in standard ISO 4309.</p>
3		4	
	<p>Check correct installation. Left hand lay to right-hand groove. Right hand lay to left-hand groove.</p>		<p>Fasten the rope end to the rope drum with the rope clamps (3).</p>

<p>5</p>	 <p>CD001418_1 CD001526_1</p>	<p>6</p>	 <p>CD001531_1</p>
	<p>Switch ON the power supply to the crane. Run the rope onto the rope drum until enough free rope is available for the reeving, using the hoisting motor.</p>		<p>Thread the rope through the rope sheave or rope sheaves as shown in the rope reeving diagram. Fix the rope in the rope anchorage, tighten it and fasten the rope clamp (4) on the free end of the rope.</p>
<p>7</p>	 <p>CD005638_1</p>	<p>8</p>	 <p>CD005639_1</p>
	<p>Place the rope in the rope anchorage the right way around. The bent part must always be in the wedge housing.</p>		<p>Install the rope anchorage on the overload device.</p>



Note: Place the rope anchorage in its suspension point. Fix the locking pins. Always adjust and check the limit switch for hoisting after replacing the rope. See section "Hoisting limit switch, Adjustment" for details.



Note: New wire rope is taken into use by testing it with a load, which is approx. 20 - 40% of the nominal load. This load must be lifted to the total lifting height about ten times. If the hook tries to turn around during the lifting, place the hook in the lowest position without load, open the rope end wedge housing and rotate the wedge housing until the hook is straight.



Note: Note the correct position of the wedge housing (see sticker on wedge housing support or see section "Rope anchorage"). Append the rope certificate for the new rope to the documentation for the hoist.

7.2.6.2 Maintenance of wire rope



Note: Regular rope inspection and maintenance must be carried out according to the guideline instructions provided by the manufacturer and according to international standard ISO 4309:2009.



Note: Mechanical and electrical maintenance work requires special skills and tools to ensure safe and reliable operation of the product. Only the authorized service personnel or an experienced service technician authorized by the manufacturer are entitled to carry out the maintenance work.



Note: The internal examination of wire rope shall not be done as part of regular maintenance, unless the person is trained for that examination (ISO4309 Annex D).



WARNING

The rope shall be changed **before** the limits are reached. Change the rope if there is a risk that the limits will be reached before the next examination.



CAUTION

Protective gloves shall be used to avoid getting wire splinters or cuts to the hands.



Note: If a rope must be changed, the owner must ensure that the old rope is disposed according to the local regulations. Refer to chapter "Disposal of waste material".

Periodical examinations

The user must inspect the rope for possible visual deformations or damages daily. Wire ropes shall be inspected by the authorized service personnel at least every 12 months or 10 % SWP reduction.

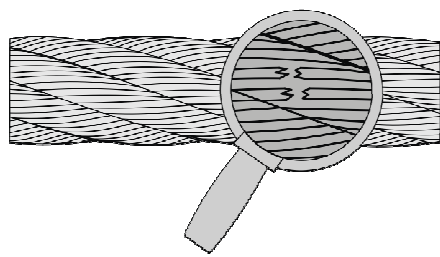
The inspection intervals must be shortened when:

- The hoist is used in heavy duty or process use (for example, duty class M6 or higher, paper mill cranes and so on)
- The hoist is used under harsh conditions (for example, extreme temperatures, excessive dirt/dust or outdoors)
- Previous examinations indicated a high rate of wear.

If any hesitation, contact the manufacturer for advice.

7.2.6.3 Discard criteria of wire rope

Discard criteria: Broken wires



CAUTION

Wire ropes shall be replaced immediately in case more than one wire is broken.

Table 1. Standard Ropes and Heavy-Duty Ropes.

Rope diameter mm	Detected length mm	Maximum wire breaks	
		Duty class M4	Duty class M5, M6
6.2 – 6.5	40	3	6
	200	6	12

8	50	5	10
	250	10	20
11	70	5	10
	350	10	20
15	90	8	16
	450	16	32

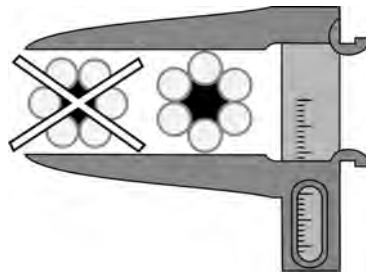
Table 2. Rotation Resistant Ropes


Rope diameter mm	Rope construction	Detected length mm	Maximum wire breaks	
			Duty class M4	Duty class M5, M6
6.7	17 x 7	40	2	4
		200	4	8
8 – 8.5	24 x 7	50	2	4
		250	4	8
11 – 11.5	28 x 7	70	2	4
		350	4	8
15	28 x 7	90	2	4
		450	4	8

Discard criteria: Local reduction of rope diameter

A reduction in the rope diameter in any part of the rope is an indication of internal or external wear or damage.


To accurately measure the diameter at any point of the rope, rotate the vernier caliper around the rope to record the maximum dimension.



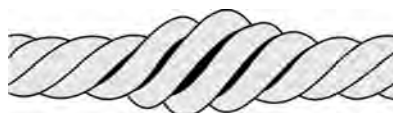
	CAUTION	<p>Standard or heavy-duty ropes shall be discarded when the actual diameter at any point of the rope is 7% less than the nominal diameter. Rotation resistant ropes shall be discarded when the actual diameter at any point of the rope is 3% less than the nominal diameter.</p>
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Discard criteria: Local increase of rope diameter

An increase in rope diameter in any part of the rope is an indication of deformation inside the rope.

	CAUTION	<p>Ropes shall be discarded when the actual diameter at any point of the rope is 5% more than the nominal diameter.</p>
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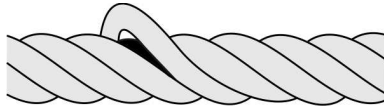
Discard criteria: Basket (birdcage) deformation




Basket (birdcage) deformation occurs when there is a difference in length between the rope core and outer strands.

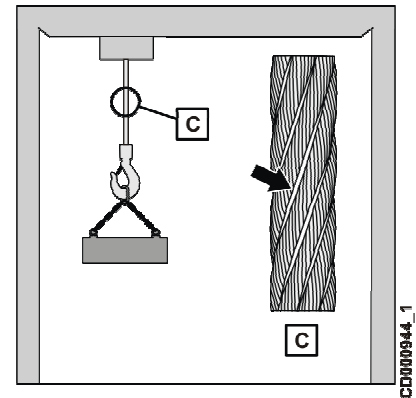
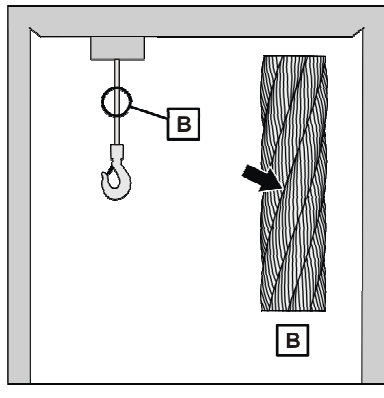
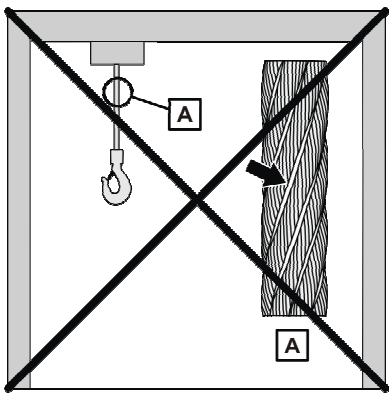
 CAUTION	Ropes with basket deformation shall be discarded immediately.
--------------------------------------------------------------------------------------------------	----------------------------------------------------------------------

Discard criteria: Protrusion of rope parts



 CAUTION	Ropes in which there is a protrusion of core, strand, or group of wires shall be discarded immediately.
--------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------

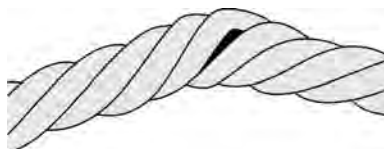
Discard criteria: Loose outer strands



 CAUTION	If outer strand of the rope has gaps when there is no load on the rope, the rope shall be discarded immediately.
----------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------

The outer strands of the rope shall be tight when there is no load (drawing B) on the rope. When standard or heavy-duty ropes are under load, there can be small visible gaps between the outer strands (C). If these gaps do not close when the load is released, the rope shall be discarded (drawing A).

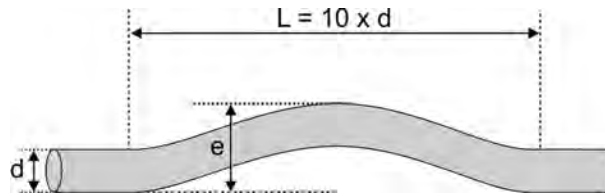
Discard criteria: Kinks



If there is a loop in the rope, the rope must be able to turn around its axis when it is tightened, otherwise a kink forms into the rope.

 CAUTION	Kinked ropes shall be discarded immediately.
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Discard criteria: Bends



Bends and other angular deformations in ropes are normally caused by some external influence.



CAUTION

For mild bends, carefully check for broken wires in the area of the bend. Discard the rope if there are more than one broken wires.

Mild bends can often be removed by carefully bending the rope by hand to straighten out the bend.

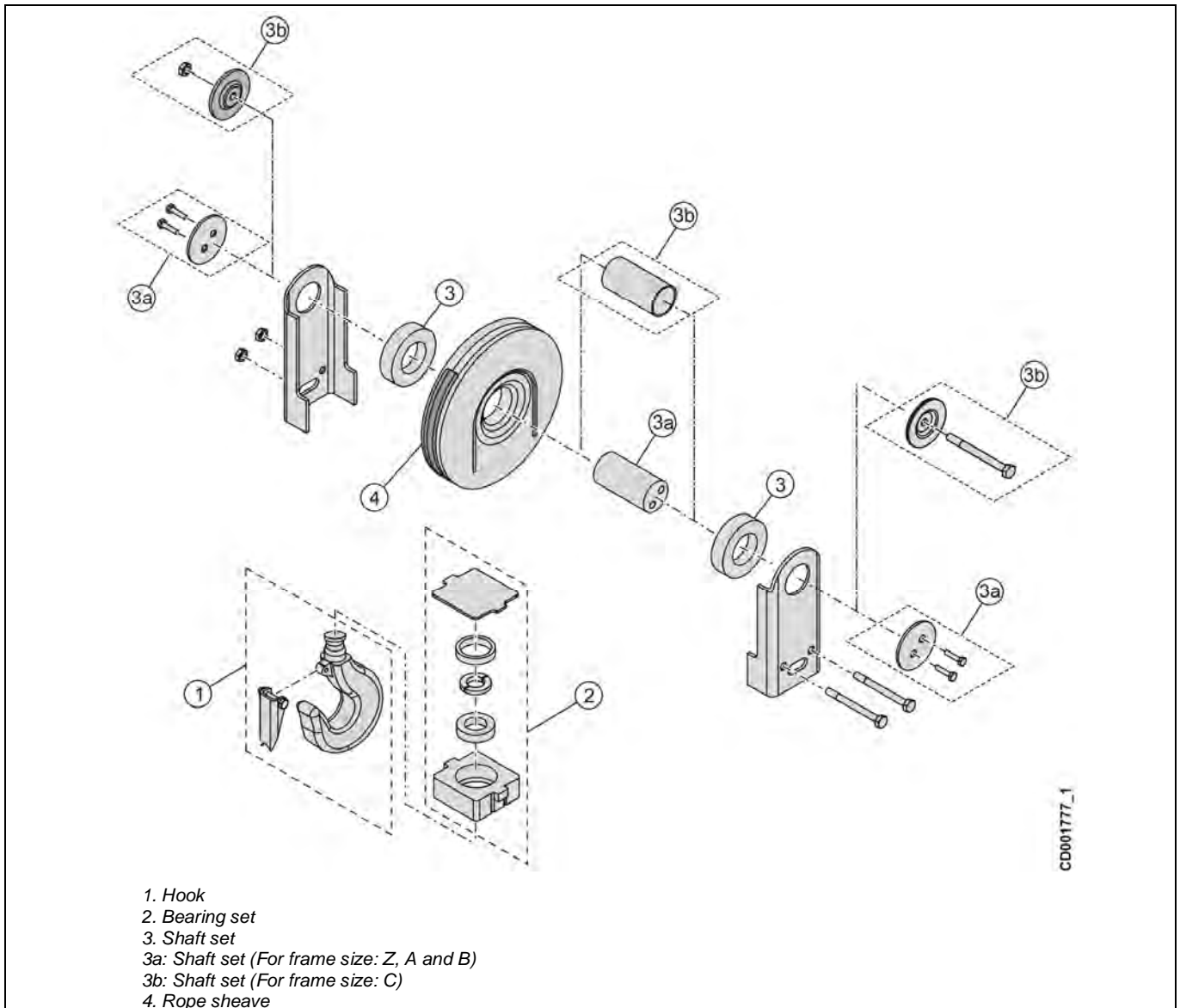


CAUTION


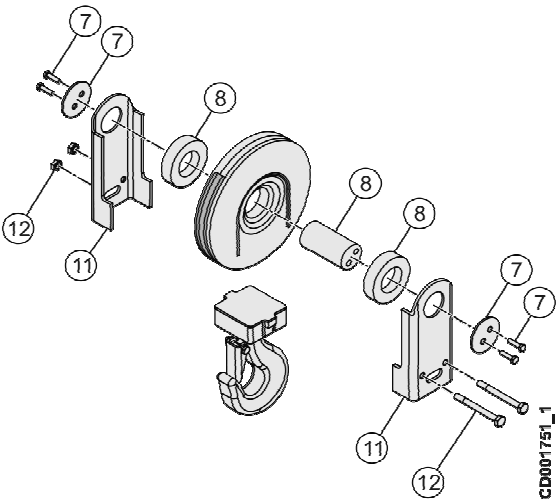
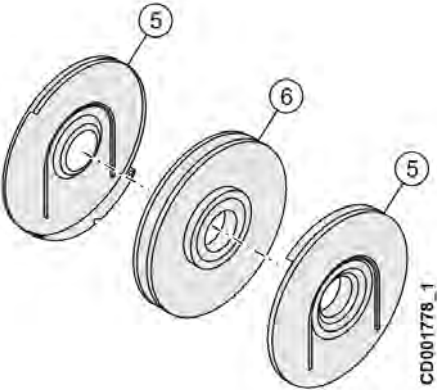
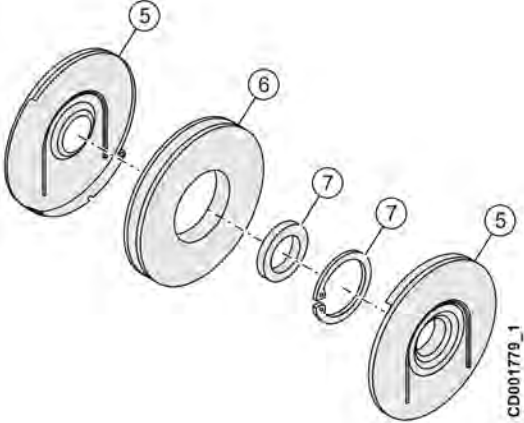
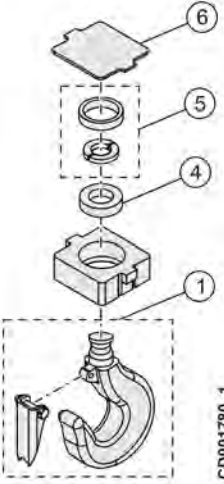
Discard the rope if the maximum deviation "e", is more than twice the rope diameter (2 x d) over a section of rope whose length is equal to ten times the rope diameter.

7.2.7 Hook-block

7.2.7.1 Hook block for hoist frame size: VTs, VT1, VT2, VT3. Reeving: 02, A2.



Disassembly

<p>1</p>	 <p>Lower the hook onto a stable working-platform. Pull with a gloved hand some extra rope down from the drum, so that the hook-block is free. If needed, adjust the lower limit switch. Switch of the power supply to the hoist.</p>	<p>2</p>  <p>Remove the shaft fixing parts (7). Remove the hook-block fixing parts (12). Remove the side plates (11) to separate the shaft assembly (8) and the hook and bearing set.</p>
<p>3</p>	 <p>For frame size VT1, VT2 Remove the sheave cover plate (5) from the rope sheave (6).</p>	<p>3</p>  <p>For frame size VT3 Remove the sheave cover plate (5), rope sheave (6), and rope sheave bearing set (7).</p>
<p>4</p>	 <p>Remove the cover plate (6), locking rings (5) and extract the hook (1) from the thrust bearing (4).</p>	

Reassembly



WARNING

On assembly use thread-locking compound Weicon Lock AN302-43 or equal for all screws.

<p>1</p>	<p>CD001781_1</p> <p>Lubricate the thrust bearing (4) and the hook shaft. Install the thrust bearing (4), locking rings (5), and cover plate (6).</p>	<p>2</p> <p>CD001782_1</p> <p>Insert the hook (1) into the bearing house and reassemble the thrust bearing (4). Ensure that the pressure plate of the thrust bearing with the bigger inside diameter (D2) is at the bottom and the one with smaller inside diameter (D1) is at the top.</p>
<p>3</p>	<p>CD001778_1</p> <p>For frame size VT1, VT2 Guide the rope on the rope sheave (6). Reassemble the rope sheave (6), sheave cover plates (5).</p>	<p>CD001779_1</p> <p>For frame size VT3 Guide the rope on the rope sheave (6). Reassemble the rope sheave (6), sheave cover plates (5) and rope sheave bearing set (7).</p>

<p>4</p> <p>Insert the hook and the bearing set, the sheave assembly, and the shaft assembly (8) between the side plates (11). Tighten the hook block fixing bolts and nuts (12) and the shaft assembly (7).</p> <p style="text-align: right;">CD001751_1</p>	<p>5</p> <p>CD001786_1</p> <p>Raise the hook block. Carefully guide the rope with a gloved hand until the hook block hangs free from the working platform. Switch ON the power supply to the hoist.</p>
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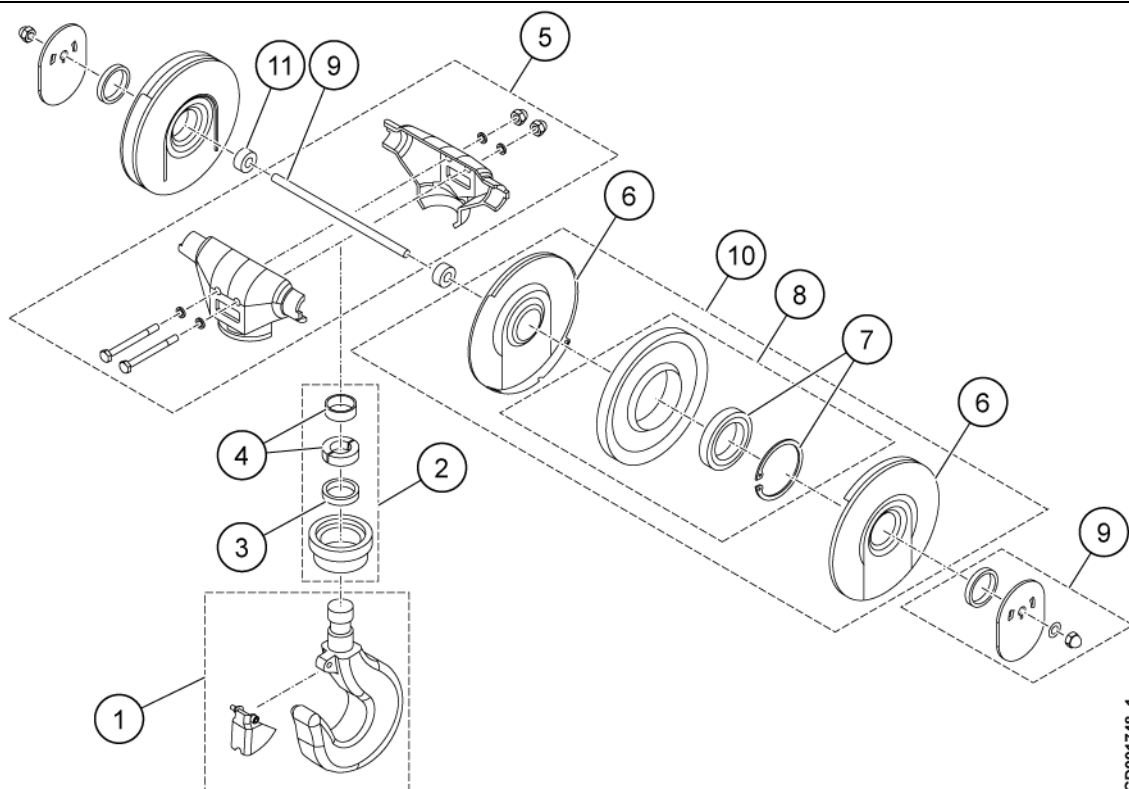
Note: If the lower limit switch has been adjusted, readjust to the correct position.

7.2.7.2 Hook block for hoist frame size: VT1, VT2. Reeving: 04, A4.

CD006015_1


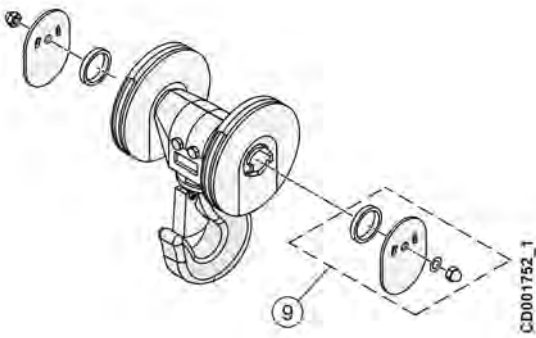
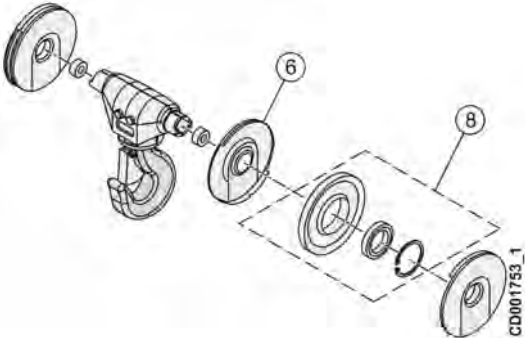
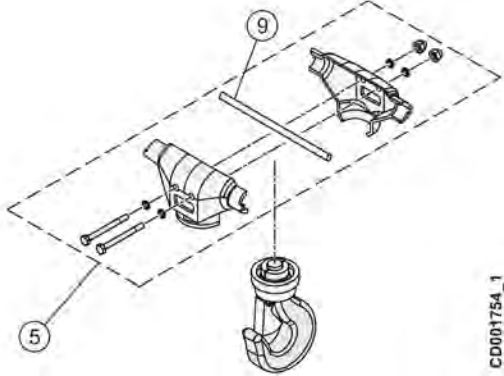
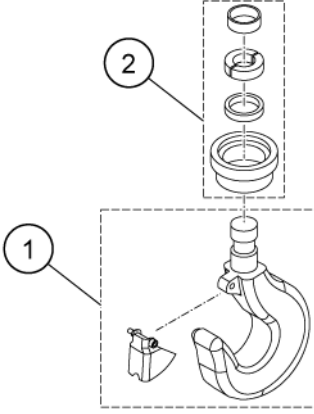
1. Hook
2. Bearing set
3. Thrust bearing
4. Locking ring
5. Locking ring (support)
6. Bearing housing
7. Side plate
8. Sheave bearing
9. Rope sheave
10. Shaft locking
11. Rope sheave

7.2.7.3 Hook block for hoist frame size: VT3. Reeving: 04, A4.

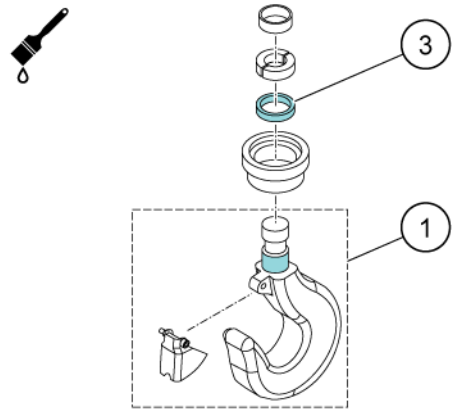
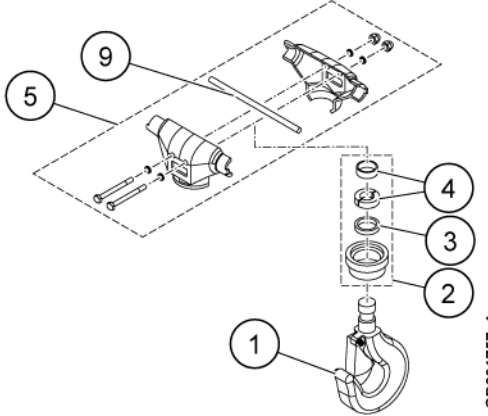
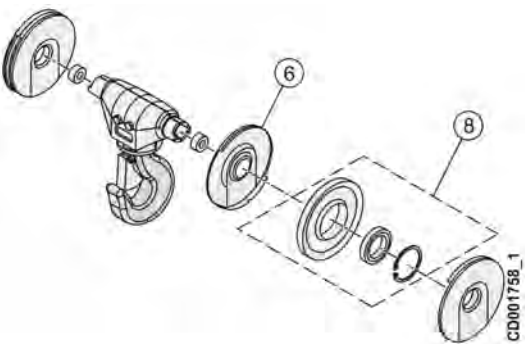
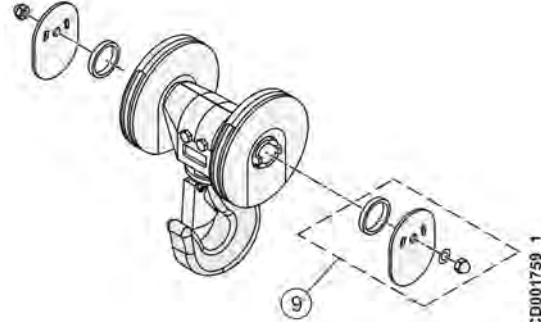
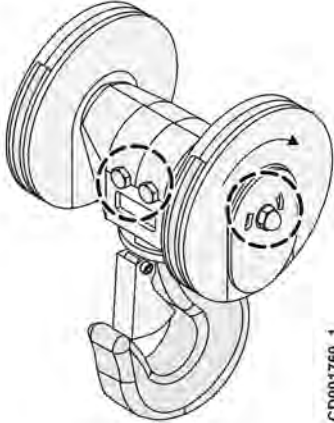
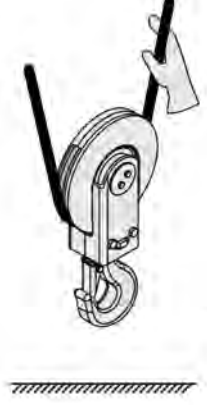


1. Hook
2. Bearing set
3. Thrust bearing
4. Locking rings
5. Sheet metal cross bar
6. Side plate
7. Sheave bearing set
8. Rope sheave
9. Shaft locking
10. Rope sheave
11. Sleeve

Disassembly

<p>1</p>	 <p>Lower the hook onto a stable working-platform. Pull with a gloved hand some extra rope down from the drum, so that the hook-block is free. If needed, adjust the lower limit switch. Switch OFF the power supply to the hoist.</p>	<p>2</p>  <p>Remove the shaft locking parts (9).</p>
<p>3</p>	 <p>Remove the sheave set from the shaft. Remove the side plate (6) in order to remove the sheave (8).</p>	<p>4</p>  <p>Remove the fixing screws to remove the sheet metal cross bar (5) from the shaft (9).</p>
<p>5</p>	 <p>Remove the bearing set (2) to extract the hook (1).</p>	

Reassembly

<p>1</p>	 <p style="text-align: right;">CD001756_1</p>	<p>2</p>  <p style="text-align: right;">CD001757_1</p>
<p>3</p>	 <p style="text-align: right;">CD001758_1</p>	<p>4</p>  <p style="text-align: right;">CD001759_1</p>
<p>5</p>	 <p style="text-align: right;">CD001760_1</p>	<p>6</p>  <p style="text-align: right;">CD001786_1</p>

Lubricate thrust bearing (3) and shaft of the hook (1).

Reassemble the thrust bearing (3) and the locking rings (4). Insert the hook (1) into it. Insert this assembly into the cross bar (5) and tighten with hand the fixing screws.

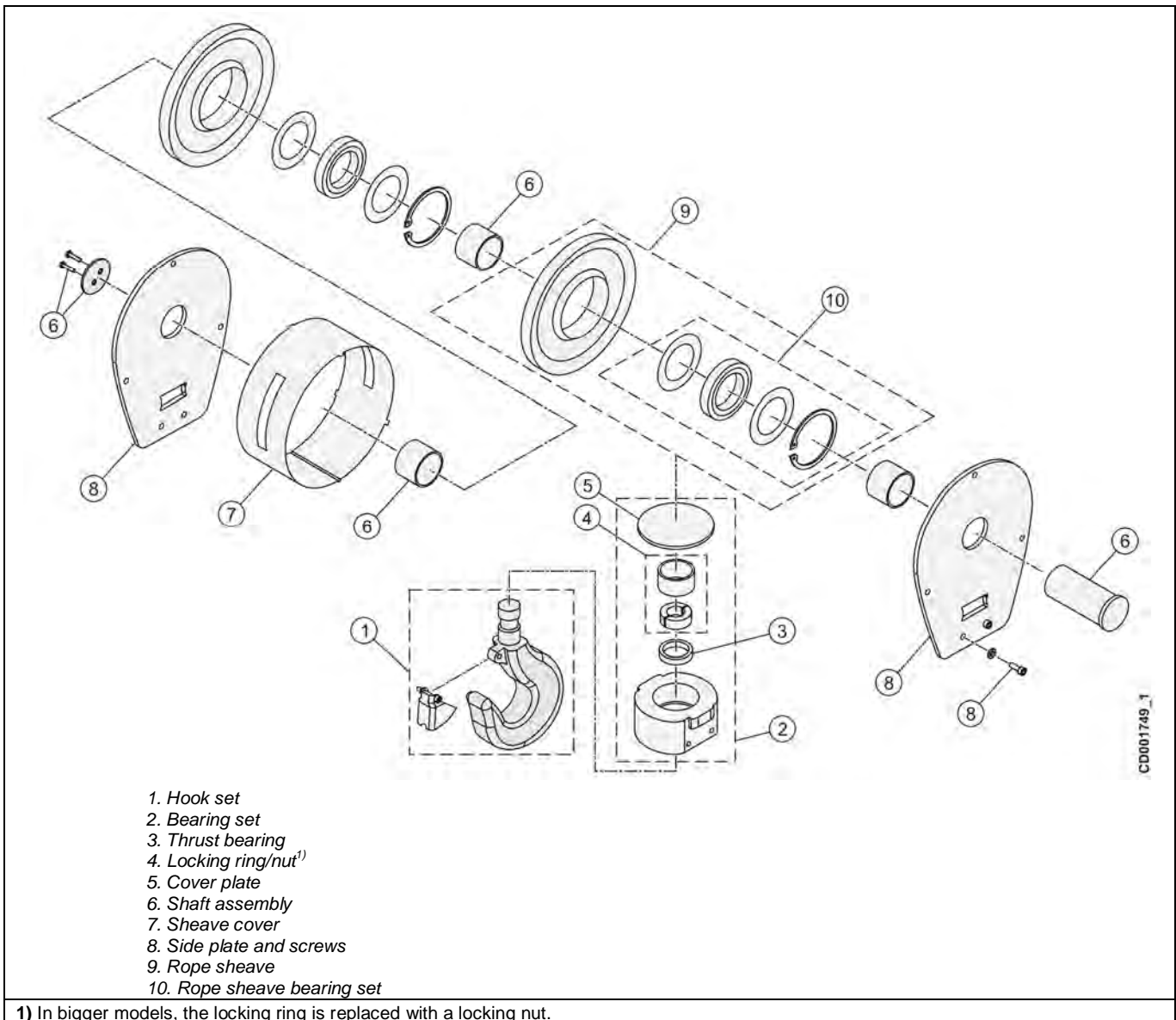
Reassemble the side plates (6) and the rope sheaves (8).

Install the shaft locking parts (9).

Ensure that the sheaves and the hook rotate freely before tightening the bearing housing fixing screws and the shaft locking screws to the required torque.

Raise the hook block. Carefully guide the rope with a gloved hand until the hook block hangs free from the working platform. Switch ON the power supply to the crane.

7.2.7.4 Hook block for hoist frame size: VT3, reeving: 22, 24, 26, VT28, Hoist frame size VT4, VT5, all reeving (before 2010 product update).


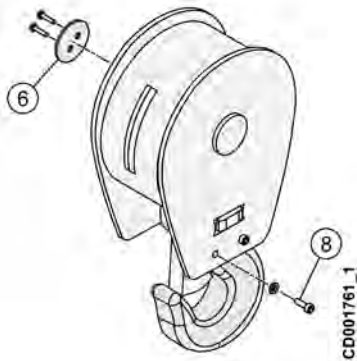
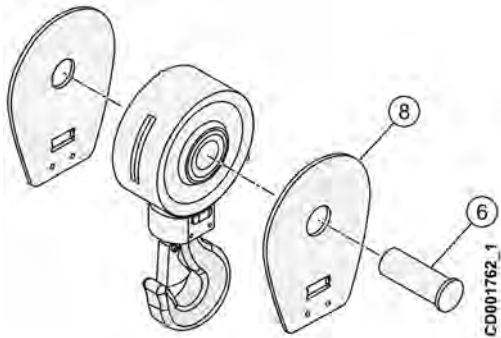
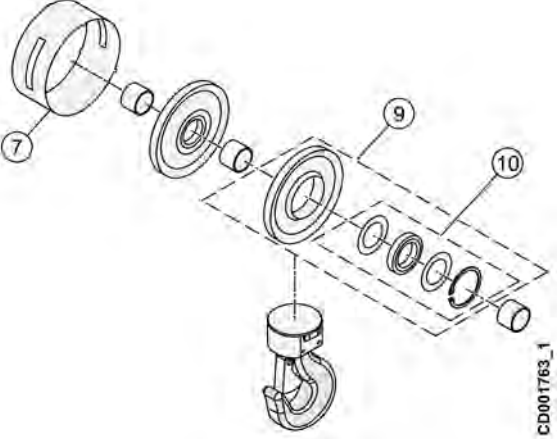
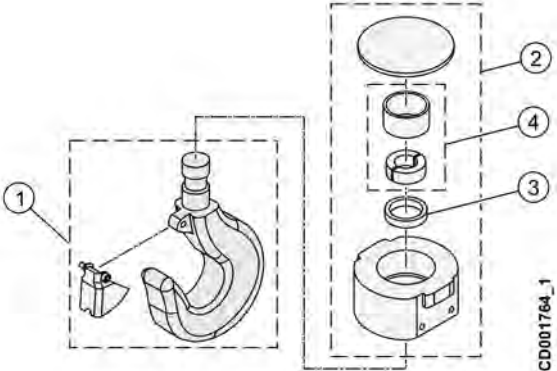


CD001749_1

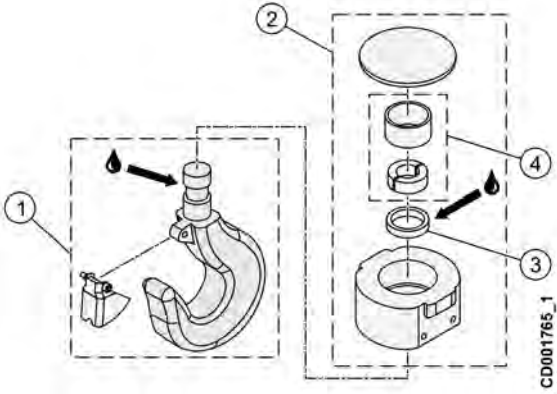
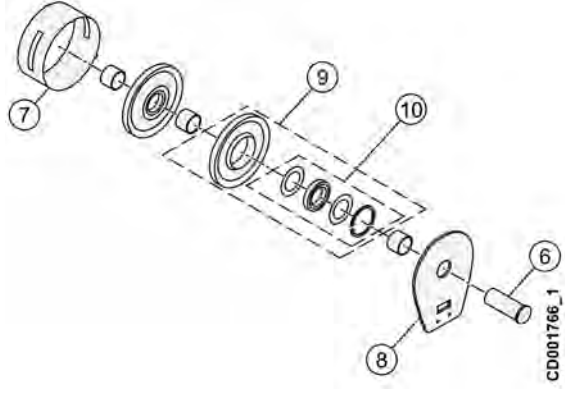
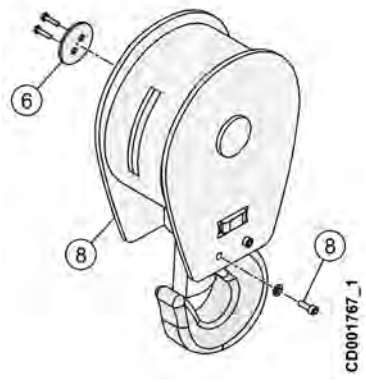
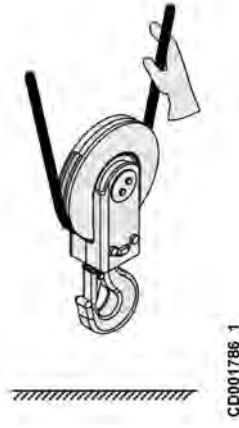


Note: The actual hook block outlook may vary, depending on the size! Depending on the number of rope falls, there are extra sheaves, side plates and sheave covers.

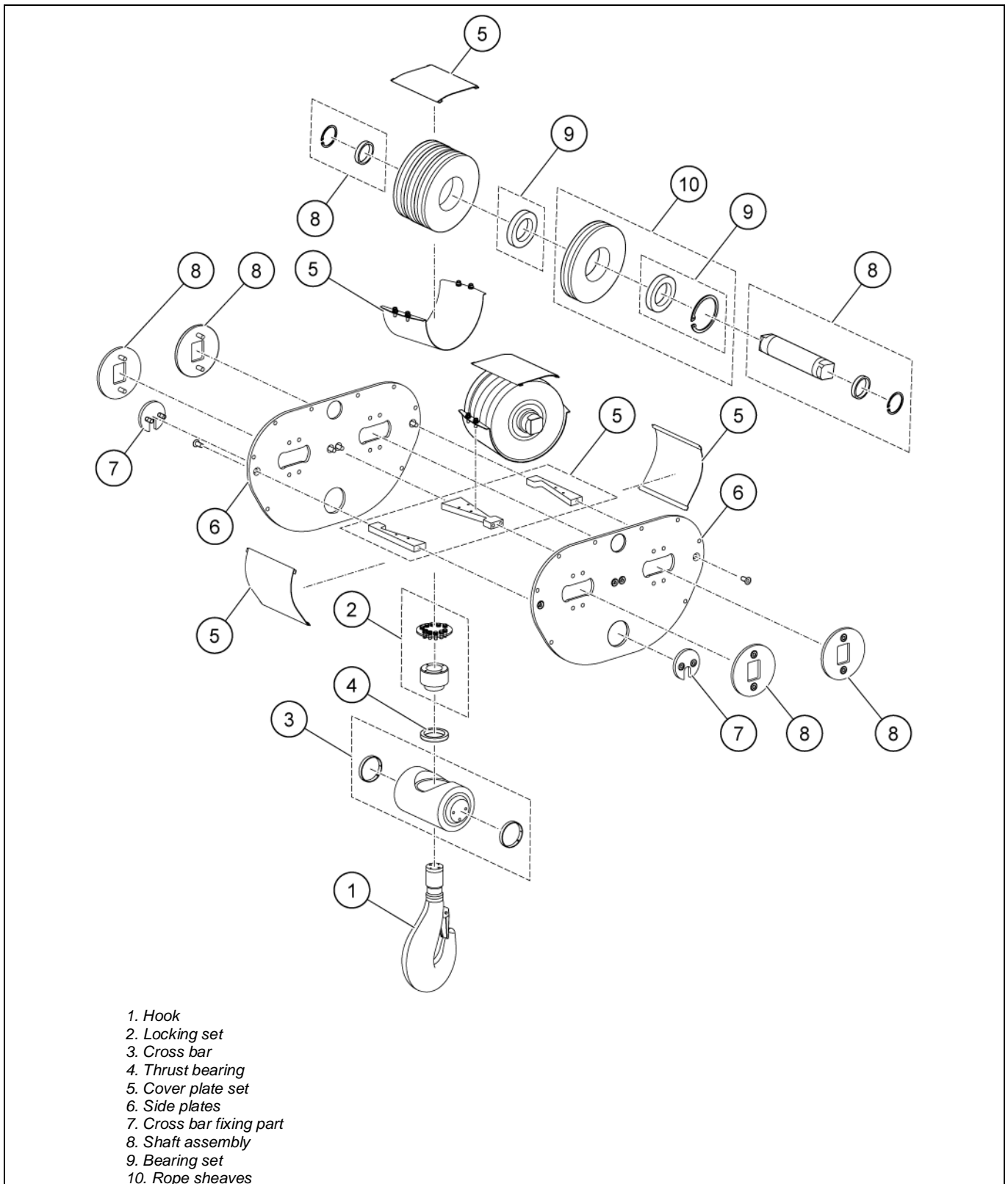
Disassembly

<p>1</p>	 <p>Lower the hook onto a stable working-platform. Pull with a gloved hand some extra rope down from the drum, so that the hook-block is free. If needed, adjust the lower limit switch. Switch OFF the power supply to the crane/hoist.</p>	<p>2</p>  <p>Remove the shaft fixing parts (6). Remove the hook-block fixing screws (8).</p>
<p>3</p>	 <p>Remove the side plates (8) to separate the shaft assembly (6).</p>	<p>4</p>  <p>Remove sheave cover screws and remove the sheave cover plate (7), rope sheave (9) along with bearing set (10).</p>
<p>5</p>	 <p>Remove the locking ring/nut (4) and extract the hook (1) from thrust bearing (3).</p>	


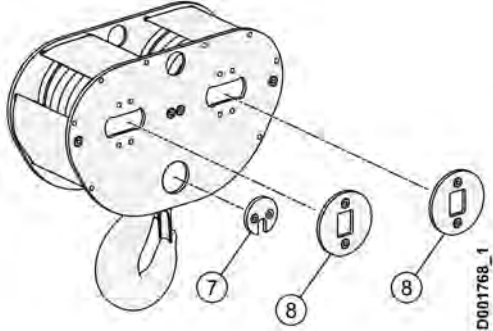
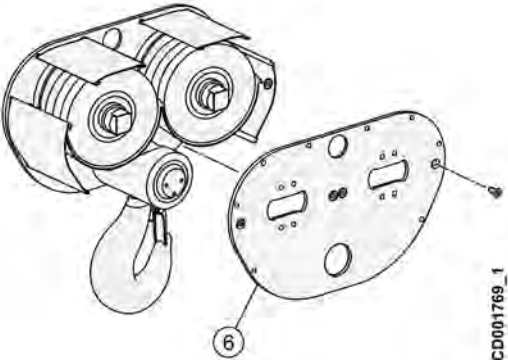
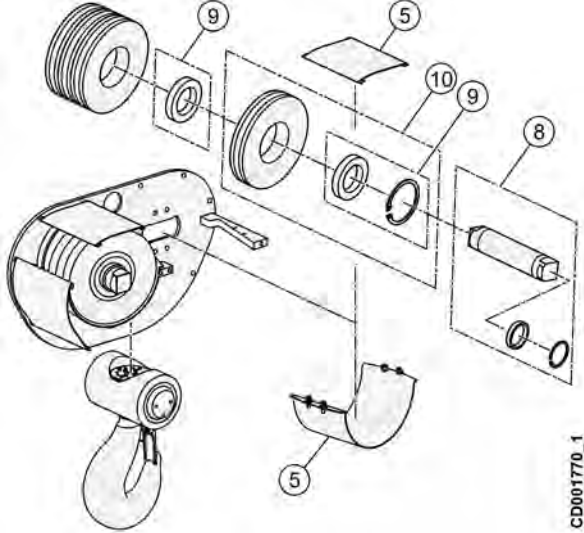
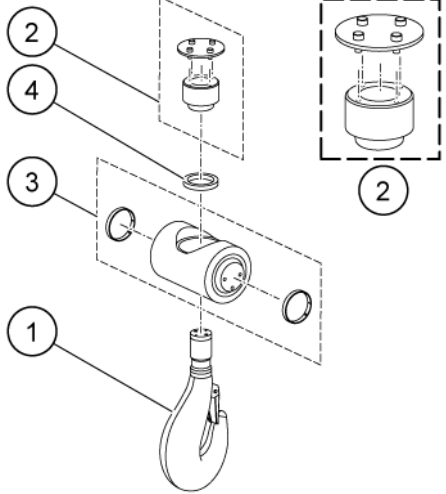
Reassembly

<p>1</p>	 <p>CD001765_1</p> <p>Lubricate the thrust bearing (3) and shaft of the hook (1). Insert the hook (1) into the bearing housing and reassemble the thrust bearing (5) and the locking set (4).</p>	<p>2</p>  <p>CD001766_1</p> <p>Reassemble the side plates (8), the rope sheaves, (9), the cover (7) and the shaft assembly (6).</p>
<p>3</p>	 <p>CD001767_1</p> <p>Insert the hook-assembly and side plate (8). Tighten the fixing screws (8) and shaft fixing part (6) to the required torque.</p>	<p>4</p>  <p>CD001786_1</p> <p>Switch ON the power supply to the hoist. Raise the hook block. Carefully guide the rope with a gloved hand until the hook block hangs free from the working platform.</p>

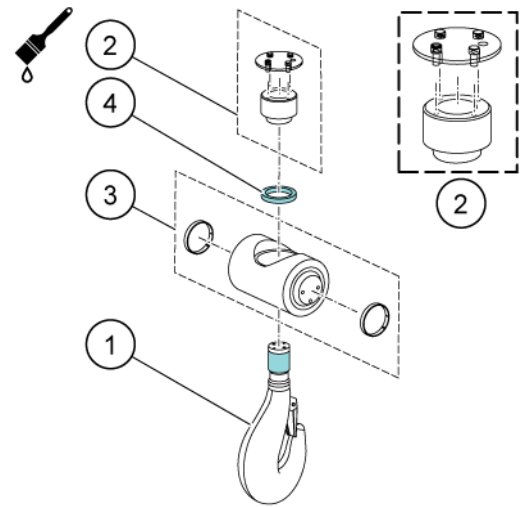
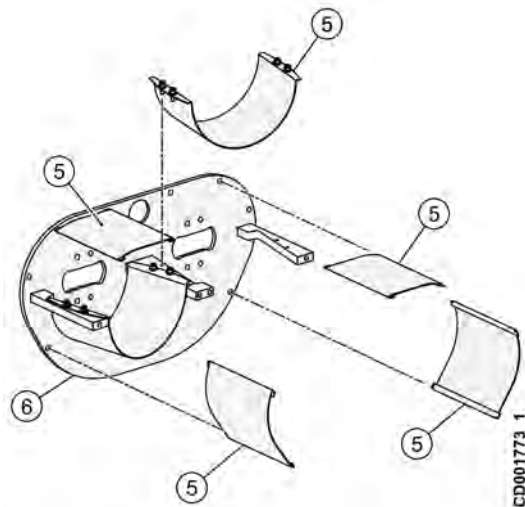
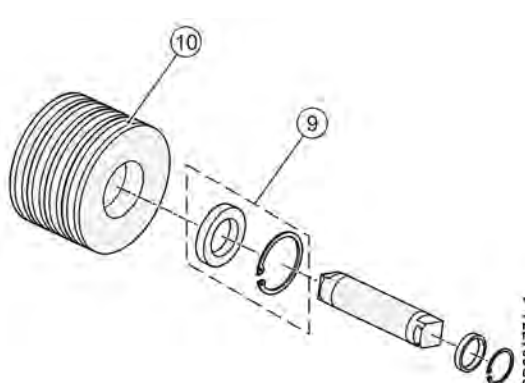
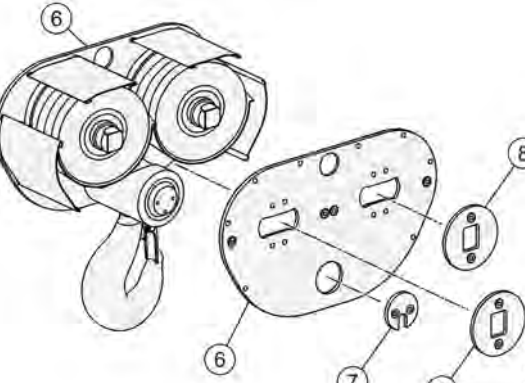

7.2.7.5 Hook block for hoist frame size: VT3, VT4, VT5, reeving: 24, 26, 28, (after 2010 product update).




Disassembly


<p>1</p>	 <p>Lower the hook onto a stable working-platform. Pull with a gloved hand some extra rope down from the drum, so that the hook-block is free. If needed, adjust the lower limit switch. Switch OFF the power supply to the hoist.</p>	<p>2</p>  <p>Remove the shaft fixing parts (8). Remove the cross bar fixing parts (7).</p>
<p>3</p>	 <p>Remove the screws in order to remove side plates (6).</p>	<p>4</p>  <p>Remove rope sheave (10) along with bearing set (9) and shaft assembly (8) by removing the snap ring on other side of the shaft. Remove the sheave cover screws and remove the sheave cover plates (5).</p>
<p>5</p>	 <p>Remove the locking set (2) and separate the hook (1) and thrust bearing (4) from the cross bar (3).</p>	


Reassembly

<p>1</p>	 <p>Lubricate the thrust bearing (4) and the shaft of the hook (1) and place the thrust bearing in the cross bar (3). Insert the hook (1) into the cross bar (3). Place the locking set (2) and secure it in place with screws.</p>	<p>2</p>  <p>Install the sheave cover plates (5) on the side plate (6) by placing the tabs of the cover plates (5) into the holes in the side plate (6).</p>
<p>3</p>	 <p>Reassemble the rope sheave (10) along with bearing set (9).</p>	<p>4</p>  <p>Install the sheave assembly and the hook assembly to the side plate (6). Install the other side plate (6) and the shaft locking parts (8). Install the cross bar fixing part (7). Tighten the screws to the required torque.</p>
<p>5</p>	 <p>Switch ON the power supply to the crane. Raise the hook block. Carefully guide the rope with a gloved hand until the hook block hangs free from the working platform.</p>	

7.2.7.6 Magnet operated hook latch trigger

 <p>WARNING</p>	<p>STRONG MAGNETIC FIELD!</p> <p>Magnets can impact the functioning of pacemakers, implanted heart defibrillators, and hearing aids.</p> <p>If you wear these devices, follow precautions associated to magnetic forces.</p>
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 <p>WARNING</p>	<p>Ensure that the hook latch trigger closes the latch properly before lifting a load.</p> <p>Failure to do so could cause death or serious injury.</p>
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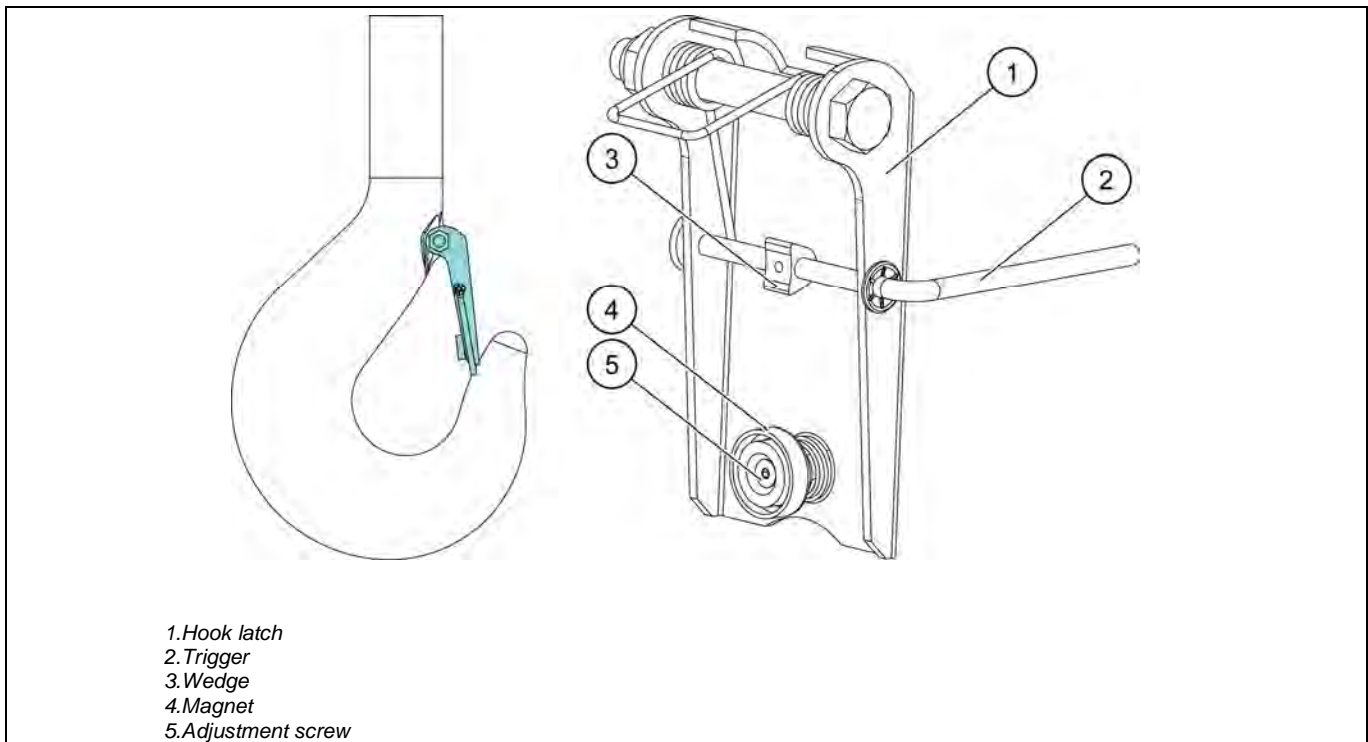
 <p>CAUTION</p>	<p>Mind your hands when handling a hook latch trigger.</p> <p>If the latch trigger is not properly adjusted, it can release the latch unintentionally causing hand injuries.</p> <p>Use the adjustment screw to adjust the latch trigger as instructed.</p>
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Hook latch trigger is a component that improves handling of the loads. It holds the hook latch open while attaching a load to a hook, or when removing it from the hook. The latch is triggered closed after the removal or installation.

The latch trigger improves efficiency and safety, as it holds the latch open allowing the operator to use both hands for removing or installing, for example, a heavy rigging from/to the hook.

Magnet operated latch triggers are designed for hook forgings DIN RSN/RFN 6...25.

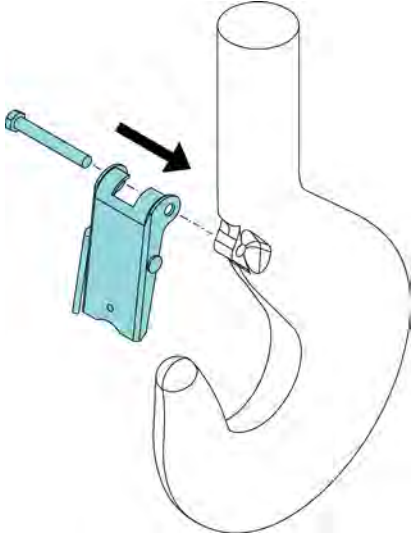
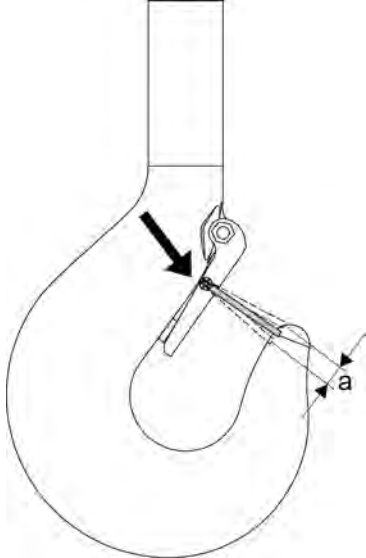
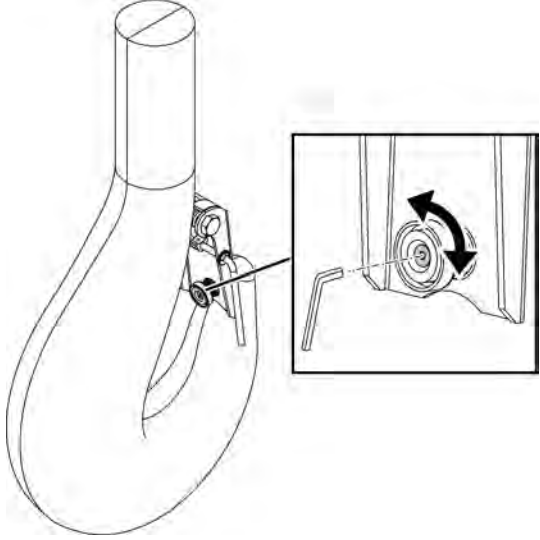
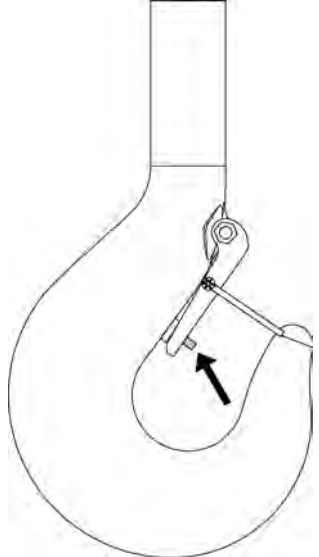
Magnet operated hook latch trigger

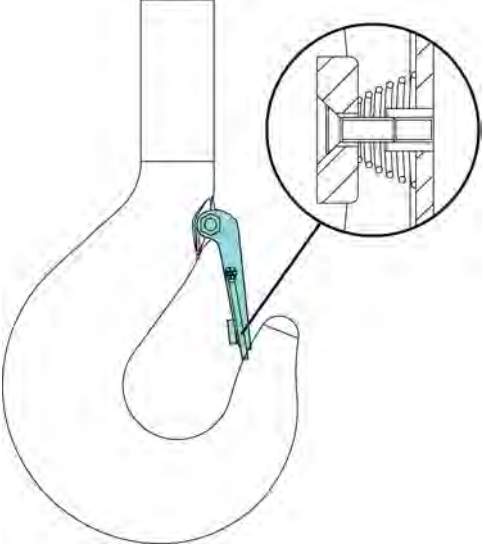
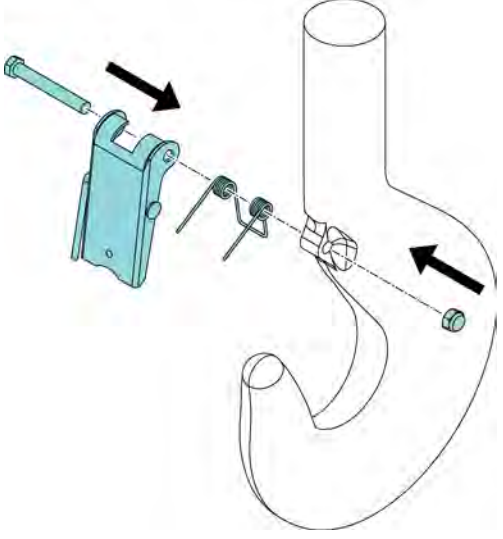
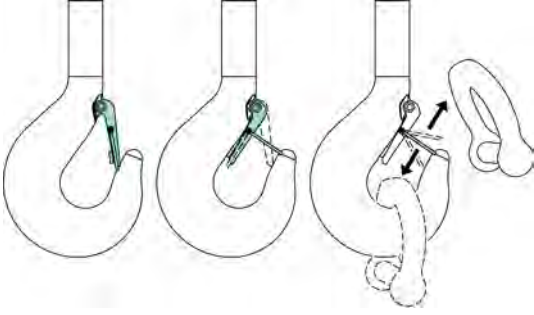


Latch trigger can be installed both on a single hook and on a Ramshorn hook. The latch trigger can also be installed as a retrofit on earlier delivered standard hooks at customer sites.

Magnet operated hook latch triggers are designed in accordance with the hook forging size. For checking which latch trigger variant is suitable for which hook forging, refer to "Technical Guide, Dimensions" for details.

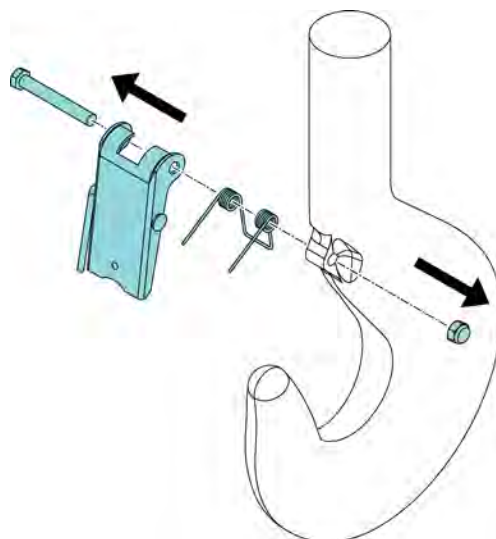
Assembly

<p>1</p>	 <p>Attach hook latch trigger without the latch spring and nut.</p>	<p>2a</p>  <p>When the latch trigger is in operation (it is lifted against the tip of the hook forging), the recommended play (movement) (a) is approximately 5 millimeters at the end of the trigger. This indicates how tight the wedge is against the back of the hook forging.</p> <p>If the wedge is too close against the hook forging and there is no movement at the end of the trigger, the trigger is too sensitive and closes the latch too easily.</p>
<p>2b</p>	 <p>The adjustment screw in the middle of the magnet is used for adjusting play (movement) in the end of the trigger. By turning the screw towards the latch (clockwise), the play decreases, and by turning the screw towards the forging (counter-clockwise), the play increases.</p> <p>Adjust the screw with a hex key.</p>	<p>2c</p>  <p>If the screw is too long and it protrudes through the front surface of the latch, switch to a shorter magnet adjustment screw.</p>

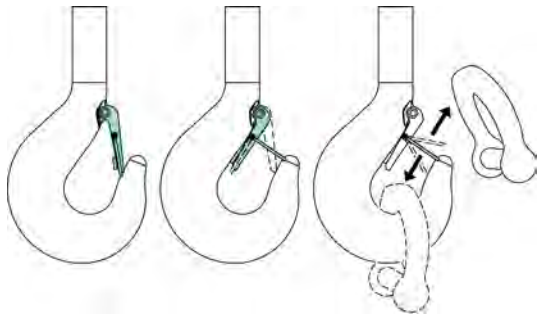
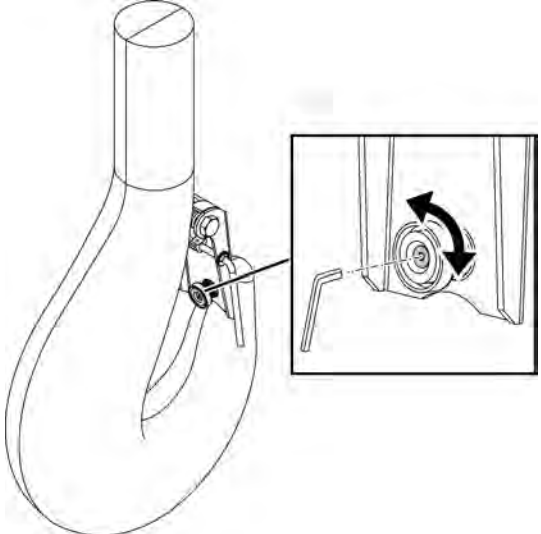
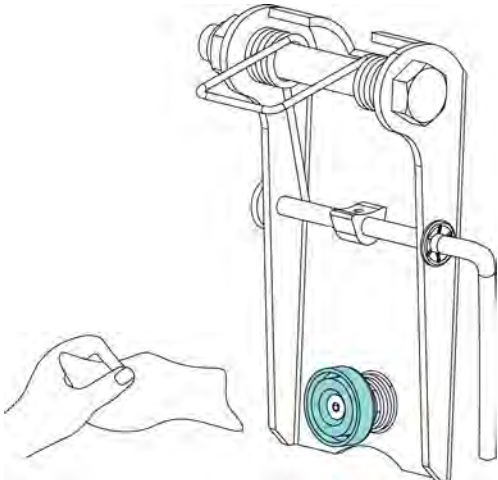
<p>2d</p>	 <p>If the screw is too short and is only barely held by self-clinching nut of the latch, switch to a longer adjustment screw.</p>	<p>3</p>  <p>Once you have chosen the correct screw and adjusted the play (movement), assemble the latch along with its spring, bolt, and nut to the hook forging.</p>
<p>4</p>	 <p>Test the operation of the latch trigger by</p> <ul style="list-style-type: none"> • attaching a load to the hook • detaching a load from the hook. <p>When the trigger is moved in the up or down direction, the magnetic hold is released and the latch closes onto the hook tip due to the spring force.</p>	

Disassembly

Disassemble the whole hook latch from the hook forging:

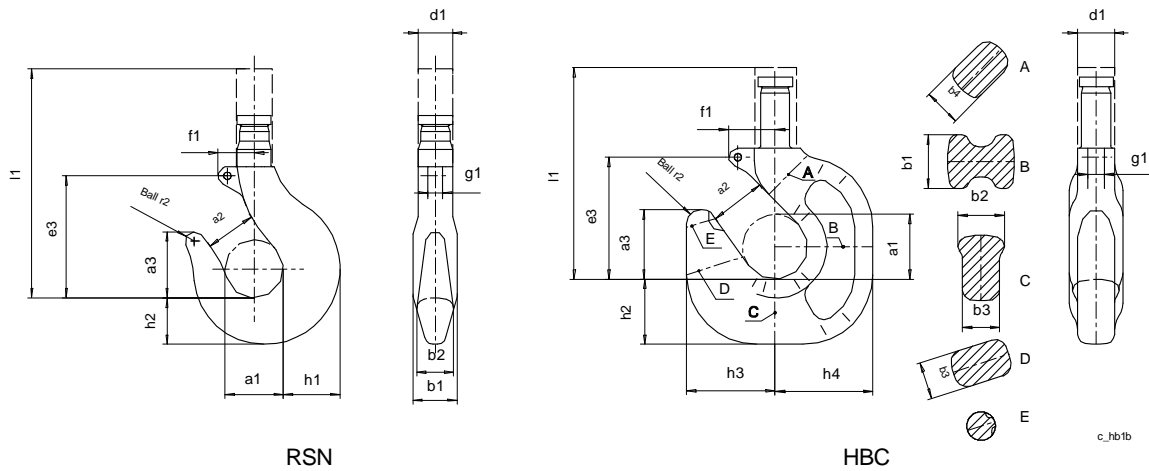


7.2.7.7 Maintenance of magnet operated hook latch trigger

<p>1</p>	 <p>Check the operation of a hook latch trigger on a regular basis.</p>	<p>2</p>  <p>If the trigger play is too loose or too tight, adjust the movement with the adjustment screw in the middle of the magnet. By turning the screw towards the latch (clockwise), the play decreases, and by turning the screw towards the forging (counter-clockwise), the play increases. Adjust the screw with a hex key.</p>
<p>3</p>	 <p>Clean the magnet when necessary to ensure its proper function.</p>	

7.2.7.8 Hook opening

The following table lists the allowed variation in the hook opening. If the opening is bigger than stated in the table, the hook is no longer acceptable, and it must be replaced.



RSN

HBC

	RSN (DIN 15401) /RFN										HBC		
	RSN 1	RSN 1.6	RSN 2.5	RSN 4	RSN 5	RSN 6	RSN 10	RSN 16	RFN 20	RFN 25	HBC 1.6	HBC 2.5	HBC 5
a ₂	40..43	45...48	50...53	56...60	63...67	71...76	90...96	112...	125...	140...	45...48	51...54	63...66
								118	137	152			

Note: Safety latch decreases dimension a₂ about 5 mm on HBC forging and about 15 mm on RSN forging.

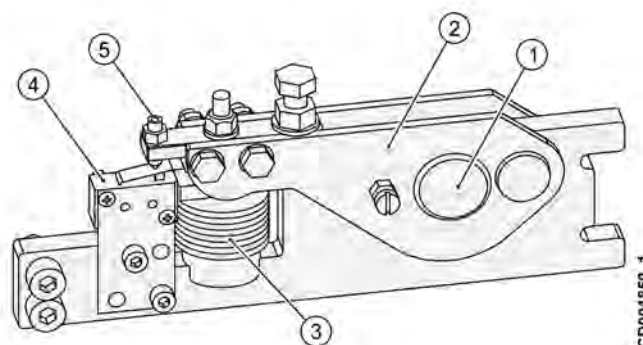
7.2.8 Overload protection

The overload protection prevents hoisting motion when there is an excessive load. The operating point of overload protection is stated in the written records for the test drive of the hoist. Overload protection is achieved by either a mechanical switch or an electronic load sensor. The mechanical switch is connected to the hoisting circuitry, and controls the hoisting contactor. The load sensor is connected to a separate condition-monitoring unit. The condition monitoring unit prevents hoisting motion when there is an excessive load. The overload protectors with a load sensor are equipped with an extra safety limit-switch.



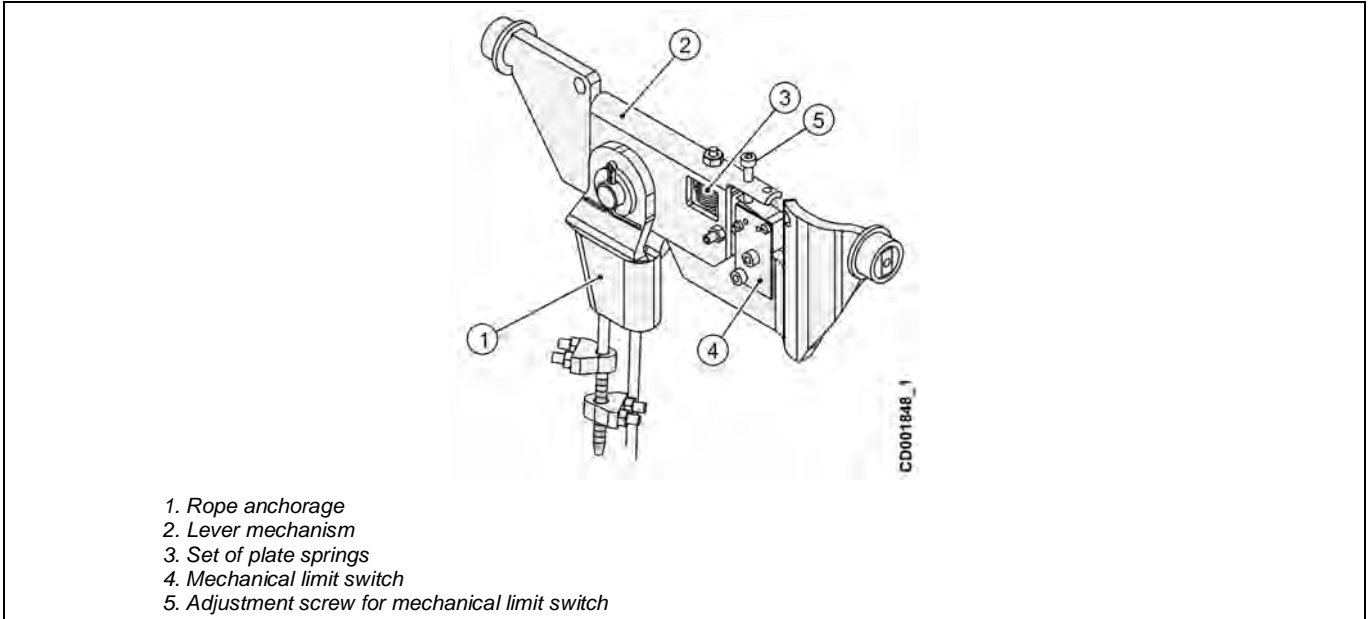
Note: From year 2015, models with strain gauge do not contain a safety limit switch.

Overload device, mechanical switch, hoist frame size: VTs.



1. Rope anchorage
2. Lever mechanism
3. Set of plate springs
4. Mechanical limit switch
5. Adjustment screw for mechanical limit switch

Overload protection, mechanical switch



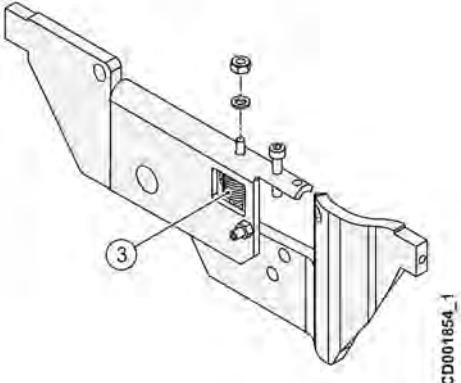
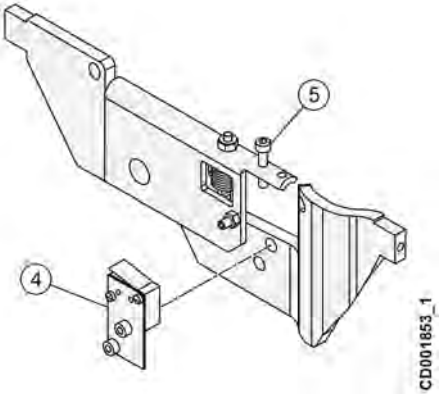
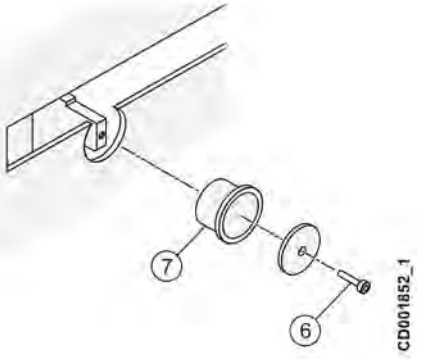
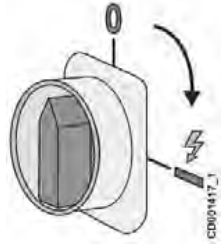
Disassembly



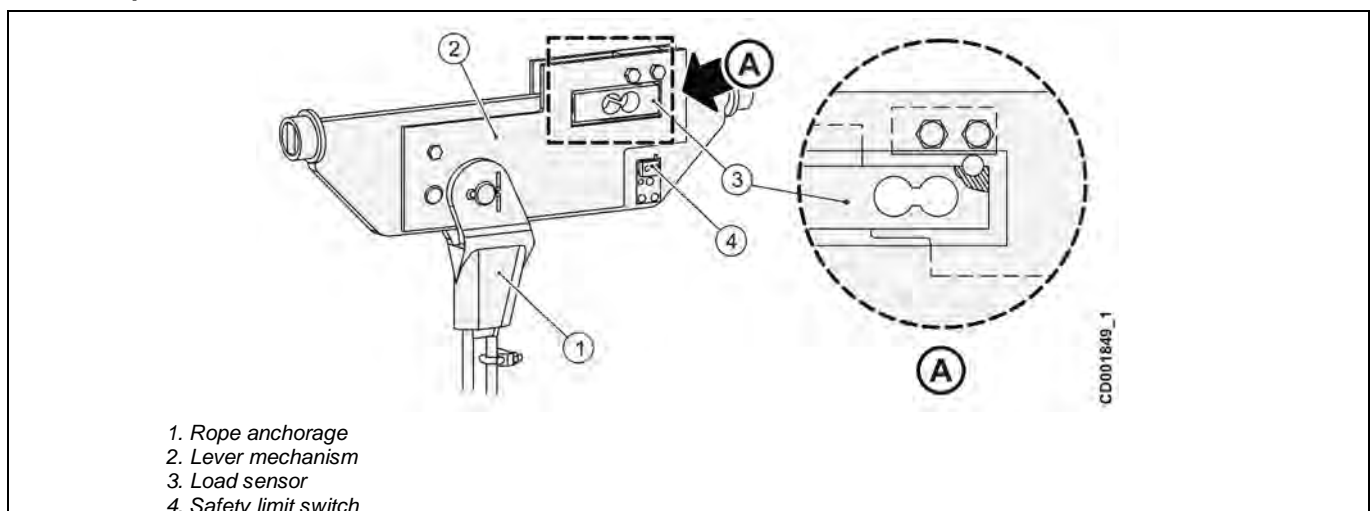
Note: The plate springs must be assembled the right way round and in proper order.

<p>1</p> <p>CD000XXX_R</p>	<p>Lower the hook onto a stable working-platform. Pull some extra rope down from the drum, so that the hook-block is free. Switch of the power supply to the hoist.</p>	<p>2</p> <p>CD001416_1</p> <p>CD001852_1</p>	<p>Remove the rope anchorage. Remove the screw (6) and washer in order to remove the sleeves (7).</p>
<p>3</p> <p>CD001853_1</p>	<p>Loosen the adjustment screw (5). Remove the screws in order to remove the limit switch (4).</p>	<p>4</p> <p>CD001854_1</p>	<p>Remove the screw in order to remove the plate springs (3) if the plate springs are to be replaced.</p>

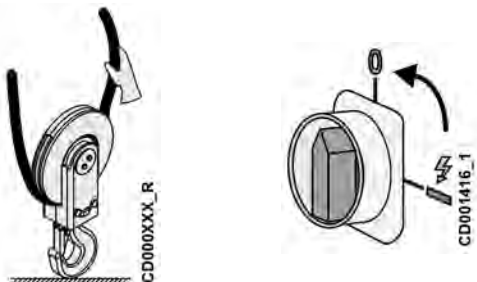
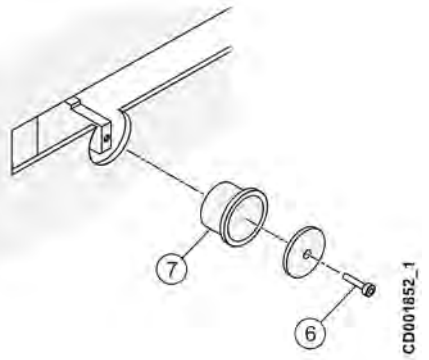
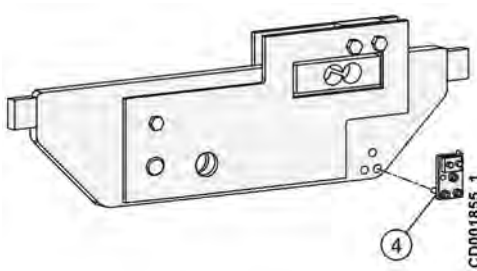
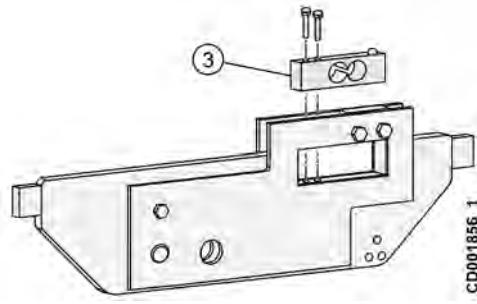
Reassembly

<p>1</p>	 <p>Assemble the set of plate springs (3) and secure in place with screws.</p>	<p>2</p>  <p>Loosen the screw (5) and install the limit switch (4). Adjust the screw (5) so that its end lies 2...3 mm above the limit switch trigger.</p>
<p>3</p>	 <p>Place the sleeve (7) on the ends of the overload device and insert the assembly into position. Secure the overload device into place with washer and screws (6).</p>	<p>4</p>  <p>Install the machinery covers. Switch ON the power supply to the hoist.</p>

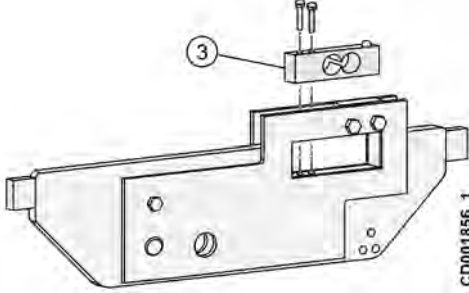
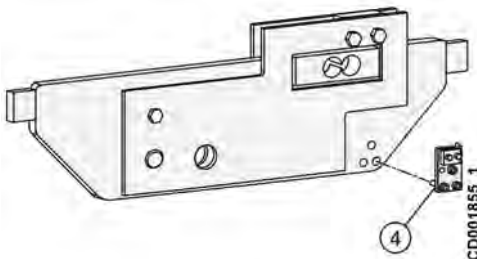
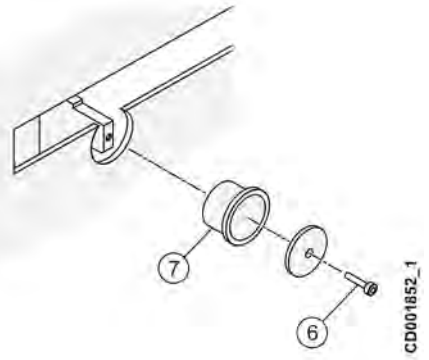
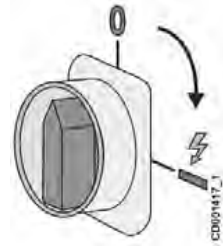
Overload protection, load sensor



Disassembly

<p>1</p>	 <p>Lower the hook onto a stable working-platform. Pull some extra rope down from the drum, so that the hook-block is free. Switch of the power supply to the hoist.</p>	<p>2</p>  <p>Remove the rope anchorage. Remove the screw (6) and the washer in order to remove the sleeves (7).</p>
<p>3</p>	 <p>Remove the screws in order to remove the limit switch (4).</p>	<p>4</p>  <p>Remove the screw in order to remove the load sensor (3) if the load sensor must be replaced.</p>

Reassembly

<p>1</p>	 <p>Assemble the load sensor (3) and secure in place with screws. Ensure that the ball glued to the sensor must point upwards.</p>	<p>2</p>  <p>Install the limit switch (4) on the overload protection frame using screws.</p>
<p>3</p>	 <p>Secure the overload device into place with washer and screws (6).</p>	<p>4</p>  <p>Install the machinery covers. Switch ON the power supply to the hoist.</p>



CAUTION

Safety limit switch (4) is designed for overload mechanism supervision, not for overload protection. Safety limit switch (4) does not measure load and it is no substitute for load sensor (3).

7.2.8.1 Maintenance of overload device

1	<p>Check the condition of the overload protection mechanism and the mechanical limit switch. Clean if needed. Test the safety limit switch (4) operation by pressing the switch manually.</p>	2	<p>Lubricate the pivot joint of the lever mechanism, the suspension support of the rope anchorage and the rocker bushings of the support beam with suitable thin oil.</p>
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CAUTION

Safety limit switch is not adjustable.



Note: Regulations in certain countries require that the operating point of overload protection is checked annually by conducting an overload test. If local requirements necessitate an overload test, conduct the annual inspection as follows:

7.2.8.2 Operation test of overload device

1	<p>Prepare a test load that is 10 % heavier than the operating point for overload protection that is stated in the written records for the test drive of the hoist. Raise the test load a little and only once. W = 110 % of Operating point of overload protection.</p>	2	<p>If the overload protection halts the hoisting of the test load, it is operating correctly. If the overload protection does not prevent hoisting of the test load, the overload protection must be readjusted.</p>
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CAUTION

Only a service agent that is authorized by the manufacturer may adjust the overload protection.

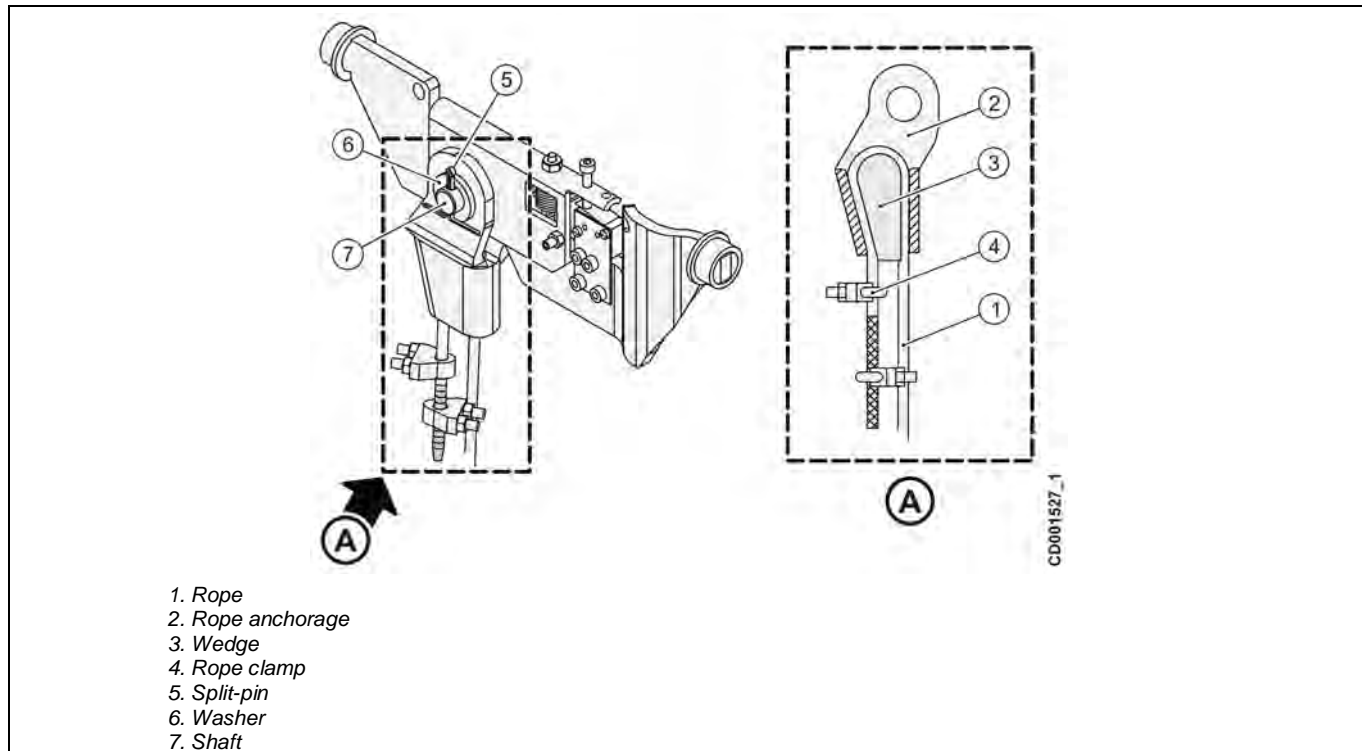


CAUTION

Do not repeat the overload test unnecessarily. The overload test is an actual overload. The test can only be conducted in carefully prepared and properly supervised conditions.

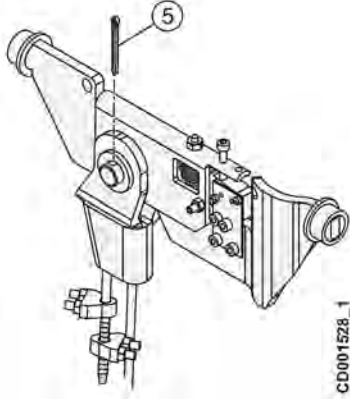
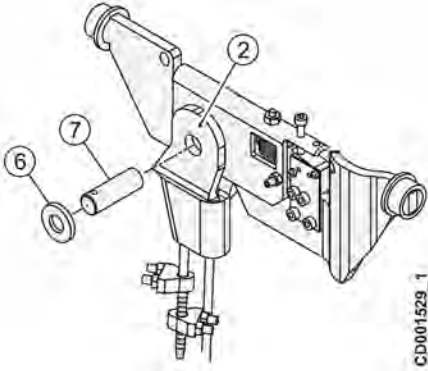
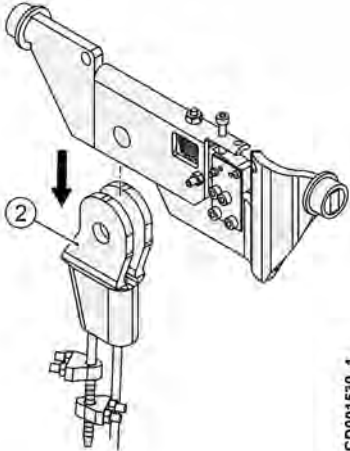
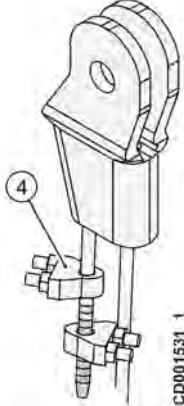
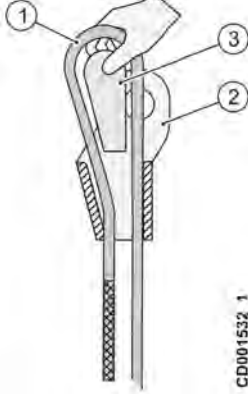
7.2.9 Rope anchorage

The free end of the rope is fixed in a suspended rope anchorage. The rope clamps ensure that the rope cannot accidentally slip through the rope anchorage.


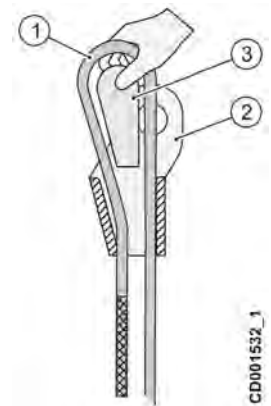


Disassembly

1	<p>Lower the hook onto a stable platform. Pull some more rope off the drum with a gloved hand.</p>	2	<p>Switch OFF the power supply to the hoist.</p>
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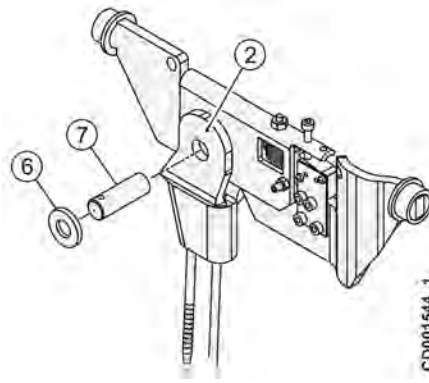
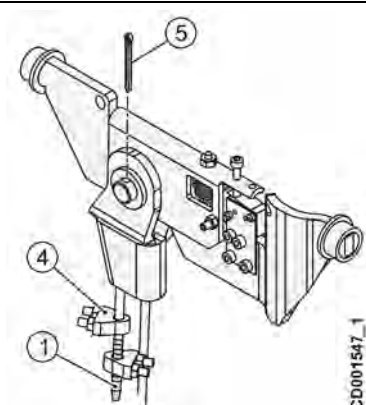
<p>3</p>	 <p>Remove the split-pin (5).</p>	<p>4</p>  <p>Remove the washers (6) and the shaft (7) while holding the rope anchorage (2).</p>
<p>5</p>	 <p>Slide the rope anchorage (2) out of the overload device.</p>	<p>6</p>  <p>Remove the rope clamps (4).</p>
<p>7</p>	 <p>Tap the wedge (3) out of the rope anchorage (2) and remove the rope (1).</p>	

Reassembly

1	 <p>Insert the rope (1) into the rope anchorage (2)</p>	2	 <p>Turn rope (1) back to rope anchorage (2). Insert the wedge (3) into the rope anchorage (2), making sure that a length of at least six times the rope diameter protrudes from the anchorage.</p>
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Note: Make sure that the rope enters the anchorage in the correct direction. See section: "Rope Anchorage, Service" for details.

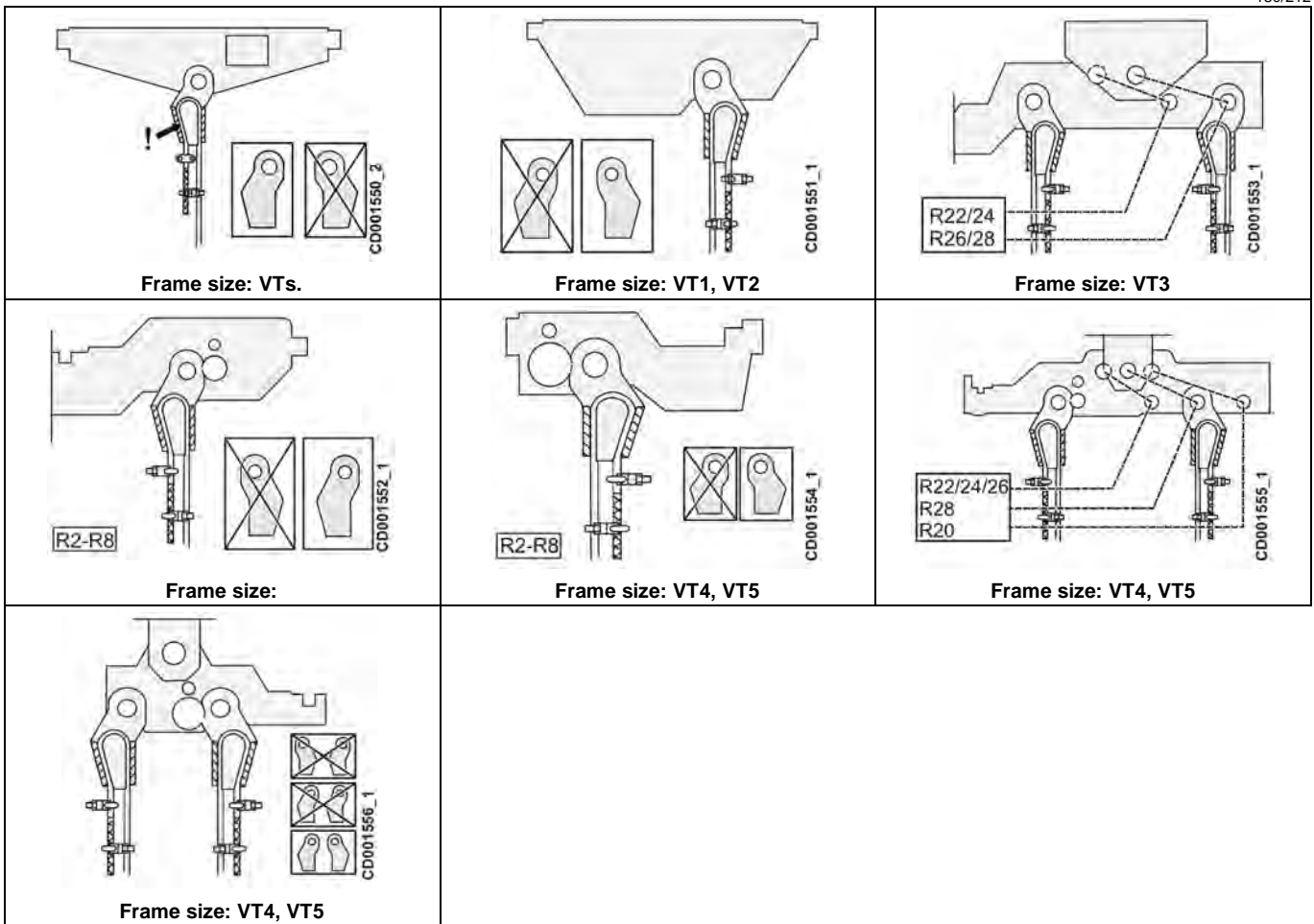
3	 <p>Place the rope anchorage (2) into the overload device and insert the shaft (7) with the washer (6).</p>	4	 <p>Assemble the rope clamps (4) on the protruding end of the rope (1) and insert the split-pin (5). Bend the split-pin (5) open.</p>
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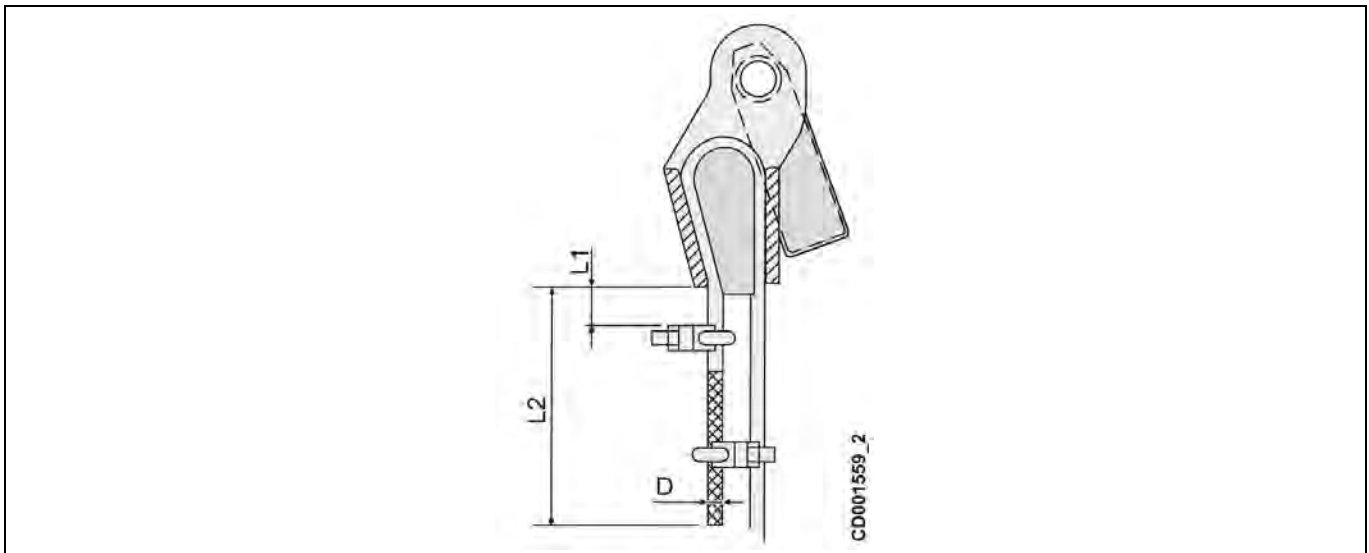
Note: Insert a new cotter pin. Do not reuse a removed cotter pin.



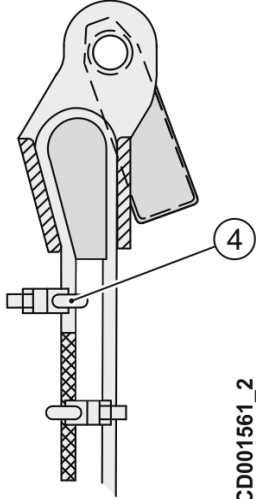
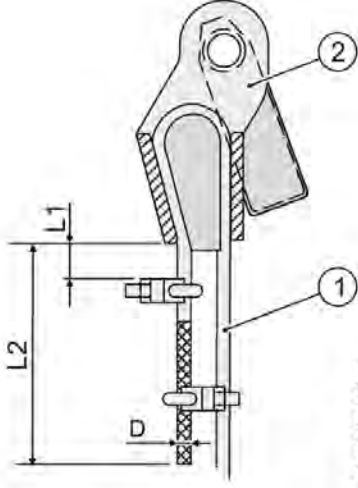
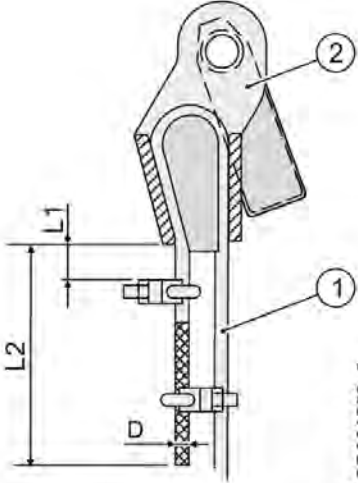
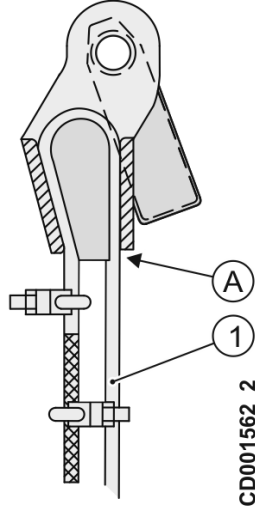
Note: It is important that the rope anchorage is correctly mounted in the overload device. See the following table for details:



7.2.9.1 Inspections and criteria for rope anchorage



D [mm]	L1 minimum [mm]	L2 minimum [mm]	Thread	Torque [Nm]
6-7	(3-4) x D	60 (120 if rope end is taped)	M5	4
8-9	(3-4) x D	70 (120 if rope end is taped)	M6	8
11-12	(3-4) x D	95 (135 if rope end is taped)	M8	10
15-16	(3-4)x D	130 (160 if rope end is taped)	M12	18

<p>1</p>	 <p>CD001561_2</p> <p>Check that the rope clamp-nuts (4) are tight.</p>	<p>2</p>  <p>CD001558_2</p> <p>Ensure that the rope (1) has not slipped in the rope anchorage (2) by comparing the measurements with the dimensions in the previous table.</p>
<p>3</p>	 <p>CD001558_2</p> <p>Make sure the rope (1) end protrudes from the rope anchorage (2) as specified in the previous table.</p>	<p>4</p>  <p>CD001562_2</p> <p>Check the condition of the rope (1) at point A.</p>

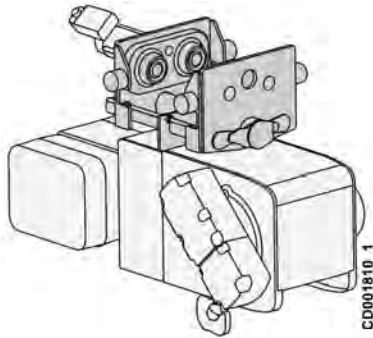
7.3 Trolley

7.3.1 Trolley

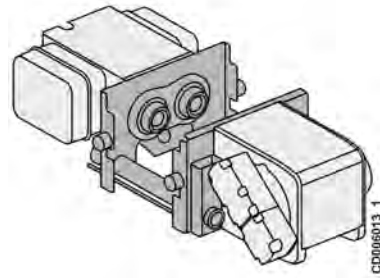
Trolley leads the rope forces to the crane structure

Single girder trolley

Single-girder trolleys are available in two versions (normal and low headroom), where the available height above the main girders determines the construction. Single-girder trolleys are commonly used in applications where lighter load handling is required.



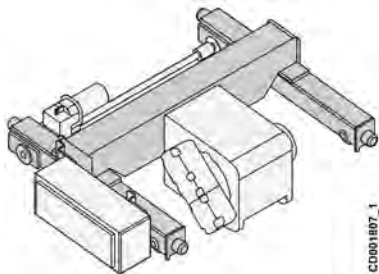
Normal headroom trolley



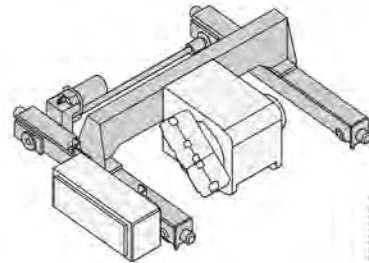
Low headroom trolley

Double girder trolley

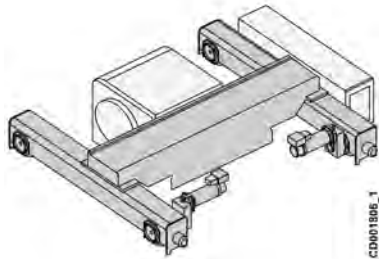
Double-girder trolleys are available in numerous versions, where the available height above the main girders determines the construction. Double-girder trolleys are commonly used in applications where heavy load handling is required.



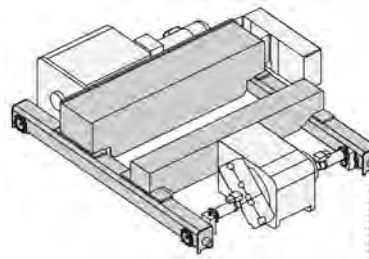
Double girder trolley (medium)



High double girder trolley



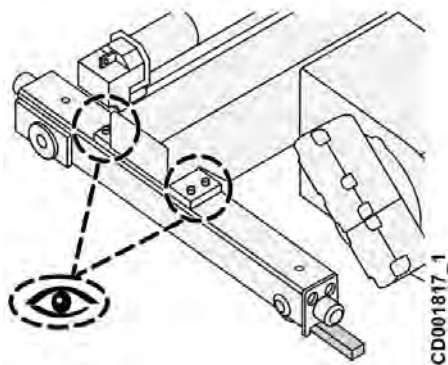
Low double girder trolley



Two hoist trolley

7.3.1.1 Maintenance of double girder trolley structure

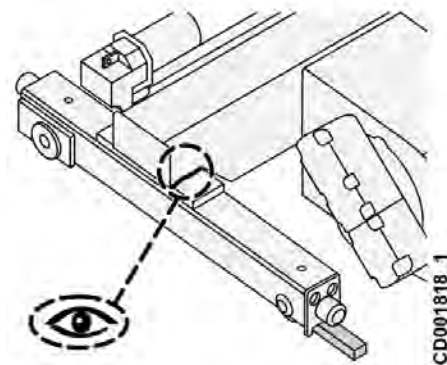
1



Bolted joints

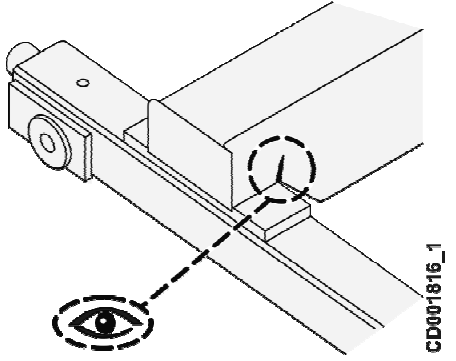
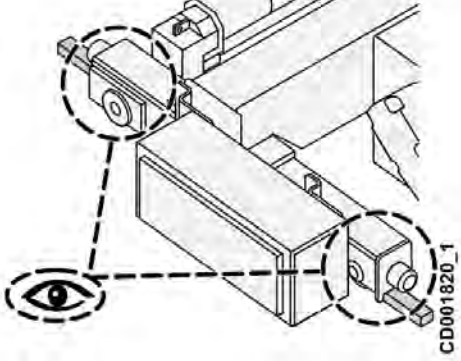
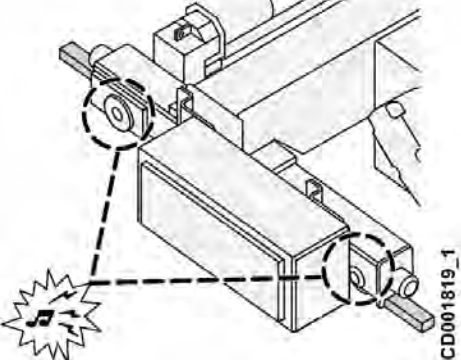
- Check the tightness of the bolted joints
- Replace loose bolts
- Replace worn out fasteners.


2



Welded joints

- Check the welds for cracks. Replace the trolley if cracks are found.

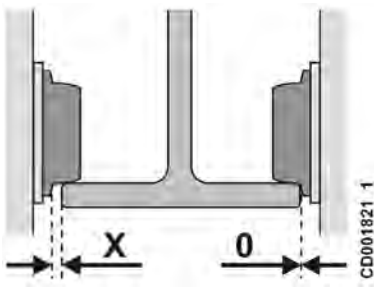
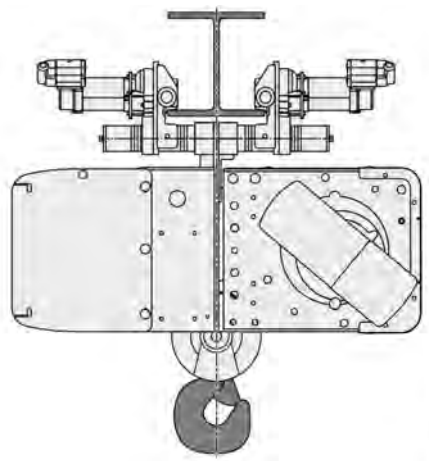
<p>3</p>	 <p>Load bearing structure Check the load bearing structure (such as a load beam, the end carriage housing). Replace the structure if deformations, cracks, or broken welding seams are found.</p>	<p>4</p>  <p>Trolley wheels</p> <ul style="list-style-type: none"> • Check that the wheels are correctly aligned. • If an overspeed situation occurs, check that the trolley wheels have not been damaged and that the trolley is properly on the rails.
<p>5</p>	 <p>Trolley (alignment)</p> <ul style="list-style-type: none"> • If the traveling motion produces loud noise or strong vibration, the trolley is probably incorrectly installed on the track. Check that the trolley is properly mounted on the track. 	

 <p>CAUTION</p>	<p>Do not use the hoist before you have identified and eliminated the cause of excessive noise or vibration.</p>
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7.3.1.2 Maintenance of single girder trolley structure



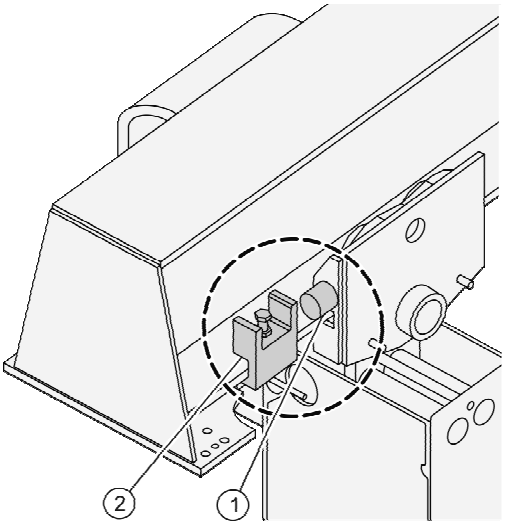
Note: If the trolley is reassembled, the track width of the trolley must be properly adjusted.

1	 <p>CD001821_1</p> <p>Check the gap between the wheel flange and the flange of the beam. If necessary, adjust the side plate (5) of the trolley inwards until there is a gap of approximately $X = 3 \dots 5$ mm between the wheel flange and the flange of the beam.</p>	2	 <p>CD006012_1</p> <p>Check that the position of the trolley is adjusted so that the hook is hanging below the centerline of the beam.</p>
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7.3.2 Trolley buffers

The hoisting trolley is provided with rubber buffers. Some models are equipped with buffer extensions.

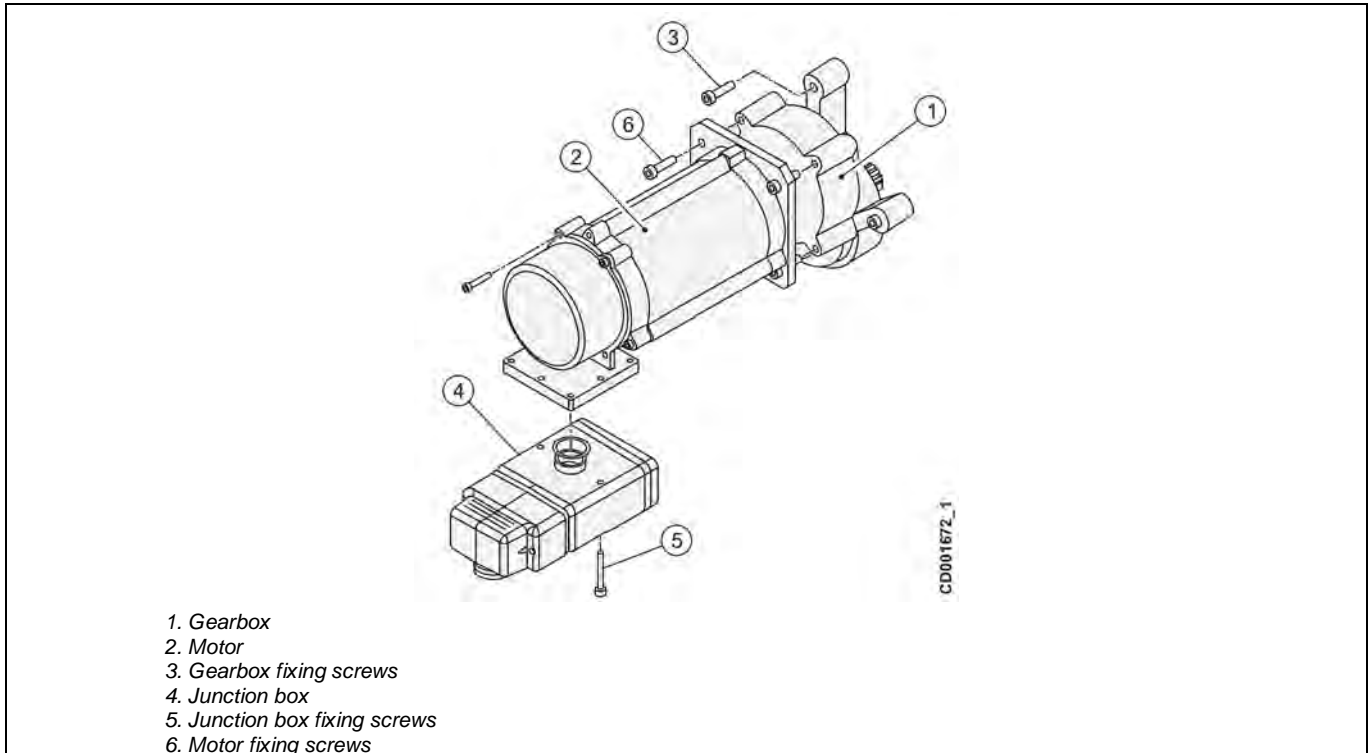
7.3.2.1 Maintenance of trolley buffers

1	 <p>CD001671_1</p> <p>Check that the hoist buffers (1) bump into the runway end stops (2) or buffers of other trolley.</p> <p>Check that the buffers (1) and runway end stops (2) are in good condition. Replace broken buffers.</p> <p>If buffers are worn or broken, investigate why buffers are used. Buffers are not operational limits.</p>
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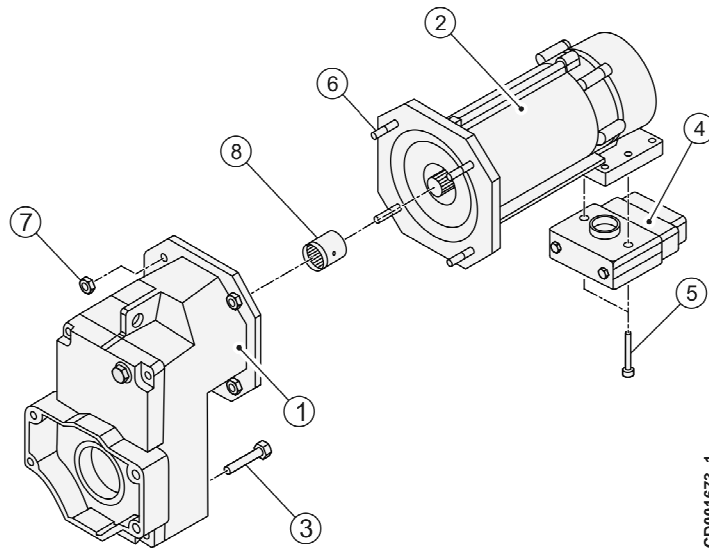
7.3.3 Traveling machinery

The traveling machinery provides the cross-traveling motion of the trolley. The traveling machinery consists of a squirrel-cage motor and a gearbox. The motor can be either a 2-speed motor, which is controlled by contactors or a 1-speed motor that is controlled by a frequency converter. The 1-speed motors have a built-in compact brake, whereas the 2-speed motors are equipped with an external electro-mechanical brake. The gearbox comprises multistage spur gear transmission, running in grease lubrication. When used in conformance with the operating group classification of the hoist, the gearbox lubricant is not changed during the Safe Working Period (SWP). If the hoist is operated in extremely cold conditions, the factory-installed grease must be replaced with synthetic transmission grease. Refer to the section "Lubricants" for further instructions.

Low Headroom and Normal Headroom trolleys

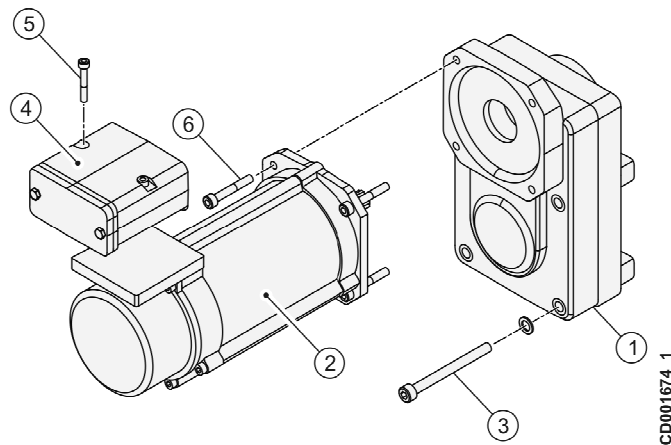


Double girder trolleys, hoist frame size: .VT1, VT2, VT3



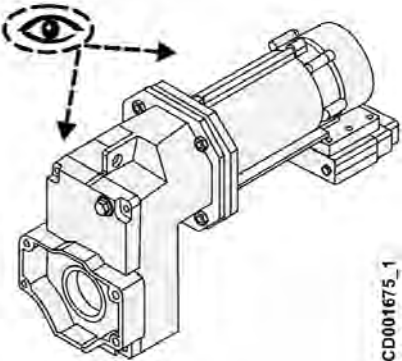
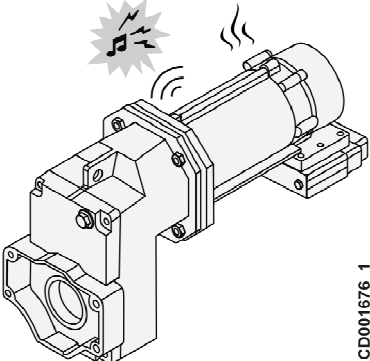
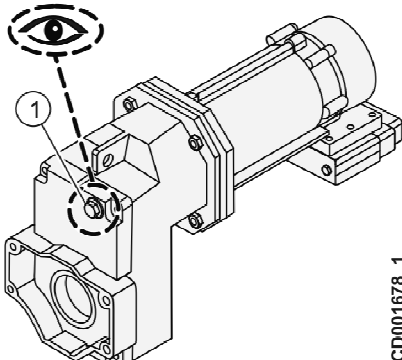
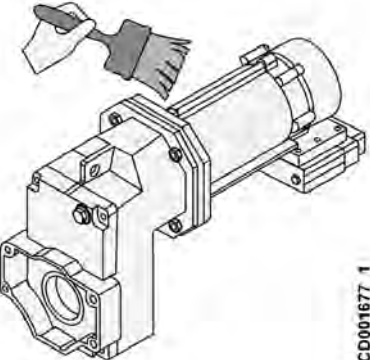
1. Gearbox
2. Motor
3. Gearbox fixing screws.
4. Junction box
5. Junction box fixing screws
6. Motor fixing screws
7. Securing nuts
8. Coupling

Double girder trolleys, hoist frame size: VT4, VT5.



1. Gearbox
2. Motor
3. Gearbox fixing screws
4. Junction box
5. Junction box fixing screws
6. Motor fixing screws

7.3.3.1 Maintenance of traveling machinery unit

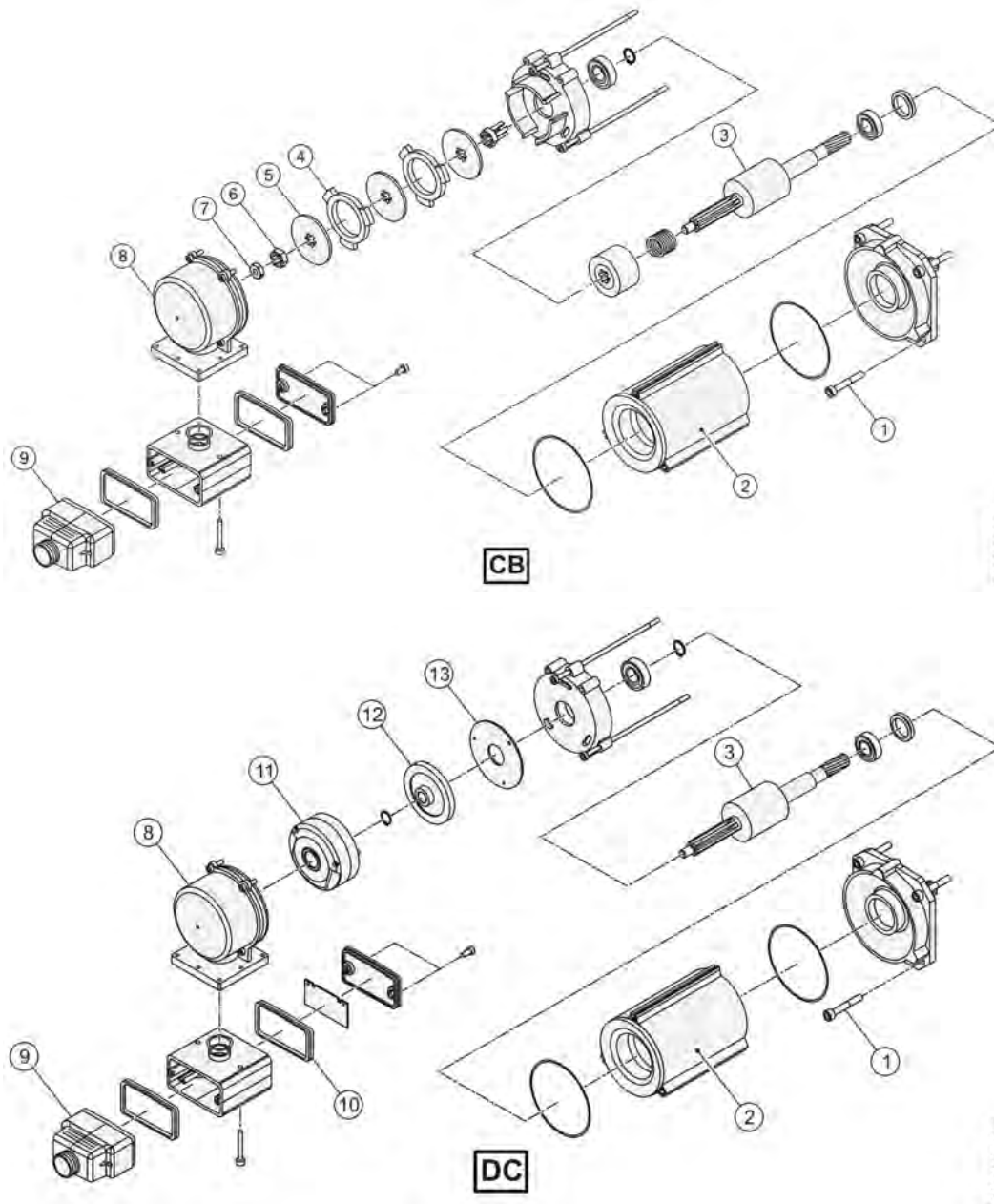
<p>1</p>	 <p>CD001675_1</p> <p>Check the gearbox visually for leakage. In case the gearbox shows signs of excessive leakage, find the reason for the leakage and replace the worn part, or the complete gearbox.</p>	<p>2</p>	 <p>CD001676_1</p> <p>Check for any excessive noise, vibration, and/or heat. Check that the traveling motor operates properly when loaded.</p>
<p>3</p>	 <p>CD001678_1</p> <p>Check the breather-plug (1) (if applicable) breaths freely and clean if needed.</p>	<p>4</p>	 <p>CD001677_1</p> <ul style="list-style-type: none"> • Clean the cooling-ribs surface when needed.



Note: If the factory-installed grease is topped up with a different lubricant, ensure that the lubricant is compatible. Refer to the section “Lubricants” for further instructions.

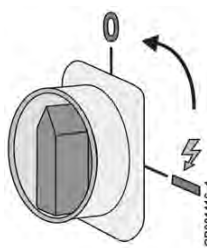
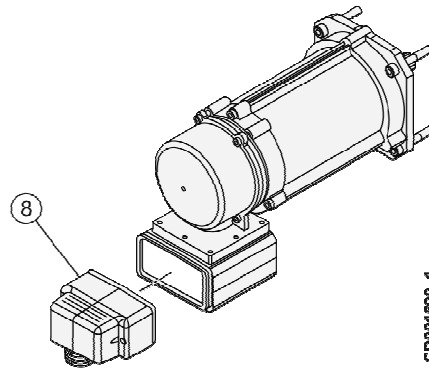
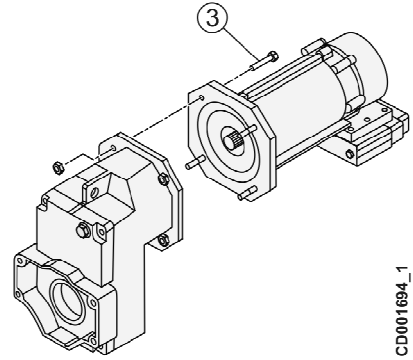
7.3.4 Traveling motor

7.3.4.1 MF06 Traveling motor with Compact- / DC-brake

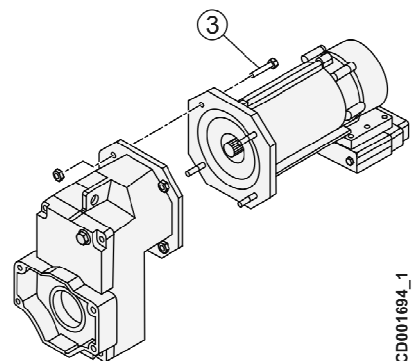
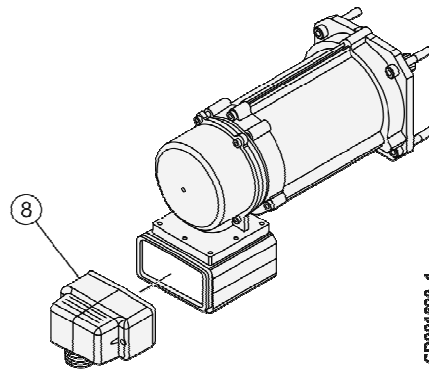
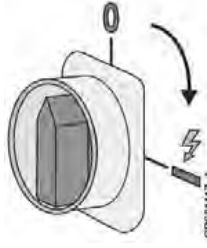


- CB. Compact brake
 DC-brake
1. Fixing screws for traveling gear
 2. Traveling motor
 3. Shaft and rotor assembly
 4. Brake disc
 5. Friction disc
 6. Aluminum ring
 7. Adjustment nut for brake air gap (self-locking)
 8. Motor cover
 9. Power supply plug
 10. Rectifier (DC brake)
 11. Brake (DC brake)
 12. Brake disc (DC brake)
 13. Friction disc (DC brake)

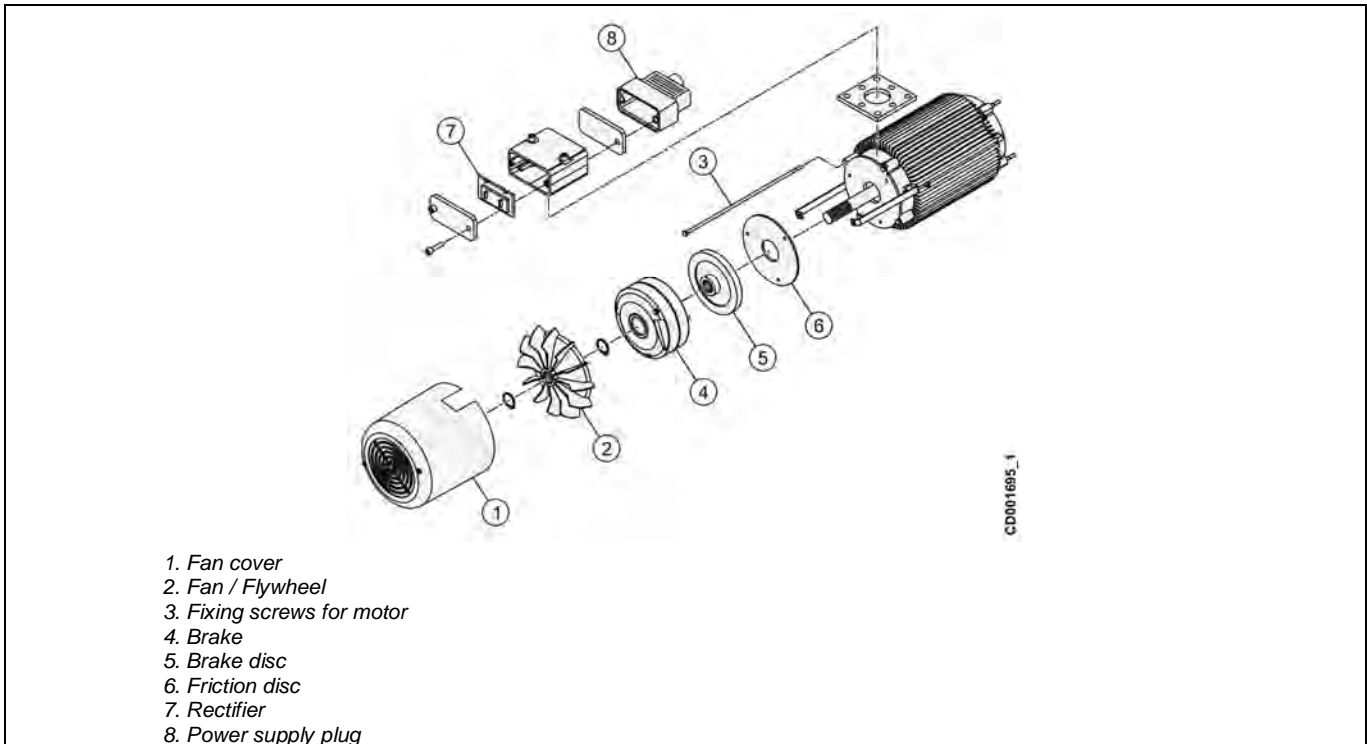
Disassembly

<p>1</p>	 <p>Switch OFF the power supply to the hoist. Ensure there is no danger of live voltage.</p>	<p>2</p>	 <p>Remove the power supply plug (8) for the traveling machinery.</p>
<p>3</p>	 <p>Unscrew the fixing screws (3) holding the motor and detach the motor from the gearbox</p>		

Reassembly

<p>1</p>	 <p>Install the motor to the gearbox and ensure that the splines on the shaft engage correctly. Secure it in place with fixing screws (3).</p>	<p>2</p>	 <p>Install the power supply plug (8) to the traveling motor.</p>
<p>3</p>	 <p>Install the machinery covers and switch ON the power supply to the hoist.</p>		

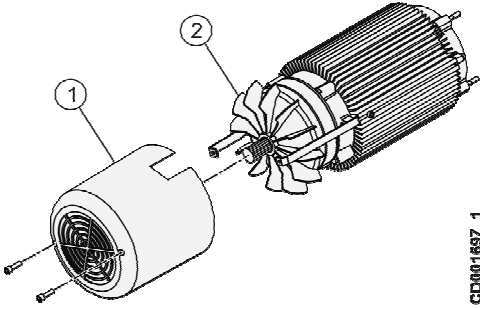
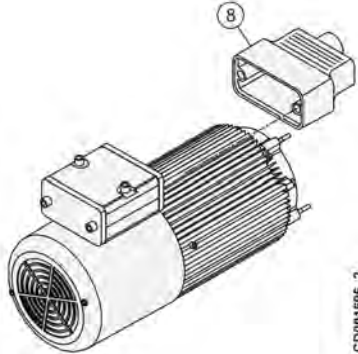
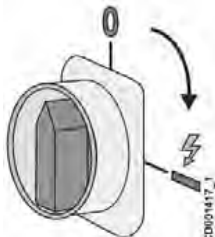
7.3.4.2 MF07 and MF10 Traveling motor



Disassembly

<p>1</p>	<p>CD001696_1</p> <p>Switch OFF the power supply to the hoist. Ensure there is no danger of live voltage.</p>	<p>2</p> <p>CD001696_2</p> <p>Remove the power supply plug (8) for the traveling machinery.</p>
<p>3</p>	<p>CD001699_1</p> <p>Remove the fan cover (1). Unscrew the fixing screws (3) for the motor and detach the motor from the gearbox.</p>	

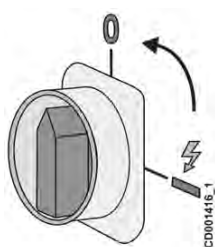
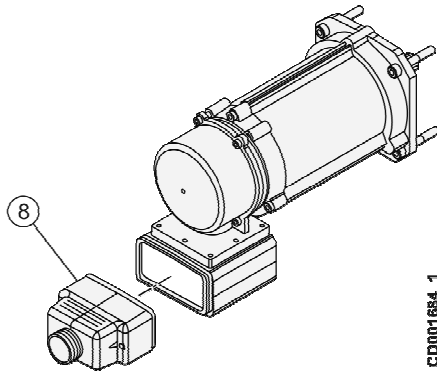
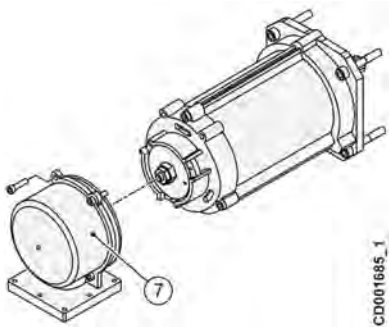
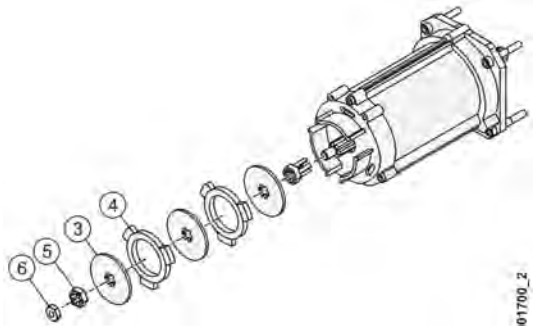
Reassembly

<p>1</p>	 <p>CD001697_1</p> <p>Install the motor to the gearbox and ensure that the splines on the shaft engage correctly. Secure the motor into place with the fixing screws (3).</p>	<p>2</p>  <p>CD001696_2</p> <p>Install the power plug (8) to the motor.</p>
<p>3</p>	 <p>CD001417_1</p> <p>Install the machinery covers and switch ON the power supply to the hoist.</p>	

7.3.5 Traveling brake

7.3.5.1 Construction of Compact brake for traveling motor MF06

Disassembly

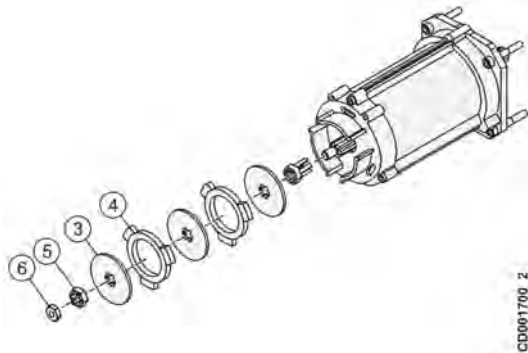
<p>1</p>	 <p>CD001416_1</p> <p>Switch OFF the power supply to the hoist. Ensure there is no danger of live voltage.</p>	<p>2</p>  <p>CD001694_1</p> <p>Remove the power supply plug (8) for the traveling machinery.</p>
<p>3</p>	 <p>CD001695_1</p>	<p>4</p>  <p>CD001700_2</p>

Open the motor cover (7).

Unscrew the adjustment nut (6) and extract the ring (5), friction discs(3), and brake discs (4) and other brake parts.

Reassembly

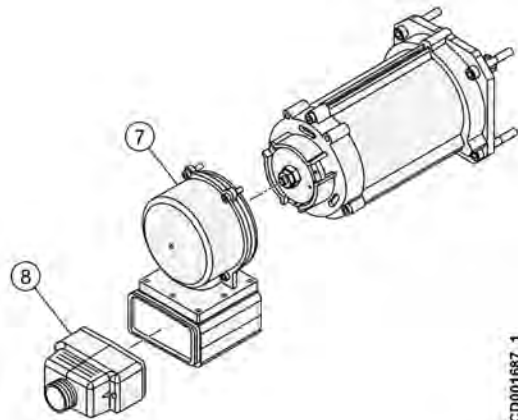
1



CD001700_2

Install the brake parts, friction discs (3), and brake discs (4). Place the ring (5) and screw in the adjustment nut (6).

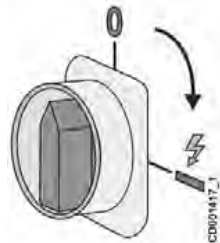
2



CD001687_1

Fasten the motor cover (7) and the power supply plug (8).

3

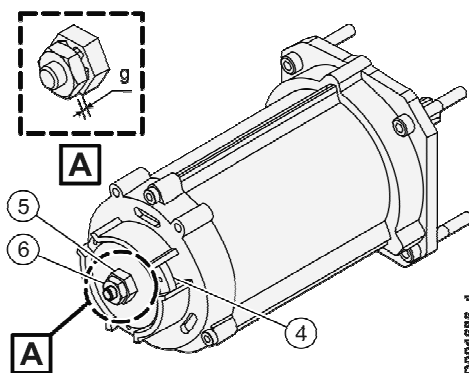


CD001687_1

Install the machinery covers. Switch ON the power supply to the hoist and check the proper functioning of the motor.

7.3.5.2 Maintenance of traveling brake, compact brake

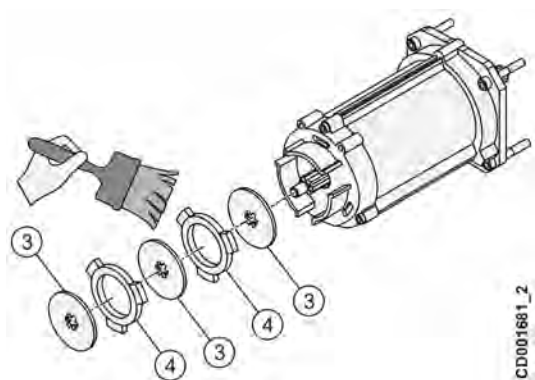
1



CD001686_1

Push the brake disk (4) and measure the air gap between the adjustment nut (6) and aluminum ring (5). The air gap has to be 0.2 ... 0.3 mm. If needed, adjust the air gap using the adjustment nut (6).

2



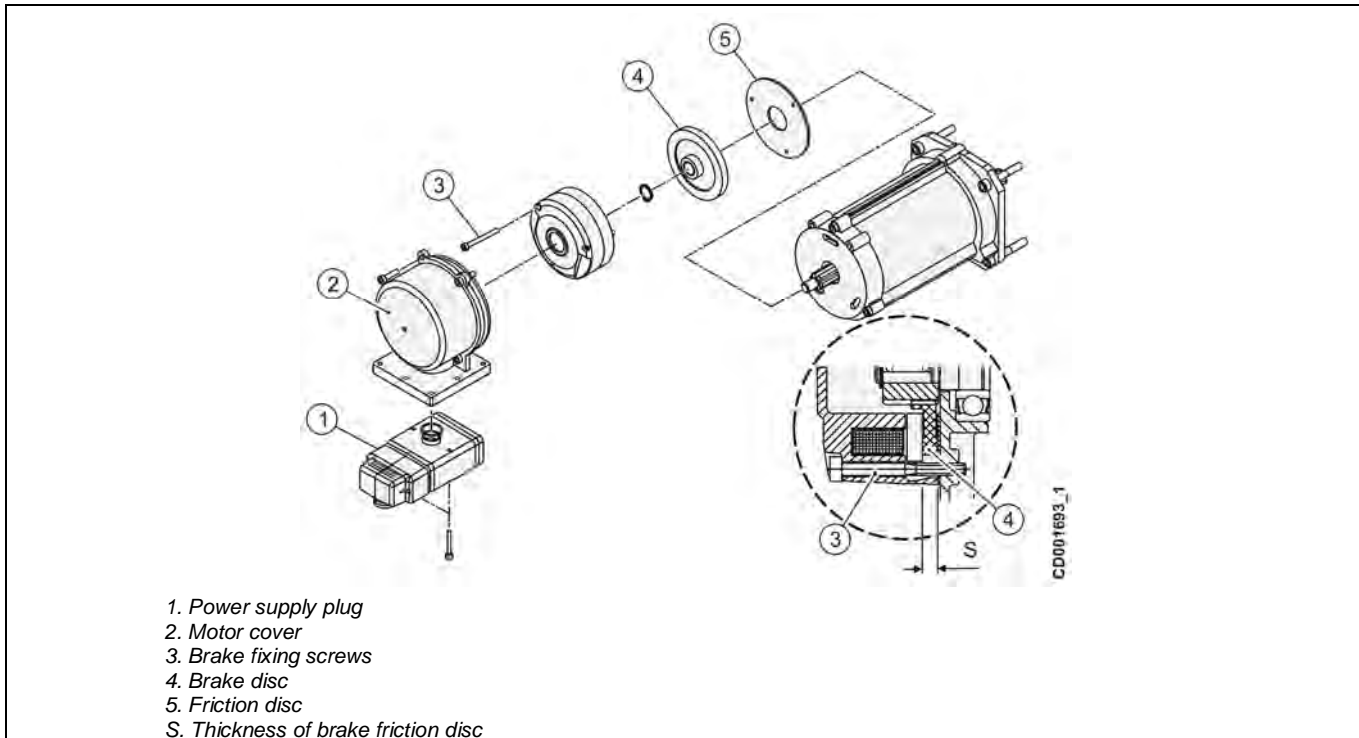
CD001681_2

Remove dust and dirt from the friction discs (3) and brake discs (4).



Note: If the air gap is greater than 0.2...0.3 mm, the brake disc may be worn out. Check the thickness of the brake disc. If the brake disc thickness is less than 5.0 mm, it must be replaced with a new brake disc.

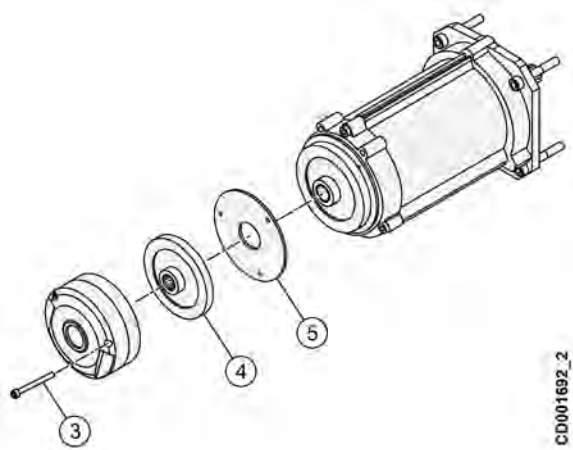
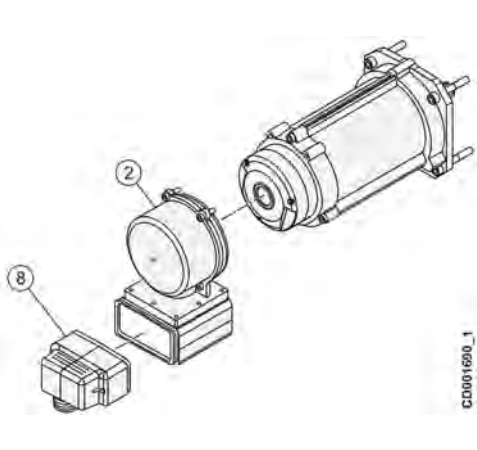
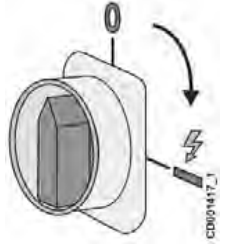
7.3.5.3 Construction of DC brake for motor MF06LB* or MF06 two-speed



Disassembly

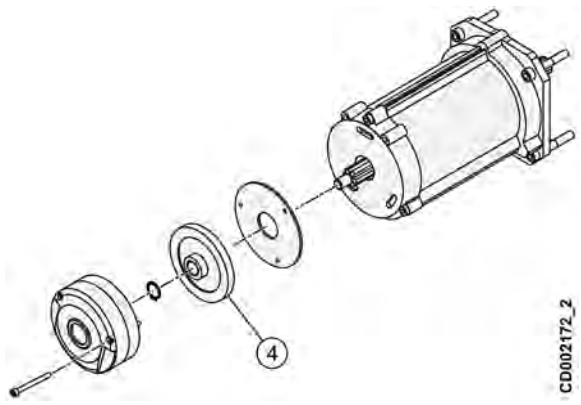
<p>1</p> <p>Switch OFF the power supply to the hoist. Ensure there is no danger of live voltage</p>	<p>2</p> <p>Remove the power supply plug (8) and the motor cover (2).</p>
<p>3</p> <p>Unscrew the brake fixing screws (3) to remove the brake, brake disc (4), and the friction disc (5).</p>	

Reassembly

<p>1</p>  <p style="text-align: right; font-size: small;">CD001692_2</p> <p>Install the brake disc (4), the friction disc (5), and the brake. Secure them in place with fixing screws (3).</p>	<p>2</p>  <p style="text-align: right; font-size: small;">CD001690_1</p> <p>Install the motor cover (2) and the power supply plug (8).</p>
<p>3</p>  <p style="text-align: right; font-size: small;">CD001617_1</p> <p>Install the machinery covers. Switch ON the power supply to the hoist.</p>	

7.3.5.4 Maintenance of traveling brake, DC brake for motor MF06

1



CD002172_2

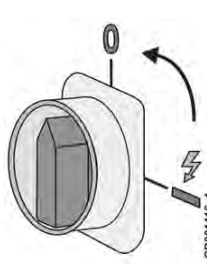
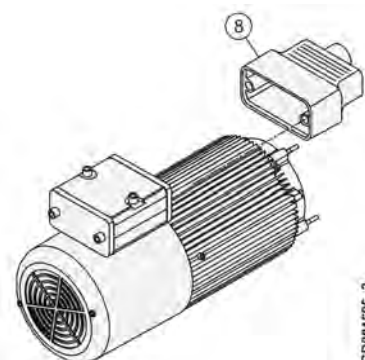
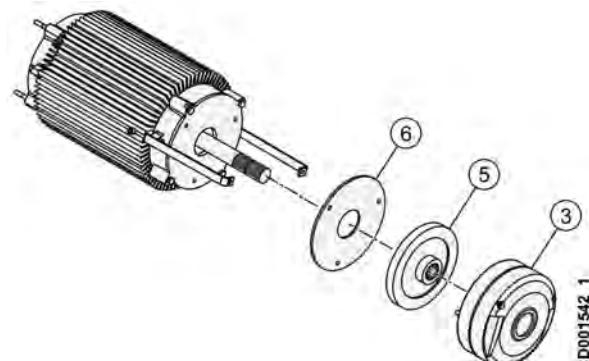
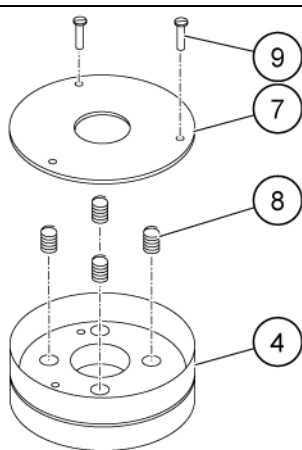
Check the brake type on the rating plate that is fixed to the brake. Measure the thickness of the brake disc (4). Replace the brake disc if its thickness is less than the min. thickness.

Brake type and size	Min. thickness of brake disc	Tightening torque for brake fixing screws
NM38710NR#, 2 Nm	5.8 mm	2.5 Nm / 1.8 lbf.ft
NM38711NR#, 4 Nm	5.9 mm	2.5 Nm / 1.8 lbf.ft
NM38712NR#, 2 Nm	5.8 mm	2.5 Nm / 1.8 lbf.ft
NM38713NR#, 4 Nm	5.9 mm	2.5 Nm / 1.8 lbf.ft

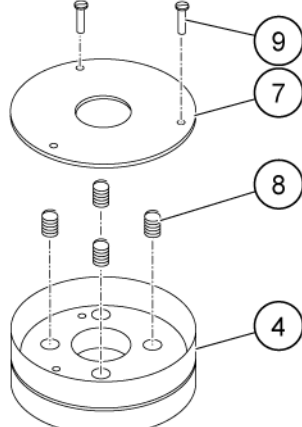
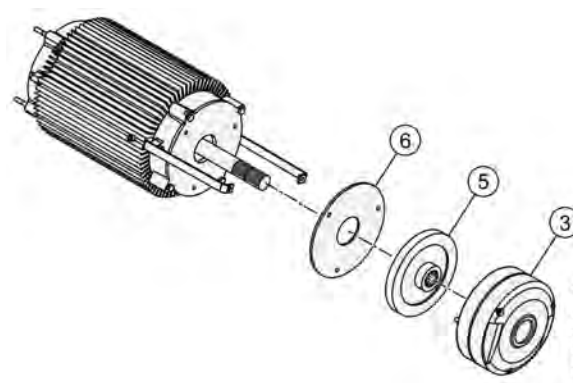
CAUTION	<p>If there have been jamming problems with a thinner friction disc (1 mm), replace it with new friction disc (3 mm).</p>
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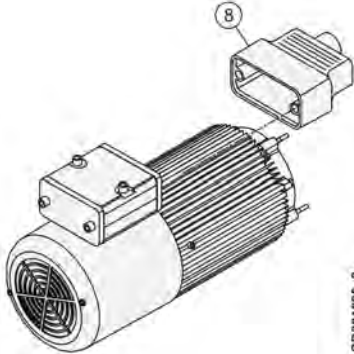
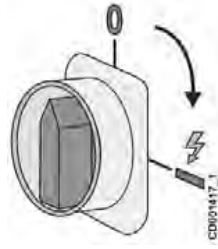
7.3.5.5 Construction of DC brake for motors MF07 and MF10

Disassembly

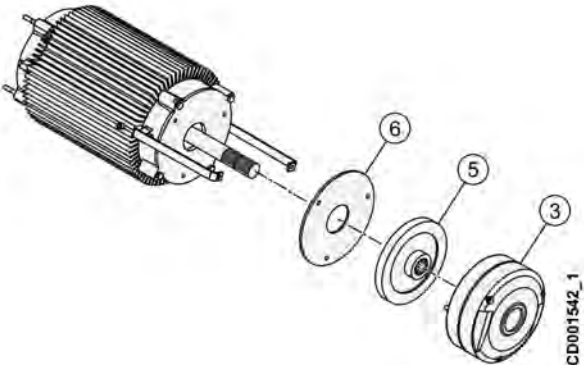
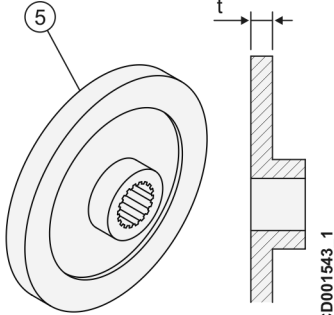
<p>1</p>	 <p>CD001416_1</p> <p>Switch OFF the power supply to the hoist. Ensure there is no danger of live voltage.</p>	<p>2</p>	 <p>CD001666_2</p> <p>Remove the power supply plug (8) from the motor.</p>
<p>3</p>	 <p>CD001542_1</p> <p>Remove the fixing screws for the brake. Detach the brake (3).</p>	<p>4</p>	 <p>CD001545_1</p> <p>Remove the anchor plate (7), the spring (8), and the screws (9) from the inner side of the brake (4).</p>

Reassembly

<p>1</p>	 <p>CD001545_1</p> <p>Install the spring (8), the screws (9), and the anchor plate (7) to the inside of the brake (4).</p>	<p>2</p>	 <p>CD001542_1</p> <p>Install the brake disc (5) and the friction disc (6). Install the brake (3) and fix with the screws.</p>
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<p>3</p>  <p style="text-align: right; font-size: small;">CD001696_2</p> <p>Install the power supply plug (8) to the motor.</p>	<p>4</p>  <p style="text-align: right; font-size: small;">CD001617_1</p> <p>Install the machinery covers and switch ON the power supply to the hoist.</p>
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7.3.5.6 Maintenance of traveling brake, DC brake for motors MF07 and MF10

<p>1</p>  <p style="text-align: right; font-size: small;">CD001542_1</p> <p>Disassemble the brake and clean the brake disc (5) and the friction disc (6).</p>	<p>2</p>  <p style="text-align: right; font-size: small;">CD001543_1</p> <p>Check the brake type on the rating plate that is fixed to the brake. Measure the thickness of the brake disc (5). Replace the brake disc if the thickness (t) is less than the minimum thickness as according to the table below.</p>
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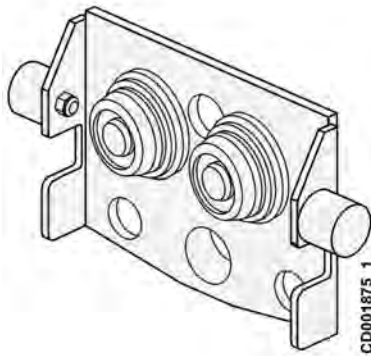
Brake type and size	Min. thickness of brake disc	Tightening torque for brake fixing screws
NM38770NR#, 16 Nm	6.8 mm	5 Nm / 3.7 lbf.ft
NM38771NR#, 8 Nm	6.6 mm	5 Nm / 3.7 lbf.ft
NM38720NR#, 21 Nm	7.6 mm	9 Nm / 6. lbf.ft
NM38721NR#, 14 Nm	7.6 mm	9 Nm / 6. lbf.ft

7.3.6 Trolley wheels

7.3.6.1 Construction of under running (single girder) trolley wheels

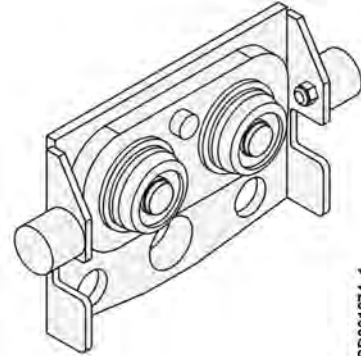
Low headroom and Normal headroom trolleys

Normal headroom



CD001875_1

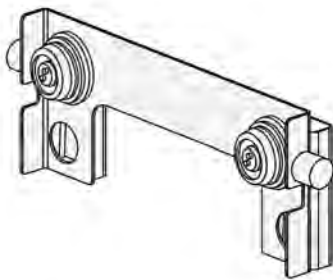
Idle wheels



CD001874_1

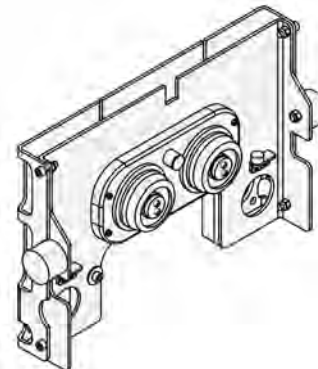
Driving wheels

Low headroom



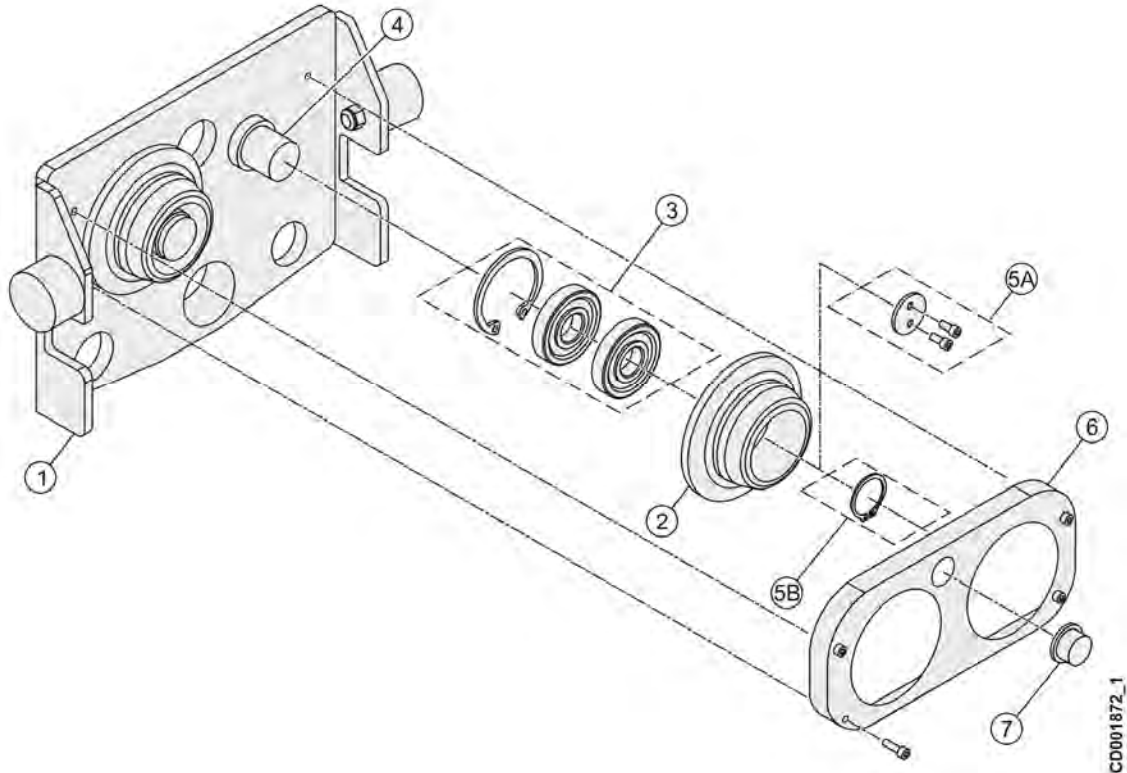
CD001871_1

Idle wheels



CD001869_1

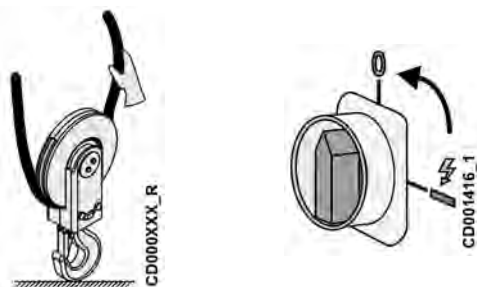
Driving wheels



- 1. Side plate (Low headroom)
- 2. Travel wheel
- 3. Bearing set
- 4. Shaft set
- 5A. Fixing set (Low headroom, load ≤ 5000)
- 5B. Fixing set (Low headroom, load ≥ 5000 and Normal headroom)
- 6. Cover plate (Driven wheels)
- 7. Cap

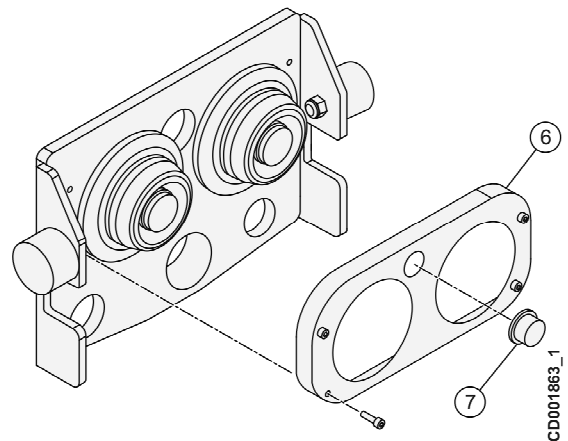
Disassembly

1

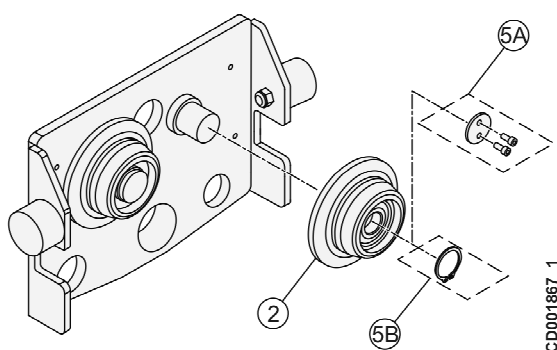
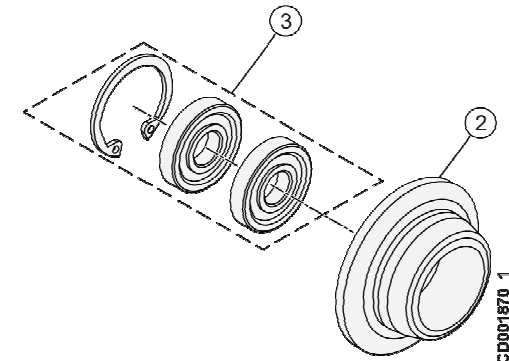


Lower the hook to the ground and switch OFF the power supply to the hoist. Remove the hoist with trolley from the runway (see section "8. Installation") and place on a suitable platform to disassemble the trolley wheels.

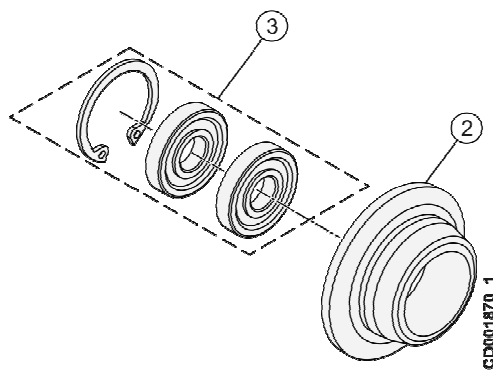
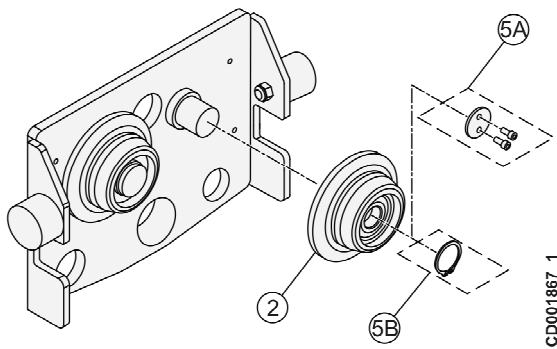
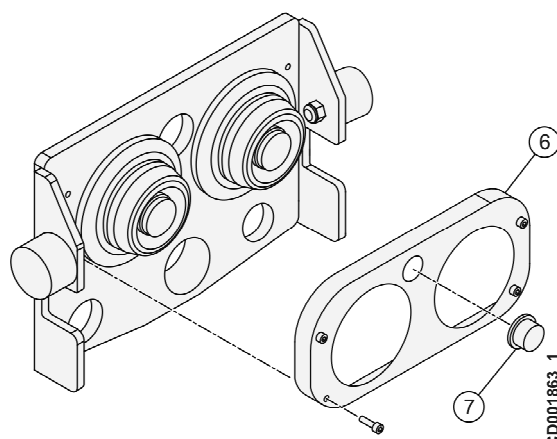
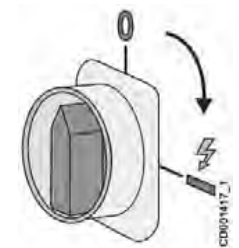
2



For driving wheels:
Remove screws to remove cover plate (6) and cap (7).

3	 <p>Remove the fixing parts (5) (5A Snap ring or 5B Plate and screw whichever applicable). Remove the trolley wheel along with the bearing set by gently tapping the wheel with a mallet.</p>	4	 <p>Remove the snap ring in order to remove the bearing set (3) from the trolley wheels (2).</p>
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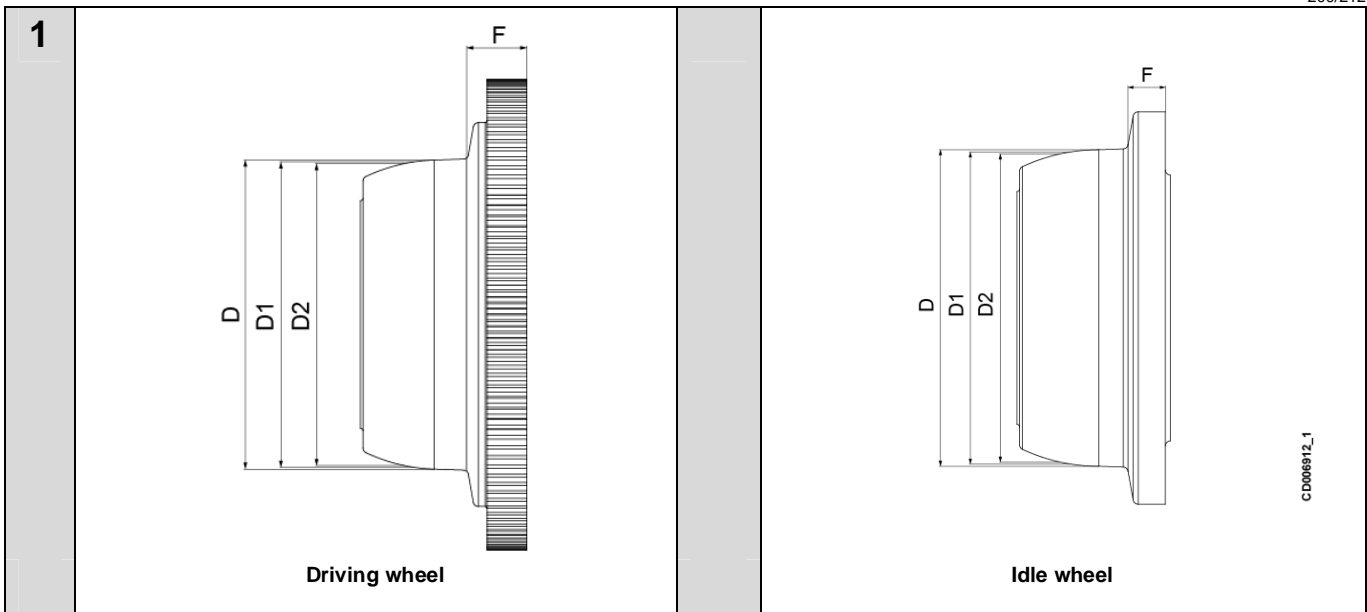
Reassembly

1	 <p>Install the bearing set (3) in the travel wheel (2) with the snap ring</p>	2	 <p>Install the trolley wheel along with the bearing set by gently tapping the wheel with a mallet. Install the fixing parts (5) (5A snap ring or 5B plate and screw whichever applicable).</p>
3	 <p>For driving load Place the cap (7) and reassemble the cover plate (5) and fix with screws.</p>	4	 <p>Install the hoist on the runway. Switch ON the power supply to the hoist and raise the hook off the ground.</p>

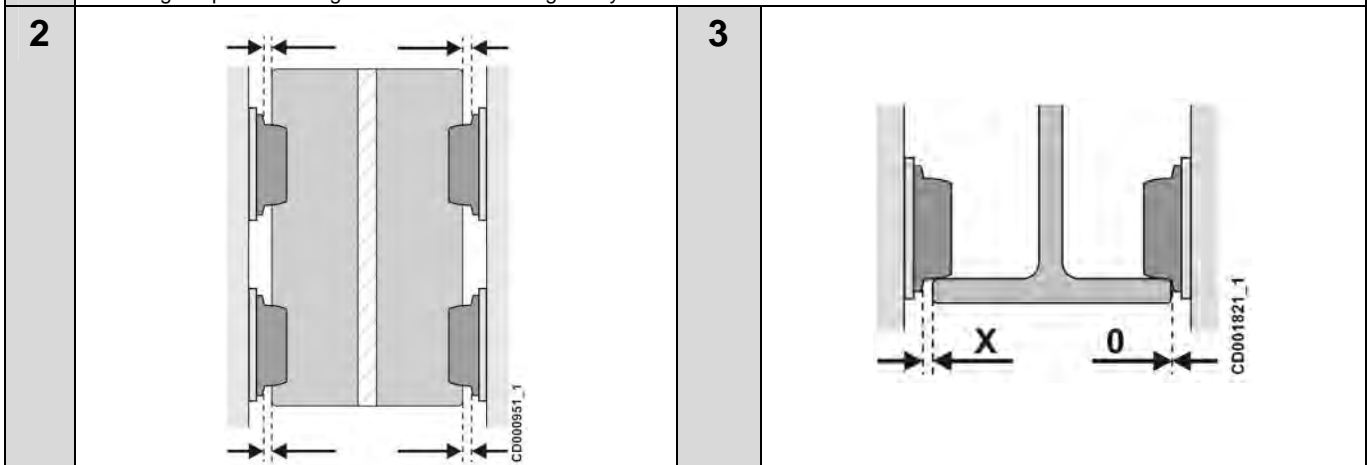
7.3.6.2 Maintenance of under running (single girder) trolley wheels

CAUTION

Asymmetrical wear may indicate misalignment on wheels. If the wheels are asymmetrically worn, measure the wheel alignment. Readjust if possible or change the parts if necessary.

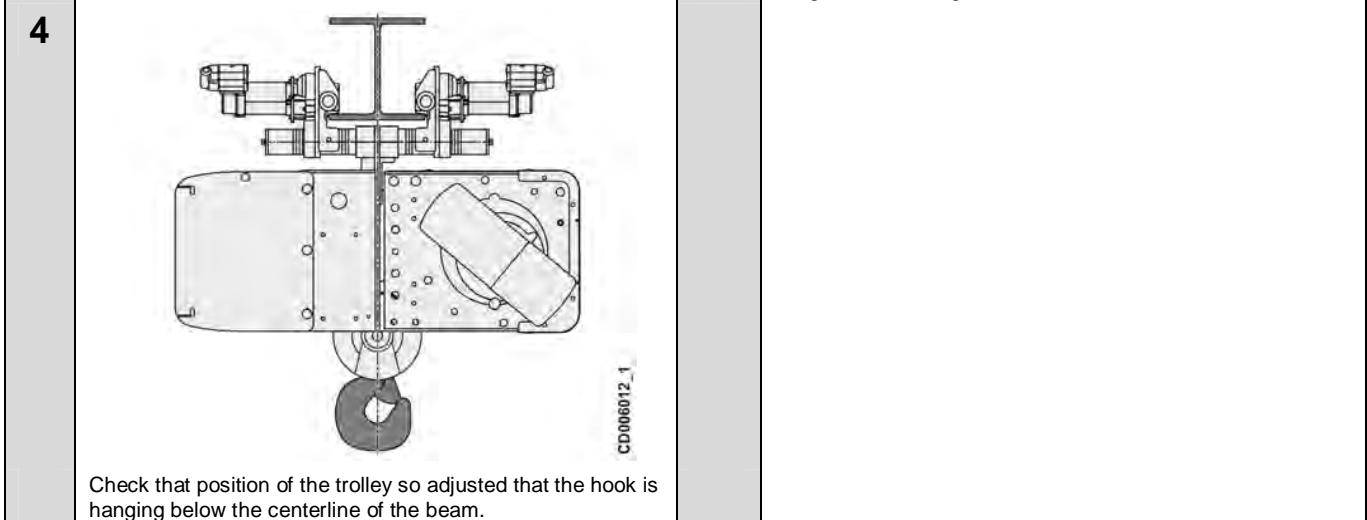


Inspect visually the condition of the trolley wheels. Change the trolley wheels if they are worn more than the wear limits given in the following chapter "Wearing limits of under running trolley wheels".



Check that the wheels of the trolley are correctly aligned. Adjust alignment if necessary (see "Adjustment" below).

Adjust the side plate (5) of the trolley inwards until there is a gap of approximately $X = 3 \dots 5$ mm between the wheel flange and the flange of the beam.



Check that position of the trolley so adjusted that the hook is hanging below the centerline of the beam.



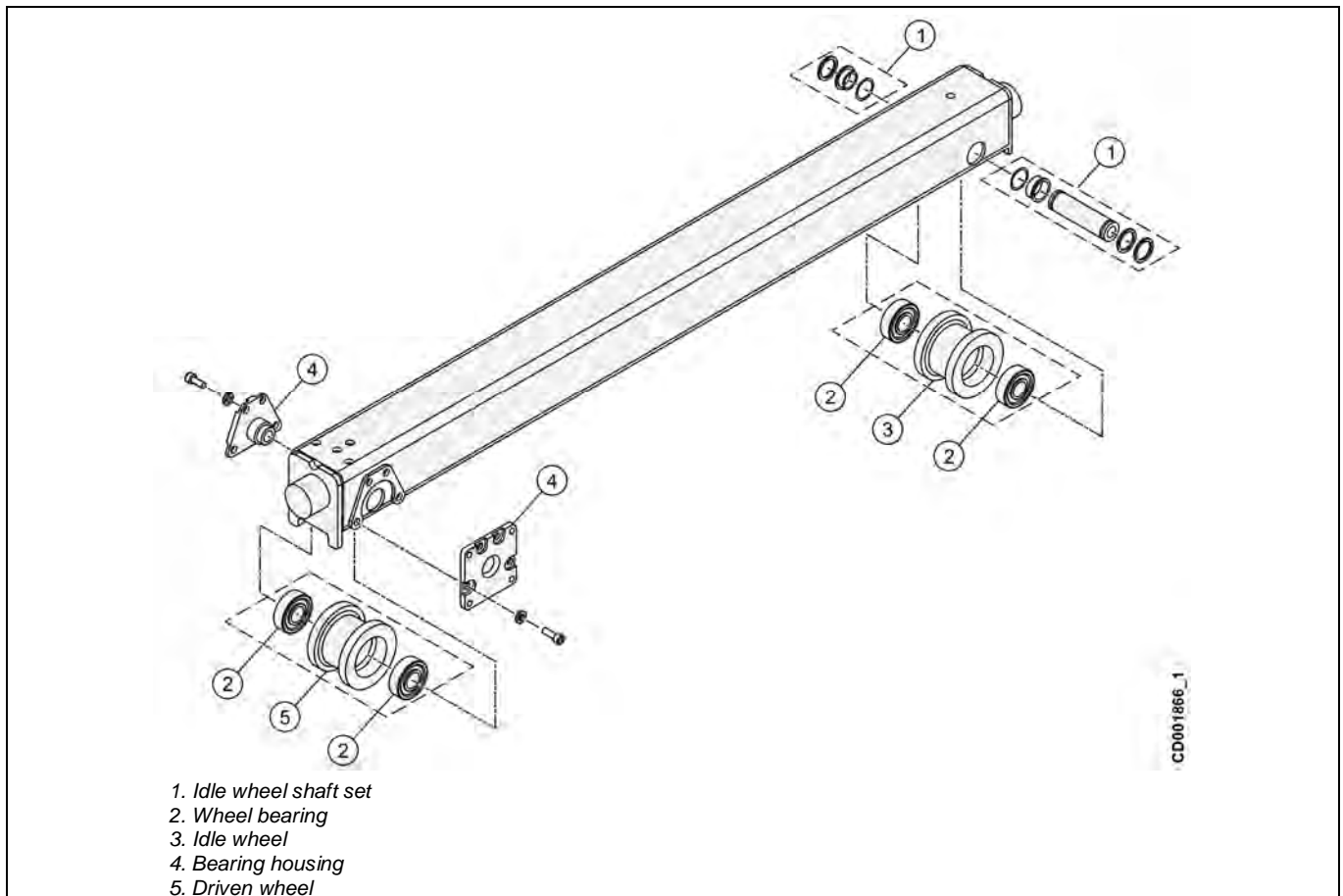
Note: If the trolley is reassembled, the track width of the trolley must be properly adjusted.

7.3.6.3 Wearing limits of under running trolley wheels

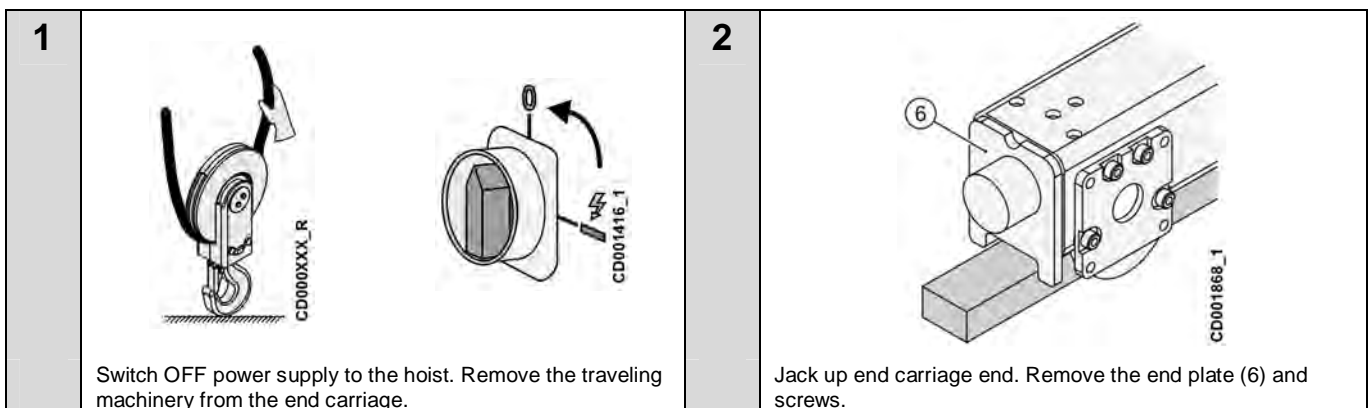
Wheel nominal diameter D [mm]	Replace limit D1 [mm]	Worn out limit D2 [mm]	Min F [mm] idle	Min. F [mm] driving
80	77	74	6	16
100	97	94	13	19
125	120	115	13	22
150	145	140	23	22
180	175	170	25	25

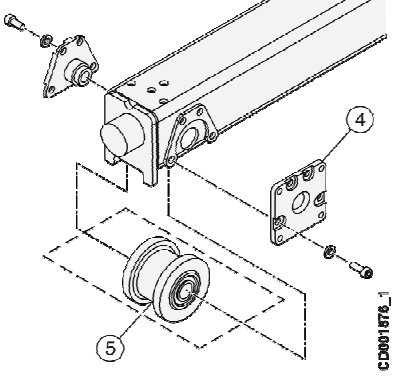
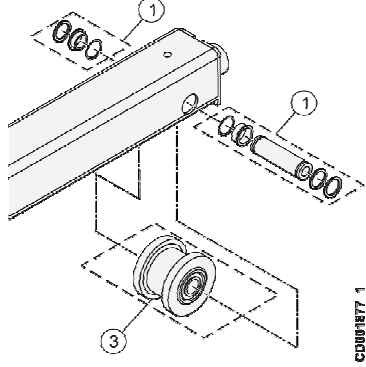
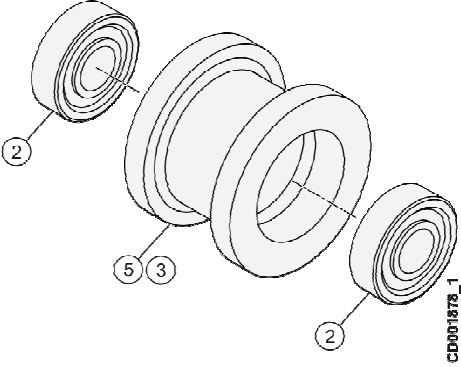
7.3.6.4 Construction of top running (double girder) trolley wheels

End carriage

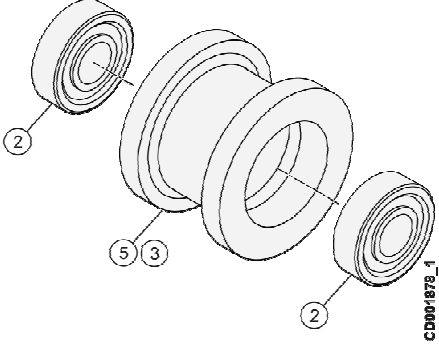
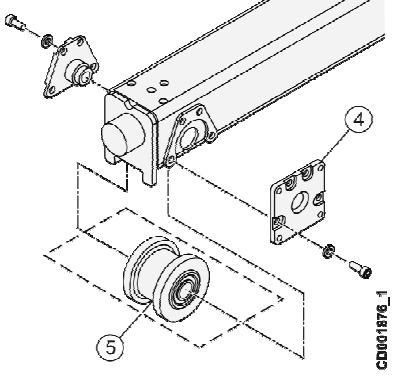
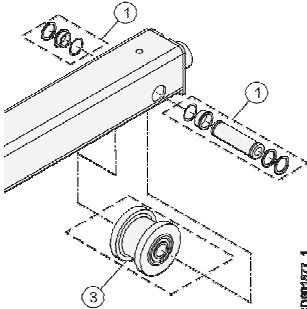
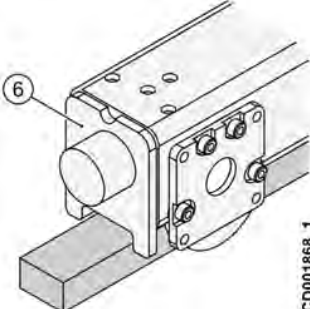


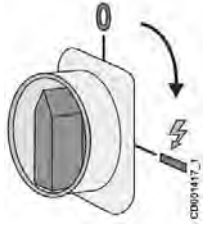
Disassembly



<p>3</p>	 <p>Remove screws and pull out bearing housing (4). Remove the driven wheel (5) along with the bearing.</p>	<p>4</p>  <p>Remove the snap rings in order to remove the shaft set.</p>
<p>5</p>	 <p>Remove wheel (1) and pull out bearings (2) from wheels (3) and (5).</p>	

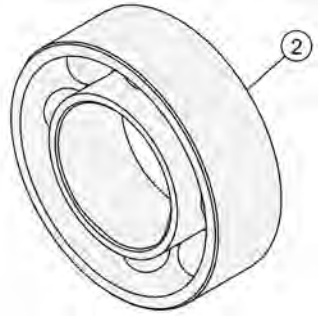
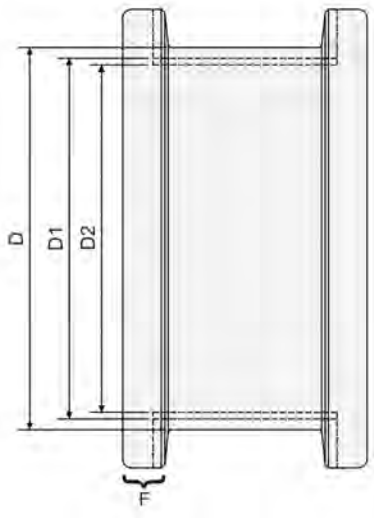
Reassembly

<p>1</p>	 <p>Press bearings (2) into wheel, avoid pressing from inner ring. Insert the wheels (3) and (5) including bearings into end carriage.</p>	<p>2</p>  <p>Mount bearing housing (4) into end carriage and tighten screws to the recommended tightening torques.</p>
<p>3a</p>		<p>4</p> 

	Insert the shaft (1) through the bearing in the wheels. Mount the rest of the shaft set (1) and lock shaft with snap rings.	Fix the end plate (6) and tighten the bolts according to chapter "Recommended tightening torque". Attach the traveling machinery to the spline of driven wheel. Tighten the screws of the machinery to a correct torque.
5	 <p>Connect the power supply plug to the motor and switch ON the power supply to the hoist.</p>	

7.3.6.5 Maintenance of top running (double girder) trolley wheels

CAUTION	Asymmetrical wear may indicate misalignment on wheels. If the wheels are asymmetrically worn, measure the wheel alignment. Readjust if possible or change the parts if necessary.
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1	 <p>CD001865_1</p> <p>Check the condition of the wheel bearings (2) for wear or any other damage. Replace if necessary.</p>	2  <p>CD005865_1</p> <p>Inspect visually the condition of trolley wheels. Change the trolley wheels if they are worn more than the wear limits given in the following table.</p>
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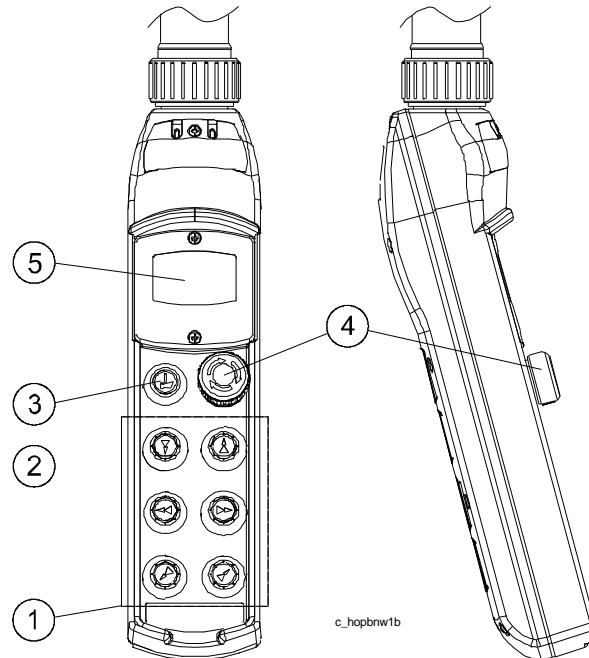
7.3.6.6 Wearing limits for top running trolley wheels

Wheel nominal diameter D [mm]	Replace limit D1 [mm]	Worn out limit D2 [mm]	Min. thickness of the flange F [mm]
90	87	84	6
100	97	94	7
110	107	104	8
140	135	130	8
200	195	190	11
250	245	240	11

7.4 Electrics

7.4.1 Push-button controller

The hoisting and travel motions of the hoist as well as crane travel motions are controlled with the push-button controller or by remote control. Some push-button controllers and remote control units are provided with a selector switch that allows the same controller unit to be used to control several hoists and/or cranes.



1. Movement push-buttons
2. Hoist selection push-button (only if push-button controls several hoists)
3. Push-button ON and warning signal
4. Emergency stop push button
5. Display (optional)

Use the following procedure to start up a hoist that is in standby mode:

Release the emergency stop push-button by turning it. Use a key to release if it is the lockable type.

Press the push-button ON. The hoist is now ready for operation.



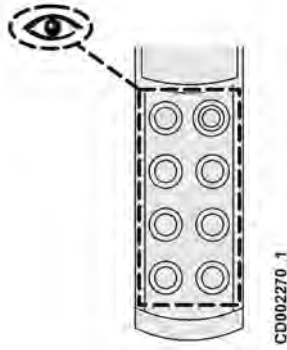
Note: If the push-button controller includes a selection switch, check that the hoist selection switch is in the correct position before using push-buttons.

After operating the hoist, return it to standby mode as follows:

Run the hoist to the correct parking position. Stop all hoist motions.

When all hoist motions have ceased, press the emergency stop push-button. The push-button locks.

Push-button controller inspection

1	 <p style="text-align: right; font-size: small;">CD0002270_1</p>	2	
	<p>Check the push-buttons:</p> <ul style="list-style-type: none"> • Check the push-button rubbers, emergency stop-button and other eventual selector switches are in good condition • Check that the buttons move freely and do not stick • Check that the switch-elements are in good condition and not loose • Check the display readings (if applicable). 		<p>Check the wires:</p> <ul style="list-style-type: none"> • Check that the cable entry and the plug (if applicable) are tight and in good condition • Check that the control cable and strain wire are properly and securely fixed. • <p>Test all functions.</p>

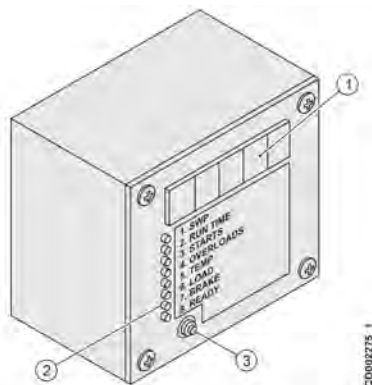
7.4.2 Condition monitoring unit

The electrical cubicle on the hoist contains the condition-monitoring unit that supervises the safe operation of the hoist. The unit collects data on functions that affect safety and calculates the remaining time in the Safe Working Period (SWP) during which the hoist can operate safely. Separate operating and servicing instructions for the condition-monitoring unit are delivered with the hoist.

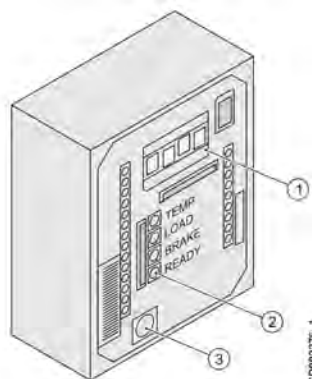


Note: Only qualified personnel authorized by the manufacturer of the hoist may do the programming of the condition-monitoring unit.

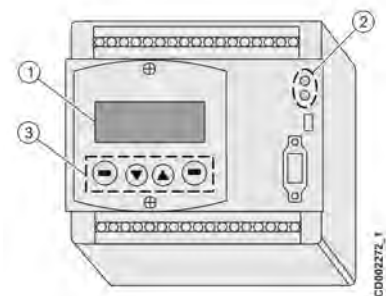
CU1



SWM

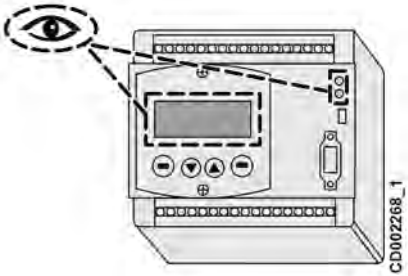



Condition monitoring unit



1. Digital display
2. Indicator LEDs
3. Programming buttons

Condition monitoring unit Inspection

1	 <p>CD002268_1</p>	2	 <p>CD002274_1</p>
	<p>Check that none of the fault-indicating LEDs are lit up, and that the display does not show an error message.</p>		<p>Write down the primary monitoring values and keep a log of them.</p>



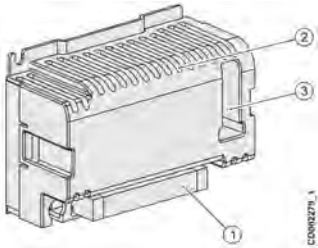
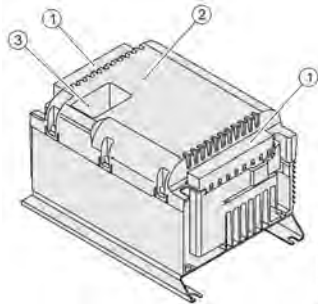
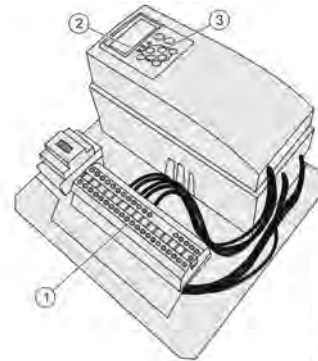
Note: If any of the red alarm lights is lit or blinking, check out if this is caused by a normal supervisory function. If this is not the case, and the problem still occurs, follow the troubleshooting instructions given in the component-specific Service Manual.

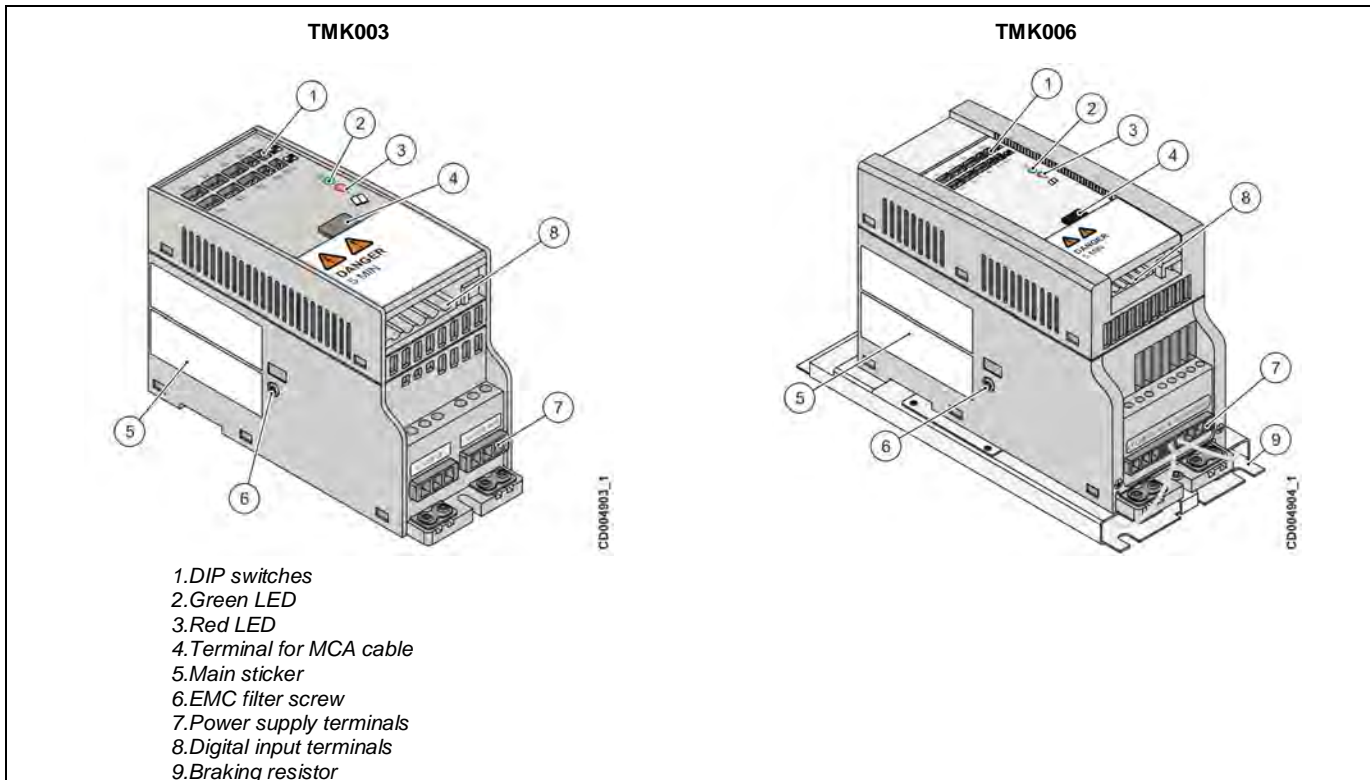
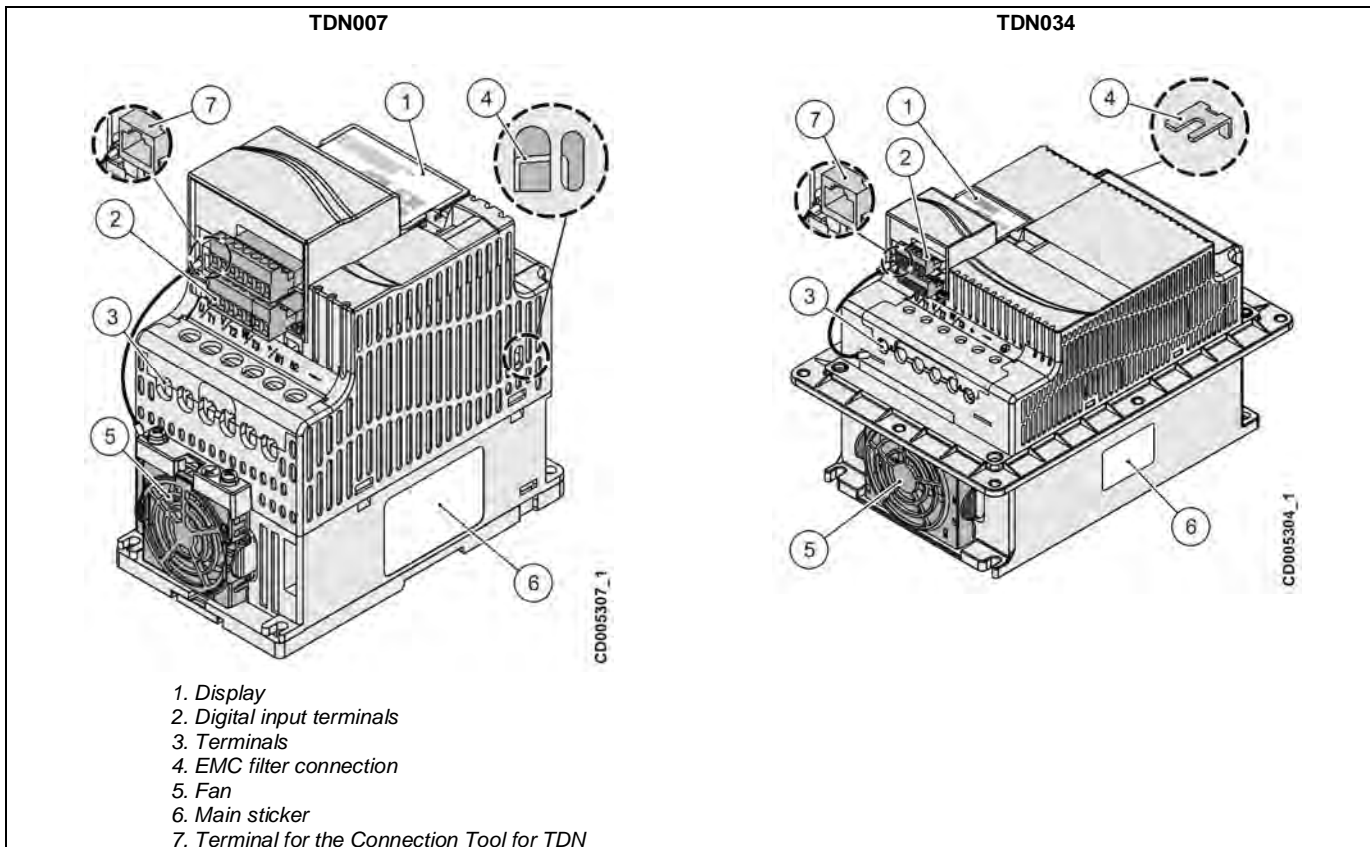
7.4.3 Frequency converters

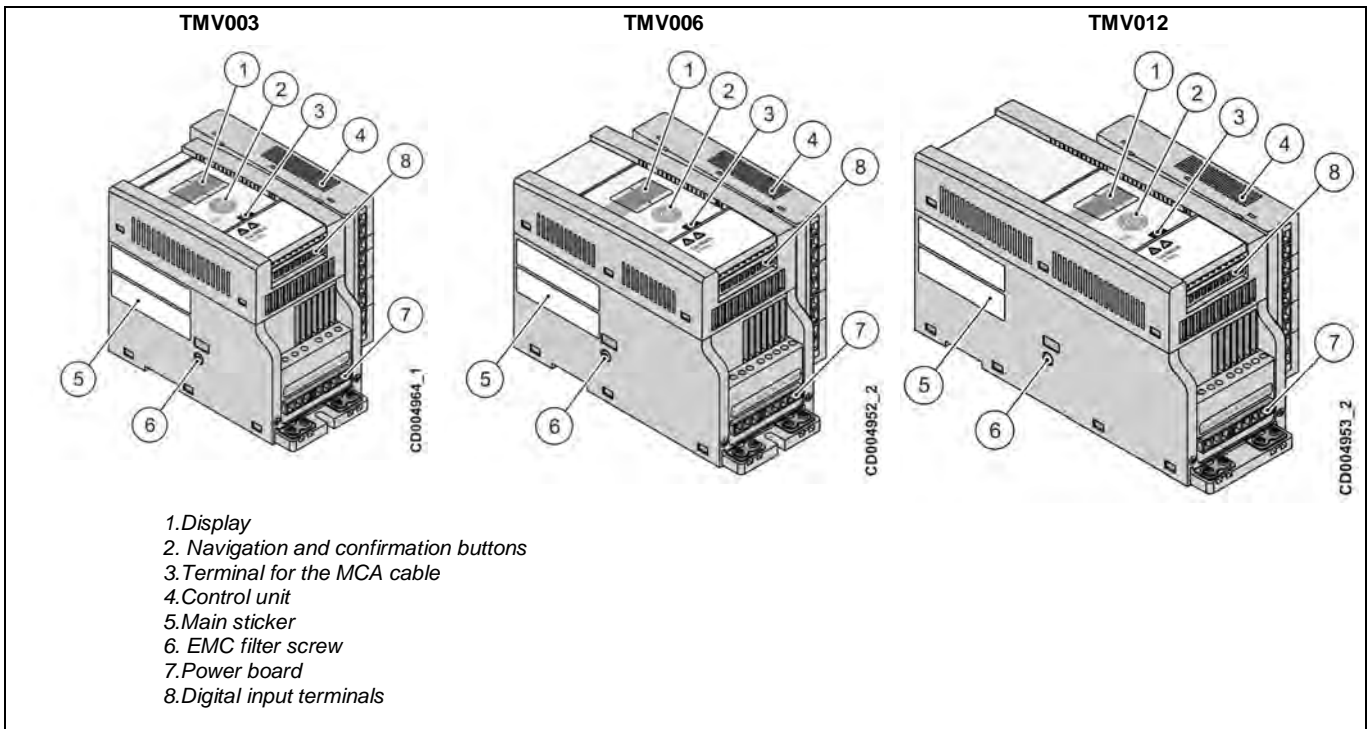
The electrical cubicle on the hoist contains a frequency converter that controls the rotation speed of the traveling motor, according to the commands given by the operator.

The frequency converter has signal LEDs or a display indicating its operating status and possible malfunction. Refer to the Service Manual of the respective frequency converter for details.

The parameters of the frequency converter are pre-set at the factory, and usually do not require re-adjustment. In case re-adjustment is needed, refer to the Service Manual of the respective frequency converter for details.

0.7 kW frequency converter	2.2 kW frequency converter	4 kW frequency converter
 <p>CD002271_1</p>	 <p>CD002288_1</p>	 <p>CD002277_1</p>
<p>1. Connectors 2. Signal LEDs / Display 3. Parameter switches</p>		





WARNING There are high voltages inside the frequency converter (including programming switches). Wait for at least three minutes after the supply voltage has been switched off before any service actions.



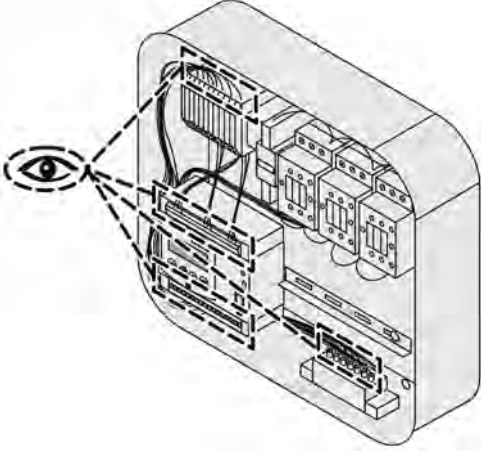
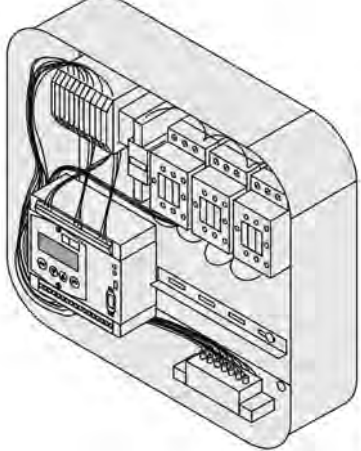
Note: The fault codes are explained in the frequency converter-specific manual.

Frequency converter inspection

<p style="font-size: 24px; font-weight: bold; margin-bottom: 0;">1</p> <p style="text-align: right; font-size: 10px;">CD0002278_1</p> <p style="margin-top: 10px;">Check that all connections are properly and securely fixed. Check the operation and cleanliness of the cooling fan.</p>	<p style="font-size: 24px; font-weight: bold; margin-bottom: 0;">2</p> <p style="text-align: right; font-size: 10px;">CD0002277_1</p> <p style="margin-top: 10px;">Check the operation mode. Check error codes if any.</p>
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7.4.4 Cubicles and wiring

Inspection of cubicles and wiring

1	 <p style="text-align: right; font-size: small;">CD0002336_1</p>	2	 <p style="text-align: right; font-size: small;">CD0002333_1</p>
	<p>Open electric cubicles and check visually the fastenings of the electrical equipment and internal wiring connections. Check the security of the fastenings in the electrical cubicle.</p>		<p>Follow the power supply and visually check potential areas for crushing. Check visually or test by hand that cable bushings are tight. Check visually or test by hand that connectors are OK. Check the cableways for electrical wiring. Make sure that wires do not snag on structures when the hoist and trolley are in motion. Check that the connections of electrical devices comply with the wiring diagrams and meet local requirements.</p>

7.4.5 Contactors

Hoisting, speed change, and brake contactors are monitored by CID that calculates contactors' lifetime, that is, the number of the control actions. The maximum number of control actions is defined with Parameter 6-19 (Max Control). The default value is 640,000 operations. Once this design limit has been reached, CID sends a warning: "Control", and the contactors must be replaced. If a brake contactor contains an auxiliary contact block or a time delay auxiliary contact block, replace that part as well.

7.4.5.1 CID parameter settings after replacing contactors

When the condition monitoring unit indicates the "Control" warning, one of the start counters 2-7 (ST up), 2-8 (ST down) or 2-9 (ST fast), has reached the set design limit (the default value is 640,000 operations) which is defined with parameter 6-19 (Max Control). Replace the contactors and calculate a new parameter value for parameter 6-19 (Max Control) in CID as follows:

Calculate a new value for parameter 6-19 (Max Control) by taking the maximum (value) of the parameters 2-7 (ST Up), 2-8 (ST down) or 2-9 (ST Fast) increased by 640k0 (640 000).

$$\begin{array}{ccccccc}
 & \text{Max (2-7, 2-8, 2-9)} & & & & & \text{6-19} \\
 & \boxed{} & + & 640k0 & = & \boxed{} & \\
 \end{array}$$

Example:

A warning when parameter 6-19=640k0 and the start counters show the following values:

- Parameter 2-7=630k0
- Parameter 2-8=470k0
- Parameter 2-9=739k0

The new value of parameter 6-19 = Max(2-7,2-8,2-9)+640k0 =739k0+640k0=1M379.

8 DISMANTLING

8.1 Dismantling the Product

The product will need to be dismantled at the end of its life or if it must be moved to a new location.

Strict safety precautions shall be followed when dismantling the product. For example, when working at heights, fall protection procedures must be followed. Only experienced service personnel are permitted to dismantle the product.

The owner shall nominate a person to be responsible for the dismantling process. This person shall give instructions and monitor the process.

All controls must be placed in the OFF position, safety switches must be opened and the main isolator switch must be turned off. The product must be electrically isolated before dismantling commences.

Make sure that all personnel involved are aware that the product will be dismantled before dismantling commences.

The owner must prevent unauthorized persons and bystanders from walking on or below the work site. Ensure that the secured area is spacious enough to prevent injuries which could occur as a result of falling components or tools.

Only use safe tools and machinery for dismantling.

Make sure that removed fastenings and components will not fall.

Pay attention to the environmental conditions. For example, do not disassemble the product if the prevailing weather could compromise safety.

The disassembly sequence is completed in the reverse order to the assembly sequence. Refer to installation/assembly instructions for correct sequence.

After the product has been dismantled, the owner or person responsible for the dismantling can return the working area back to normal use.

8.2 Disposal of Waste Material

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

As waste regulations and types of recovery and disposal methods vary so much regionally, no general detailed guidance can be given. The chart below gives example of manufacturer's proposals for adequate waste handling methods.

NOTICE	Use always licensed recycling companies.
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1	Metals should be recycled.	
2	Electronics and electromechanical components should be collected separately and recycled. Some electrical parts may be treated as hazardous waste, e.g. standard fluorescent lamps contain mercury.	
3	Batteries and other energy storage components may contain hazardous substances. These items should be collected separately and recycled according to local regulations.	
4	Plastics should be either recycled as material or used for energy recovery or landfilled. PVC plastic should be recycled according to local regulations.	
5	Chemicals , like oil, grease and other liquids shall never be spilled onto the ground, soil or sewage. Waste oil and grease shall be stored in containers indicated for the purpose. More detailed information of chemical handling as waste can be found in the chemical's Safety Data Sheet that is available from manufacturer of the chemical.	
6	Packing materials , like plastics, wood and cardboard, should be reused or recycled as material or to energy.	

9 APPENDIX: TIGHTENING TORQUES

The following tightening torques shall be applied on bolts in cases, where tightening of a bolt is not specified in any way in the relevant drawing.

Tightening must be done using a tool or method, where the applied torque is measured and indicated.

See below screw joints, recommended tightening torques. Measurements are given in Nm. A friction coefficient $\mu = 0,14$ is assumed in the calculations of the preceding tightening torques.

Size	Tightening torque (Nm)		
	Strength class 8.8	Strength class 10.9	Strength 12.9
M2	Hand tight (0.39)	Hand tight (0.55)	Hand tight (0.66)
M3	Hand tight (1.41)	Hand tight (1.98)	Hand tight (2.37)
M4	Hand tight (3.3)	Hand tight (4.8)	Hand tight (5.6)
M5	Hand tight (6.5)	Hand tight (9.5)	Hand tight (11.2)
M6	Hand tight (11.3)	Hand tight (16.5)	Hand tight (19.3)
M8	25	35	42
M10	49	69	83
M12	86	122	145
M14	136	190	230
M16	210	300	360
M18	290	410	495
M20	410	590	710
M22	560	790	950
M24	710	1000	1200
M27	1040	1460	1750
M30	1410	2000	2400
M33	1910	2700	3250
M36	2460	3500	4200

These torques are for

- screws DIN912, DIN931, DIN933
- nuts DIN934, DIN935, DIN982, DIN985, DIN98

Others shall be specified in drawings



Note: It is recommended that self-locking nuts (Nyloc nut) are always replaced when removed. Self locking nuts can be reused no more than 5 times.