

INSTRUCTIONS FOR USE

INSTALLATION | USE | MAINTENANCE

DMK 1/2/3/4
SERIES **ELECTRIC CHAIN HOISTS**

DMT 2/3/4/5
SERIES **TRAVEL TROLLEYS**



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1. PRELIMINARY INFORMATION

1.1 CONTENT AND RECIPIENTS OF THE MANUAL

This technical publication refers to the **“DMK 1/2/3/4 series electric chain hoists and related DMT 2/3/4/5 series electric travel trolleys”** manufactured and placed on the market by the company:



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It relates to their “intended use”, their functional and performance-related technical characteristics and the related instructions for installation, use and maintenance. It is intended for:

- ▶ the person in charge of the plant, workshop or building site
- ▶ the operators in charge of transport, handling and installation
- ▶ the operators in charge of using the jib crane
- ▶ maintenance personnel

The manual must be kept by a person appointed for the purpose in a suitable place, so that it is always available for consultation in the best state of repair.

In the event of loss or deterioration, replacement documentation must be requested directly from the manufacturer, quoting the code of this manual.



The manufacturer reserves the material and intellectual property rights to this publication and prohibits its disclosure and duplication, even partial, without prior written consent.

1.2 SYMBOLS: MEANING AND USE

This manual uses a number of symbols to draw the reader’s attention and highlight some particularly important aspects of the subject matter.

The following table shows the list and meaning of the symbols used in the manual.

SYMBOL	MEANING	EXPLANATION, ADVICE, NOTES
	Danger	▶ Indicates a hazard with a risk of injury, possibly fatal. ▶ Failure to follow the instructions marked with this symbol may result in a situation of serious danger to the safety of the operator and/or people exposed to risk! ▶ Strictly follow the instructions!
	Warning	▶ It represents a note of caution regarding possible damage to the jib or another personal item belonging to the operator ▶ An important warning that requires the utmost attention.
	Warning Note	▶ Indicates a warning or a note about key functions or useful information.
	Visual observation Action to be taken	▶ A stylised eye may indicate to the reader that: a) They must carry out a visual inspection. b) They must proceed with the operating sequence. c) They are required to read a measurement value, check a signal, etc.

The hoists and their trolleys are designed and manufactured in accordance with the **“Essential Health and Safety Requirements”** of **Annex I of the Machinery Directive 2006/42/EC** and are placed on the market **with the CE marking** and the **EC Declaration of Conformity**, as set out in **Annex IIA** of the same Directive.

In addition, the DMK series hoists and their trolleys comply with the following Directives:

- ▶ **Low Voltage Directive 2014/35/EU;**
- ▶ **Electromagnetic Compatibility Directive 2014/30/EU.**



1.3 MANUFACTURER'S LIABILITY

With reference to the contents of this manual, no liability shall be accepted in the event of:

- ▶ use of the hoist contrary to national laws on safety and accident prevention
- ▶ incorrect preparation of the site and the structures on which the hoist will operate
- ▶ voltage and mains supply faults
- ▶ failure to follow, or incorrect observance of, the instructions provided in this instruction manual
- ▶ unauthorised modifications to the machine
- ▶ use by untrained or unsuitable personnel



- ▶ **The designated use and the specified jib configurations are the only ones permitted. Do not attempt to use it while ignoring the instructions provided.**
- ▶ **The instructions in this manual do not replace but summarise the obligations to comply with current accident-prevention legislation.**

2. DESCRIPTION OF THE MACHINE AND TECHNICAL INFORMATION

2.1 THE ELECTRIC CHAIN HOIST AND ITS TRAVEL TROLLEYS

2.1.1 INTENDED USE - PLANNED USE - DESIGNATED USE

The electric **chain hoist** is a machine generally used to lift an unguided load vertically using the hook or suitable lifting attachments. When the hoist is combined with a **travel trolley** that runs overhead on one or two beams, it is able to ensure both lifting and horizontal movement of the load.

All lifting movements (up and down) **must be activated electrically** and can be controlled using the push-button panel or radio control system. Electric or manual movement (right and left).

The electric **chain hoist and its travel trolleys**, mounted overhead, can be fitted to monorails or serve as the lifting unit of other machines in which they are incorporated, such as bridge, gantry or jib cranes, etc.

The electric **chain hoist**, whether installed at a height or on the ground, after appropriate safety checks and any necessary protective measures (see paragraph 3.4), it can also be used in various configurations in a fixed position.

2.1.2 THE RANGE

The range of DMK series electric chain hoists is available in:

4 basic sizes, DMK 1 - 2 - 3 - 4, for capacities from 100 to 4000 kg, in the service groups FEM (ISO) 1Bm (M3) -1Am (M4) - 2m (M5).

- ▶ At a lifting speed obtained with a single-pole motor:
 - ▶ 4 or 6.3; 8; 16 m/min. for hoists with 1 chain fall
 - ▶ 3.2 or 4 m/min for 2-fall chain hoists
- ▶ At two lifting speeds obtained with a double-pole motor:
 - ▶ 4/1.2 or 6.3/2.1; 8/2.5 m/min for hoists with 1 chain fall
 - ▶ 2.5/0.8 or 3.2/1 m/min. for 2-fall chain hoists

Data and technical characteristics can be found in paragraph 2.2

DMK series electric chain hoists are available in the following standard configurations:

- ▶ **Fixed version:** (fig.1)
With the hoist suspended by means of an eyebolt or (upon request) by means of a hook.
- ▶ **With electric travel trolley, single-girder, type DMT/EM3-4-5:** (fig.2)
- ▶ **With push trolley, single-girder, type DMT/SM2-3-4-5:** (fig.3)
- ▶ **With chain trolley, single-girder, type DMT/CM3-4-5:** (fig.4)

The DMK hoist is supplied in a suspended version with normal and lowered trolleys, running on a single beam.



fig.1



fig.2



fig.3



fig.4

Design and construction:

- ▶ The DMK series electric chain hoists and their travelling trolleys are manufactured according to the modular component concept. These components are assembled to one another to meet commercial requirements and, in addition to the standard versions that are always available in stock, allow for the quick, economical production of numerous standardised and special configurations.
- ▶ Thanks to their extreme compactness, the basic components, motor and gearbox, are assembled together in a coaxial line, so as to ensure maximum utilisation of the hook run and minimum overall dimensions of the hoist. The components are connected by means of high-strength bolted joints, which can be inspected and are fitted with self-locking safety nuts to prevent unscrewing.
- ▶ The construction benefits from the most advanced technologies based on highly industrialised production processes, which allow the creation, through economies of scale, of totally reliable and technically innovative machines. The high level of quality is guaranteed and controlled by the company's quality system, which is certified according to the UNI EN ISO 9001:2008 standard.

2.1.3 THE PARTS OF THE DMK ELECTRIC CHAIN HOIST (fig. 5)

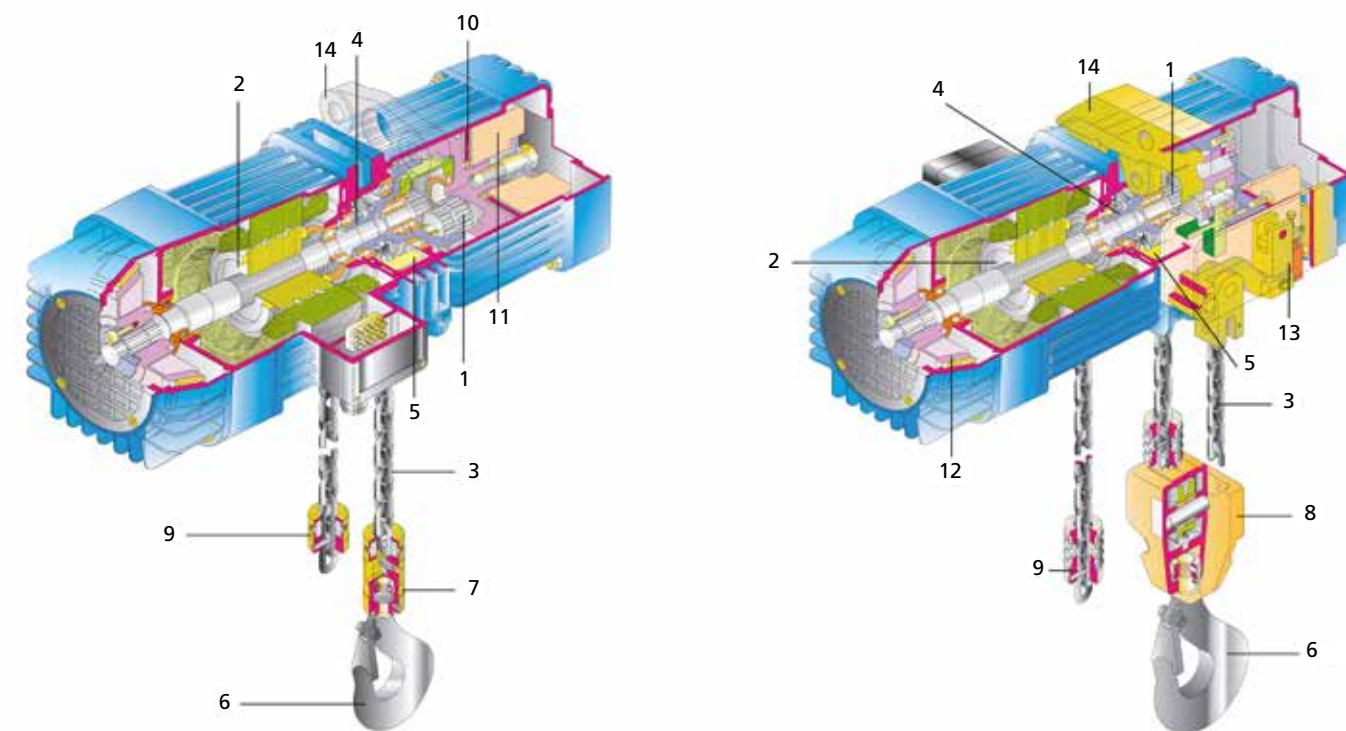


fig.5

1. Gear reducer

Epicyclic reduction gear with heat-treated, high-strength steel gears, mounted on ball bearings and lubricated in an oil bath. The frame is made with radiating fins in aluminium alloy to improve heat dissipation.

2. Self-braking electric motor

The axial movement of the conical brake allows rapid and reliable mechanical braking over time [RES. 4.1.2.6. c – Annex I Machinery Directive]. The brake lining is asbestos-free. Three-phase asynchronous motor: single-polarity for single-speed hoists and dual-polarity for two-speed hoists.

3. Chain

Calibrated round high-strength steel of special quality, featuring high dynamic stability, with a minimum breaking load of 80 kg/mm² and ultimate elongation no higher than 10%. The applicable safety coefficient is always greater than 5 [RES. 4.1.2.4. - Annex I Machinery Directive]. The heat and galvanic treatments to which it is subjected give it a high resistance to wear, ageing and corrosion.

4. Load nut

Heat-treated, it features five precision-machined pockets produced on high-precision automatic machines. It drives the chain, ensuring optimal movement.

5. Chain guide (inserter/extractor)

The chain guide is used to insert and extract the chain links of the pockets of the nut during both upward and downward movement [RES. 4.1.2.4. Annex I Machinery Directive].

6. Load hook

Made of high-strength steel, it is equipped with a safety device (carabiner) to prevent the load from detaching [RES. 4.1.2.6. and - Annex I Machinery Directive] and rotates on a thrust bearing.

7. Bottom block (hoists with 1 chain fall)

This connects the chain to the turning hook. It is made of light alloy and is equipped with a high-strength steel pin to lock the chain.

8. Hook block (hoists with 2 chain falls)

Fully enclosed and cast in aluminium, it is equipped with a high-strength, heat-treated steel return sprocket with pockets to house the chain.

9. Stops

Installed on the free descending section of the chain and on the load-bearing section in single-fall hoists, they act as regulators and limit switches for travel of the hook [RES. 4.1.2.6.a - Annex I of the Machinery Directive]; they are made of pressed steel and feature a shock-absorbing insert.

Chain guide

It is necessary to contain the free-hanging section of the chain and is available in different sizes according to the hook run; it is made of impact-resistant plastic and is equipped with suspensions that provide functional mobility.

10. Clutch device (hoists with 1 chain fall)

Emergency device and limit switch for upward and downward movement; it also functions as an overload device [RES. 4.2.1.4. Annex I Machinery Directive]. The asbestos-free clutch discs are preloaded with a disc spring system.

11. Balancer (hoists with 1 chain fall)

It is connected to the clutch device and keeps the hoist balanced; it absorbs the large amount of heat generated during slippage of the clutch.

12. DMK brake

The brake shoe consists of a fan that ensures the cooling of the brake itself and of the motor. The high degree of inclination of the braking surface allows excellent brake release even under the most demanding operating conditions. The brake can be adjusted easily from the outside simply by turning the adjusting ring.

13. Overload device (hoists with 2 chain falls)

Electromechanical type, with a microswitch featuring a single intervention threshold [RES. 4.2.1.4 - Annex I Machinery Directive]. The overload device does not allow the hoist to be overloaded by more than 20% of its maximum load capacity, interrupting the lifting control circuit.

14. Suspension

It is produced with an eyebolt fitting; it can be made with a hook execution upon request or even a 90° eyebolt version for longitudinal hoist.

Electric lifting limit switches

Supplied as standard for 2-fall chain hoists and available on request for 1-fall hoists, they limit the travel of the hook when lifting and lowering [RES. 4.1.2.6 a) - Annex I Machinery Directive]. Consisting of two precision microswitches, operating according to the "positive slow opening" principle and acting on the auxiliary circuit of the hoist motor control device.

ELECTRIC CONTROLS

When the hoist is equipped with electric controls, the movements can alternatively be activated by:

- ▶ 48 V AC 50 Hz low-voltage electrical equipment comprising: the transformer for the low voltage power supply of the control circuits, the general line contactor, the contactors used to control the hoist motors and optional electric trolley, the transformer protection fuses and the terminal block for the connections of the auxiliary and power circuits. The components are housed in a watertight, IP55-rated box made of shock-resistant thermoplastic material. The control equipment is fixed on the motor side of the hoist.
- ▶ direct control, at mains voltage, available exclusively for controlling the electric hoist only, i.e. for the up and down functions. It uses a power push-button panel that directly interrupts and switches the power supply line. In both options, the controls are activated via an ergonomically shaped hanging control panel made of shockproof, self-extinguishing thermoplastic material, watertight with IP 65 protection rating. The emergency stop function [RES. 1.2.4 - Annex I Machinery Directive], is equipped with a mushroom button that, by means of a voluntary unlocking action, sets the control circuit to run-enable mode [RES. 1.2.3 - Annex I Machinery Directive]. The pendant control station is connected to the hoist by means of a multi-core electric cable equipped with tear-resistant metal cores.

2.1.4 TRAVEL TROLLEYS (fig. 6)



fig.6

DMT TRAVERSING TROLLEYS used for the horizontal movement of the load are produced in three different versions: manual push type SM; mechanical chain type CM; electric type EM. The trolleys slide on the lower flange of the beam and can be adjusted according to the width of the beam flange; they are made of pressed steel sheet (GR 2) and pantographed sheet metal (GR 3, 4 and 5), and are fitted with anti-derailment brackets [RES. 4.1.2.2. Annex I Machinery Directive] and shock-absorbing pads. They are equipped with machined pressed-steel wheels that swivel on permanently lubricated ball bearings. Motor reducer with self-braking motor: supplies drive to the trolley's toothed wheels in the EM-type electric version [RES. 4.1.2.6. c - Annex I Machinery Directive]. Electric travel limit switches: limit the horizontal travel of the electric trolley on the beam [RES. 4.1.2.6. a - Annex I Machinery Directive]. Towing arm: for all types of DMT series trolleys, a towing arm is available that connects the trolley to the power supply line. It is easily adjustable in all directions and is an essential element for towing the power supply line in order to avoid tearing the conductors.

2.2 TECHNICAL INFORMATION AND CONDITIONS OF SERVICE

2.2.1 REGULATORY FRAMEWORK

The following main standards and technical regulations were taken into account in the design and construction of the DMK series electric chain hoists:

- ▶ EN ISO 12100:2010 "Basic concepts, general principles for design"
- ▶ EN ISO 13849-1:2008 "Safety-related parts of control systems" (where applicable)
- ▶ EN 12077-2:2008 "Limiting and indicating devices"
- ▶ EN 60204-32:2009 "Safety of electrical equipment of lifting equipment"
- ▶ EN 60529:1997 "Degrees of protection provided by enclosures (IP codes)"
- ▶ ISO 4301-1:1988 "Classification of lifting equipment"
- ▶ DIN 15401 "Selection of lifting hooks" (2-fall version)
- ▶ FEM 1.001/98 "Calculation of lifting equipment"
- ▶ FEM 9.511/86 "Classification of mechanisms"
- ▶ FEM 9.671/88 "Quality of chains"
- ▶ FEM 9.683/95 "Selection of lifting and travel motors"
- ▶ FEM 9.755/93 "Safe working periods"
- ▶ FEM 9.941/95 "Control symbols"

2.2.2 PROTECTION AND INSULATION OF ELECTRICAL PARTS

- ▶ Lifting and travel motors: Protection rating IP55 - Insulation Class "F"
- ▶ DMK 2-3-4 IP23 hoist motor brake
- ▶ Limit switch: Minimum protection rating IP65 - Max. insulation voltage 500 V
- ▶ Cables: CEI 20/22 II - Max. insulation voltage 450/750 V

2.2.3 POWER SUPPLY

- ▶ The DMK electric chain hoists are designed to be powered by alternating current at a three-phase voltage of: 400 V +/- 10% - 50Hz. according to IEC 38-1.

2.2.4 ENVIRONMENTAL CONDITIONS OF USE

- ▶ Operating temperature: minimum -10°C; maximum +40°C
- ▶ Maximum relative humidity: 80%
- ▶ Maximum altitude of 1000 m above sea level
- ▶ The machine must be placed in a covered, well-ventilated environment free from corrosive vapours (acid vapours, salt mists, etc.).



- ▶ It is forbidden to use the machine in an explosive or potentially explosive atmosphere or where the use of explosion-proof components is required
- ▶ Sufficient working space must be provided to ensure the safety of the operator and maintenance personnel.

2.2.5 NOISE – VIBRATIONS

- ▶ The sound pressure level emitted by the hoist at full load is less than 85 dB (A). The impact of environmental characteristics such as sound transmission through metal structures, and reflection caused by combined machines and walls, is not included in the indicated value.
- ▶ The vibrations produced by the hoist are not hazardous to the health of the personnel working with it. Excessive vibration may be caused by a fault that must be immediately reported and eliminated so as not to compromise the reliability of the hoist.

2.2.6 LIMITS OF USE, OPERATING CONDITIONS AND SERVICE LIFE

- ▶ Adequately determining the operating limits of the hoist is the necessary condition to guarantee its correct operation and service life, as well as full compliance with the operating conditions for which it is intended.
- ▶ The ISO 4301-1:1988 standard and the FEM 9.511/86 rule allow electric chain hoists to be classified according to the type of service, and the parameters necessary to determine their limits of use are as follows:

1. The effective load capacity;
2. The stress state;
3. The average daily operating time.

1. The effective load capacity

- ▶ This is determined by the heaviest load to be lifted.

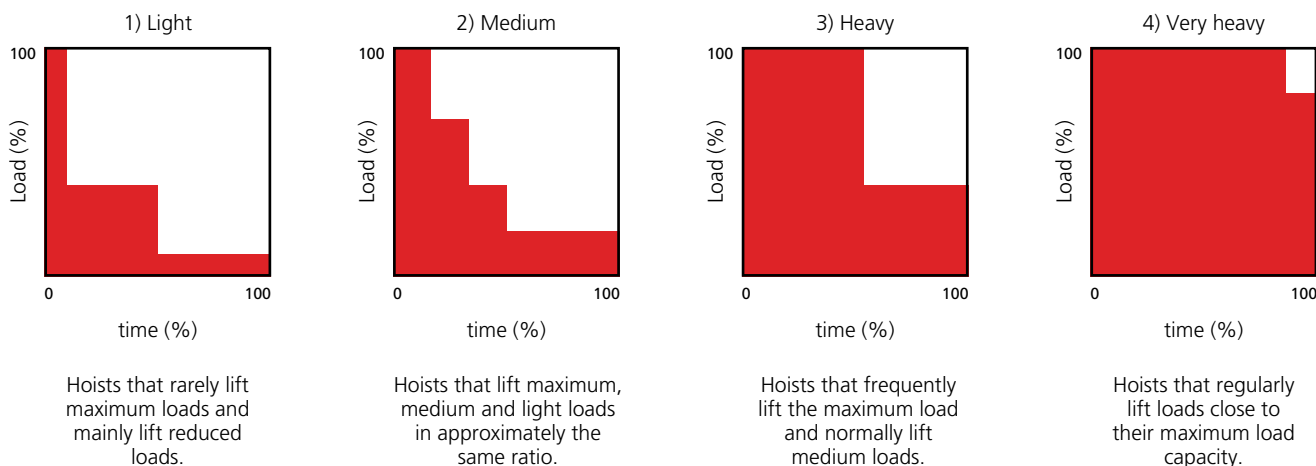


The hoist's nominal load capacity must be greater than or equal to its effective load capacity.

Lifting capacity = kg

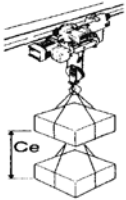
2. The stress state

- ▶ The stress state is assessed considering the average of the loads to be handled and can be attributed to one of the four load spectra shown below, which determine the type of service.



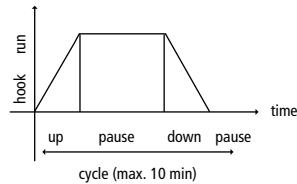
3. The average daily operating time

► It is determined for **lifting operations** as follows: $T_a \text{ (hours)} = (R_a \times C/h \times T_u) / (30 \times S)$



Actual hook run
 $R_a = m$

This is the average of the actual load runs.



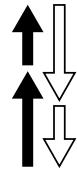
Operating cycles per hour
 $C/h = N^\circ$

This is the number of complete up and down cycles carried out in an hour.



Daily time of use
 $T_u = \text{hours}$

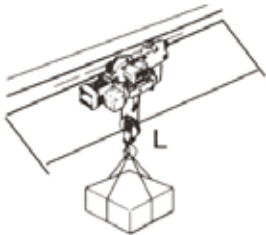
This is the time the hoist is used throughout the day.



Lifting speed
 $S = m/min$

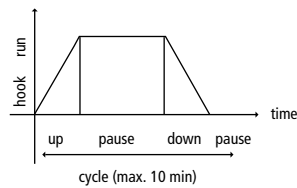
It is the distance that the load can travel in one minute of continuous lifting.

► It is determined for **Travel operations**, as follows: $T_a \text{ (hours)} = (P_a \times C/h \times T_u) / (30 \times S)$



Actual hook run
 $R_a = m$

It is the average of the length L of the trolley's sliding beam.



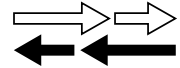
Operating cycles per hour
 $C/h = N^\circ$

It is the number of complete movements to the right and left that are carried out in one hour.



Daily time of use
 $T_u = \text{hours}$

This is the time the trolley is used throughout the day.



Travel speed
 $S = m/min$

It is the distance that the trolley can cover in one minute of continuous travel.

Choice of lifting equipment:

1. Based on the type of service, which determines the **Stress** state, and on the calculation of the **average daily operating Time** in lifting and/or in travel, the following table is used to classify the group to which the relevant mechanisms belong, and then the type of hoist is chosen in relation to the **Load capacity**.
2. Once the lifting equipment has been identified, it is also advisable to check its suitability in terms of service life, in terms of hours of service and the total number of cycles expected over 10 years of operation.

CLASSIFICATION AND LIMITS OF USE OF THE ELECTRO-MECHANISMS OF THE LIFTING EQUIPMENT								
Use based on the Stress State (type of service)	1) Light Service	Ta = Average daily operating time (hours)	≤ 2	≤ 4	≤ 8	≤ 16	> 16	
		Lifespan of the mechanisms after 10 years of operation (hours)	3200	6300	12500	25000	50000	100000
		Max. no. of operating cycles in 10 years of operation (Σ cycles)	250X10 ³	500x10 ³	100x10 ⁴	200x10 ⁴	400x10 ⁴	> 4x10 ⁶
	2) Medium Service	Ta = Average daily operating time (hours)	≤ 1	≤ 2	≤ 4	≤ 8	≤ 16	> 16
		Lifespan of the mechanisms after 10 years of operation (hours)	1600	3200	6300	12500	25000	50000
		Max. no. of operating cycles in 10 years of operation (Σ cycles)	125x10 ³	250x10 ³	500x10 ³	100x10 ⁴	200x10 ⁴	400x10 ⁴
	3) Heavy Duty	Ta = Average daily operating time (hours)	≤ 0.5	≤ 1	≤ 2	≤ 4	≤ 8	≤ 16
		Lifespan of the mechanisms after 10 years of operation (hours)	800	1600	3200	6300	12500	25000
		Max. no. of operating cycles in 10 years of operation (Σ cycles)	63x10 ³	125x10 ³	250x10 ³	500x10 ³	100x10 ⁴	200x10 ⁴
	4) Very heavy duty	Ta = Average daily operating time (hours)	≤ 0.25	≤ 0.5	≤ 1	≤ 2	≤ 4	≤ 8
		Lifespan of the mechanisms after 10 years of operation (hours)	400	800	1600	3200	6300	12500
		Max. no. of operating cycles in 10 years of operation (Σ cycles)	32x10 ³	63x10 ³	125x10 ³	250x10 ³	500x10 ³	100x10 ⁴
Service unit for lifting and traversing mechanisms		according to ISO 4301-1	M3	M4	M5	M6	M7	M8
		according to FEM rule 9.511	1Bm	1Am	2m	3m	4m	5m
Use for intermittent service in accordance with FEM rule 9.683/95	Hoist Mechanisms	Intermittency ratio (IR%)	25	30	40	50	60	60
		Max. no. of starts per hour (S/h)	150	180	240	300	360	360
		Max. no. of cycles per hour (C/h)	25	30	40	50	60	60
	Trolley Mechanisms	Intermittency ratio (IR%)	20	25	30	40	50	60
		Max. no. of starts per hour (S/h)	120	150	180	240	300	> 360
		Max. no. of cycles per hour (C/h)	20	25	30	40	50	> 60
Use in temporary service	Time of use at main speed (min)		15	15	30	30	60	> 60
	Time of use at slow speed (min.)		2.5	3	3.5	4	5	6
	Maximum number of starts per hour (S/h)		10	10	10	10	10	10
Two-speed dual-polarity motors	Max. no. of starts per hour (S/h)	Main speed	1/3 (33. 3% of the total number of starts per hour)					
		Slow speed	2/3 (66. 7% OF THE TOTAL NUMBER OF STARTS PER HOUR)					
	Ta = Average daily time of use (hours)	Main speed	2/3 (66. 7% of the average daily time of use)					
		Slow speed	1/3 (33. 3% of the average daily time of use)					

Example::Load capacity = **6 300** kg Stress state = **2)** Medium ServiceDaily time of use = **Tu 8 h**No. of days of service per year = **D/year 220**Actual hook run = **Ra 2.5** m No. of cycles per hour = **C/h 8**Lifting speed = **S 4** m/min (4/1 rope falls)**1. Determination of the average daily operating time:**

$$T_m \text{ (hours)} = (R_a \times C/h \times T_u) / (30 \times S) = (2.5 \times 8 \times 8) / (30 \times 4) = 1.33 \text{ h}$$

In the table in paragraph 2.2.7, by taking into account the Load Capacity (6300 kg), the Average Stress State (2) and the Average Daily Operating Time ($T_a = 1.2$ h), it is possible to identify the rope hoist, with 4/1 rope falls, which is:

Service group FEM 1Am - Type DRH 24L1•M**2. Verification of service life:**

Operating hours in 10 years

$$T_a \times D/\text{year} \times 10 \text{ years} = 1.33 \times 220 \times 10 = 2933 \text{ (hours)} < \text{than } 3200 \text{ (max. hours allowed)} > \text{OK}$$

No. of operating cycles in 10 years

$$C/h \times T_u \times D/\text{year} \times 10 \text{ years} = 8 \times 8 \times 220 \times 10 = 140,800 \text{ (cycles)} < \text{than } 250,000 \text{ (max. cycles allowed)} > \text{OK}$$

Lifting equipment service life:

- ▶ The service life of the device as a whole is determined not only by the **stress state**, but also by the **actual operating hours** of each individual mechanism and by the number of operating cycles to which the entire machine is subjected. **The operating hours** and the **number of cycles**, which depend on the FEM/ISO service group in which the lifting equipment is classified, are conventionally provided to allow safe use for a period of 10 years.
- ▶ After 10 years of operation, the machine may therefore have reached the end of its expected life, i.e. completed the available operating cycles for the service group in which it is classified. For this reason, at the end of the 10th year, the lifting equipment must **NOT** be put back into service unless it has undergone an inspection, carried out by **DONATI SOLLEVAMENTI S.r.l.** or by expert technicians appointed for the purpose, aimed at ascertaining whether the machine, following its actual use, still has sufficient **Residual Life** and is therefore considered capable of operating safely for a further period, or whether it must undergo a general overhaul.



- ▶ The classification of the hoist's duty class is shown on the plate affixed to it (see paragraph 3.5.3 - List of labels).
- ▶ **DONATI SOLLEVAMENTI S.r.l.** guarantees the safe use of the DMK electric chain hoist for its entire expected service life only if it is used in accordance with the parameters corresponding to the intended duty class and subject to correct and regular maintenance.

2.2.7 TECHNICAL FEATURES AND DATA

CHARACTERISTIC DATA OF THE DMK SERIES ELECTRIC CHAIN HOISTS AND RELATED DMT TROLLEYS

CAPACITY (kg)	FEM GROUP	DMK TYPE	CHAIN FALLS	LIFTING SPEED (m/min)		LIFTING MOTOR POWER (kW)		DMT TROLLEY TYPE FOR HOIST S= MANUAL-PUSH TROLLEY C= MANUAL GEAR OPERATED TROLLEY E=ELECTRIC TROLLEY						TROLLEY MOTOR POWER (kW)				CHAIN TYPE	CHAIN WEIGHT PER METER
								S	C	E SPEED (m/min)				SPEED (m/min)					
				1 SPE.	2 SPE.	1 SPE.	2 SPE.			11	14	22	7/22	11	14	22	7/22		
125	2m	154C	1	8	/	0.2	/	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	4x12	0.38
	2m	132D	1	8	2.5	0.2	0.06	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	4x12	0.38
	2m	232C	1	16	/	0.4	/	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	5x15	0.58
250	2m	134C	1	4	/	0.2	/	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	4X12	0.38
	2m	112D	1	4	1.2	0.2	0.06	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	4X12	0.38
	2m	234C	1	8	/	0.4	/	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	5x15	0.58
	2m	234D	1	8	2.5	0.4	0.12	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	5x15	0.58
	2m	332C	1	16	/	0.8	/	SM3	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	7x21	1.16
500	2m	214C	1	4	/	0.4	/	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	5x15	0.58
	2m	214D	1	4	1.2	0.4	0.12	SM2	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	5x15	0.58
	2m	334C	1	8	/	0.8	/	SM3	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	7x21	1.16
	2m	334D	1	8	2.5	0.8	0.24	SM3	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	7x21	1.16
	2m	432C	1	16	/	1.6	/	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
1000	2m	314C	1	4	/	0.8	/	SM3	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	7x21	1.16
	2m	314D	1	4	1.2	0.8	0.24	SM3	CM3	EM3	EM3	EM3	EM3	0.12	0.18	0.25	0.08 0.25	7x21	1.16
	2m	434C	1	8	/	1.6	/	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
	2m	434D	1	8	2.5	1.6	0.5	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
1600	2m	424L	1	6.3	/	2.5	/	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
	2m	424D	1	6.3	2.1	2	0.65	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
2000	2m	414C	1	4	/	1.6	/	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
	2m	414D	1	4	1.2	1.6	0.5	SM4	CM4	EM4	EM4	EM4	EM4	0.12	0.18	0.25	0.08 0.25	10x28	2.42
2500	2m	434L.I	2	4	/	2.5	/	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
	2m	424D.I	2	3.2	1	2	0.65	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
3200	1Am	434L.J	2	4	/	2.5	/	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
	1Am	424D.J	2	3.2	1	2	0.65	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
	2m	424L.J	2	3.2	/	2.5	/	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
	2m	454D.J	2	2.5	0.8	2	0.65	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
4000	1Am	424L.K	2	3.2	/	2.5	/	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42
	1Am	454D.K	2	2.5	0.8	2	0.65	SM5	CM5	EM5	EM5	EM5	EM5	0.17	0.25	0.37	0.08 0.25	10x28	2.42

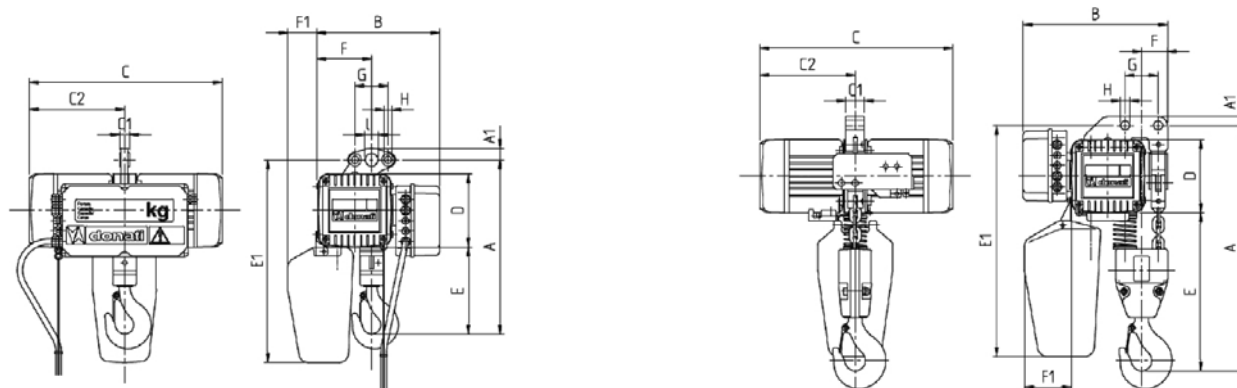
SINGLE-PHASE VERSION

CAPACITY (kg)	FEM GROUP	DMK TYPE	CHAIN FALLS	LIFTING SPEED (m/min)		LIFTING MOTOR POWER (kW)		DMT TROLLEY TYPE FOR HOIST S= MANUAL-PUSH TROLLEY C= MANUAL GEAR OPERATED TROLLEY		CHAIN TYPE	CHAIN WEIGHT PER METER
				1 SPE.	2 SPE.	1 SPE.	2 SPE.	S	C		(kg/m)
100	1Bm	132M	1	8	/	0.2	/	SM2	CM3	4x12	0.38
200	1Bm	112M	1	4	/	0.2	/	SM2	CM3	4x12	0.38
	1Bm	234M	1	8	/	0.4	/	SM2	CM3	5x15	0.58
400	1Bm	214M	1	4	/	0.4	/	SM2	CM3	5x15	0.58
	1Bm	334M	1	8	/	0.8	/	SM3	CM3	7x21	1.16
800	1Bm	314M	1	4	/	0.8	/	SM3	CM3	7x21	1.16

DMK ELECTRIC CHAIN HOISTS – OVERALL DIMENSIONS WEIGHTS – FIXED EXECUTION

1 chain fall version

2 chain falls version



SIZE	CHAIN FALLS	DMK TYPE	*HOIST WEIGHT (kg)	OVERALL DIMENSIONS (mm)											
				**A	A1	B	C	C1	C2	D	**E	F	G	H	I
1	1	154C	23	275	23	253	385	19	207	120	128	80	70	14	27
	1	132D/M	23	275	23	253	385	19	207	120	128	80	70	14	27
	1	134C	23	275	23	253	385	19	207	120	128	80	70	14	27
	1	112D/M	23	275	23	253	385	19	207	120	128	80	70	14	27
2	1	232C	33	310	23	268	438	19	237	135	150	92	70	14	27
	1	234C/M	33	310	23	268	438	19	237	135	150	92	70	14	27
	1	234D	33	310	23	268	438	19	237	135	150	92	70	14	27
	1	214C/M	33	310	23	268	438	19	237	135	150	92	70	14	27
	1	214D	33	310	23	268	438	19	237	135	150	92	70	14	27
3	1	332C	50	378	28	293	514	25	274	160	188	114	70	14	30
	1	334C/M	50	378	28	293	514	25	274	160	188	114	70	14	30
	1	334D	50	378	28	293	514	25	274	160	188	114	70	14	30
	1	314C/M	50	378	28	293	514	25	274	160	188	114	70	14	30
	1	314D	50	378	28	293	514	25	274	160	188	114	70	14	30
4	1	432C	80	471	32	332	583	27	317	200	233	146	90	20	35
	1	434C	80	471	32	332	583	27	317	200	233	146	90	20	35
	1	434D	80	471	32	332	583	27	317	200	233	146	90	20	35
	1	424L	80	471	32	332	583	27	317	200	233	146	90	20	35
	1	414C	80	471	32	332	583	27	317	200	233	146	90	20	35
	1	414D	80	471	32	332	583	27	317	200	233	146	90	20	35
	2	434L.I	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	424D.I	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	434L.J	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	424D.J	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	424L.J	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	454D.J	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	424L.K	105	670	25	395	583	50	317	200	432	71	90	25	/
	2	454D.K	105	670	25	395	583	50	317	200	432	71	90	25	/

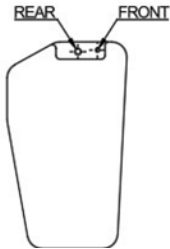
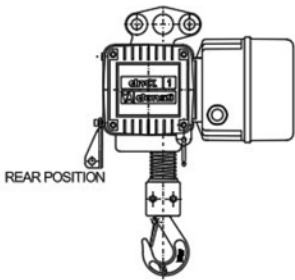
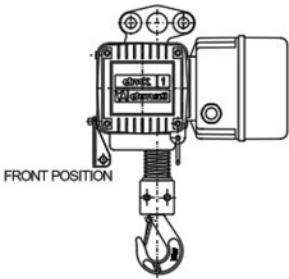
* Weight of hoist with 3m hook run and 2m push button panel cable

** With application of raise/lower electric limit switches A and E dimensions increase by: DMK1 + 45mm; DMK2 + 40mm; DMK3 + 45mm; DMK4 (1 fall) + 60mm

TYPE OF CHAIN BOX AND SUPPORT (C-D-E-F-G-H-I-9-N-10)

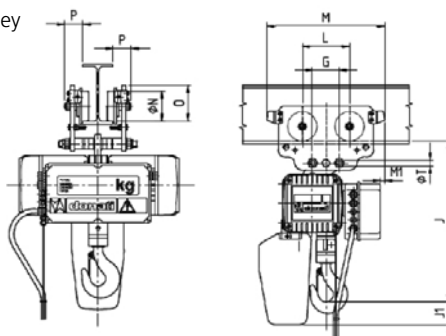
[illegible]

				SHEET METAL CHAIN BOX					
H		I		9		N		10	
	F.C		F.C		F.C		F.C		F.C
70									
539									
137									
DMK150301									
Rear									
Front									
30	25	70	60						
530	552	613	635						
124	126	174	176						
DMK250300	DMK250301	DMK250300	DMK250301						
Rear	Rear	Rear	Rear						
Rear	Rear	Front	Front						
16	14	25	22	65		90			
561	582	644	665	848		971			
125	126	175	176	215		259			
DMK350300	DMK350301	DMK350300	DMK350301	DMK310180		DMK310180			
Inverted	Rear	Rear	Rear	=		=			
Rear	Rear	Front	Front	Front / Rear		Front / Rear			
8	6	13	11	25		44		66	
610	650	693	733	891		1015		1125	
107	106	138	137	221		260		343	
DMK450300	DMK450302	DMK450300	DMK450302	DMK410180		DMK410180		DMK410180	
Front	Front	Front	Front	=		=		=	
Front	Front	Front	Front	Front / Rear		Front / Rear		Front / Rear	
	3		3		12		21		32
	650		733		891		1015		1125
	87		137		221		260		343
	DMK450302		DMK450302		DMK410180		DMK410180		DMK410180
	Front		Front		=		=		=
	Rear		Front		Front / Rear		Front / Rear		Front / Rear

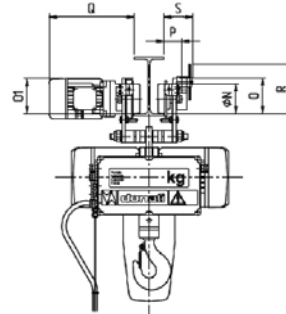


DMK SERIES ELECTRIC CHAIN HOISTS WITH DMT SERIES TRAVEL TROLLEYS: OVERALL DIMENSIONS - WEIGHT DATA

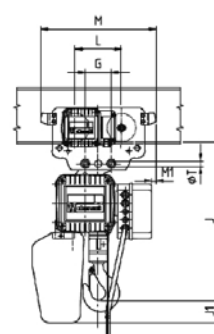
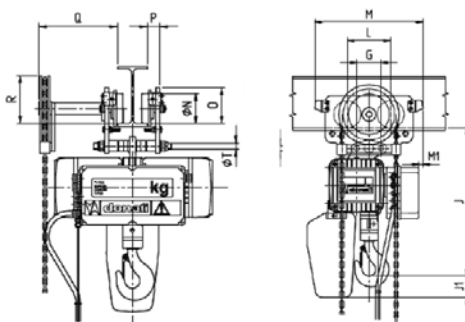
Hoist with SM hand-push trolley



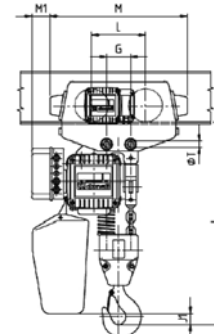
Hoist with EM electric trolley



Hoist with CM manual gear operated trolley



1 chain fall version



2 chain falls version

DMK SIZE	CHAIN FALLS	DMT TROLLEY TYPE	*HOIST TROLLEY WEIGHT (kg)	OVERALL DIMENSIONS (mm)											
				***J	L	M	M1	Ø N	O	**Ø1	P	**Q	R	S	Ø T
1	1	SM2	29	323	100	236	54	52	72	/	20	/	/	/	M16
	1	EM3	58	345	135	362	-10	80	98	100(108)	54	290(314)	165	90	M14
	1	CM3	41	345	135	362	-10	80	98	/	54	240	108	/	M14
2	1	SM2	39	360	100	236	58	52	72	/	20	/	/	/	M16
	1	EM3	68	380	135	362	-6	80	98	100(108)	54	290(314)	165	90	M14
	1	CM3	51	380	135	362	-6	80	98	/	54	240	108	/	M14
3	1	SM3	62	448	135	362	-3	80	98	/	54	/	/	/	M14
	1	EM3	85	448	135	362	-3	80	98	100(108)	54	290(314)	165	90	M14
	1	CM3	68	448	135	362	-3	80	98	/	54	240	108	/	M14
4	1	SM4	105	547	160	402	-15	100	120	/	60	/	/	/	M20
	1	EM4	130	547	160	402	-15	100	120	110(118)	60	296(320)	165	96	M20
	1	CM4	115	547	165	402	-15	100	120	/	60	264	160	/	M20
	2	SM5	160	755	201	510	70	125	155	/	55	/	/	/	M24
	2	EM5	190	755	201	510	70	125	155	130(130)	55	316(316)	211	110	M24
	2	CM5	170	755	201	510	70	125	155	/	55	350	198	/	M24

* Weight referred to 3m hook-run hoist.

** Dimensions for 2 speed trolleys in brackets.

*** SM3/EM3/CM3: for width > 220 mm up to 400 mm dimension J increases by 70 mm

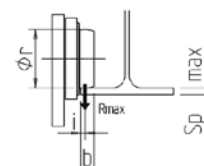
*** SM4/EM4/CM4: for width > 220 mm up to 400 mm dimension J increases by 60 mm

*** SM5/EM5/CM5: for width > 240 mm up to 400 mm dimension J increases by 75 mm

Note When the hoist is equipped with raise/lower limit switches, dimension J increases as much as dimensions A and E, page 11 and note regarding the chain box

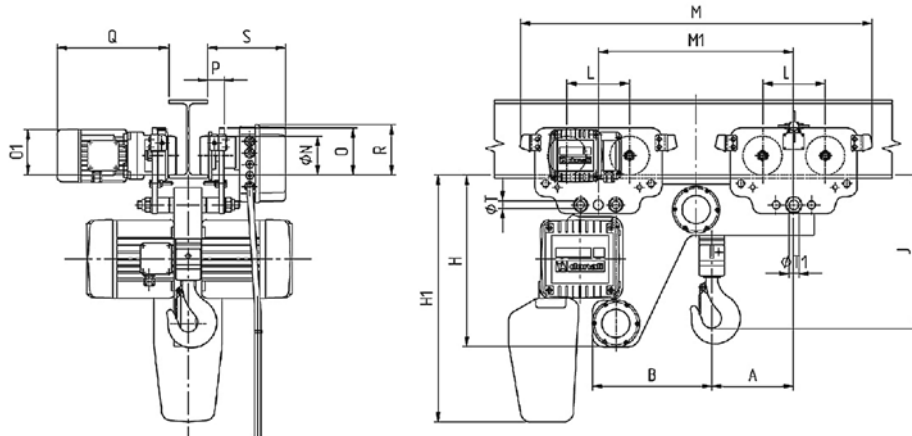
MAXIMUM REACTIONS OF DMT TROLLEY WHEELS ON THE GIRDER FLANGE

DMK SIZE	MAX CAPACITY (kg)	DMT TROLLEY TYPE	OVERALL DIMENSIONS (mm)				
			Ø R	I	B	*R MAX (kg)	SP MAX
1	250	SM2	52	5	15	80	17
		EM3/CM3	80	7	16	87	22
2	500	SM2	52	5	15	154	17
		EM3/CM3	80	7	16	161	22
3	1000	SM3					
		EM3/CM3	80	7	16	309	22
4	2000	SM4					
		EM4/CM4	100	9	19	608	24
	4000	SM5					
		EM5/CM5	125	14	29	1193	20



* Max R calculated with a dynamic coefficient of 1.15 and no "M" increasing coefficient

DMK SERIES ELECTRIC CHAIN HOISTS, LOWERED VERSION: OVERALL DIMENSIONS – WEIGHT DATA



DMK SIZE	MAX CAPACITY (kg)	DMT TROLLEY TYPE	*HOIST TROLLEY WEIGHT (kg)	OVERALL DIMENSIONS (mm)																
				A	B	H	***H1	J	L	M	M1	Ø N	O	**Ø1	P	**Q	R	S	Ø T	Ø T1
1	250	SM3+SM3	60	170	228	317	417	233	135	742	380	80	98	/	54	/	108	/	M14	M16
		SM3+EM3	75	170	228	317	417	233	135	742	380	80	98	100/(108)	54	290/(314)	108	196	M14	M16
2	500	SM3+SM3	67	176	240	346	455	255	135	762	386	80	98	/	54	/	108	/	M14	M16
		SM3+EM3	80	176	240	346	455	255	135	762	386	80	98	100/(108)	54	290/(314)	108	196	M14	M16
3	1000	SM3+SM3	100	190	275	390	510	313	135	812	450	80	98	/	54	/	108	/	M14	M16
		SM3+EM3	115	190	275	390	510	313	135	812	450	80	98	100/(108)	54	290/(314)	108	196	M14	M16
4	2000	SM4+SM4	155	205	310	462	637	386	160	902	500	100	120	/	60	/	118	/	M20	M24
		SM4+EM4	170	205	310	462	637	386	160	902	500	100	120	110/(118)	60	296/(320)	118	202	M20	M24
	4000	UPON REQUEST	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
		UPON REQUEST	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

* Weight referred to 3m hook-run hoist.

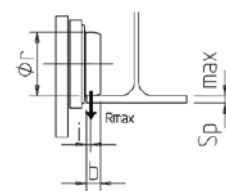
** Dimensions for 2 speed trolleys in brackets

*** Weight referred to 3m hook-run hoist

With application of an electric raise/lower limit switch dimension H1 increases by 25mm and dimension J increases by: DMK1+45mm; DMK2+40mm; DMK3+45mm; DMK4(1 fall)+60mm

MAXIMUM REACTIONS OF THE WHEELS OF THE DMT TROLLEY ON THE BEAM FLANGE FOR THE LOWERED VERSION OF THE DMK

DMK SIZE	MAX CAPACITY (kg)	DMT TROLLEY TYPE	OVERALL DIMENSIONS (mm)					
			Ø R	I	B	*R MAX (kg)	SP MAX	
1	250	SM3+SM3	80	7	16	44	18	
		SM3+EM3				87		
2	500	SM3+SM3	80	7	16	80	18	
		SM3+EM3				82		
3	1000	SM3+SM3	80	7	16	156	18	
		SM3+EM3				158		
4	2000	SM4+SM4	100	9	19	307	21	
		SM4+EM4				608		
	4000	SM5+EM5 (UPON REQUEST)	125	14	29	/	/	
		SM5+EM5 (UPON REQUEST)				/		

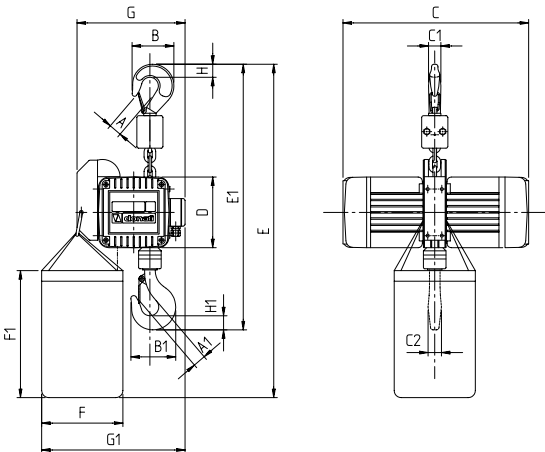


* Max R calculated with a dynamic coefficient of 1.15 and no "M" increasing coefficient

TECHNICAL FEATURES AND DATA FOR DMK SERIES CHAIN HOISTS, SELF-LIFTING VERSION

CAPACITY (kg)	FEM GROUP	DMK TYPE	CHAIN FALLS	LIFTING SPEED (mm)		LIFTING MOTOR POWER (kW)		*HOIST WEIGHT (kg)	CHAIN TYPE	CHAIN WEIGHT PER METER (kg/m)
				1 SPEED	2 SPEED	1 SPEED	2 SPEED			
125	2m	154C	1	8	/	0.2	/	17	4x12	0.38
250	2m	134C	1	4	/	0.2	/	17	4x12	0.38
	2m	234C	1	8	/	0.4	/	24	5x15	0.58
500	2m	214C	1	4	/	0.4	/	24	5x15	0.58
	2m	334C	1	8	/	0.8	/	38	7x21	1.16
1000	2m	314C	1	4	/	0.8	/	38	7x21	1.16
	2m	434C	1	8	/	1.6	/	65	10x28	2.42
2000	2m	414C	1	4	/	1.6	/	65	10x28	2.42

* Hoist weight without chain



OVERALL DIMENSIONS - WEIGHTS

DMK SIZE	MAX CAPACITY (kg)	DMK HOIST TYPE	OVERALL DIMENSIONS (mm)															
			A	A1	B	B1	C	C1	C2	D	E	E1	F	F1	G	G1	H	H1
1	125	154C	21	24	62	67	385	22	19	120	710	400	230	360	210	310	17	19
	250	134C	21	24	62	67	385	22	19	120	710	400	230	360	210	310	17	19
2	250	234C	25	28	78	83	438	22	23	135	740	465	230	360	225	325	22	24
	500	214C	25	28	78	83	438	22	23	135	740	465	230	360	225	325	22	24
3	500	334C	30	34	96	103	514	27	30	160	800	577	230	360	250	350	29	32
	1000	314C	30	34	96	103	514	27	30	160	800	577	230	360	250	350	29	32
4	1000	434C	36	40	118	137	583	35	38	200	880	716	230	360	307	410	37	44
	2000	414C	36	40	118	137	583	35	38	200	880	716	230	360	307	410	37	44

TYPES OF TIE RODS IN RELATION TO THE MIN. AND MAX DIMENSIONS OF THE BEAMS

TROLLEY TYPE	BEAM TYPE	GROUP 1		GROUP 2		GROUP 3		GROUP 4		*MINIMUM RADIUS OF MONORAIL INTERNAL CURVATURE (mm)
		BEAM	FLANGE	BEAM	FLANGE	BEAM	FLANGE	BEAM	FLANGE	
SM2	INP	80÷160	42÷74	180÷280	82÷119	300÷380	125÷149	400	155	1000
	IPE	80÷140	46÷73	160÷240	82÷120	270÷300	135÷150	330÷500	160÷200	
	HEA	-	-	100÷120	100÷120	140	140	160÷200	160÷200	
SM3	INP	120÷240	58÷106	260÷450	113÷170	475÷600	178÷215	-	-	1300
	IPE	120÷220	64÷110	240÷360	120÷170	400÷600	180÷220	-	-	
	HEA	-	-	140÷160	140÷160	180÷220	180÷220	-	-	
SM4	INP	160÷280	74÷119	300÷475	125÷178	500÷600	185÷215	-	-	1500
	IPE	160÷240	82÷120	270÷400	135÷180	450÷600	190÷220	-	-	
	HEA	-	-	160÷180	160÷180	200÷220	200÷220	-	-	
SM5	INP	180÷300	82÷125	320÷500	131÷185	550÷600	200÷215	-	-	1900
	IPE	180÷240	91÷120	270÷400	135÷180	450÷600	190÷220	-	-	
	HEA	-	-	180	180	200÷240	200÷240	-	-	
CM3	INP	140÷240	66÷106	260÷450	113÷170	475÷600	178÷215	-	-	1300
	IPE	140÷220	73÷110	240÷360	120÷170	400÷600	180÷220	-	-	
	HEA	-	-	140÷160	140÷160	180÷220	180÷220	-	-	
CM4	INP	180÷280	82÷119	300÷475	125÷178	500÷600	185÷215	-	-	1500
	IPE	180÷240	91÷120	270÷400	135÷180	450÷600	190÷220	-	-	
	HEA	-	-	160÷180	160÷180	200÷220	200÷220	-	-	
CM5	INP	220÷300	98÷125	320÷500	131÷185	550÷600	200÷215	-	-	1900
	IPE	220÷240	110÷120	270÷400	135÷180	450÷600	190÷220	-	-	
	HEA	-	-	180	180	200÷240	200÷240	-	-	
EM3	INP	120÷240	58÷106	260÷450	113÷170	475÷600	178÷215	-	-	1300
	IPE	120÷220	64÷110	240÷360	120÷170	400÷600	180÷220	-	-	
	HEA	-	-	140÷160	140÷160	180÷220	180÷220	-	-	
EM4	INP	160÷280	74÷119	300÷475	125÷178	500÷600	185÷215	-	-	1500
	IPE	160÷240	82÷120	270÷400	135÷180	450÷600	190÷220	-	-	
	HEA	-	-	160÷180	160÷180	200÷220	200÷220	-	-	
EM5	INP	180÷300	82÷125	320÷500	131÷185	550÷600	200÷215	-	-	1900
	IPE	180÷240	91÷120	270÷400	135÷180	450÷600	190÷220	-	-	
	HEA	-	-	180	180	200÷240	200÷240	-	-	

NOTE: For EM trolleys with electric travel limit switches, check the R dimensions on page 12

* Electric trolleys suitable to run on a bend with guide roller kit

SPECIFICATIONS OF MOTORS, FUSES AND POWER CABLES

HOIST TYPE	MOTOR TYPE	POLES	POWER (kW)	POWER FACTOR COSφ	Ia 50Hz		(In) 50	FUSES aM	POWER CABLE SECTION 400V - (ΔU20V)	
					380V A	400V A	415V A	400V A	Φmm²	L =m
134C-154C	71C4AS1/1	4	0.2	0.43	3.8		(1.4)	4	1.5	≤ 100
112D-132D	72K1AS1/1	2/6	0.2/0.06	0.6/0.5	3.3/1.8		(0.8/0.8)	4	1.5	≤ 100
232C	80C2AS2/2	2	0.4	0.45	6.5		(2.5)	4	1.5	≤ 100
214C-234C	80C4AS2/2	4	0.4	0.48	6.4		(2.1)	4	1.5	≤ 100
214D-234D	81K5AS2/2	4/12	0.4/0.12	0.6/0.6	5.2/3		(1.6/2)	4	1.5	≤ 100
332C	90C2AS3/2	2	0.8	0.6	14.5		(4.8)	6	1.5	≤ 70
314C-334C	90C4AS3/2	4	0.8	0.46	14		(5.2)	6	1.5	≤ 70
314D-334D	91K5AS3/3	4/12	0.8/0.24	0.6/0.5	14.6/4		(3.1/2.6)	6	1.5	≤ 70
432C	100C2AS4/2	2	1.6	0.7	32		(6.2)	10	2.5	≤ 50
414C-434C	100C4AS4/2	4	1.6	0.6	28		(6.5)	10	2.5	≤ 60
424L-434L	101K4AS4/2	4	2.5	0.7	38		(6.2)	10	2.5	≤ 40
414D-434D	101K5AS4/2	4/12	1.6/0.5	0.62/0.4	28/12		(5.5/6)	10	2.5	≤ 60
424D-454D	101K5AS4/4	4/12	2/0.65	0.72/0.5	28/8		(6.5/5)	10	2.5	≤ 60

SINGLE-PHASE HOIST	MOTOR TYPE	POLES	POWER (kW)	POWER FACTOR COSφ	Ia 50Hz	(In) 50	FUSES aM	POWER CABLE SECTION 230V - (ΔU20V)	
					230V A		230V A	Φmm²	L =m
132M-112M	72K2AM1/1	2	0.2	0.9	9.6	(3.2)	6	1.5	≤ 60
234M-214M	81K4AM2/1	4	0.4	0.9	11.3	(5.2)	10	1.5	≤50
334M-314M	91K4AM3/2	4	0.8	0.9	32	(12)	20	2.5	≤ 30

TROLLEY TYPE	MOTOR TYPE	POLES	POWER (kW)	POWER FACTOR COSφ	Ia - (A) 400V - 50HZ	In - (A) 400V - 50HZ	Velocità m/min
EM3-EM4	71C4TV1/1	4	0.25	0.43	3.8	1.4	22
EM3-EM4	71C8TS1/1	8	0.12	0.53	2.5	1.3	11
EM3-EM4	72K6TS1/1	6	0.18	0.5	3	1.7	14
EM3-EM4-EM5	81C5AD2/1	4/12	0.25/0.08	0.54/0.7	4.5/1.8	1.4/1.2	22/7
EM5	80C4TV2/1	4	0.37	0.7	4.4	1.7	22
EM5	80C8TS2/1	8	0.17	0.5	2.6	1.6	11
EM5	80C6TS2/1	6	0.25	0.5	3.8	1.2	14

3. SAFETY AND ACCIDENT PREVENTION

DMK electric chain hoists and their trolleys and accessories have been designed and built on the basis of the most modern technical knowledge and can be used safely. The hazards for the personnel in charge can only be totally eliminated and/or significantly reduced if the hoist is used in accordance with the instructions given in this documentation by authorised, specially trained personnel with adequate preparation.



THE PERSONNEL ARE RESPONSIBLE FOR THE FOLLOWING OPERATIONS:

- ▶ Completion of the hoist by installing any missing parts (electrical controls), in accordance with current legislation.
- ▶ Commissioning of the hoist, and in any case, oversight of its operation.
- ▶ Performing various operations on the hoist, in particular in relation to the maintenance, inspection and repair of any of its components before starting the machine, during its operation or even after it has stopped.
- ▶ Personnel must be fully informed both about the potential hazards they face in the performance of their duties and about the operation and correct use of the safety devices available on the machine.
- ▶ Personnel must also carefully observe the safety rules in this chapter in order to avoid the occurrence of hazardous situations.

3.1 QUALIFICATIONS OF AUTHORISED OPERATORS

The table below lists the various operators with pictograms and a description of their duties and responsibilities, as well as their specific training and qualifications.

PICTOGRAM	MEANING	OPERATOR PROFILE
	Operator	Operator assigned to use the hoist: Personnel qualified to perform only simple tasks, i.e. operating the crane through the use of the controls and loading and unloading the materials to be handled.
	Mechanical maintenance technician	Mechanical maintenance technician: Qualified personnel able to work on the hoist under normal conditions, to carry out normal adjustments to the mechanisms, routine maintenance work and mechanical repairs.
	Electrical maintenance technician	Electrical maintenance technician: Qualified personnel capable of working on the hoist under normal conditions and responsible for normal electrical, adjustment, maintenance and repair work. This personnel is able to operate in the panels when these are under voltage.
	Mechanical technician	Mechanical technician: Qualified technician authorised to carry out complex and extraordinary mechanical operations.
	Electrical technician	Electrical technician: Qualified technician authorised to carry out complex and extraordinary electrical operations.

3.2 GENERAL SAFETY RULES

Before putting the jib crane into service, it is necessary to:

- ▶ Carefully read the technical documentation;
- ▶ Find out about the operation and positioning of the emergency stop devices;
- ▶ Know which safety devices are installed on the crane and their location;

Some of the components pose a risk of serious danger. Personnel must therefore have authorisation and be duly trained in the work procedures and in the hazardous situations and correct methods to avoid them.

3.3 SAFETY SIGNS

Pictograms are used in the manual to indicate hazardous situations due to residual risks or actions that must be carried out according to the safety requirements described in the text.

PICTOGRAMS USED IN THE MANUAL TO INDICATE HAZARDOUS SITUATIONS

PICTOGRAM	MEANING
	Risk of crushing during the handling of suspended loads in the event of exposure of the operator or other personnel in zones/areas affected by the trajectory of the load.
	Warning: danger of crushing due to moving mechanical parts.
	Warning: danger of entanglement and dragging due to moving parts (chain, wheels, etc.).
	Risk of electrocution when carrying out maintenance on electrical equipment without first switching off the power supply.
	It is forbidden to pass, stand, operate or manoeuvre under the suspended load.
	It is forbidden to touch the moving chain. It is forbidden to tamper with the overload device or alter its calibration.
	It is forbidden to work on the electrical equipment before disconnecting the hoist from the power supply.
	It is forbidden to restart the hoist if the removed guards have not been put back in place.
	Protective gloves must be worn.
	Follow the instructions in this manual.
	Obligation to carry out regular checks on the chain.

3.4 WARNINGS REGARDING RESIDUAL RISKS

After careful consideration of the hazards present in all operating phases of the DMK electric chain hoist and its travelling trolleys, the necessary measures have been taken to eliminate, as far as possible, the risks to operators and/or to limit or reduce the risks arising from hazards that cannot be completely eliminated at source. However, despite all the precautions taken, the following residual risks remain on the machine, which can be eliminated or reduced through the relevant prevention activities:

RISKS DURING USE		
HAZARD / RISK	PROHIBITION / WARNING	OBLIGATION / PREVENTION
		 
Risk of crushing during the handling of suspended loads in the event of exposure of the operator or other personnel in zones/areas affected by the trajectory of the load.	It is forbidden to lift loads while people are passing through the relevant manoeuvring area. It is forbidden to pass, stand, operate or manoeuvre under the suspended load.	The operator responsible for use must ensure maximum safety by following the guidelines and complying with the requirements set out in the manual. Obligation to carry out regular checks on the chain.
 		
Risk of entanglement and/or crushing injuries following contact with moving chains and pulleys.	Warning! Exposure to moving parts can create hazardous situations. It is forbidden to touch moving chains and pulleys.	Gloves must be worn during the slinging and pushing of the load.

RISKS DURING MAINTENANCE		
HAZARD / RISK	PROHIBITION / WARNING	OBLIGATION / PREVENTION
		 
Risk of electrocution when carrying out maintenance on electrical equipment without first switching off the power supply.	It is forbidden to work on the electrical equipment before disconnecting the hoist from the power supply.	Entrust electrical maintenance work to qualified personnel. Carry out the checks on the electrical equipment prescribed in the manual.
 		 
Risk of entanglement and/or crushing in the event of contact with the chain.	Warning! Exposure to moving parts can create hazardous situations. It is forbidden to restart the hoist if the removed guards have not been put back in place.	Entrust chain replacement operations to qualified maintenance technicians. Protective gloves must be worn.

3.5 SAFETY DEVICES AND INSTRUCTIONS

3.5.1 CONTROL DEVICES

The DMK chain hoist and any trolley are generally controlled by means of a **push-button** panel (which may or may not be part of the supply) that sends electrical signals to a low-voltage **control panel** to activate the related movements.

These movements are activated by means of the following buttons on the push-button panel (fig. 7):

- ▶ **up and down buttons** to control the **lifting** of the **hoist** (fast and/or slow)
- ▶ **right and left buttons** to control **travel of the trolley** (fast and/or slow)

The buttons for the **up** and **right** functions have a **black symbol on a white background**, while those for **down** and **left** have a **white symbol on a black background**. They activate the function when held down. The commands for the slow auxiliary speeds, lifting and travel are always activated **with two-stage buttons** (with one stage for “slow” speed and another for “fast” speed).

To allow the hoist to operate, the **emergency stop button** on the push-button panel must be moved to the “raised” position to enable operation, and the function button must then be pressed. When the hoist is supplied with an onboard control panel, the push-button panel is suspended and can be operated by the operator from the ground.

The hoist can also be controlled via a radio control system; the functionality of the buttons is unchanged compared to that of the pendant push-button panel.

The hoist can also be controlled via a fixed push-button panel (e.g. automatic cycles). In this case, the installer is obliged to ensure that the control guarantees the best possible safety, with particular regard to the visibility of the load.

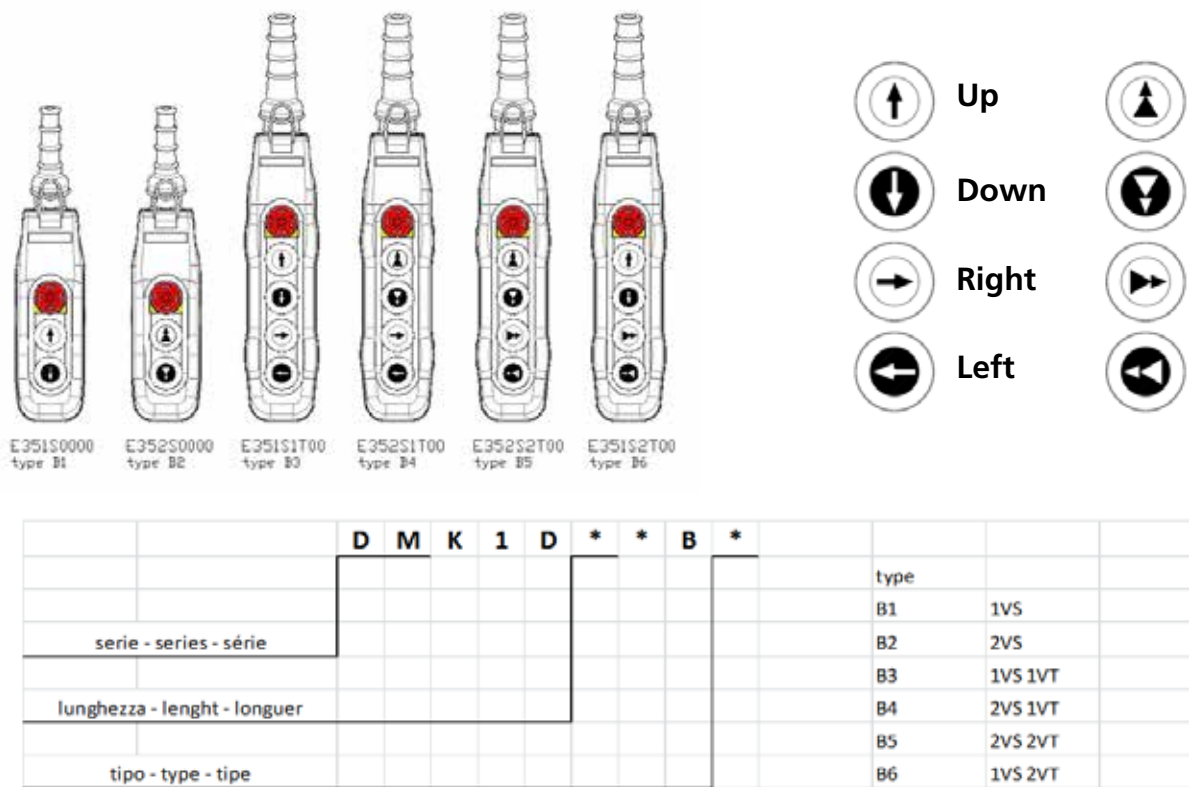


fig.7

The electric chain hoist and optional trolley, depending on the contractual agreements, can be supplied **complete or without control systems and devices** (control panel with push-buttons).



When the chain hoist is supplied without control systems and devices, it is forbidden to put it into service before it has been completed in accordance with the provisions of Machinery Directive 2006/42/EC.

3.5.2 SAFETY AND EMERGENCY DEVICES

DMK electric chain hoists and their trolleys are equipped with the following devices (fig. 8):

2) **Negative mechanical brakes** on the lifting and travel motors, respectively for up/down and right/left manoeuvres, which intervene automatically in the event of a power failure.

3) **Lifting stops** that limit the hook run of the hoist for up/down manoeuvres respectively 10-13) **Overload device**, of the clutch type (hoists with one chain fall) and electromechanical type (hoists with two chain falls) with one intervention threshold. The calibration of the load limiters installed on DMK chain hoists falls within intervention thresholds corresponding to the nominal load capacity increased by the following percentages: 1 clutch fall from min. 40% to max. 60%, 2 electromechanical falls max. 20%.

The emergency stop, located on the push-button panel, is shaped like a red mushroom and activates the stop function when fully pressed, stopping any movement.

Electric travel limit switches, located on the trolleys, limit the horizontal travel of the electric trolleys on the beam.

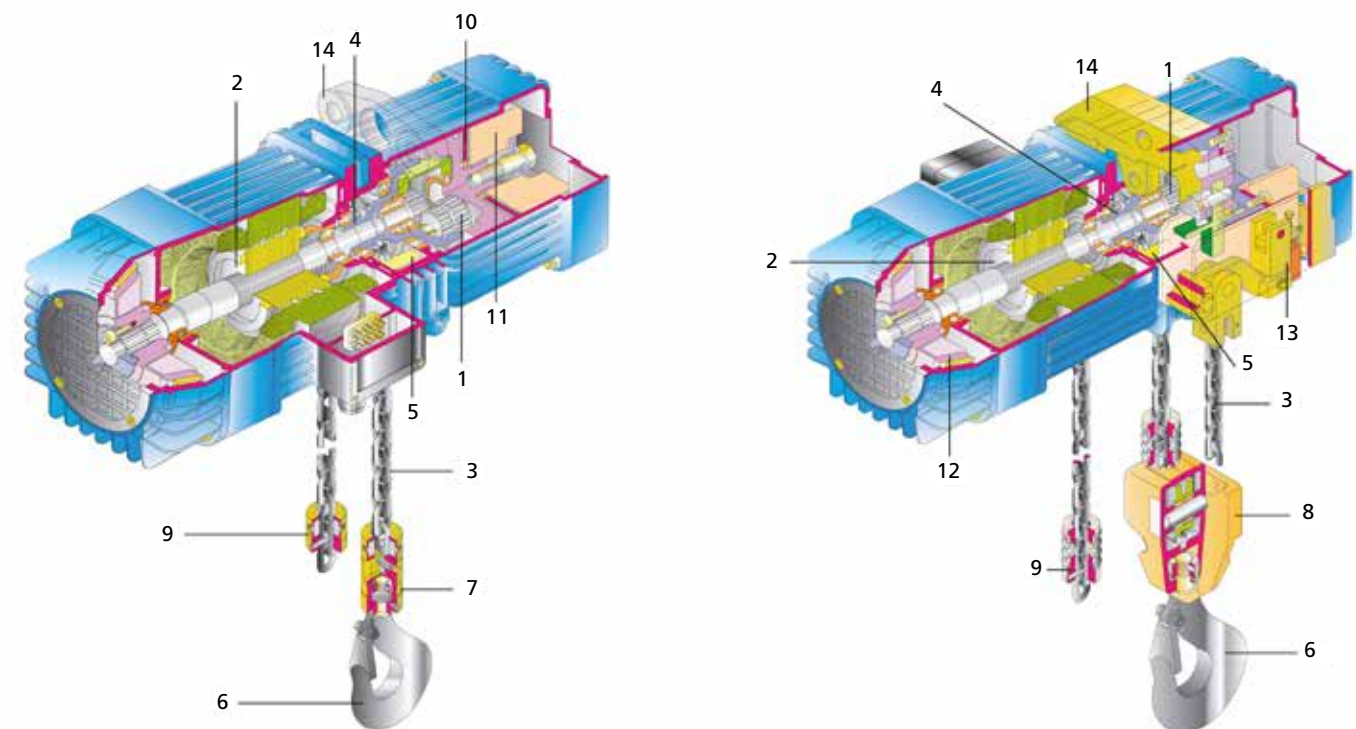


fig.8

**WARNING!!****1. When the hoist and any trolley are supplied WITHOUT controls:**

- ▶ The limit switches and the overload device are not connected!

Before putting the hoist into service, it is mandatory to connect the devices and check that they operate correctly, as described in paragraph 4.5 "Commissioning"

2. When the hoist and any trolley are supplied COMPLETE with a control panel:

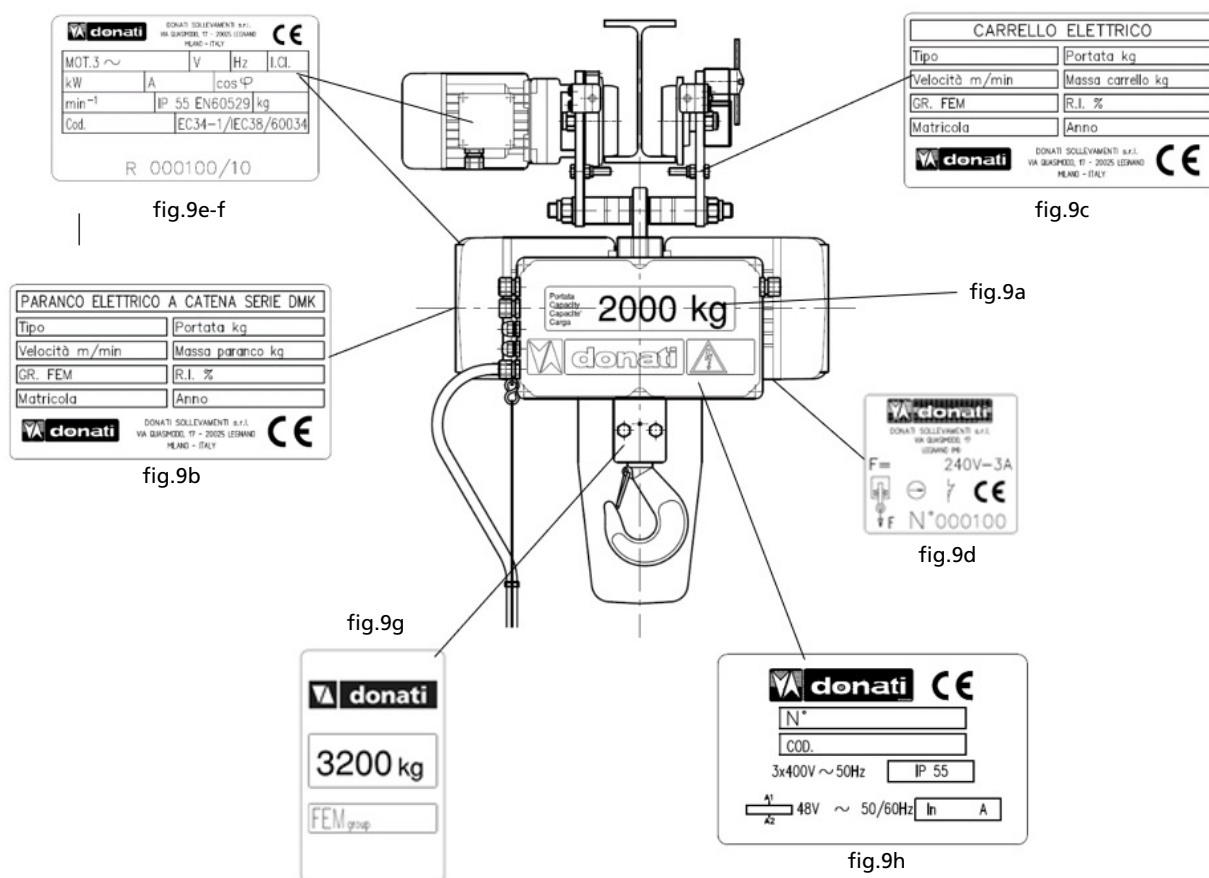
- ▶ The overload device is connected in such a way that, in the event of an overload, only the upward movement is stopped. Therefore, in the event of the limiter tripping, the operator must only operate the descent movement to disengage the load, taking care to avoid commanding any other horizontal movement (traversing, sliding, rotation)

3.5.3 WARNING AND SIGNALLING DEVICES - PLATE SUMMARY

DMK electric chain hoists and their trolleys are equipped with the following devices (fig. 9):

Plates present on the machine:

- ▶ plate indicating the maximum load capacity of the hoist (fig. 9a)
- ▶ hoist data plate with CE marking (fig. 9b)
- ▶ trolley data plate (fig. 9c)
- ▶ overload device calibration data plate (fig. 9d)
- ▶ hoist motor plate (fig. 9e)
- ▶ travel motor plate (fig. 9f)
- ▶ hook block plate with lifting capacity and FEM service group (only in the 2-fall hook block; otherwise only lifting capacity) (fig.9g)
- ▶ control box type plate (fig. 9h)
- ▶ manufacturer's logo  **donati**



Legibility and conservation of the plates

The plates must always be kept legible with regard to all the data they contain, and they must be cleaned periodically.

If a plate becomes damaged or illegible, even if only one item of information is affected, you should request a new one from the manufacturer, quoting the data in this manual or on the original plate, and arrange for its replacement.

4. HANDLING - INSTALLATION - COMMISSIONING

4.1 GENERAL NOTES ON DELIVERY



- ▶ The main parts of the DONATI DMK series electric chain hoists and their travelling trolleys are, as far as possible, delivered pre-assembled.
- ▶ The customer can proceed independently with the hoist installation phases by following the instructions in this chapter and entrusting the assembly of the hoist to specialised personnel specifically appointed for the purpose.



- ▶ Because of their delicacy and importance, the operations described in this chapter, if carried out incorrectly, can pose serious risks to the safety of those exposed during the installation and use of the hoist.
- ▶ Therefore, they must be carried out by professionally qualified personnel specialised in the assembly of industrial plant, with expertise in electromechanics, equipped with work and personal protective equipment in compliance with the laws in force on accident prevention and occupational safety, after having carefully read this publication.



Upon receipt of the delivery, check and ensure that:



1. The shipping details (recipient's address, number of packages, etc.) correspond to what is contained in the accompanying documentation (transport document and/or any packing list) (fig. 10).
2. The technical/legal documentation supplied with the hoist includes (fig. 11):
 - ▶ The instruction manual for the DMK hoist to be installed.
 - ▶ The logbook, or its contents if not supplied with the machine.
 - ▶ The EC Declaration of Conformity.
3. The packaging, if included in the supply, is in good condition, intact and free from damage.



In the event of damage or missing parts, report the issue to the carrier by noting a written reservation on the accompanying document and notify DONATI SOLLEVAMENTI S.r.l. within eight days of receipt of the goods.

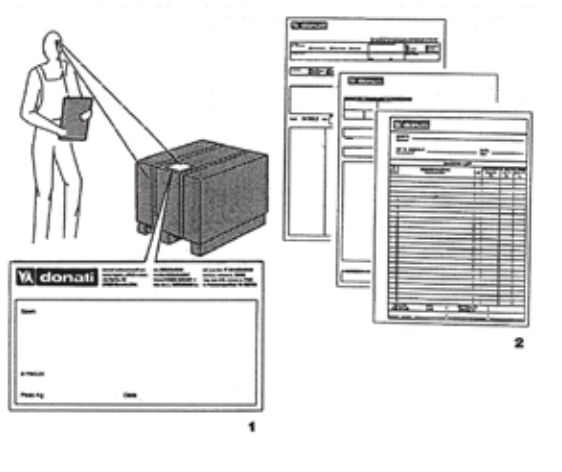


fig.10



fig.13

4.2 PACKAGING, TRANSPORT AND HANDLING



Before handling the DMK hoist, it is advisable to know that:

4.2.1 STANDARD PACKAGING

- ▶ The hoist is generally delivered in cardboard boxes and, depending on the weight, secured on a pallet, with its main parts pre-assembled.
- ▶ Any accessories that are part of the supply may be delivered inside the cardboard box or boxes which, depending on the mass to be handled, may or may not be fitted with pallets.
- ▶ Standard packaging is not waterproofed against rain and is intended for land shipments rather than sea, for covered and non-humid environments.
- ▶ The packages, when properly preserved, can be stored for a period of approximately two years in covered environments where the temperature is between -20°C and $+60^{\circ}\text{C}$ with a relative humidity of 80%. Specific packaging must be provided for different environmental conditions.



Any special waterproof packaging and/or packaging intended for sea transport can be arranged on request.

4.2.2 TRANSPORT

- ▶ Transport must be carried out by qualified carriers capable of ensuring the correct handling of the material being transported.
- ▶ During transport, avoid placing weights on top of the DMK hoist or other packaged items, as this could cause damage.
- ▶ During the transport phases, it is recommended that the pallet, or the boxes containing the hoist and its accessories, are not tipped over or turned upside down to avoid dangerous changes in their centre of gravity and thus to ensure the best stability at all times.



DONATI SOLLEVAMENTI S.r.l. assumes no responsibility in the event of transport arranged by the customer or by carriers chosen by the customer.

4.2.3 LIFTING POINTS AND HANDLING EQUIPMENT

- ▶ To allow easy and safe handling, it is advisable to remove the hoist from the packaging using its bracket or suspension hook.

4.2.4 HANDLING



To handle the DMK hoists, proceed as follows:



- ▶ Prepare a suitable, demarcated area with a flat surface for unloading pallets containing the materials and placing them on the ground.
- ▶ Prepare the necessary equipment for unloading and handling the DMK hoist (or the trolley/hoist assembly) and any accessories, taking into account their weight, overall dimensions and the gripping and/or suspension elements.
- ▶ The use of special equipment is not required.
- ▶ Packages of any accessories weighing less than 30 kg (unlike those weighing more than 30 kg) do not bear any weight indication and can be handled by hand.
- ▶ Grasp and handle the hoist, or the trolley/hoist, very carefully in the area designated for unloading, avoiding dangerous swinging, swaying and loss of balance.
- ▶ After handling, check the integrity of the package and that there has been no damage.



- ▶ **The hoist, with or without the trolley, must be handled with great care and with suitable lifting and transport equipment so as not to create hazards due to the risk of loss of stability.**
- ▶ **The hoist and any trolley must be placed or securely fixed in all phases of handling, transport and storage and must not be tipped over or placed in a vertical position or on their side.**



Provide for the disposal of packaging, after sorting it by type (wood, plastic, cardboard), in accordance with the relevant regional laws.

4.3 PREPARATION OF THE INSTALLATION SITE



To allow the installation of the DMK electric chain hoist with or without the corresponding trolley, the following operations must be carried out beforehand:



- ▶ check the suitability of the load-bearing structures on which the hoist will operate, in relation to the static and dynamic actions and reactions associated with its operation and use.
- ▶ check the installation height and manoeuvring spaces available to the hoist in relation to its overall dimensions.
- ▶ check that the hook run meets the requirements and does not encounter obstacles.
- ▶ if the hoist is equipped with a DMT single-beam trolley, check the width of the beam flange, which must correspond to that provided for the trolley wheels.
- ▶ if the hoist is equipped with a double-beam trolley (special design), check the gauge of the beam tracks, which must correspond to that provided for the trolley wheels.
- ▶ check the suitability and correct functioning of the electrical system: supply line, power socket and, if not included in the supply, control panel and push-button panel.
- ▶ installation of appropriate signs to indicate the presence of operations with moving cranes.



It is also necessary to check that:

- ▶ **the instruction manual is the correct one for the hoist to be installed.**
- ▶ **the load capacity of the hoist is equal to or greater than the loads to be lifted.**
- ▶ **the duty class corresponds to the FEM classification shown on the hoist's plates.**

4.4 INSTALLATION OF THE HOIST AND ANY TRAVEL TROLLEY

For the installation of the DMK electric chain hoist in the various supply configurations:

- ▶ 4.4.1 Hoist, without trolley, designed for suspended installation.
- ▶ 4.4.2 Hoist equipped with DMT series travel trolley.

follow the instructions in this chapter and in any case **bear in mind that:**



- ▶ **When the controls (push-button panel, LV equipment) are not included in the scope of supply, the hoist is incomplete**
- ▶ **Any devices required to complete the hoist must be installed by the user, who is also responsible for the cost. It is recommended that the operations be carried out with the hoist on the ground, i.e. before lifting it into position.**
- ▶ **It is forbidden to put the hoist into service before it has been completed in accordance with the applicable laws, regulations and standards.**



Lifting and positioning the hoist at height must be carried out by qualified personnel trained for the purpose, using the accident prevention equipment required by the legislation in force, namely:

- ▶ **suitable personal protective equipment** (e.g. helmet, gloves, safety belts, etc.)
- ▶ **work equipment** (e.g. forklift, scaffolding, etc.) **suitable for the purpose**

And following a careful assessment of the following parameters:

- ▶ **type of workplace, its environmental characteristics, type of ground**
- ▶ **height of the beam in relation to the loading surface and available spaces**
- ▶ **dimensions and weight of the hoist to be installed**

To commission the hoist, proceed as follows:

1. Insert the end on the chain stop side into the chain collector. (fig.12)
2. Fit the chain box, as shown in the figure, onto the hoist attachment and insert the supplied pin and cotter pin. (fig.13)
3. Sling the hoist to the pallet, placing two spacers as shown in the figure to avoid crushing the chain collector and any limit switches. (fig.13)

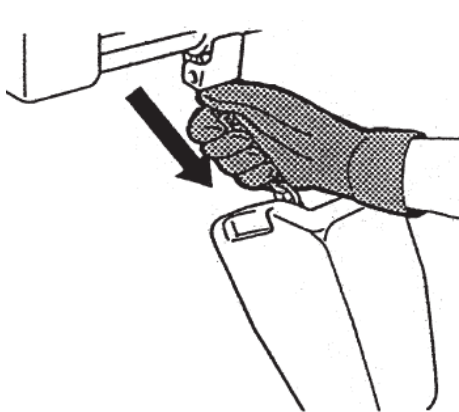


fig.12

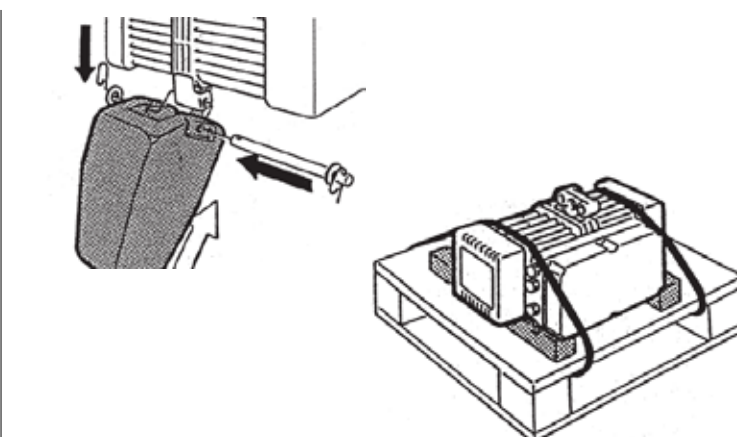


fig.13

3.1 In the case of the DMK1 hoist with raise/lower limit switch and type "E" chain collector, insert the 10 mm thick spacers supplied in the relevant kit as shown in fig. 14



fig.14

4. If the fixed hoist is to be mounted on an existing trolley, consult the relevant manufacturer's manual.
5. Use a forklift to transport the pallet with the hoist under the attachment point. (fig.15)



The forklift must not be positioned under any beams or obstacles during the lifting phase.

6. Lift the pallet beneath the attachment point until it is close to the latter. (fig.16)



- ▶ **The hoist must be lifted perpendicularly. The forklift operator must never leave the vehicle and must ensure that no unexpected movements occur.**
- ▶ **The use of the forklift for lifting people is not permitted.**

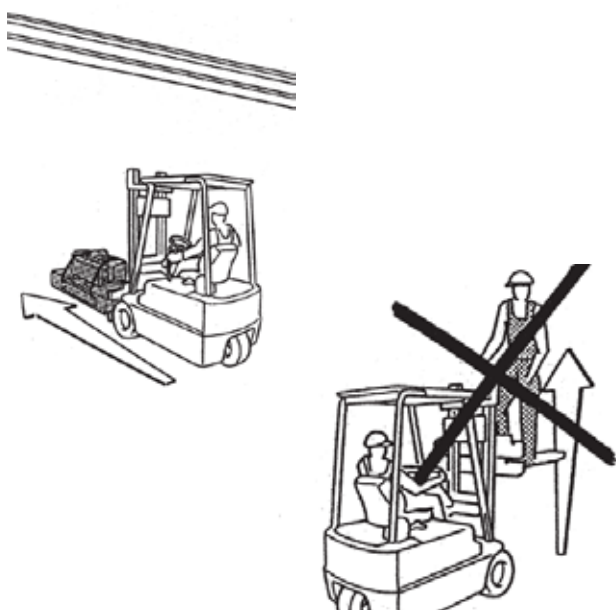


fig.15

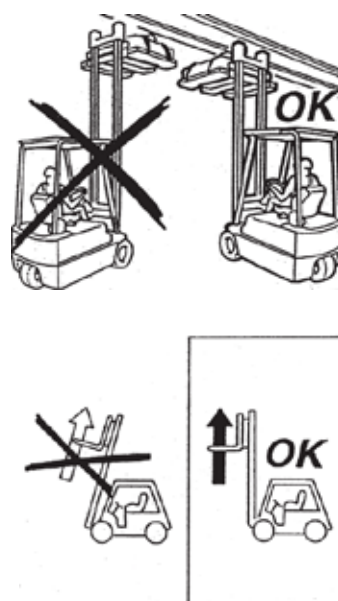


fig.16

7. Move the mobile scaffold to the side and secure it with the feet. (fig.17)
8. At this point, one of the two installers climbs onto the mobile scaffolding and secures himself to a stable point with the safety line, NOT TO THE MOBILE SCAFFOLDING. The other operator stays in contact with the installer on the scaffold and directs the forklift driver during the approach. (fig.18)



The installer on the scaffolding must keep a safe distance and communicate only visually. The positioning of the hoist on the attachment point or on the beam must be controlled by slow and short movements.



9. Once positioning is complete, the second installer climbs onto the scaffolding and secures themselves to a stable point, NOT TO THE SCAFFOLDING. (fig.18)
10. Remove or cut the hoist's sling from the pallet

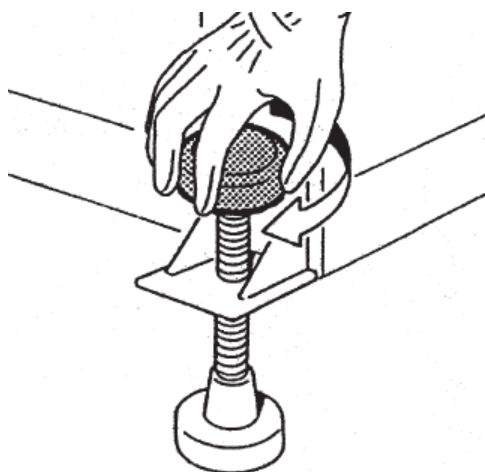
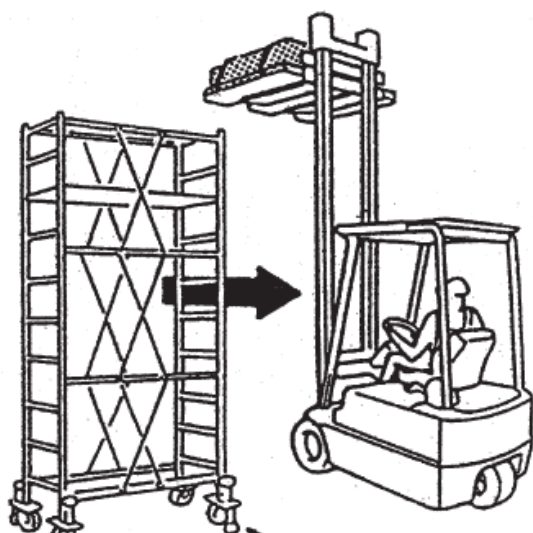


fig.17

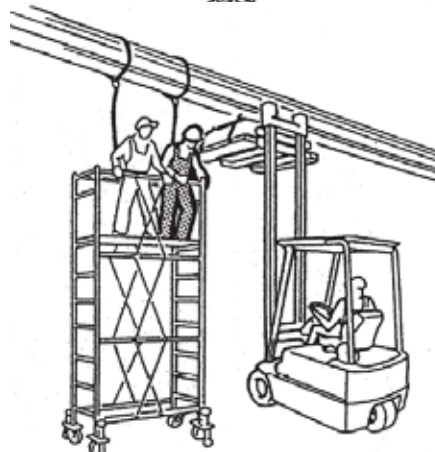
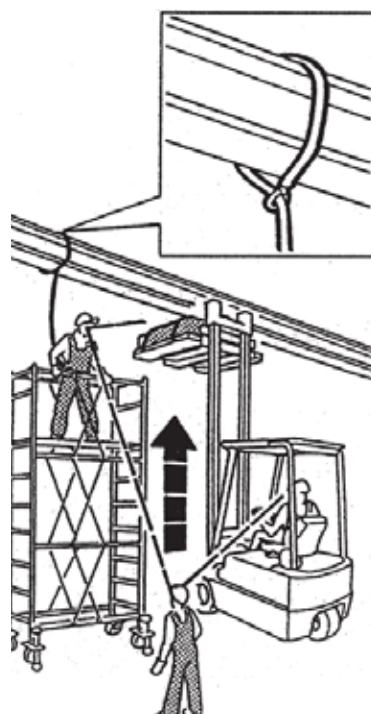


fig.18

4.4.1 HOIST, WITHOUT TROLLEY, PREPARED FOR SUSPENDED INSTALLATION

DMK electric chain hoists, when supplied without a travel trolley, are designed to be installed using special suspension eye bolts supplied as standard.

1. Prepare the fixing point and grease the point of contact with the eye bolt bracket or the hook in the case of a hoist with hook suspension. (fig.19)



Check that the fixing point is suitable for safely supporting the hoist and its maximum lifted load.

2. Attach the hoist to the designated attachment system, either through the central hole of the eyebolt bracket or to the hook (for hoists with hook suspension), to allow tilting. (fig.19)

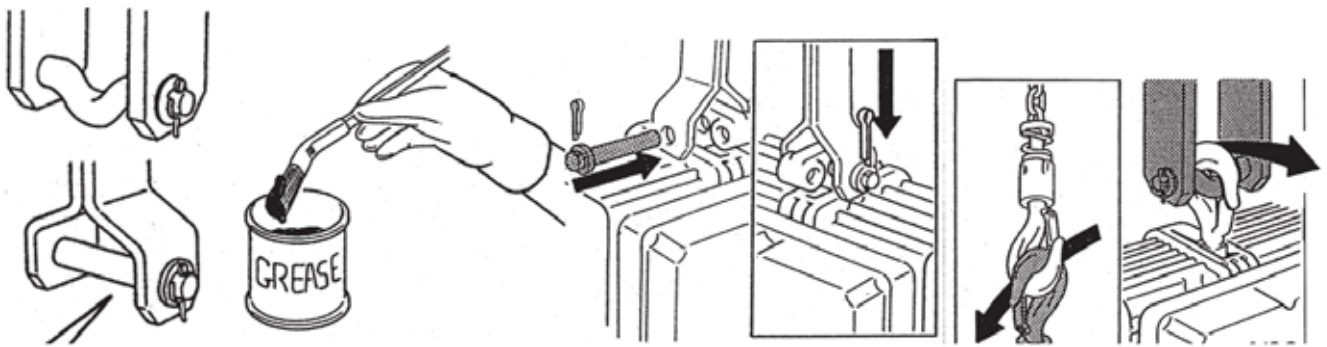


fig.19

4.4.2 HOIST EQUIPPED WITH DMT SERIES TRAVEL TROLLEY

PRE-ASSEMBLY OF THE TROLLEY

The hoist with trolley is supplied with the plates disassembled and equipped with a kit of spacers and tie rods suitable for the flange of the beam specified when ordering. Pre-assemble the trolley on the hoist as follows:

1. Depending on the beam flange, choose the arrangement of the spacers (see tables below) to ensure the necessary clearance. (fig.20)



The spacers (internal and external) must be distributed symmetrically.



2. Grease the central hole of the eye bolt bracket and the tie rod supplied (only for SM2 trolleys). (fig.20)

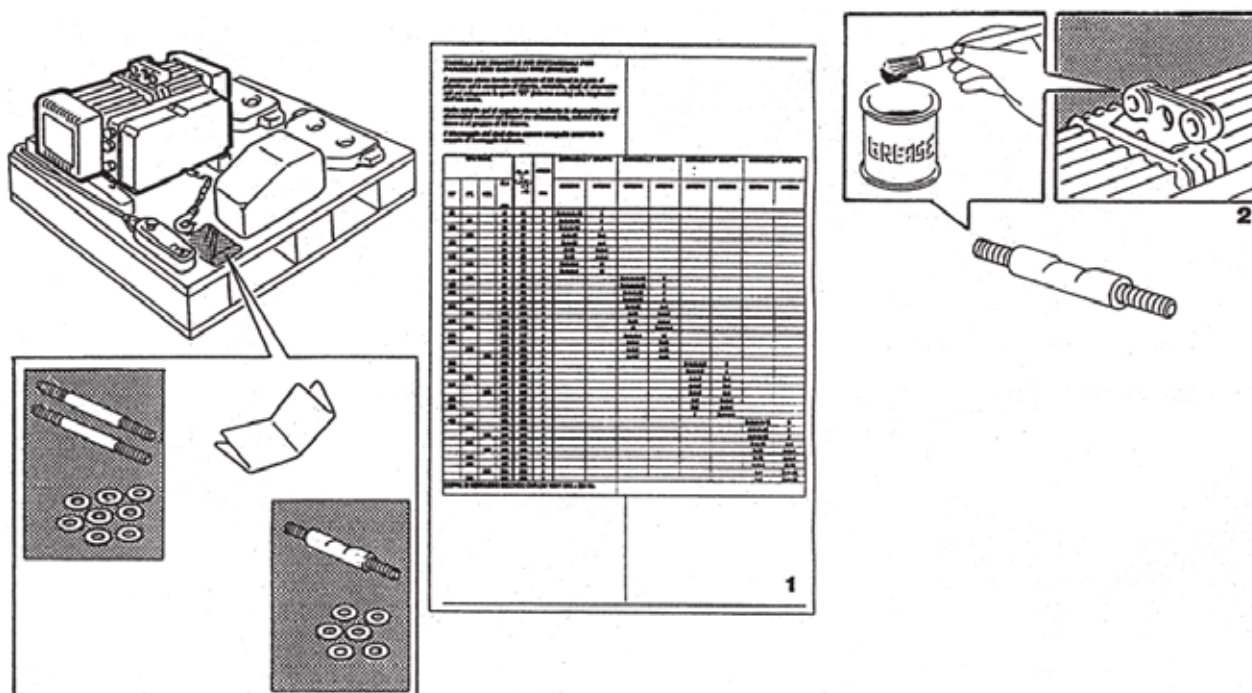


fig.20

DMT SM2 TROLLEYS

Insert the gooseneck tie rod into the central hole of the eye-bolt bracket, then fit the internal spacers, the two trolley plates and the external spacers, and hand-tighten the nuts by a few turns. Keep the two supplied anti-loosening Palmuttern nuts. (fig.21)



fig.21

SM3/SM4/SM5/ CM3/CM4/CM5/EM3 EM4/EM5 TROLLEYS

Insert the two tie rods into the side holes of the eyebolt bracket, insert the external spacers and hand-tighten the nuts by a few turns. Keep the two supplied anti-loosening Palmuttern nuts. (fig.22)

The pre-assembly of the trolley is complete.

SM TROLLEYS**CM TROLLEYS****EM TROLLEYS**

fig.22

TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH SM2 TROLLEYS (DMK1/2)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the "IR" dimension (inside of the wheel) to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

TYPE OF BEAM				FLANGE + CLEARANCE + 1 - 0	CLEARANCE mm	GROUP 1 SPACERS		GROUP 2 SPACERS		GROUP 3 SPACERS		GROUP 4 SPACERS	
INP	IPE	HEA	FLANGE mm			EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL
80			42	45	3	2+4+4+4+16	0						
	80		46	49	3	4+4+4+16	2						
100			50	53	3	2+4+4+16	4						
	100		55	57	2	4+4+16	2+4						
120			58	61	3	2+4+16	4+4						
	120		64	69	5	2+16	4+4+4						
140			66	69	3	2+16	4+4+4						
	140		73	77	4	2+4+4+4	16						
160			74	77	3	2+4+4+4	16						
	160		82	85	2	2	16+4						
180			82	85	2	2	16+4						
200			90	93	3			2+4+4+16	4				
	180		91	93	2			2+4+4+16	4				
220			98	101	3			2+4+16	4+4				
	200		100	105	5			4+16	4+4+2				
240			106	109	3			2+16	4+4+4				
	220		110	113	3			16	2+4+4+4				
260			113	117	4			2+4+4+4	16				
280			119	121	2			4+4+4	2+16				
	240		120	125	5			4+4+2	4+16				
		120	120	125	5			4+4+2	4+16				
300			125	127	2					2+4+4+4+2	0		
320			131	135	4					2+4+4+2	4		
	270		135	139	4					4+4+2	2+4		
340			137	139	2					4+4+2	2+4		
		140	140	143	3					.. 2+4+2	4+4		
360			143	147	4					4+2	2+4+4		
380			149	151	2					2+2	4+4+4		
	300		150	155	5					2	2+4+4+4		
400			155	159	4							2+4+4+4+16	0
	330		160	163	3							4+4+4+16	2
		160	160	163	3							4+4+4+16	2
	360		170	175	5							2+4+16	4+4
		180	180	183	3							2+16	4+4+4
	400		180	183	3							2+16	4+4+4
		450	190	195	5							4+4+4	2+16
		200	200	203	3							4+4	2+4+16
		500	200	203	3							4+4	2+4+16

TIGHTENING TORQUE ACCORDING TO CNR-UNI 10011 M16 = 128 Nm

TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH SM3-CM3-EM3 TROLLEYS (DMK3)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the "IR" dimension (inside of the wheel) to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

TYPE OF BEAM				FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	GROUP 1 SPACERS		GROUP 2 SPACERS		GROUP 3 SPACERS	
INP	IPE	HEA	FLANGE mm			EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL
120			58	61	3	12+6+4+4	41				
	120		64	65	1	12+6+4+2	41+2				
140			66	69	3	12+6+4	41+4				
	140		73	77	4	12+6	41+4+4				
160			74	77	3	12+6	41+4+4				
	160		82	85	3	6+4+4	41+12				
180			82	85	3	6+4+4	41+12				
200			90	93	3	6+4	41+12+4				
	180		91	93	2	6+4	41+12+4				
220			98	101	3	6	41+12+4+4				
	200		100	101	1	6	41+12+4+4				
240			106	109	3	4	41+12+6+4+2				
	220		110	113	3	2	41+12+6+4+4				
260			113	117	4			12+12+4	65+4		
280			119	121	2			12+12+2	65+6		
	240		120	121	1			12+12+2	65+6		
300			125	129	4			12+12	65+6+4		
320			131	133	2			12+6+4	65+12		
	270		135	137	2			12+4+4	65+12+2		
340			137	141	4			12+4+2	65+12+4		
		140	140	141	1			12+4+2	65+12+4		
360			143	145	2			12+4	65+12+6		
380			149	153	4			12	65+12+6+4		
	300		150	153	3			12	65+12+6+4		
400			155	157	2			6+4	65+12+12		
	330		160	161	1			6	65+12+12+2		
		160	160	161	1			6	65+12+12+2		
450			170	173	3			2	65+12+12+4+4		
	360		170	173	3			2	65+12+12+4+4		
	400		180	183	3					12+6+4+2	102
		180	180	183	3					12+6+4+2	102
500			185	187	2					12+6+4	102+2
	450		190	191	1					12+6+4	102+4
550			200	203	3					12+4+2	102+6+4
	500		200	203	3					12+4+2	102+6+4
		200	200	203	3					12+4+2	102+6+4
	550		210	211	1					12	102+6+4+4
600			215	219	4					4+4	102+12+6
	600		220	223	3					4	102+12+6+2
		220	220	223	3					4	102+12+6+2

TIGHTENING TORQUE ACCORDING TO CNR-UNI 10011 M14 = 85 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer

TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH CM3-EM3 TROLLEYS (DMK1/2)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the “IR” dimension (inside of the wheel) to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

TYPE OF BEAM				FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	GROUP 1 SPACERS		GROUP 2 SPACERS		GROUP 3 SPACERS	
INP	IPE	HEA	FLANGE mm			EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL
120			58	59	1	12+6+4+4+2	41+2				
	120		64	67	3	12+6+4+2	41+2+4				
140			66	67	1	12+6+4+2	41+2+4				
	140		73	75	2	12+6+2	41+2+4+4				
160			74	75	1	12+6+2	41+2+4+4				
	160		82	83	1	6+4+4+2	41+2+12				
180			82	83	1	6+4+4+2	41+2+12				
200			90	95	5	4+4+2	41+2+12+6				
	180		91	95	4	4+4+2	41+2+12+6				
220			98	103	5	4+2	41+2+12+6+4				
	200		100	103	3	4+2	41+2+12+6+4				
240			106	107	1	2+2	41+4+12+6+4				
	220		110	111	1	2	41+4+12+6+4+2				
260			113	115	2			12+12+4+2	65+6		
280			119	123	4			12+12+4+2	65+6+4		
	240		120	123	3			12+12+2	65+6+4		
300			125	127	2			12+6+4+2	65+12		
320			131	135	4			12+6+2	65+12+4		
	270		135	139	4			12+4+2	65+12+6		
340			137	139	2			12+4+2	65+12+6		
		140	140	143	3			12+6	65+12+4+4		
360			143	147	4			12+2	65+12+6+4		
380			149	151	2			6+4+2	65+12+12		
	300		150	151	1			6+4+2	65+12+12		
400			155	159	4			6+2	65+12+12+4		
	330		160	163	3			4+2	65+12+12+6		
		160	160	163	3			4+2	65+12+12+6		
450			170	171	1			2	65+12+12+6+4		
	360		170	171	1			2	65+12+12+6+4		
	400		180	181	1					12+6+4+4	102+2
		180	180	181	1					12+6+4+4	102+2
500			185	189	4					12+4+4+2	102+6
	450		190	193	3					12+4+4	102+6+2
	500		200	205	5					6+4+4	102+ 12+2
550			200	205	5					6+4+4	102+ 12+2
	200		200	205	5					6+4+4	102+ 12+2
	550		210	213	3					4+4+2	102+12+6
600			215	217	2					4+4	102+12+6+2
	600		220	225	5					4	102+12+6+4+2
	220		220	225	5					4	102+12+6+4+2

TIGHTENING TORQUE ACCORDING TO CNR-UNI 10011 M14 = 85 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer

TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH SM4-CM4-EM4 TROLLEYS (DMK4)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the "IR" dimension (inside of the wheel) to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

TYPE OF BEAM				FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	GROUP 1 SPACERS		GROUP 2 SPACERS		GROUP 3 SPACERS	
INP	IPE	HEA	FLANGE mm			EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL
160			74	77	3	12+6+4+2	52				
	160		82	85	3	12+6+2	52+4				
180			82	85	3	12+6+2	52+4				
200			90	93	3	12+4	52+6+2				
	180		91	93	2	12+4	52+6+2				
220			98	101	3	6+4+2	52+12				
	200		100	105	5	6+4	52+12+2				
240			106	109	3	6+2	52+12+4				
	220		110	113	3	4+2	52+12+6				
260			113	117	4	6	52+16+4				
280			119	121	2	4	52+16+6				
	240		120	125	5	4	52+16+6+2				
300			125	129	4			16+12+2	78		
320			131	133	2			16+12	78+2		
	270		135	137	2			16+12	78+4		
340			137	141	4			16+4+2	78+6		
			140	145	5			16+4	78+6+2		
360			143	145	2			16+4	78+6+2		
380			149	153	4			16+2	78+12		
	300		150	153	3			16+2	78+12		
400			155	157	2			16	78+12+2		
	330		160	165	5			4+2	78+12+6		
		160	160	165	5			4+2	78+12+6		
450			170	173	3			4+2	78+16+6		
	360		170	173	3			4+2	78+16+6		
			180	185	5			4	78+16+12		
		180	180	185	5			4	78+16+12		
500			185	189	4					12+6+2	108
	450		190	193	3					12+6	108+2
550			200	205	5					12	108+6+2
	500		200	205	5					12	108+6+2
		200	200	205	5					12	108+6+2
	550		210	213	3					6	108+12
600			215	217	2					6	108+12+2
	600		220	225	5					2	108+12+6
		220	220	225	5					2	108+12+6

TIGHTENING TORQUE ACCORDING TO CNR-UNI 10011 M20 = 250 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer

TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH SM5-CM5-EM5 TROLLEYS (DMK4-2 pulls)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the “IR” dimension (inside of the wheel) to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

TYPE OF BEAM				FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	GROUP 1 SPACERS		GROUP 2 SPACERS		GROUP 3 SPACERS	
INP	IPE	HEA	FLANGE mm			EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL
180			82	85	3	16+4+2+2	40+4+4+4				
200			90	93	3	4+4+4+4+2+2	40+16				
	180		91	93	2	4+4+4+4+2+2	40+16				
220			98	101	3	4+4+4+2+2	40+16+4				
	200		100	105	5	4+4+4+2	40+16+4+2				
240			106	109	3	4+4+2+2	40+16+4+4				
	220		110	113	3	4+4+2	40+16+4+4+2				
260			113	117	4	4+2+2	40+16+4+4+4				
280			119	121	2	4+2	40+16+4+4+4+2				
	240		120	125	5	2+2	40+16+4+4+4+4				
300			125	129	4	2	40+16+4+4+4+4+2				
320			131	135	4			16+16+2	40+25+4+4+4		
	270		135	139	4			16+16	40+25+4+4+4+2		
340			137	139	2			16+16	40+25+4+4+4+2		
			140	143	3			16+4+4+4+2	40+25+16		
360			143	147	4			16+4+4+4	40+25+16+2		
380			149	151	2			16+4+4+2	40+25+16+4		
	300		150	155	5			16+4+4	40+25+16+4+2		
400			155	159	4			16+4+2	40+25+16+4+4		
	330		160	163	3			16+4	40+25+16+4+4+2		
		160	160	163	3			16+4	40+25+16+4+4+2		
450			170	175	5			4+4+4+2	40+25+16+16		
	360		170	175	5			4+4+4+2	40+25+16+16		
	400		180	183	3			4+4+2	40+25+16+16+4		
		180	180	183	3			4+4+2	40+25+16+16+4		
500			185	189	4					16+4+4+4+2	60+40+4
	450		190	193	3					16+4+4+4	60+40+4+2
550			200	205	5					16+4+2	60+40+4+4+4
	500		200	205	5					16+4+2	60+40+4+4+4
		200	200	205	5					16+4+2	60+40+4+4+4
	550		210	213	3					4+4+4+4+2	60+40+16
600			215	217	2					4+4+4+4	60+40+16+2
	600		220	225	5					4+4+4	60+40+16+4+2
		220	220	225	5					4+4+4	60+40+16+4+2
		240	240	245	5					2	60+40+16+4+4+4+4

TIGHTENING TORQUE ACCORDING TO CNR-UNI 10011 M24 = 432 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer

TABLE OF STIRRUPS AND SPACERS FOR HOISTS WITH SM3-CM3-EM3 TROLLEYS (For 240 to 400 mm flanges)

The hoist is supplied complete with stirrup and a kit containing a plastic bag of washers and safety nuts to adapt the inside of the wheel to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT3						SPACERS
TYPE OF BEAM		FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	SPACERS		
HEA	FLANGE mm			EXTERNAL	INTERNAL	
240	240	241	1	12+2	24+4	GROUP 4
	250	253	3	6+2	24+4+4+2	
260	260	261	1	4	24+12+2	
	270	273	3	12+4	24	GROUP 5
280	280	281	1	12	24+4	
	290	293	3	4+2	24+6+4	
300	300	301	1	2	24+12+2	GROUP 6
	350	352	2	24+6	4+2	
	360	364	4	24	12	
	370	372	2	6+4+2+2	12+4	
	380	384	4	4+2+2	12+6+4	
	390	392	2	6+4	24+2	
	400	404	4	4	24+6+2	

ACCORDING TO CNR-UNI 10011 M14 = 85 Nm

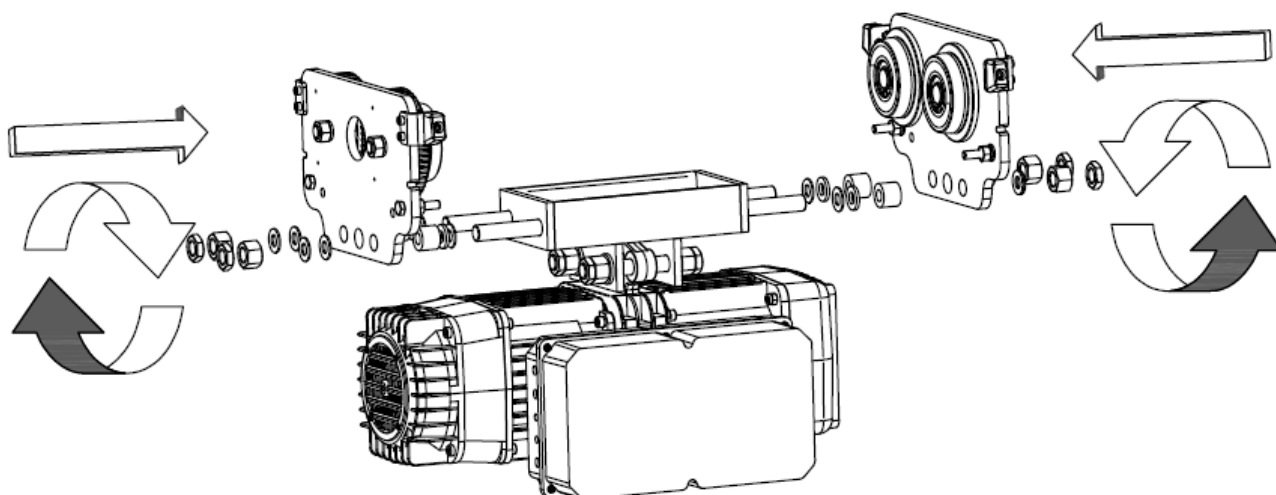


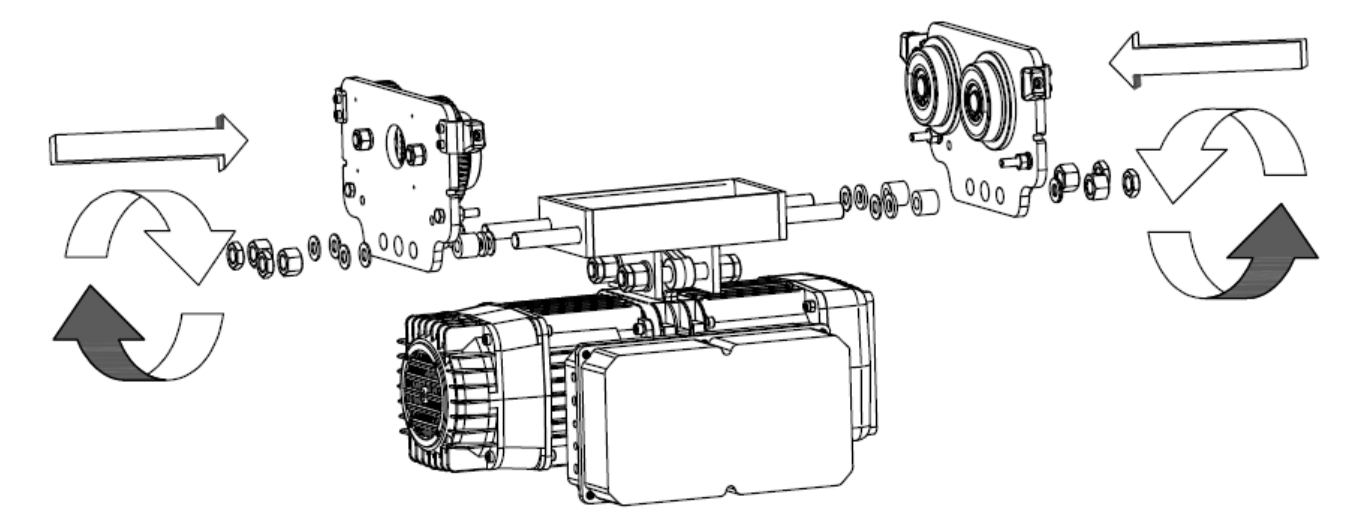
TABLE OF STIRRUPS AND SPACERS FOR HOISTS WITH SM4-CM4-EM4 TROLLEYS (For 240 to 400 mm flanges)

The hoist is supplied complete with stirrup and a kit containing a plastic bag of washers and safety nuts to adapt the inside of the wheel to the beam span.
 The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT4						SPACERS
TYPE OF BEAM		FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	SPACERS		
HEA	FLANGE mm			EXTERNAL	INTERNAL	
240	240	242	2	16	30	GROUP 4
	250	254	4	4+4+2	30+6	
260	260	262	2	6	30+4+4+2	
	270	274	4	4+4+4+2	16+6+6	GROUP 5
280	280	282	2	16	25+6	
	290	292	2	6+2	25+4+4+4	
300	300	302	2	6	25+16	GROUP 6
	350	353	3	25+4+2	6	
	360	365	5	25	6+4+2	
	370	373	3	6+4+4+2	16	
	380	385	5	4+4+2	16+6	
	390	393	3	4+2	16+6+4	
	400	403	3	4+2	25+6	

ACCORDING TO CNR-UNI 10011 M20=250 Nm



**TABLE OF STIRRUPS AND SPACERS FOR HOISTS WITH SM5-CM5-EM5
TROLLEYS (For 260 to 400 mm flanges)**

The hoist is supplied complete with stirrup and a kit containing a plastic bag of washers and safety nuts to adapt the inside of the wheel to the beam span.

The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT5						DISTANZIALI
TYPE OF BEAM		FLANGE + CLEARANCE +1 - 0	CLEARANCE mm	SPACERS		
HEA	FLANGE mm			EXTERNAL	INTERNAL	
260	260	264	4	16+4+4+4+2	4	4° GRUPPO
	270	272	2	16+4+4+2	4+4	
280	280	284	4	16+4	4+4+4+2	
	290	292	2	4+4+4+4	16+2	
300	300	304	4	4+4+2	16+4+4	
	350	352	2	25+12+4	/	5° GRUPPO
	360	364	4	25+4+2	4+2	
	370	372	2	25+2	4+4+2	
	380	384	4	25+2	12+4	
	390	392	2	2	12+4+4	
	400	402	2	12+4	25	

ACCORDING TO CNR-UNI 10011 M24=432 Nm

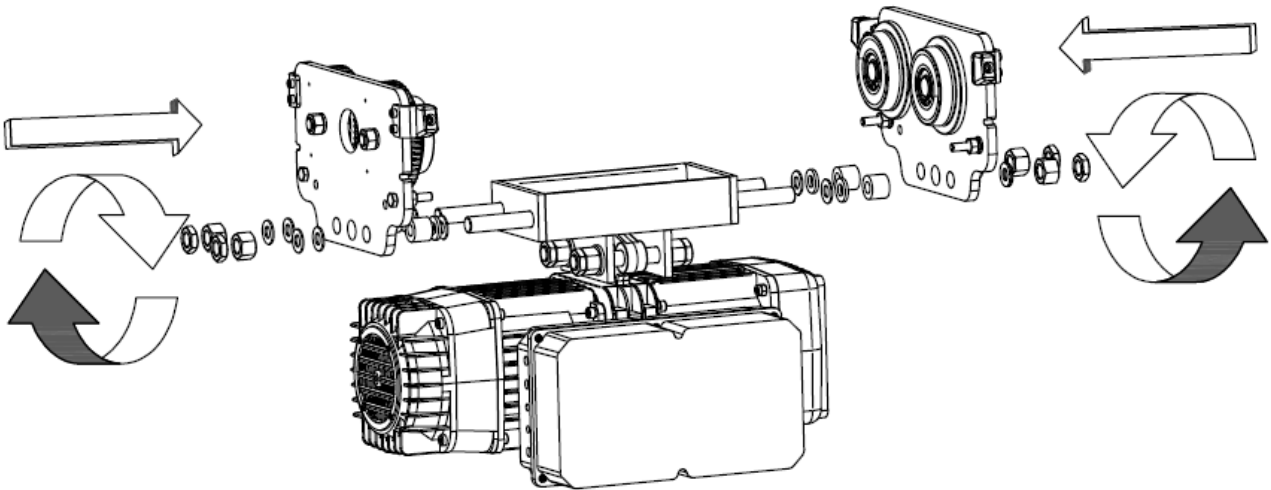


TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH LOWERED TROLLEYS SM3-CM3-EM3 (DMK1)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the “IR” dimension (inside of the wheel) to the beam span. The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT3 x DMK1												SPACERS
TYPE OF BEAM				FLANGE + CLEARANCE M16 mm	M16 CLEARANCE mm	FLANGE + CLEARANCE M14 mm	M14 CLEARANCE mm	GROUP 1 FRONT M16 SPACERS		GROUP 1 FRONT M14x2 SPACERS		
INP	IPE	HEA	FLANGE mm					EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	
120			58	60	2	60	2	16+12+2	24+4	16+12+2	24+4	GROUP 1
	120		64	68	4	68	4	16+4	24+6+2	16+4	24+6+2	
140			66	68	2	68	2	16+4	24+6+2	16+4	24+6+2	
	140		73	76	3	76	3	16+4+2	24+12	16+4+2	24+12	
160			74	76	2	76	2	16+4+2	24+12	16+4+2	24+12	
180	160		82	84	2	84	2	12+6	24+16	12+6	24+16	
200			90	92	2	92	2	12+2	24+16+4	12+2	24+16+4	
	180		91	92	1	92	1	12+2	24+16+4	12+2	24+16+4	
220			98	100	2	100	2	4	24+16+6+2	4	24+16+6+2	
	200	100	100	104	4	104	4	2	24+16+6+4	2	24+16+6+4	
240			106	108	2	108	2	6	24+16+12	6	24+16+12	GROUP 2
	220		110	112	2	112	2	4	24+16+12+2	4	24+16+12+2	
260			113	116	3	114	1	16+12+4	55	16+12+4	55	
280			119	120	1	122	3	16+12	55+4	16+12	55+4	
	240	120	120	124	4	122	2	16+12	55+4	16+12	55+4	
300			125	128	3	126	1	16+4+2	55+6	16+4+2	55+6	
320			131	132	1	134	3	16+2	55+6+4	16+2	55+6+4	
	270		135	136	1	138	3	16+4	55+12	16+4	55+12	
340			137	140	3	138	1	16+4	55+12	16+4	55+12	
		140	140	144	4	142	2	16	55+12+2	16	55+12+2	
360			143	144	1	146	3	12+4	55+16	12+4	55+16	GROUP 3
380			149	152	3	150	1	12	55+16+2	12	55+16+2	
	300		150	152	2	154	4	12	55+16+4	12	55+16+4	
400			155	156	1	158	3	4+2	55+16+6	4+2	55+16+6	
	330	160	160	164	4	162	2	4	55+16+6+2	4	55+16+6+2	
450	360		170	172	2	174	4	0	55+16+12+2	0	55+16+12+2	
	400	180	180	182	2	182	2	16+6+4	89	16+6+4	89	
500			185	186	1	186	1	16+6	89+2	16+6	89+2	
	450		190	194	4	194	4	16+4	89+6	16+4	89+6	
550	500	200	200	202	2	202	2	16	89+6+4	16	89+6+4	
	550		210	214	4	214	4	6+4	89+16	6+4	89+16	
600			215	218	3	218	3	6	89+16+2	6	89+16+2	GROUP 3
	600	220	220	222	2	222	2	6	89+16+4	6	89+16+4	

ACCORDING TO CNR-UNI 10011 M14 = 85 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer.

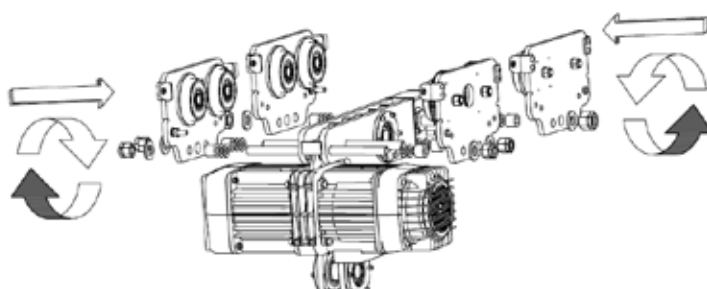


TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH LOWERED TROLLEYS SM3-CM3-EM3 (DMK2)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the “IR” dimension (inside of the wheel) to the beam span. The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT3 x DMK2												SPACERS
TYPE OF BEAM				FLANGE + CLEARANCE M16 mm	M16 CLEARANCE mm	FLANGE + CLEARANCE M14 mm	M14 CLEARANCE mm	GROUP 1 FRONT M16 SPACERS		GROUP 1 FRONT M14x2 SPACERS		
INP	IPE	HEA	FLANGE mm					EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	
120			58	60	2	62	4	16+12	24+6+4	16+12	24+6+4	GROUP 1
	120		64	68	4	66	2	16+6+4	24+12	16+6+4	24+12	
140			66	68	2	70	4	16+6	24+12+2	16+6	24+12+2	
	140		73	76	3	74	1	12+6+4	24+16	12+6+4	24+16	
160			74	76	2	78	4	12+6	24+16+2	12+6	24+16+2	
180	160		82	84	2	86	4	12+4	24+16+6	12+4	24+16+6	
200			90	92	2	94	4	12	24+16+6+4	12	24+16+6+4	
	180		91	92	1	94	3	12	24+16+6+4	12	24+16+6+4	
220			98	100	2	102	4	6	24+16+12+2	6	24+16+12+2	
	200	100	100	104	4	102	2	6	24+16+12+2	6	24+16+12+2	
240			106	108	2	110	4	4	24+16+12+6	4	24+16+12+6	
	220		110	112	2	114	4	0	24+16+12+6+2	0	24+16+12+6+2	
260			113	116	3	116	3	16+12+4	55+6	16+12+4	55+6	
280			119	120	1	120	1	16+12	55+6+2	16+12	55+6+2	
	240	120	120	124	4	124	4	16+12	55+6+4	16+12	55+6+4	
300			125	128	3	128	3	16+6+4	55+12	16+6+4	55+12	
320			131	132	1	132	1	16+6	55+12+2	16+6	55+12+2	
	270		135	136	1	136	1	12+6+4	55+16	12+6+4	55+16	
340			137	140	3	140	3	12+6	55+16+2	12+6	55+16+2	
		140	140	144	4	144	4	12+6	55+16+4	12+6	55+16+4	
360			143	144	1	144	1	12+6	55+16+4	12+6	55+16+4	
380			149	152	3	152	3	12	55+16+6+2	12	55+16+6+2	
	300		150	152	2	152	2	12	55+16+6+2	12	55+16+6+2	
400			155	156	1	156	1	12	55+16+6+4	12	55+16+6+4	
	330	160	160	164	4	164	4	6	55+16+12+2	6	55+16+12+2	
450	360		170	172	2	172	2	4	55+16+12+6	4	55+16+12+6	
	400	180	180	182	2	184	4	16+4+2	89+6	16+4+2	89+6	
500			185	186	1	188	3	16+4	89+6+2	16+4	89+6+2	
	450		190	194	4	192	2	16+2	89+6+4	16+2	89+6+4	
550	500	200	200	202	2	204	4	12+2	89+16	12+2	89+16	
	550		210	214	4	212	2	6+2	89+16+4	6+2	89+16+4	
600			215	218	3	216	1	4+2	89+16+6	4+2	89+16+6	
	600	220	220	222	2	224	4	2	89+16+6+4	2	89+16+6+4	

ACCORDING TO CNR-UNI 10011 M14 = 85 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer.

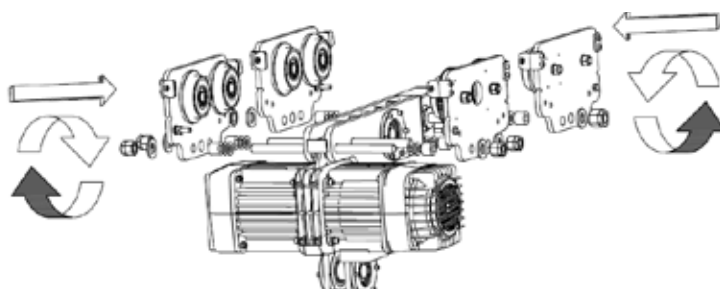


TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH LOWERED TROLLEYS SM3-CM3-EM3 (DMK3)

The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the “IR” dimension (inside of the wheel) to the beam span. The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT3 x DMK3												SPACERS
TYPE OF BEAM				FLANGE + CLEARANCE M16 mm	M16 CLEARANCE mm	FLANGE + CLEARANCE M14 mm	M14 CLEARANCE mm	GROUP 1 FRONT M16 SPACERS		GROUP 1 FRONT M14x2 SPACERS		
INP	IPE	HEA	FLANGE mm					EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	
120			58	60	2	62	4	16+12	24+4	16+12	24+4	GROUP 1
	120		64	68	4	66	2	16+4+2	24+6	16+4+2	24+6	
140			66	68	2	70	4	16+4	24+6+2	16+4	24+6+2	
	140		73	76	3	74	1	16+2	24+6+4	16+2	24+6+4	
160			74	76	2	78	4	16+4	24+12	16+4	24+12	
180	160		82	84	2	86	4	12+4	24+16	12+4	24+16	
200			90	92	2	94	4	12	24+16+4	12	24+16+4	
	180		91	92	1	94	3	12	24+16+4	12	24+16+4	
220			98	100	2	102	4	4	24+16+6+2	4	24+16+6+2	
	200	100	100	104	4	102	2	4	24+16+6+2	4	24+16+6+2	
240			106	108	2	110	4	4	24+16+12	4	24+16+12	
	220		110	112	2	114	4	0	24+16+12+2	0	24+16+12+2	
260			113	116	3	116	3	16+12+4	55	16+12+4	55	GROUP 2
280			119	120	1	120	1	16+12	55+2	16+12	55+2	
	240	120	120	124	4	124	4	16+12	55+4	16+12	55+4	
300			125	128	3	128	3	16+4+2	55+6	16+4+2	55+6	
320			131	132	1	132	1	16+4	55+6+2	16+4	55+6+2	
	270		135	136	1	136	1	16+2	55+6+4	16+2	55+6+4	
340			137	140	3	140	3	16+4	55+12	16+4	55+12	
		140	140	144	4	144	4	16	55+12+2	16	55+12+2	
360			143	144	1	144	1	16	55+12+2	16	55+12+2	
380			149	152	3	152	3	12	55+16+2	12	55+16+2	
	300		150	152	2	152	2	12	55+16+2	12	55+16+2	
400			155	156	1	156	1	12	55+16+4	12	55+16+4	
	330	160	160	164	4	164	4	4	55+16+6+2	4	55+16+6+2	
450	360		170	172	2	172	2	4	55+16+12	4	55+16+12	
	400	180	180	182	2	184	4	16+6+2	89	16+6+2	89	
500			185	186	1	188	3	16+6	89+2	16+6	89+2	
	450		190	194	4	192	2	16+2	89+4	16+2	89+4	
550	500	200	200	202	2	204	4	12+2	89+6+4	12+2	89+6+4	
	550		210	214	4	212	2	6+4	89+12+2	6+4	89+12+2	
600			215	218	3	216	1	6+2	89+16	6+2	89+16	
	600	220	220	222	2	224	4	2	89+16+4	2	89+16+4	

ACCORDING TO CNR-UNI 10011 M14 = 85 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer.

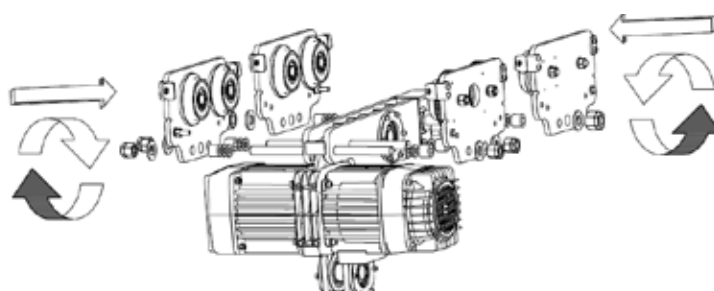


TABLE OF TIE RODS AND SPACERS FOR HOISTS WITH LOWERED TROLLEYS SM4-CM4-EM4 (DMK4)

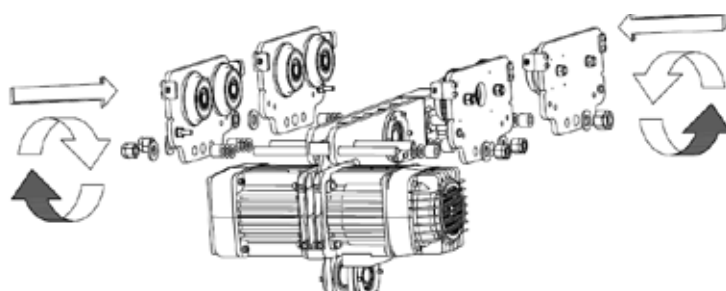
The hoist is supplied complete with a tie rod kit containing a plastic bag of tie rod, washers and safety nuts to adapt the “IR” dimension (inside of the wheel) to the beam span. The table below shows the number of external and internal spacers on each side, corresponding to the beam type and tie rod kit group.

The nuts must be tightened following the tightening torques indicated.

DMT4 x DMK4												SPACERS
TYPE OF BEAM				FLANGE + CLEARANCE M16 mm	M16 CLEARANCE mm	FLANGE + CLEARANCE M14 mm	M14 CLEARANCE mm	GROUP 1 FRONT M16 SPACERS		GROUP 1 FRONT M14x2 SPACERS		
INP	IPE	HEA	FLANGE mm					EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	
160			74	76	2	76	2	16+12	30	16+12	30	GROUP 1
180	160		82	84	2	84	2	16+6+2	30+4	16+6+2	30+4	
200			90	92	2	92	2	16+4	30+6+2	16+4	30+6+2	
	180		91	92	1	92	1	16+4	30+6+2	16+4	30+6+2	
220			98	100	2	100	2	16	30+12	16	30+12	
	200	100	100	104	4	104	4	6+4	30+12+2	6+4	30+12+2	
240			106	108	2	108	2	12	30+16	12	30+16	
	220		110	112	2	112	2	6+4	30+16+2	6+4	30+16+2	
260			113	116	3	116	3	6+2	30+16+4	6+2	30+16+4	
280			119	120	1	120	1	4+2	30+16+6	4+2	30+16+6	
	240	120	120	124	4	124	4	4	30+16+6+2	4	30+16+6+2	GROUP 2
300			125	128	3	128	3	16+12+4	52+4	16+12+4	52+4	
320			131	132	1	132	1	16+12+2	52+6	16+12+2	52+6	
	270		135	136	1	136	1	16+12	52+6+2	16+12	52+6+2	
340			137	140	3	140	3	16+2	52+6+4	16+2	52+6+4	
	140		140	144	4	144	4	16+6+2	52+12	16+6+2	52+12	
360			143	144	1	144	1	16+6+2	52+12	16+6+2	52+12	
380			149	152	3	152	3	12+6+2	52+16	12+6+2	52+16	
	300		150	152	2	152	2	12+6+2	52+16	12+6+2	52+16	
400			155	156	1	156	1	12+6	52+16+2	12+6	52+16+2	
	330	160	160	164	4	164	4	12+2	52+16+6	12+2	52+16+6	GROUP 3
450	360		170	172	2	172	2	2	52+16+6+4	2	52+16+6+4	
	400	180	180	184	4	184	4	2	52+16+12+4	2	52+16+12+4	
500			185	188	3	188	3	12+6+2	86	12+6+2	86	
	450		190	192	2	192	2	12+6	86+2	12+6	86+2	
550	500	200	200	204	4	204	4	12	86+6+2	12	86+6+2	
	550		210	212	2	212	2	6+2	86+12	6+2	86+12	
600			215	216	1	216	1	6	86+12+2	6	86+12+2	
	600	220	220	224	4	224	4	2	86+12+6	2	86+12+6	

ACCORDING TO CNR-UNI 10011 M20=250 Nm

For beams with spans wider than those in the tables, a special stirrup has to be requested from the manufacturer.



ASSEMBLY OF THE HOIST WITH TROLLEY (SM, CM or EM)

1. Check that the anti-tip screws of the DMT3 and DMT4 trolleys are positioned in 'A' or 'B' depending on the thickness of the beam flange and that the tightening torque is 50 Nm. (fig.23)
2. After passing over the lower flange of the beam with the wheels of the trolley, close the plates and screw the nuts of the tie rods as far as they will go, but without tightening them. (fig.24)
3. Lower the pallet by about 15 cm in order to align the geometry of the four wheels on the lower flange of the beam. (fig.23)
4. Tighten the tie-rod nuts to the torque specified in the relevant table (TIE ROD TABLE). (fig.24)



Once tightened, check that the four wheels are engaged and that the clearance corresponds to that indicated in the table; otherwise, the internal spacers must be adjusted.

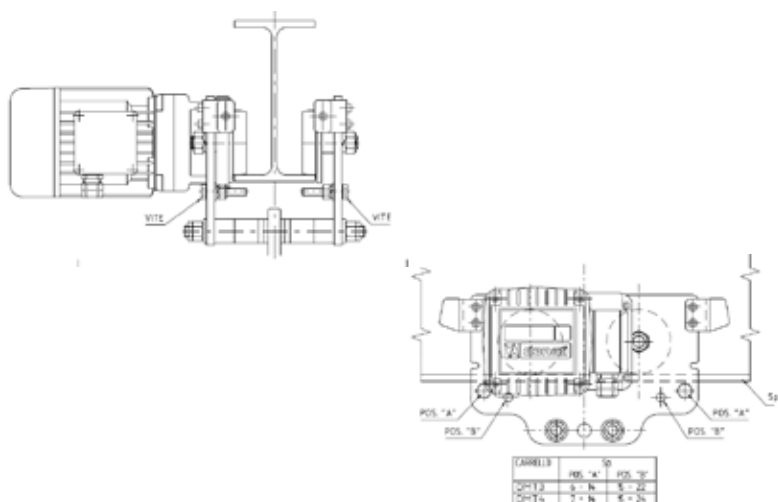


fig.23

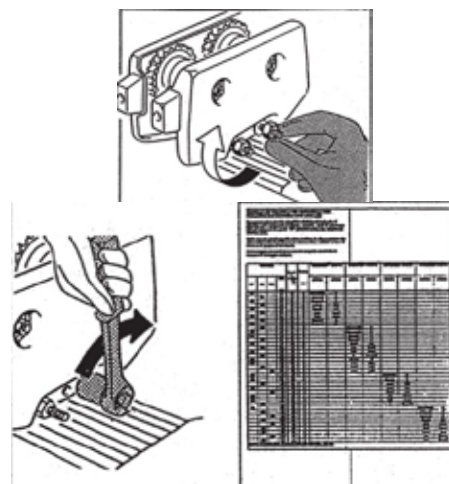


fig.24

5. Apply and tighten the supplied Palmuttem 'A' anti-loosening devices against the outer side of the nuts. (fig.25)
6. Lower the pallet and move the forklift away. (fig.25)
7. If the hoist is installed outdoors, a canopy must be set up to protect it from the elements (sun, heavy rain, snow, etc.). (fig.26)

The hoist is now ready for use.

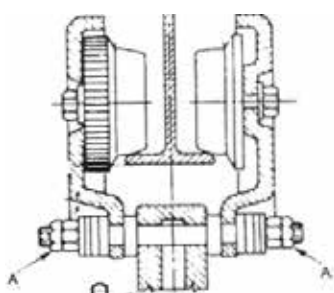


fig.25

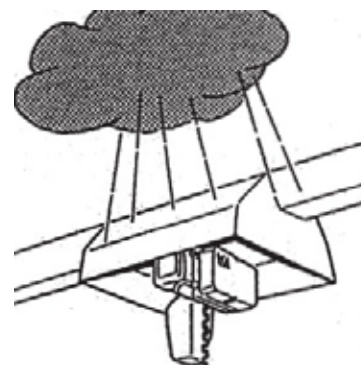
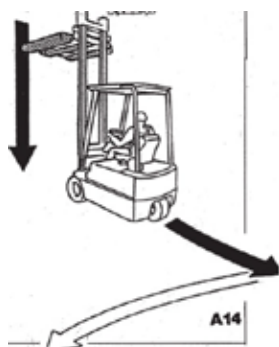


fig.26

4.4.3 INSTALLATION OF THE LIMIT SWITCH STOPS (HOIST WITH SM, CM, EM TROLLEY)



The first step is to mark out the hoist's working area according to the load to be handled, ensuring a distance from walls, pillars or barriers and adequate space for the accumulation of the cable holder trolleys on the power supply side of the power line.



The stops must be provided at both ends in the case of a beam or, in the case of a jib crane equipped with a suitable front plate, only at the column-side end. If the hoist is supplied as part of a complete system, DONATI Sollevamenti provides the limit switches, which are shown in the layout. The SM, CM and EM trolleys are equipped with four rubber pads for the mechanical limit switch stops which, for beams already in place or provided by the customer, must be installed as follows:

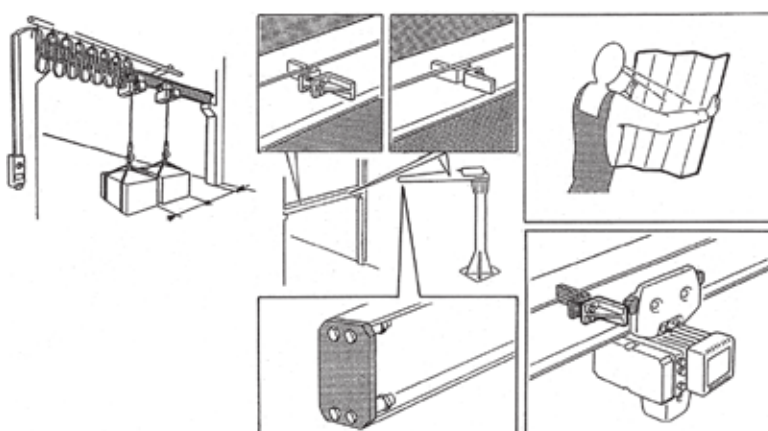


fig.27

1. Drill the holes for fixing the stops on the beam web (at the limits of the working area), at a height corresponding to that of the trolley pads. (fig.28)
2. Assemble the stops and fix them using suitable screws ($\varnothing$ 10 mm, tightening torque 48 Nm) on both sides of the beam. (fig.28)



The stops for the mechanical striker must be sized to withstand the impact at full load and must have two holes of not less than $\varnothing$ 10 mm for fixing.



3. The girder must be in perfect condition. Manually check that the hoist trolley moves freely along the entire length of the beam. (fig.29)



There must be no snagging points or obstacles (screws, welds, hooks, etc.) along the section where the trolley moves that could cause irregular movement; if there are, take action. (fig.29)

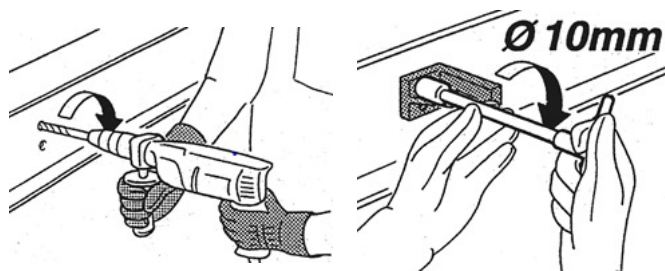


fig.28

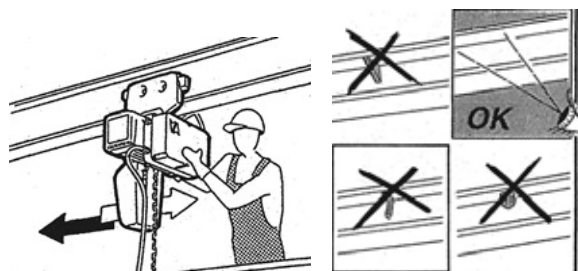


fig.29

4.4.4 INSTALLATION OF THE LIMIT SWITCH MICROSWITCH ACTUATORS (ONLY HOIST WITH EM TROLLEY)



Once the mechanical limit switch stops are in place, the limit switch microswitch actuators must be installed. If the hoist is supplied as part of a complete system, DONATI Sollevamenti provides the limit switch actuators, which are shown in the layout. The EM3 and EM4 trolleys are equipped with a bidirectional microswitch to cause automatic stopping on the limit switch actuators, which, for beams already in place or provided by the customer, must be installed as follows:



1. Drill a $\varnothing 10.5$ mm hole in the beam web at each end, at a distance of not less than 400 mm from the stops and 20 mm below the microswitch probe. (fig.30)

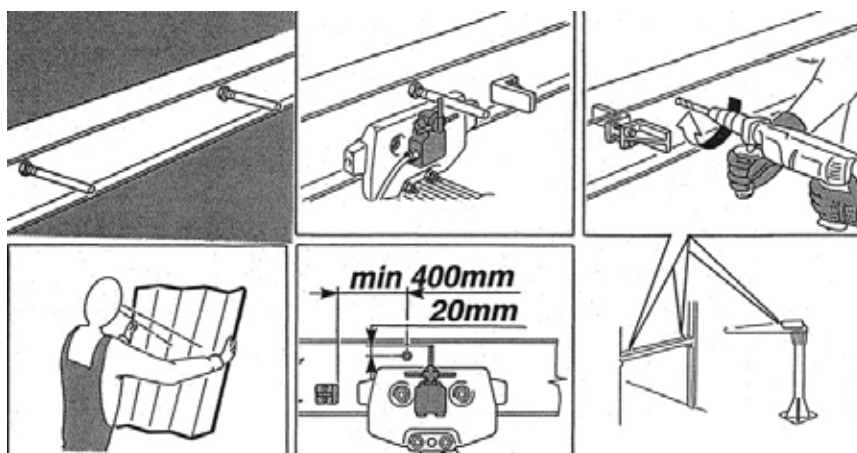


fig.30

2. Prepare two actuators of suitable length made from $\varnothing 10$ mm rod with one threaded end fitted with a nut. (fig.31)
3. Assemble the actuators on the beam and, after ensuring the minimum distance of 40 mm, fully tighten the locking nuts. (fig.31)

The operation is now complete.

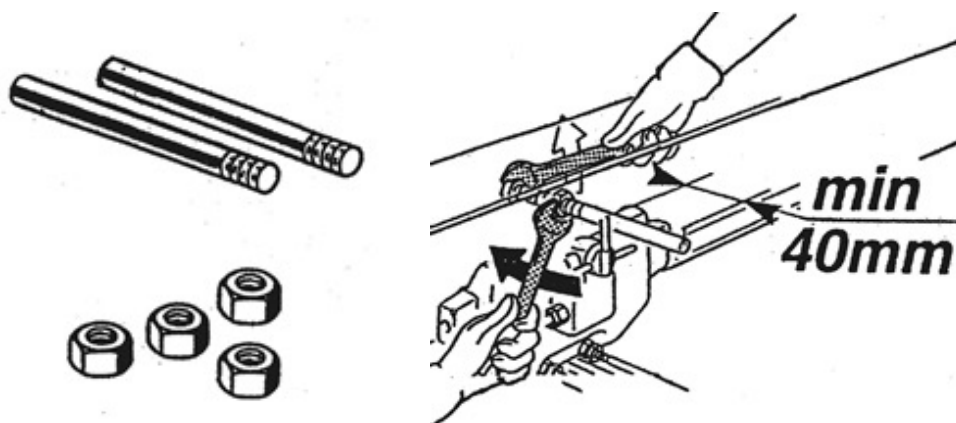


fig.31

4.4.5 ELECTRICAL CONNECTIONS



The electrical connection of the hoist must be made by means of a plug compliant with EN60204, interlocked with the line disconnector, located in the immediate vicinity of the installation site. The main on/off switch must be equipped with "aM" type fuses (delayed), with an amperage suitable for the sum of the current draw values indicated on the motor rating plate (of the hoist and, if applicable, of the EM trolley), as well as the cross-sections of the connection cables, as described on the sheet supplied with the hoist. After having set up the power supply cable and any cable holder trolleys in the case of a hoist with a trolley, operate as follows for the electrical connection: (fig.32)



These operations are reserved for qualified personnel with the aid of the wiring diagrams.

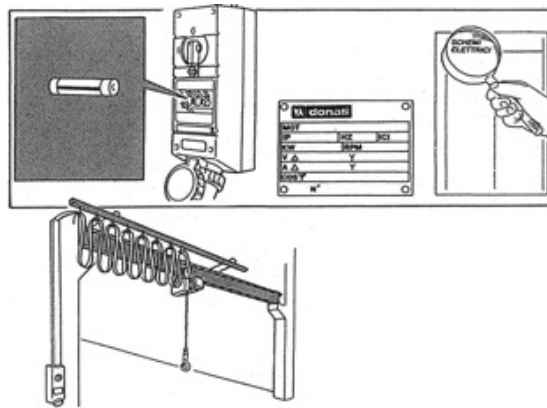


fig.32

1. The power supply cable must be disconnected from the line disconnector and, in any case, the work in progress must be signalled. (fig.33-36)
2. Undo the six screws and remove the cover of the hoist's electrical box. (fig.34)
3. Loosen the cable gland for connection to the line; in the case of a hoist with an EM electric trolley, also loosen the cable gland for connection of the trolley motor. (fig.35)
4. Insert the trolley motor wiring cable into its cable gland. (fig.37)
5. Connect the phase cables of the trolley motor according to the attached wiring diagram, tightening the terminals fully.
6. Insert the power cable into the cable gland and connect the L1-L2-L3 and PE phases, taking care to fully tighten the terminals. (fig.38)



fig.33

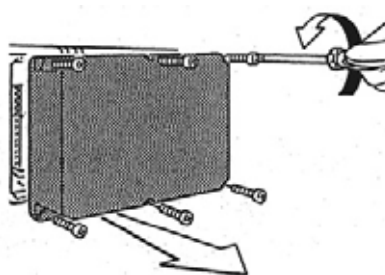


fig.34

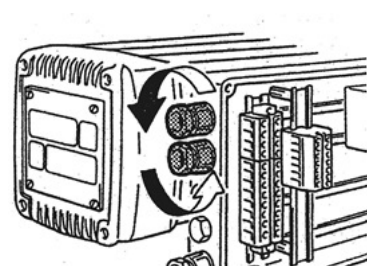


fig.35



fig.36

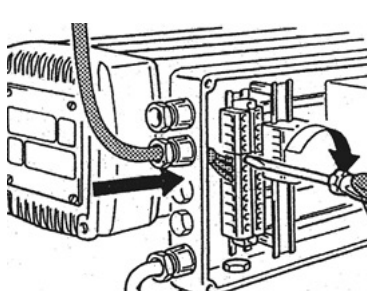


fig.37

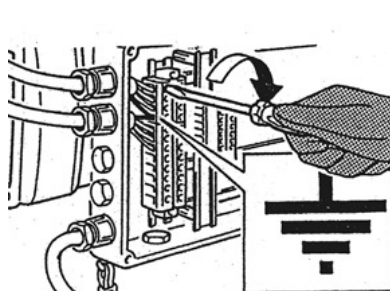


fig.38



- ▶ Never make live electrical connections
- ▶ Tighten the cable glands fully
- ▶ Never make loose, makeshift or temporary connections
- ▶ Obtain the wiring diagrams corresponding to the DMK hoist you are working on

7. Tighten the two cable glands fully. (fig.39)

8. Refit the cover of the hoist's electrical box and tighten the six screws. (fig.40)



The connection and power supply must be earthed.

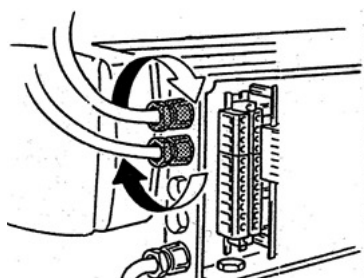


fig.39

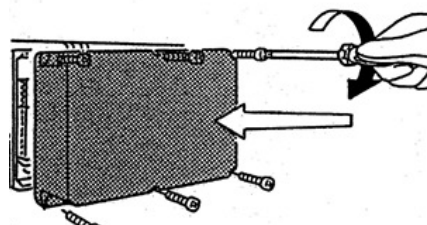


fig.40

9. Insert the hoist power plug into the main on/off switch, checking that the voltage corresponds to that of the hoist motor. (fig.41)

10. Set the line disconnecter to '1' - 'ON'. (fig.42)

11. Press the down button '3' and then button '2' to check that the directions match those on the push-button panel. (fig.43)



fig.41



fig.42

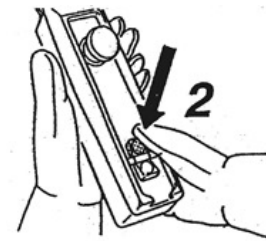
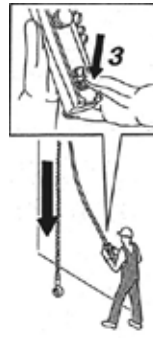


fig.43

12. For a hoist fitted with an EM electric trolley, press button '4' (right travel) and then button '5' to check that the directions match those on the push-button panel and the directional plates on the beam. (fig.44)
13. If the drive is synchronised, proceed as described in point 14; otherwise, two of the three phases (L1-L2-L3) on the terminal block must be reversed, repeating the operations described from point 1 to point 12.
14. Check the efficiency of the travel and raise/lower limit switches, if present, by making the hoist perform an automatic stop in all directions without a load. (fig.45)

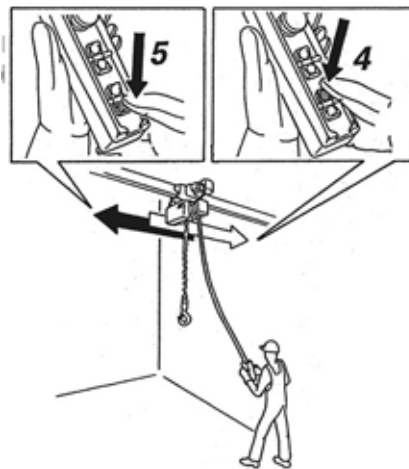


fig.44

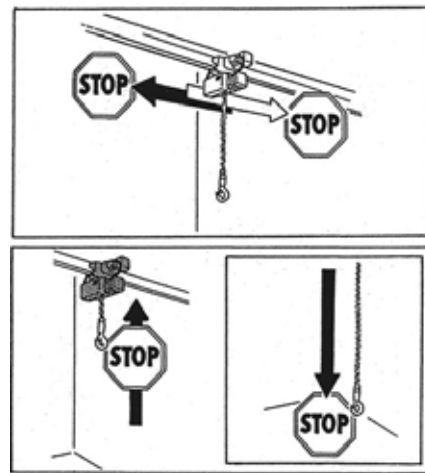


fig.45

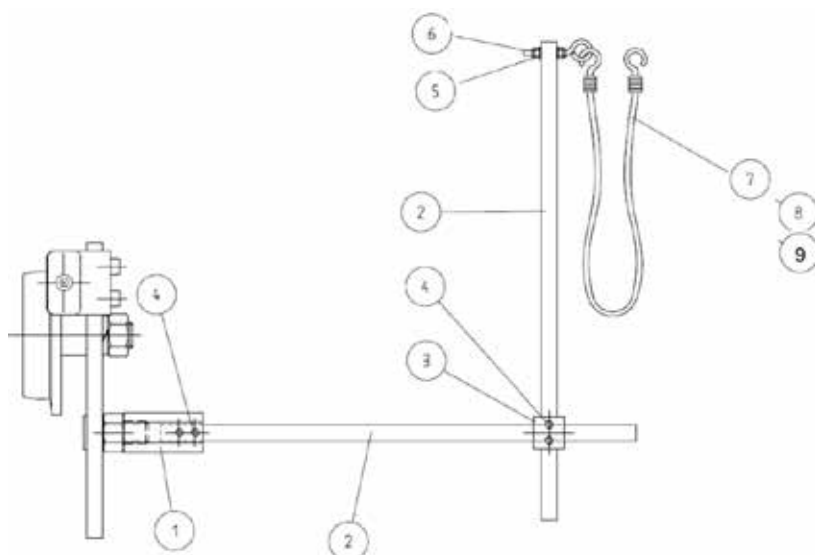
4.4.6 INSTALLATION OF TOWING ARM FOR POWER SUPPLY SYSTEM

1. HEX SOCKET
2. TOWING ARMS
3. ADJUSTMENT BLOCK
4. M5x12 GRUB SCREWS
5. M5 NUTS
6. EYE TENSIONER
7. BUNGEE ELASTIC
8. CHAIN
9. SUSPENSION HOOK



ASSEMBLY PROCEDURE

- ▶ Screw the hex socket (1) onto one of the threaded ends of the trolley tie rod.
- ▶ Fit the first towing arm (2) into the hex socket just screwed in, tighten it with the two screws (4) and screw and tighten the nuts (5) on each screw.
- ▶ Insert the adjustment block (3) into the first towing arm at a suitable distance from the feed system, screw in the first pair of screws (4) without fully tightening them.
- ▶ Fit the second towing arm (2) into the adjustment block (3), taking care to leave the drilled part of the arm (2) at the top, insert and tighten the second pair of screws (4) on the adjustment block (3).
- ▶ Fully tighten the screws (4) on the block and screw and tighten the nuts (5) on each screw.
- ▶ Place a nut (5) in the eye tensioner (6) and insert the tensioner into the hole at the end of the vertical towing arm (2), making sure that the eye faces away from the hoist trolley. Tighten the tensioner (6) with a nut (5).
- ▶ Attach the end of the bungee elastic (7) or alternatively the suspension hook (9) with its chain (8) to the tensioner eye (6).
- ▶ Lastly, attach the second end of the bungee elastic (7) or chain (8) to the first towing trolley of the festoon system.



4.5 COMMISSIONING

4.5.1 PRELIMINARY OPERATIONS



Before commissioning the DMK chain hoist and any travel trolley, carry out the following operations:



- ▶ **Lubrication of mechanisms:** (see also point 6.3.4 "Cleaning and lubrication")
 - ▶ Make sure there are no lubricant leaks.
- ▶ **Check the suitability of the power supply:**
 - ▶ Check that the travel limit switches are installed, correctly positioned and locked.
 - ▶ Check that the line voltage and frequency, shown on the respective motor rating plates, correspond to those required for operation.
 - ▶ Check that the voltage value at the motors is within the limits of $\pm 10\%$ of the nominal value.
- ▶ **Check of the efficiency and suitability of the hoist's installation structures:**
 - ▶ Check the stability and suitability of the structures on which the hoist is installed
 - ▶ In the case of a hoist with a trolley, check the integrity of the wheel tracks, which must be free of obstacles, roughness, depressions and foreign bodies.
 - ▶ Check the available manoeuvring spaces and ascertain any possible interference
 - ▶ Check that the end stops and the trolley limit switch strikers are present
- ▶ **Checking the correct direction of rotation of the motors:**
 - ▶ If the hoist is equipped with an electric carrying trolley, press the 'right/left' buttons (fig. 46) and check that the trolley moves in the corresponding directions.
 - ▶ Proceed with the same checks for the "up/down" control of the hoist, taking care to operate it first in one direction (down) and then in the other (up) with two short pulses, which are only necessary to ascertain the correct direction of rotation (fig. 47).
 - ▶ If the direction of movement does not correspond to the function of the button pressed, immediately stop the manoeuvre and reverse the connection of two phases of the power supply line entering the control panel or the connection of the relevant motors.

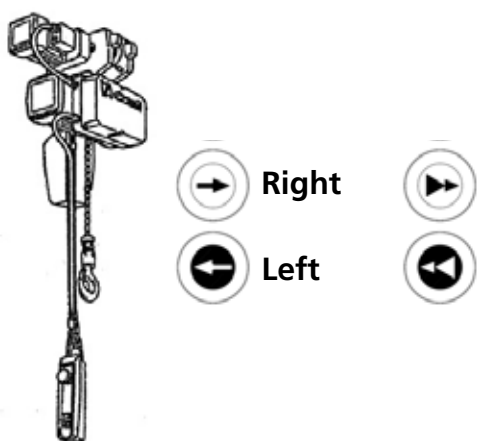


fig.46

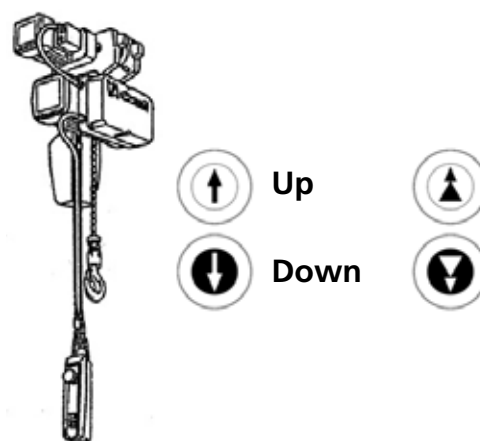


fig.47



If the direction of rotation of the motors is not in line with the controls on the push-button panel, the limit switches do not stop the movement. Consequently, whenever possible, always check the travel movements first and then the lifting movements to avoid hazardous situations that could arise if the lifting limit switch fails.

4.5.2 HOIST TESTING - FITNESS FOR USE



- ▶ The DMK electric chain hoists and their trolleys have been tested at the manufacturer's premises to ensure their functional and performance compliance. However, this testing must be repeated after installation in order to guarantee the optimal and safe functional performance of the hoist and the trolley at their place of installation.
- ▶ The testing phases involve a precise sequence of operations, described below, which must be scrupulously followed by the technicians appointed for the purpose.

After carrying out the functional tests with no load, perform the dynamic tests with masses corresponding to the hoist's load capacity increased by the overload coefficient of 1.1 (load equal to 110% of the nominal load). The static tests are carried out with an overload coefficient of 1.25 (load equal to 125% of the nominal load).



All tests must be carried out in the absence of wind.

▶ No-load tests:

- ▶ turn on the line disconnecter.
- ▶ set the emergency stop button to the "run enable" position.
- ▶ press the "start/alarm" button (if available).
- ▶ check the lifting function by pressing the raise/lower buttons.
- ▶ check the travel function by pressing the right/left buttons.
- ▶ in the case of two-speed movements, check their functionality.
- ▶ check the operation of the electric limit switches for all movements.

▶ Dynamic test:

- ▶ prepare suitable masses for the load tests equal to 1.1 times the **nominal capacity** and suitable equipment for slinging and lifting the load.
- ▶ sling the load, taking care to position the hook vertically to avoid oblique pulls; slowly tension the sling to avoid sudden jerks; if available, perform the load tests using the "slow" speed.
- ▶ slowly lift the load and check that this is done without difficulty and that there are no abnormal noises, obvious deformation or structural failure.
- ▶ repeat the test at maximum speed, performing the previous checks.
- ▶ check the functionality of the "up and down" limit switches.
- ▶ check the functionality of the lifting brake, ensuring that the mass is braked in a timely manner and that there is no slippage of the load after releasing the button.

- ▶ perform the same checks also for the trolley's lateral movements, verifying the functionality of the "right and left" limit switches, without bringing the load to the maximum height (lift to a height of one metre).
- ▶ operate first at slow speed, if available, and then at maximum speed.
- ▶ check that the trolley moves smoothly along the beam and ensure there is no unusual noise, obvious deformation or abnormal sagging of the structure.
- ▶ check the operation of the "emergency stop" button, which must stop and inhibit all movements. Any hoist and/or trolley function must stop in the shortest possible time and distance, without exhibiting anomalies, swerving, dangerous oscillations, etc., and without compromising stability of the hoist and/or trolley.
- ▶ check the braking and stopping distances during lifting and travel.
The extent of these distances can be roughly estimated as follows:
 - ▶ for downward movement, see table fig. 78
 - ▶ for travel of the trolley, which typically moves at a speed of 11 or 22 m/min, it is between 15 and 30 cm.
 - ▶ In both cases, there must be no significant oscillations of the load.

▶ **Static test:**

- ▶ lift the load used for the dynamic tests, stop it in a suspended position at a height of 50 cm, gradually apply masses to it until an overload value of 25% of the maximum nominal load capacity is reached.
- ▶ leave the mass suspended for a period of not less than 10 minutes.
- ▶ check that the suspended mass (load + overload) does not give way (the lifting brake must not slip) and that there are no obvious deformations or sagging of the structure.
- ▶ check the operation of the overload device.



- ▶ **During the static test, the overload device must disable the lifting movement.**
- ▶ **No movement must be activated during the static test.**
- ▶ **The hoist/trolley test must be repeated during the annual checks; see point 6.3.4. The test results must be recorded in the appropriate logbook, see chapter 8.**

5. OPERATION AND USE OF THE HOIST

5.1 THE FUNCTIONS OF THE HOIST

5.1.1 INTENDED USE

The electric chain hoist is a machine generally used to lift an unguided load vertically using the hook or suitable lifting attachments.

When the hoist is combined with a travel trolley that runs overhead on one beam, it is able to ensure both lifting and horizontal movement of the load.

All lifting (up and down) and travel (right and left) movements can be controlled using the push-button panel or radio control.

All lifting (up and down) and travel (right and left) movements can be controlled using the push-button panel or radio control.

The electric chain hoist, whether placed at height or on the ground, can also be used in different configurations in a fixed position.

The functions are performed through **two main** movements:

- ▶ **vertical**; lifting of the load by means of a hook and movement of the electric hoist chain
- ▶ **horizontal**; travel of the load by movement of the electric trolley along the beam

These movements can be controlled via (fig. 48):

- ▶ **raise/lower buttons or actuator for lifting the hoist (main and auxiliary)**
- ▶ **right and left buttons or actuator for travel of the trolley (main and auxiliary)**

They activate the function when they are held down and control of the slow auxiliary lifting and travel speeds can be activated in the following ways:

- ▶ **with separate actuators, operating the "slow" speeds independently of the "fast" speeds.**
- ▶ **with a single two-stage step actuator (with one stage for "slow" speed and another for "fast" speed).**

The **control panel**, when part of the supply, **is equipped with a red mushroom-shaped emergency stop button**, which activates the **stop** function when fully pressed. (fig.49)

In order to operate the hoist, move the **emergency stop** button to the "raised" position to enable operation, and then press the **function buttons**.

The operator can use the push-button panel from the ground, following the travel movement of the trolley.

The hoist can also be controlled via a radio control system; the functionality of the buttons is unchanged compared to that of the pendant push-button panel.

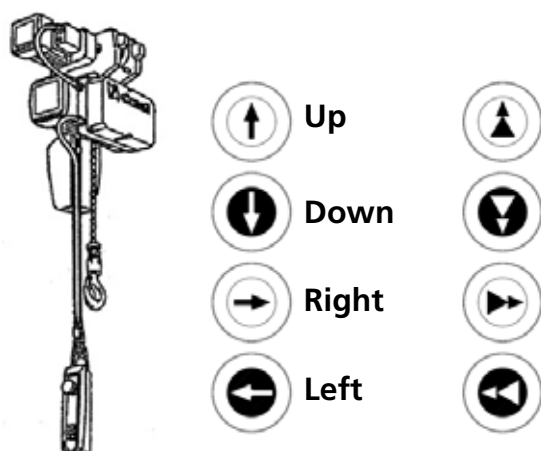


fig.48

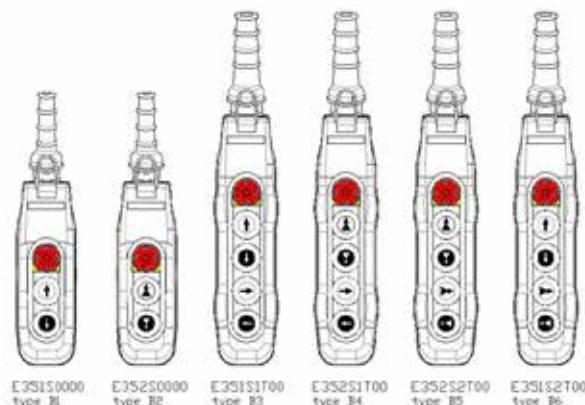


fig.49



When the hoist is controlled by radio remote control, the push-button panel is free and not attached to the hoist itself. The operator must therefore always pay the utmost attention when manoeuvring, without ever losing sight of the work area and the load being moved, so as not to compromise their own safety and/or that of any people exposed to risk.

5.1.2 PERMITTED LOADS, NON-PERMITTED LOADS

The loads must be:

- ▶ Of a shape, size, mass, balance and temperature suited to the characteristics of the place where they are to be handled, and they must be compatible with the performance of the jib crane.
- ▶ Equipped with suitable hand-holds and/or harnessed with appropriate accessories to prevent accidental falls.
- ▶ Stable and not subject to changing their static or physical configuration during handling.



It is not permitted to handle loads:

- ▶ whose weight exceeds the nominal load capacity of the hoist.
- ▶ having masses that are unbalanced in relation to their centre of gravity.
- ▶ with surfaces that are not sufficiently resistant to the pressure exerted by the grip
- ▶ not equipped with the accessories referred to in the following point.
- ▶ which are classified as hazardous due to their chemical-physical characteristics (e.g. flammable, explosive, radioactive, etc.).
- ▶ which are harmful or toxic if not handled in special safety containers (e.g. corrosive chemicals, products with biological risks, etc.).
- ▶ which are loose food products or substances that could come into direct contact with the parts of the hoist or its lubricants.
- ▶ that may change their static and/or chemical-physical configuration or their centre of gravity during handling.

5.1.3 LIFTING ACCESSORIES

The following are generally permitted:

- ▶ Harnesses consisting of ropes and/or chains and/or textile fibre bands.
- ▶ Lifting accessories that are placed between the load and the lifting hook, such as: sling bars, grippers, suction cups, magnets and electromagnets, etc.
- ▶ The use of such accessories must comply with the instructions provided by their manufacturer.



It is generally not permitted to use accessories:

- ▶ whose functional characteristics may subject the hoist to dynamic overstresses exceeding the allowable limits or to accidental overloads. (fig.50)
- ▶ which may collide with parts of the hoist or trolley.
- ▶ which limit the free movement of the load.
- ▶ which are connected with independent power lines.



The weight of the lifting accessories must be deducted from the rated capacity of the hoist. (fig.51).

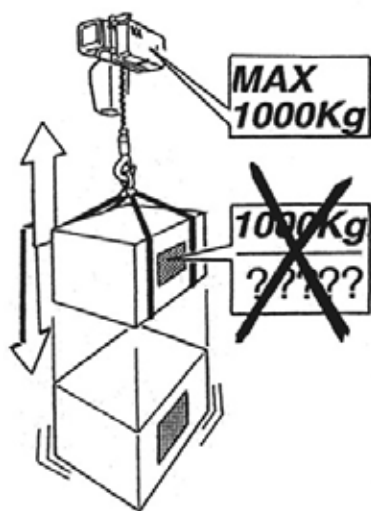


fig.50

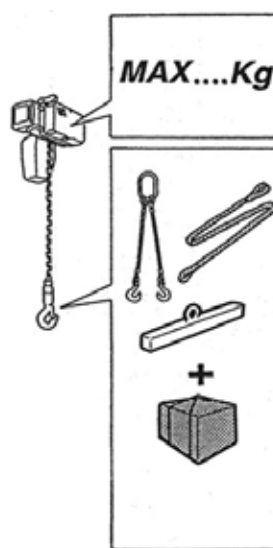


fig.51

5.2 OPERATING CONDITIONS

5.2.1 OPERATING ENVIRONMENT

The operating environment must have the following characteristics:

- ▶ **temperature:** min.: - 10°C; max.: + 40°C; relative humidity max. 80%; maximum altitude 1000 m above sea level.
- ▶ **when used in a covered environment:** since the hoist is not exposed to the weather, it does not require any particular precautions.
- ▶ **when used outdoors:** the hoist may be exposed to the elements during and after use. The electrical parts of the hoist and the trolley have IP55 protection; however, it is advisable to protect the hoist and the trolley with canopies and guards (fig. 52).

To avoid oxidation, protect the structure with suitable treatments and lubricate the mechanisms.



The standard version of the hoist must not be used in environments and areas:

- ▶ With highly corrosive and/or abrasive vapours, fumes or dust (when this cannot be avoided, increase the frequency of maintenance cycles).
- ▶ In the presence of flames and/or heat above the permitted temperatures.
- ▶ With a risk of fire or explosion and where the use of explosion-proof and/or non-sparking components is required.
- ▶ In areas where there are strong electromagnetic fields that can build up electrostatic charge.
- ▶ In direct contact with loose foodstuffs.

5.2.2 DANGER ZONES AND EXPOSED PERSONS

Hazardous areas are all those where, at any stage of operation, exposed persons may be subject to the risk of an event occurring that is hazardous to their safety, health or physical and mental integrity. In particular, it is necessary to inform **potentially exposed persons** that the operator who uses the hoist does not always have sufficient visibility in the **hazardous areas** to be able to completely or promptly prevent all risks of crushing, impact and dragging which may affect people, and that they must therefore avoid exposing themselves to the risk during manoeuvres in these areas (fig. 53).



The customer is obliged to provide adequate signs for the hazardous areas to prohibit or limit access to unauthorised and/or unassigned personnel in the areas where the hoist operates, as required by the laws in force.



fig.52

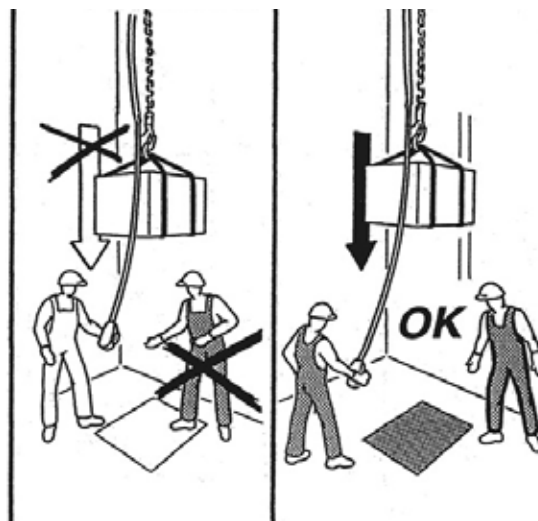


fig.53

5.2.3 LIGHTING OF THE WORK AREA

The DMK electric chain hoist and its travelling trolleys are not equipped with their own lighting system. Consequently, the workstation of the operator using the hoist must be adequately illuminated and must ensure maximum visibility.



- ▶ The level of ambient lighting must always be such as to ensure that the hoist can be operated as safely as possible (fig. 54).
- ▶ Equip areas that are not sufficiently well lit with an additional lighting system, avoiding shadows that prevent or reduce visibility in the operational and/or surrounding areas.

5.2.4 OPERATOR

Operators are all those who, from time to time, carry out the following activities on the hoist:

- ▶ transport, handling, assembly, installation, adjustments and testing
- ▶ commissioning, use, cleaning, maintenance and repair
- ▶ disassembly, dismantling and demolition

The operators must be people who are fit for the job and physically and mentally able to meet the requirements associated with use of the hoist during all operating phases, and in particular during the slinging and handling phases.

The operator assigned to use the hoist must position themselves in a way that is not hazardous to their own safety, anticipating and/or preventing and thus avoiding possible falls or dangerous movements of the transported load. They must follow the instructions provided to ensure the greatest possible safety for themselves and for others when using the machine; in particular, they must scrupulously follow the instructions contained in this manual.



- ▶ The operator must not allow anyone to approach while the hoist is in use and must prevent its use by unauthorised personnel, especially those under 18 years of age.
- ▶ The use of the hoist by unauthorised and uninformed persons is prohibited.

5.2.5 HOIST CAPACITY

The hoist's **load capacity**, in the intended operating configuration, is clearly indicated on the plate affixed to the hoist and on the block and is visible from the operating position.



The load capacity limit of the hoist or its accessories must never be exceeded by applying overloads or by modifying the calibration of the overload device and the clutch (fig. 55).

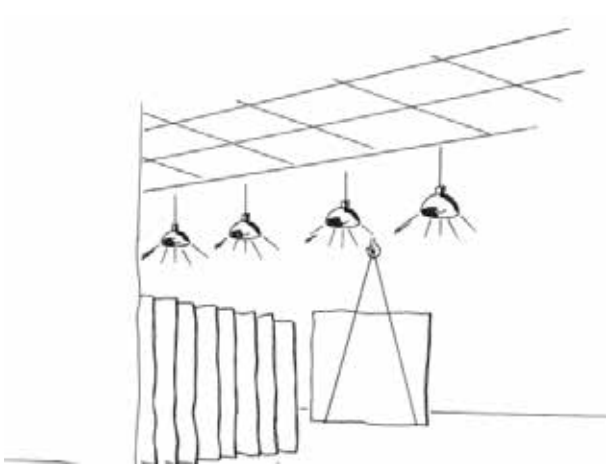


fig.54

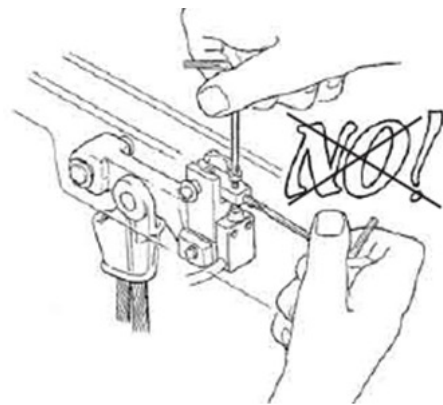


fig.55

5.2.6 MANOEUVRES

It is good practice to perform one movement at a time, as this is the only way an operation can be started, stopped and constantly monitored by the operator, who must also avoid continuously engaging and disengaging the hoist, even for small movements.

- ▶ The load must be picked up, using the hoist hook and lifting accessories, very carefully, gently and without jerking.
- ▶ Start the lifting operation by slowly tensioning the chain until the load is lifted by a few centimetres, stop the manoeuvre and check that the load is secure and stable.
- ▶ When handling is complete, carefully set the load down and release the hoist hook.



- ▶ **Operate with care and diligence, constantly following the manoeuvres and visually checking the balance of the mass being moved.**
- ▶ **Avoid abrupt manoeuvres and "small jerks", which are very detrimental to the stability of the load due to the dynamic effects they generate.**
- ▶ **Never lift loads with off-centre, unbalanced grips, or fail to hook and secure all the required slinging accessories, or secure the load with improvised or makeshift slings.**

5.2.7 LIFTING

The operator must take care to always keep the lifting chain taut, never resting the hook on the ground or on the loads to be lifted. The loose chain can twist, form knots, become seriously damaged, and create sudden dangerous situations. The operator must strictly avoid making oblique pulls, which are always dangerous and difficult to control and can cause damage to the hoist. (fig.56)



Periodically check the efficiency of the chains and hooks, recording their condition in the appropriate logbook. (Chapter 8)



5.2.8 TROLLEY TRAVEL

The limit switches are generally located near the end of the beam, so as to make full use of the trolley's travel. Therefore, especially near the end of the beam, avoid movement manoeuvres with short repeated impulses or abrupt reversals of direction which, in addition to causing damage to the mechanical parts, can also generate dangerous swinging of the load with the risk of impact or violent collision between the trolley and the mechanical stops at the end of the beam (fig. 57).



fig.56

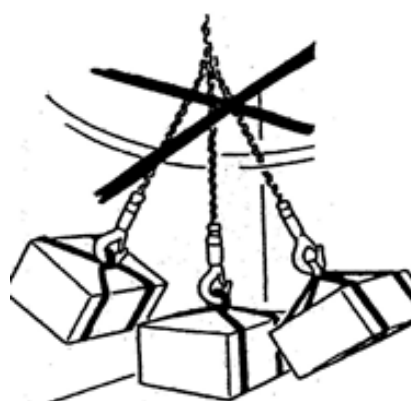


fig.57

5.2.9 SAFETY DEVICES

Cut off the power supply to the DMK chain hoist and its trolley by switching off the main on/off switch/line disconnecter and/or by pressing the emergency-stop button on the push-button panel.

An electrical and/or mechanical interlock prevents simultaneous control in the two directions of rotation of the motors, both at slow and fast speed.

A power failure causes the immediate blocking of all movements of the hoist and the trolley, as the electric motors are equipped with automatic braking devices.

The safety carabiner is installed on the lifting hook to prevent accidental unhooking of the sling and/or load (fig. 58).

The lifting limit switches (optional for a chain pull) and travel limit switches (optional) limit the maximum vertical and horizontal travel of the hook. They are emergency devices and are not suitable as service stops or enabling devices for subsequent operations.

The overload device or clutch device prevents the hoist from being overloaded.



- ▶ The safety devices, when not supplied by DONATI SOLLEVAMENTI S.r.l., must be installed by the customer.
- ▶ It is forbidden to put the hoist into service before it has been completed in accordance with the requirements in this section.



5.3 ENABLING - STARTING THE HOIST



To start operating, perform the following operations:



1. Visually check the integrity of the DMK chain hoist, any trolley and the structures where they are installed. Pay particular attention to the chain, the hook and its snap hook.
2. Carry out all the preliminary checks as described in section 5.5 "Criteria and precautions for use"
3. Activate the power supply line by setting the main switch to the "ON" or "1" position
4. Check that there are no people exposed to risk in the danger zones
5. Set the red mushroom "**emergency stop**" button to enable operation (fig. 59)
6. Activate all functions by pressing the "**start**" button, if available, and, if available, give warning of the start of manoeuvres using the "**alarm**" button which activates the audible warning device
7. Check performance of the safety devices by monitoring the movements as described in paragraph 5.1 "The functions of the hoist"



fig.58



fig.59

5.4 STOPPING THE HOIST - DISABLING AT THE END OF WORK

Normal stop:

- ▶ A normal stop of the controlled functions is achieved by simply releasing the relevant buttons. When they return to '0', the corresponding movements are instantly locked and held in a stable, safe condition by the motor brakes.

Emergency stop:

- ▶ The emergency stop must be used only when there are hazardous conditions for which the hoist must be stopped immediately in all its functions.



- ▶ In the event of serious faults, or unrecognised faults, stop the machine by immediately pressing the red mushroom-shaped emergency stop button on the control panel and wait for the appointed technical personnel to intervene.



- ▶ Do not use the emergency stop as a normal stop for the controlled functions.

Resuming operation after an emergency stop:



To restore operation after an emergency stop, you must:



1. Remove the cause that triggered the emergency stop.
2. Release the "emergency stop" button and return it to the normal operating position.
3. Repeat the procedure described in points 6 and 7 of paragraph 5.3 "Enabling".

Stopping and disabling the hoist at the end of work:



Deactivate the hoist as follows:



1. Place the load in the intended location. Never leave the load suspended (fig. 60)
2. Free the lifting hook from any slings used to move the load
3. Store the hoist/trolley in the area designated for parking when not in operation
4. Raise the hook to a height of not less than 2.5 m so that it does not cause disturbance or danger to the movement of people and objects below the hoist (fig. 61)
5. Stop the movements of the hoist by fully pressing the red mushroom-shaped "emergency stop" button
6. Return the push-button panel to the "do not disturb" position
7. Disconnect the power supply by placing the lever of the line disconnector in the '0' or 'OFF' position.

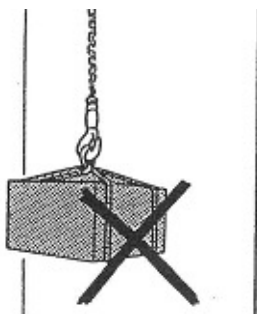


fig.60

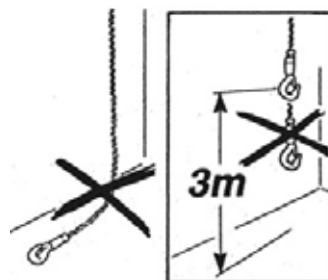
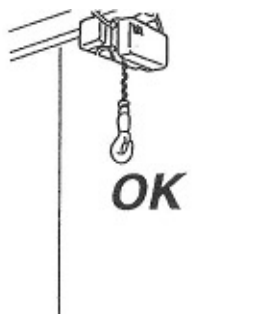


fig.61

5.5 CRITERIA AND PRECAUTIONS FOR USE



► **Correct use of the DMK series electric chain hoists and their travelling trolleys allows you to make full use of their performance in complete safety.**



► **This potential is guaranteed only by strictly following the instructions below:**

- **ALWAYS** follow the directions and instructions in the use and maintenance manual and check the integrity of the components and parts of the hoist.
- **ALWAYS** ensure that the hoist operates in an environment protected from the elements (rain, wind, snow, etc.) or, if used outdoors, that it is fitted with adequate shelter or protection. (fig.62).
- **ALWAYS** check the performance of the hoist in relation to the service for which it is intended. (work cycles - intermittence - time of use - load to be handled) - (fig. 63).
- **ALWAYS** check the suitability of the structures supporting the hoist and the trolley.
- **ALWAYS** check that the sliding beam is placed at a height that does not allow the operator to interfere with the hoist's profile. If this is not possible, arrange for suitable guards or signs in the risk area (fig. 64).
- **ALWAYS** check, before operating, that the sliding area of the trolley is free of obstacles.
- **ALWAYS** ensure that the hoist and its main components (chain, hook, push-button panel, etc.) are properly maintained (cleaned, lubricated).
- **ALWAYS** check that the motors are operating correctly.
- **ALWAYS** check that the movements of the hoist and the trolley correspond.
- **ALWAYS** test the functionality of the "emergency stop" button.

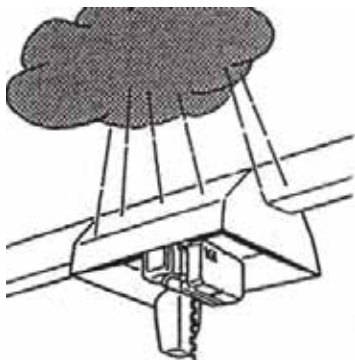


fig.62

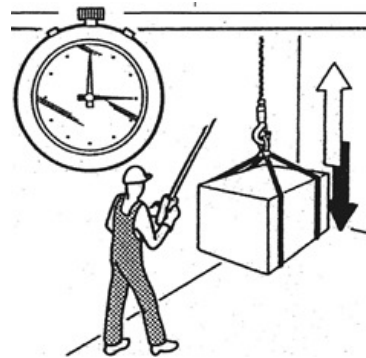


fig.63



fig.64

- ▶ **ALWAYS** make sure that you have centred the hoist hook directly above the load before slinging and moving it (fig. 65).
- ▶ **ALWAYS** secure the load slings correctly to the lifting hook and tension the slings with slow and safe manoeuvres.
- ▶ **ALWAYS** make sure that the hook is not worn, damaged or missing a carabiner.
- ▶ **ALWAYS** check the efficiency of the brakes and limit switches, constantly verifying their functionality.
- ▶ **ALWAYS** operate outside the manoeuvring range of the lifted load (fig. 66).
- ▶ **ALWAYS** ensure the integrity and efficiency of the chain, hook and push-button panel.
- ▶ **ALWAYS** warn persons at risk before starting handling operations.
- ▶ **ALWAYS** ensure that the load does not encounter obstacles during handling operations (lifting and traversing) (fig. 67).
- ▶ **ALWAYS** operate only when lighting of the area and visibility of the load are at their best.
- ▶ **ALWAYS** operate the movements, avoiding command pulses in rapid succession.
- ▶ **ALWAYS** avoid combining movements by simultaneously pressing the lifting and traversing buttons and take care not to cause the load to swing (fig. 68).
- ▶ **ALWAYS** use "slow" speed for approach and positioning operations.
- ▶ **ALWAYS** press the red "emergency stop" button on the control panel and switch off the main line switch before leaving the operating position.
- ▶ **ALWAYS** report any operating anomalies (faulty behaviour, failure, suspected breakage, incorrect movements and abnormal noise) to the department manager and take the machine out of service.
- ▶ **ALWAYS** comply with the maintenance schedule and, at each check, record any observations relating, above all, to hooks, chains, brakes and limit switches.

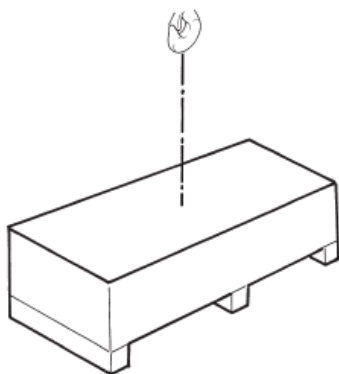


fig.65

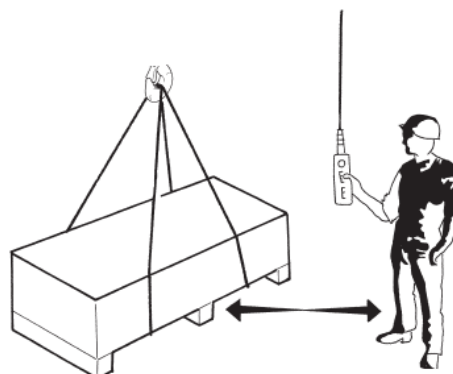


fig.66

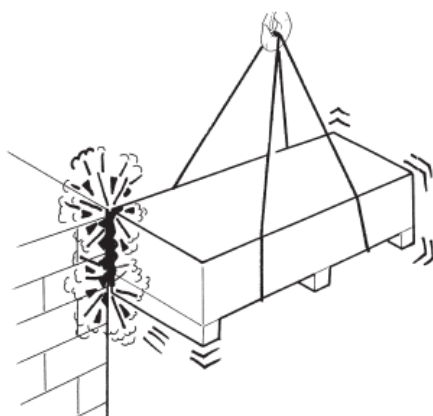


fig.67

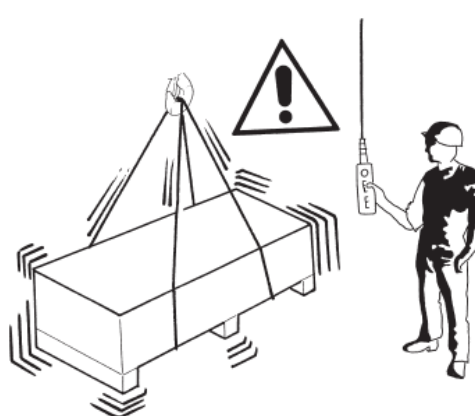


fig.68

5.6 CONTRAINDICATIONS FOR USE



- ▶ The use of the hoist for unauthorised manoeuvres, its improper use and lack of maintenance can pose serious risks to the health and safety of the operator and other exposed persons, cause damage to the working environment, and impair the functionality and intrinsic safety of the machine. 
- ▶ The actions described below, which obviously cannot cover the entire range of possible “misuse” of the hoist, but nevertheless constitute those most reasonably foreseeable ones, are strictly prohibited and therefore:

5.6.1 UNINTENDED AND PROHIBITED USE – FORESEEABLE AND UNFORESEEABLE IMPROPER USE

- ▶ **NEVER** use the hoist for lifting and transporting people (fig. 69).
- ▶ **NEVER** pass, stand, operate or manoeuvre under the suspended load (fig. 70).
- ▶ **NEVER** lift loads exceeding the nominal load capacity of the hoist.
- ▶ **NEVER** allow the hoist to be used by unqualified personnel or persons under the age of 18.
- ▶ **NEVER** place your hands on the moving chains, on the slings during the “tensioning” phase, in the areas of contact with the load, or between the hook and the slings (fig. 71).
- ▶ **NEVER** leave the load unattended.
- ▶ **NEVER** use the hoist for operations other than those for which it is intended; avoid using it for other operations such as painting ceilings, replacing lamps, etc.
- ▶ **NEVER** swing the load or the hook block during travel.
- ▶ **NEVER** place the chain in a diagonal pulling position.
- ▶ **NEVER** tow or drag masses with the hoist (fig. 72)

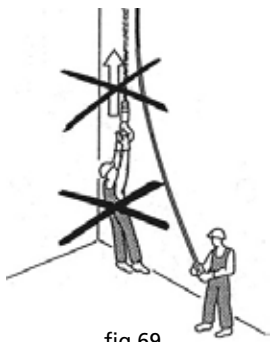


fig.69

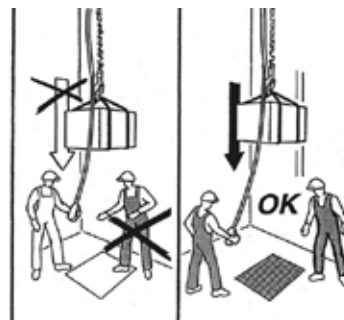


fig.70



fig.71



fig.72

- ▶ **NEVER** use the lifting chain as a sling for the load (fig. 73).
- ▶ **NEVER** lift loads with the tip of the hook.
- ▶ **NEVER** continue the hook run after positioning the load, causing the chain to bend.
- ▶ **NEVER** use the hoist and the trolley with two simultaneous movements; wait for one movement to stop completely before starting another.
- ▶ **NEVER** leave the hoist exposed to the elements (rain, wind, snow, etc.) at the end of work.
- ▶ **NEVER** cause the automatic limit switches to intervene continuously.
- ▶ **NEVER** use the hoist in the event of a significant voltage drop or if one of the phases is missing.
- ▶ **NEVER** perform sudden reversals of direction during handling operations. (fig.74)
- ▶ **NEVER** repeatedly press the control buttons on the push-button panel.
- ▶ **NEVER** modify the functions and performance of the hoist and/or its components.
- ▶ **NEVER** carry out temporary repairs or restoration work that does not comply with the instructions.
- ▶ **NEVER** use the hoist in areas where the use of explosion-proof components is required.
- ▶ **NEVER** tamper with the settings of the safety devices (limit switches and overload device).
- ▶ **NEVER** use spare parts that are not original or not specified by the manufacturer.
- ▶ **NEVER** entrust extraordinary maintenance and repairs to personnel who are not highly specialised.
- ▶ **NEVER** leave the hoist at the end of work without having lifted the hook and its block to a height of not less than 2.5 m (fig. 75).
- ▶ **NEVER**, do the following during maintenance: (fig.76)
 - ▶ place ladders against the hoist or the trolley
 - ▶ intervene without having removed the lifted load



fig.73

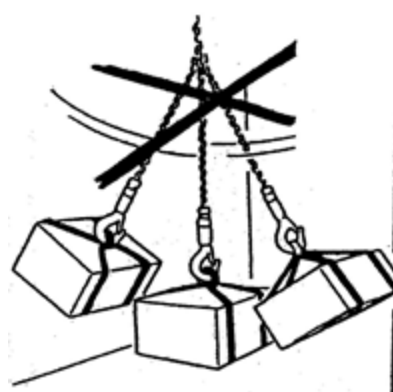


fig.74



fig.75

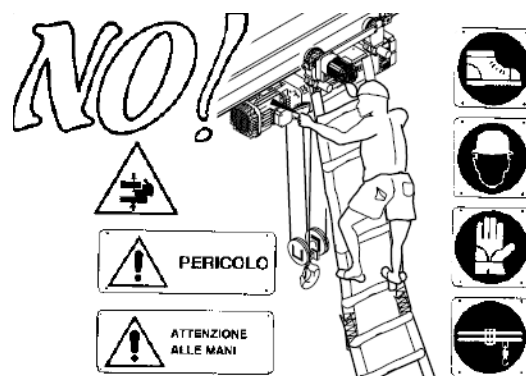


fig.76

6. HOIST MAINTENANCE

6.1 SAFETY PRECAUTIONS

The accident prevention precautions in this chapter must always be strictly observed during maintenance in order to avoid physical injury and damage to the hoist.

These precautions are referred to and further detailed in **WARNING** and **DANGER** notes whenever a procedure is required that may involve a risk of damage or injury:



The **WARNING** notes precede an operation which, if not performed correctly, may cause damage to the hoist or to the trolley, if present.



The **DANGER** notes precede an operation which, if not performed correctly, may cause injury to the operator.

6.2 QUALIFICATION OF MAINTENANCE PERSONNEL

Based on the provisions of the **ISO 9927-1:1994** standard, the maintenance of DMK series electric chain hoists and their travelling trolleys must be entrusted to maintenance technicians with proven experience who, due to their basic training, have adequate knowledge in the field of lifting equipment and are sufficiently familiar with the relevant reference standards to determine deviations from the operating conditions of the electric hoists and their components, i.e. personnel expressly trained and specialised for the purpose.



Maintenance personnel must also:

- ▶ have a thorough knowledge of the accident prevention regulations in force and be able to apply them
- ▶ have read this publication and have understood Chapter 3 “Safety and Accident Prevention” in particular
- ▶ prevent unauthorised personnel from accessing the work area during maintenance operations, possibly by cordoning off or marking the area



Special recommendations regarding maintenance:

1. Maintenance work, if carried out correctly, guarantees the safety of the operators assigned to use the hoist and minimises downtime after a fault
2. Repairs carried out in a timely manner prevent further deterioration of the hoist
3. Use original spare parts or products as far as possible



Maintenance operations must be carried out, whenever possible, with the hoist disconnected from the power supply and in safe conditions, in accordance with the provisions of the laws in force on accident prevention.



For any problems that may arise or to order spare parts, please contact the DONATI SOLLEVAMENTI S.r.l. Technical Support Service.

6.3 MAINTENANCE PLAN

The maintenance plan includes ordinary operations, which involve inspections, checks and verifications carried out by the operator assigned to use the equipment and/or by qualified personnel assigned to normal company maintenance, and periodic operations, which include replacement, adjustment and lubrication operations carried out by technical personnel trained for the purpose through specific courses or publications.



- ▶ Since maintenance operations may be carried out at a dangerous height above the ground, the personnel in charge must have appropriate and suitable means (scaffolding, platform, ladders, etc.) that allow them to carry out the activity safely.
- ▶ Personnel must also be equipped with adequate and suitable personal protective equipment (PPE), in compliance with the laws in force.

6.3.1 DAILY AND PERIODIC MAINTENANCE

This includes maintenance operations that can be performed by the operator assigned to use the hoist or by qualified personnel, as prescribed in this publication and/or in any attached documentation, which do not require the use of special tools and equipment.

Maintenance operations are divided into:



Daily operations, carried out by the operator assigned to use the hoist:

- ▶ general visual checks
- ▶ functional checks: motor test, limit switch test, no-load brake tests, test of the "stop operation" buttons and other functions of the push-button panel
- ▶ check of the condition of the chain and hook



Monthly operations, by qualified personnel:

- ▶ visual inspection of each mechanism and for any leakage of the lubricant
- ▶ functional check of the brakes at full load
- ▶ check that there are no abnormal noises and/or vibrations
- ▶ greasing of mechanisms and limit switches to ensure smooth operation and limit wear
- ▶ checking the functionality and integrity of the push-button panel and its cable.



**Quarterly operations, by qualified personnel:**

- ▶ check of efficiency and wear of the hook and chain
- ▶ check for wear on the wheels, sprockets and guide rollers of the travel trolley
- ▶ check the efficiency and functionality of the overload device.
- ▶ visual check inside the panels for any dust
- ▶ check for oxidised contacts: after cleaning, they must be covered with a very light layer of Vaseline
- ▶ check the greasing of the mobile trolleys of any festooned cable line and check the cables
- ▶ check of the efficiency and integrity of the power supply line and its components
- ▶ check of the motors and brakes under load and check for wear



6.3.2 FREQUENCY AND DEADLINES OF MAINTENANCE OPERATIONS

The frequency of the following operations refers to DMK hoists used under normal conditions of use and is valid up to duty class M6 (ISO 4301-1:1988 standard) or 3m (FEM rule 9.511/86).

If the hoist is used normally and correctly for an 8-hour daily shift, it can be overhauled after a period of use of approximately 10 years (FEM rule 9.755/93). If it is used over several shifts, the maintenance intervals must be reduced proportionally.

Table of periodic inspection and maintenance work

Subject of the check ▼	Periodic checks			
	Daily	Monthly	Quarterly *	Annual *
Checks Inspections - Tests	General visual checks. Checks for correct operation 	General visual inspections 	Check for wear 	Annual testing   
Structural elements Welds, Pins and Hinges				Check for wear and efficiency Check of the bolted/welded joints 
Chain Fixing elements	Visual inspection 		Check for wear and efficiency 	
Lifting hook	Visual inspection and carabiner check 		Check for wear and efficiency 	
Lifting gear reducer Travel gear reducer		Check for noise 		
Lifting motor Traverse motor	Check for correct operation 		Load tests 	
Freno sollevamento Freno traslazione	Check for correct operation 	Load tests of braking distances 	Load tests Check for wear 	
Wheels and pinions DMT guide rollers			Check for wear 	
Trolley buffers				Check for wear and efficiency 
Power supply Push-button panel and cable	Check for correct operation 	Visual inspection for external breakage of the push-button panel/cable 	Check for wear and efficiency 	
Overload device			Load tests to check intervention 	Check of calibration 
Lifting limit switch Travel limit switch	Check for correct operation 		Load tests Check for wear and efficiency 	
Cleaning and lubrication	Check of the correct state of cleaning and lubrication 	Check of general lubrication 	Check for leaks Lubrication of the chain, hook and mechanisms 	

* The following operations must be strictly recorded in the appropriate logbook (See chapter 8)

6.3.3 EFFICIENCY CHECKS OF PARTS AND COMPONENTS



For the individual parts of the DMK series electric chain hoists and their travelling trolleys, it is recommended that the following instructions be strictly observed:



Annual check of the efficiency of the structural elements:

In addition to normal alterations due to environmental factors and wear of moving parts, metal structures may, even inadvertently or during handling operations, be subjected to impacts, contact or scraping with other equipment, or to abnormal stresses that can cause damage to the structural frames, welds and pins. Therefore, after thorough cleaning, the structures must be periodically subjected to meticulous checks to ascertain their suitability and, if necessary, to remedy any damage.



Repair the structures or replace them if any of the following occur:

- ▶ **deformations:** elongation, crushing, dents, bending
- ▶ **wear:** worn parts, cross-section reductions, incisions, abrasions, corrosion, oxidation, scratches, peeling paint
- ▶ **breaks:** cracks in welds, fissures, cuts or incisions, broken parts
- ▶ **variations in cross-sectional area $\geq 10\%$, or in diameter or thickness $\geq 5\%$, relative to the initial values**



Quarterly inspection of the efficiency of the lifting chain and the fastening elements (pins):

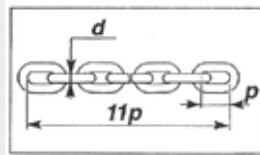


Chain check:

- ▶ The chain and pin are subject to wear.
- ▶ Check the condition of the chain to assess any degradation.
- ▶ Regular lubrication extends its life.
- ▶ It is often possible to improve chain performance by analysing the used chain to ascertain the causes of its deterioration.
- ▶ During inspections, it is advisable to carefully observe the parts of the chain that wrap around the sprockets and those near the fixing points at the ends.
- ▶ Record the date and results of the examinations in the appropriate logbook, so that the period in which the chain will need to be replaced can be predicted in the future.
- ▶ The decision to replace the chain, in accordance with **FEM 9.671 paragraph 4**, must be determined by the degree of wear and corrosion and other damage found.



The chain must be replaced if it shows wear or deformation as per the table below (see FEM standard 9.671 paragraph 4):



DIMENSIONS	DMK1	DMK2	DMK3	DMK4
Chain type	4x12	5x15	7x21	10x28
Nominal diameter of rod d (mm)	4	5	7	10
Minimum diameter of worn rod dm (mm)	3.6	4.5	6.3	9
Nominal pitch p (mm)	12	15	21	28
Max. pitch of worn mesh (mm)	12.6	15.75	22.05	29.4
Length of 11 new links = 11 times p (mm)	132	165	231	308
Max. length of 11 worn links (mm)	135.8	170.9	238.2	317.7
Minimum breaking load in kN	20.10	31.4	61.6	126



Quarterly check of the efficiency of the lifting hook (fig.77):



The hook must be examined, reporting any anomalies relating to:

- ▶ Deformations, elongations, incisions, wear, corrosion, abrasions.
- ▶ Integrity and functionality of the anti-release safety device (carabiner).
- ▶ Excessive friction; the hook must rotate and move freely in all directions with smooth motion and without jerking. Otherwise, it must be disassembled and the bearing examined.
- ▶ Wear of the area in contact with the harnesses.



Replace the hook in the case of:

- ▶ permanent deformation with widening of the inlet opening by more than 10%.
- ▶ size reductions anywhere > 5%.
- ▶ To check the dimensional characteristics of the hooks, see the table (fig. 77)
- ▶ For replacement procedures, contact the DONATI SOLLEVAMENTI S.r.l. technical support service.



Characteristics of the lifting hooks of DMK hoists (fig.77)

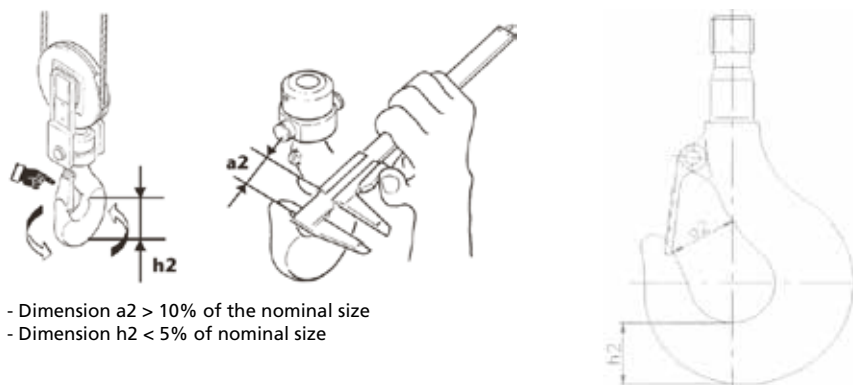


fig.77

DMK size	No. of falls	DMK type in relation to capacity (kg) and FEM service group			Hook characteristics		
		FEM duty class 2m Maximum load capacity	FEM duty class 1Am Maximum load capacity	FEM duty class 1B Maximum load capacity	a2	h2	Type No.
1	1	250	/	200 single-phase	24.2	17	/
2	1	500	/	400 single-phase	28.6	22	/
3	1	1000	/	800 single-phase	35.7	29	/
4	1	2000	/	/	41.6	37	/
4	2/1	3200	4000	/	45	48	1.6 V



Monthly check of the efficiency of the hoist and trolley gear reducers:

- ▶ Check that the noise of the gearboxes does not vary in intensity. Excessive vibration or noise indicates wear of the teeth or failure of a bearing.
- ▶ Check that there are no lubricant leaks.



WARNING:

- ▶ The gear reducers are lubricated for life and do not require any maintenance or topping up with lubricant.



IN THE EVENT OF A FAULT:

- ▶ It is forbidden to perform corrective maintenance on the lifting and travel gearboxes.
- ▶ All extraordinary maintenance of the lifting and travel gear reducers must be carried out by the DONATI SOLLEVAMENTI S.r.l. service department or by personnel authorised by the company itself.



Quarterly check of the efficiency of the hoist and trolley motors:

- ▶ Clean the hoist or trolley motor by removing dust from the casing that could hinder normal cooling; check that the ventilation openings are not obstructed.
- ▶ Check, under nominal load, that no abnormal noises are present (buzzing, rubbing).
- ▶ Check that the temperature of the casing does not exceed 110°C. If it does, look for the causes and check the service for which the hoist is intended (see point 6.7 "Troubleshooting").
- ▶ Check the current consumption and voltage, comparing them with the nominal values indicated on the nameplate of each motor (see also motor data in point 2.2.7 of this publication)



IN THE EVENT OF A FAULT:

- ▶ It is forbidden to carry out corrective maintenance inside the lifting and travel motors.
- ▶ Any extraordinary maintenance operation on the lifting and travel motors must be carried out by the DONATI SOLLEVAMENTI S.r.l. support service or by personnel authorised by the latter.





Monthly check of the braking distances

- ▶ Check that the braking distances, with nominal load, do not exceed those specified (fig. 78).



If values higher than those shown in the following table are found, adjust the brake as described in paragraph 6.4 "Adjustments".



Braking distances (cm) with nominal load	
DMK	MAX BRAKING DISTANCE
1	3 cm
2	3 cm
3	4 cm
4	4 cm

fig.78



Quarterly check of the efficiency of the brakes of the hoist and trolley motors:

- ▶ Check for correct brake release at each intervention, verifying that the rotor does not remain braked and/or that there is no rubbing.
- ▶ Under nominal load, verify that, after releasing the button, the brake keeps the load suspended for at least 10 minutes without any drop or slippage. In the event of slippage, set the load down, switch off the power supply and check the wear of the surfaces of the brake lining and the brake block, checking for any anomalies.
- ▶ If necessary, adjust the brake and/or replace the brake cover and brake gasket as described in paragraphs 6.4 'Adjustments' and 6.5 'Replacements'



- ▶ Replace the brake cover and fit the new brake gasket if the load remains unstable even after the brake has been adjusted



IN THE EVENT OF A FAULT:

- ▶ It is forbidden to perform corrective maintenance on the brakes of the self-braking lifting and travel motors.
- ▶ Any extraordinary maintenance operation on the lifting and travel brakes must be carried out by the DONATI SOLLEVAMENTI S.r.l. support service or by personnel authorised by it.



Quarterly efficiency check of the wheels, pinions and guide rollers (optional on electric trolleys). (fig.79)



- ▶ Check the wear of the flanges and rolling bands of the wheels of the travel trolleys and of the optional guide rollers in the electric travel version.
- ▶ Also check the ball bearings, which must be replaced if there is excessive noise or excessive friction, or if rotation is "jerky", difficult and/or irregular.
- ▶ Check the wheel crown gears and their pinions for wear and lubrication. If necessary, lubricate the gears after thorough cleaning or replace both wheels.



Replace the wheels and/or guide rollers of the travel carriage if:



- ▶ The thickness of the wheel flange is reduced by $\geq 50\%$
- ▶ The rolling diameter of the wheel shows wear of ≥ 5 mm
- ▶ The wheel crown gear or the pinion show severe wear
- ▶ The rolling diameter of the roller shows wear of ≥ 2 mm
- ▶ The procedure for replacing the wheels of all types of trolley is given in point 6.6 "Replacement of parts and components"



Monthly check of the braking distances



- ▶ Check that the end stops are not deformed and that there are no signs of failure in their attachment to the structures, and that the buffer is intact and securely attached to its support.



Replace the buffers when they show:



- ▶ Signs of breakage or permanent deformation, cuts, abrasions, incisions

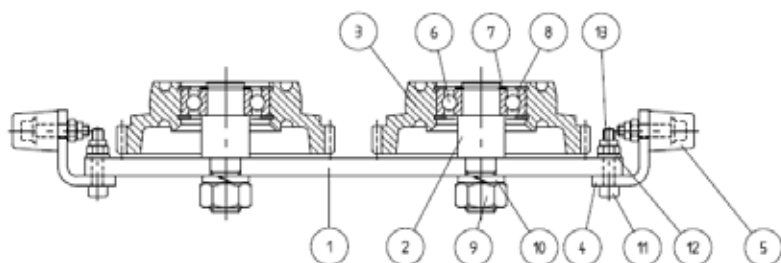


fig.79

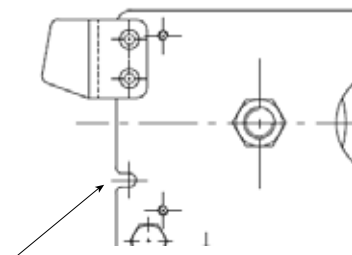


fig.80



- ▶ fig.80. If there is a power supply line with under-beam trolleys (E46*), fit the 6x50 screws using the nuts and washers supplied, in order to prevent interference between the DMK trolley and the electric system.



6.3.3.1 LOWERED HOISTS

Annual check of the efficiency of the bracket and connecting tie rods

The lowered brackets, consisting of two side plates connected by bolted (or welded) tie rods and designed to house the chain return sprockets, are subject to stresses resulting from work cycles, vibrations, accidental impacts and aggressive environments.

Therefore, after thorough cleaning, all components must undergo an in-depth check annually to ensure their full structural integrity.

During the check, in particular, make sure that:

- ▶ the side plates do not show any deformation, bending, dents, ovalisation of the holes, corrosion or cracks;
- ▶ the tie rods do not show any bending, wear, corrosion, damage of the threads or settling at the support points;
- ▶ any bolts are not loose: check correct tightening in relation to the nominal values (M10 = 25 Nm, M12 = 43 Nm);
- ▶ the contact surfaces between the tie rods and the plates are intact, without signs of crushing or scoring;
- ▶ the distance and parallelism between the two plates are consistent with the design and free from abnormal variations;
- ▶ there are no traces of impacts, rubbing or abnormal stresses due to use.

Repair and replacement of the bracket and connecting tie rods

For repair and replacement, see the notes on structural elements on page 79.

Annual check of the efficiency of the chain return sprockets

The chain return sprockets, installed inside the bracket and supported by special supports, are rotating parts and therefore subject to wear, oxidation and alterations in free movement.

During the annual check, ascertain:

- ▶ the free rotation of the sprockets, which must take place without jamming or abnormal noises;
- ▶ the integrity of the grooves: absence of irregular wear, chipping or deformation;
- ▶ the absence of excessive play on the rotation axis;
- ▶ the condition of the bearings, checking that they do not exhibit: abnormal noise, irregular rotation or high friction;
- ▶ the correct tightening of the bolts of the side supports.

Replacing the chain return sprockets

Replace:

- ▶ the sprocket in case of wear of the grooves or deformations;
- ▶ the bearings if there is noise, irregular rotation or difficulty in sliding.

6.3.3.2 CLIMBING HOISTS

Annual check of the efficiency of the chain box support

The chain collector support of the climbing version is a steel component designed to guide the chain towards the chain collector bag and to support it by means of connecting snap hooks.

During operation, this component is subject to wear due to the sliding of the chain, as well as to stresses resulting from the weight of the chain housed in the bag.

Therefore, after thorough cleaning, the chain-collector support must undergo a thorough annual check to ascertain its suitability for use and operational safety.

During the check, ensure that:

- ▶ the chain's sliding surfaces do not show excessive wear or deformations that could compromise the correct routing of the chain (e.g. formation of loops outside the bag);
- ▶ the steel support does not show any corrosion or cracks;
- ▶ the anchoring holes for the carabiners are not ovalised or worn;
- ▶ the carabiner clips securing the chain bag are intact, free from deformation, wear and corrosion, and the locking system functions correctly.

Repair and replacement of the chain collector support

The chain-collector support and its fasteners must be repaired or replaced if any of the following are found:

- ▶ wear of the sliding surfaces such as to alter the correct sliding of the chain or to generate sharp edges;
- ▶ deformations of the support such as bends, crushing or dents that may change the trajectory of the chain;
- ▶ breaks or cracks in the base material, in particular near the areas of greatest stress;
- ▶ ovalisation or increase in the diameter of the anchoring holes $\geq 5\%$ compared to the initial values;
- ▶ wear or deformation of the snap hooks.

Quarterly check of the efficiency of the lifting hook

For the check of the lifting hook and its components, see the notes on page 80.

Replacing the lifting hook

To replace the lifting hook, see the notes on page 80.



Quarterly check of the efficiency of the electric control system:

(in the case of a hoist and any trolley with a built-in LV control panel)

WARNING! Some of the operations described below are carried out under live voltage; work with the utmost caution.



- ▶ Check the inside of the control equipment by removing the screws from the cover.
- ▶ Using the push-button panel, check that the moving parts of the contactors move with minimal friction; otherwise, the force of the electromagnet may be insufficient to ensure good pressure between the contacts.
- ▶ To avoid loose contacts, overheating or noise, check that the supply voltage of the coils is correct.
- ▶ Check the efficiency of the conductors and the earthing connections by inspecting all the screws of the earth terminals and tightening any that are loose.
- ▶ Check that the terminals are properly tightened; check that the identification number is clearly visible on the terminals; check the integrity of the thermal insulation material and, in the event of cracks or breakage, replace it promptly.
- ▶ Provide a regular supply for each type of fuse installed (see wiring diagram), so that a quick replacement with the same type of fuse can be made if necessary.
- ▶ Check all the seals on the covers and cable glands.
- ▶ Check that the warning plates are in place on the cover and are in good condition.



- ▶ Do not hesitate to replace the electrical component if it is no longer able to offer sufficient guarantees of functional reliability.
- ▶ Never carry out improvised or makeshift repairs.
- ▶ Use original spare parts.



Monthly check of the push-button panel and its cable.

- ▶ Check the condition of the push-button panel, check the functionality and efficiency of all the buttons, and clean by removing dirt or any sludge from the button housings. Check the legibility of the plates. Check the seals.
- ▶ Check that the push-button panel's multi-core cable and all the flexible cables are in good condition and that there are no cuts, abrasions, stripping or exposed conductors. Check the efficiency of the push-button panel's suspension ropes and their correct attachment to the hoist body.



If any breakages of the push-button panel, abrasions, cuts or stripping of the cable are found, inform the electrical maintenance technician for replacement.





Quarterly check of the efficiency of the overload device (fig.81):



► **Clutch device (hoists with 1 chain fall)**

Emergency device and limit switch for upward and downward movement; it also functions as an overload device. The asbestos-free clutch discs are preloaded with a disc spring system.

► **Overload device (hoists with 2 chain falls)**

Electromechanical type, with a microswitch featuring a single intervention threshold.

The calibration of the load limiters installed on DMK chain hoists falls within intervention thresholds corresponding to the nominal load capacity increased by the following percentages:

1 clutch fall from min. 40% to max. 60%

2 electromechanical falls of max. 20%.

The triggering of the overload device signals that the maximum permissible load limit has been reached and stops only the upward movement.

- Verify proper operation by checking that it trips under a load corresponding to its calibration.
- Repeat the operation several times, checking the repeatability of the release values.
- Check the mechanical integrity and cleanliness of the moving parts (lever and pins), and verify that the pivot cotter pins and the microswitch mounting screws are properly tightened (two falls).



► Overload devices are safety components, and their failure or malfunction can compromise the safety of people in the vicinity!



► The calibration value for the tripping limit of the overload device's intervention threshold must be verified, in accordance with FEM rule 9.761, at least once a year using suitably prepared knownweight masses and/or a load cell that displays the load values.

► It is recommended that the values obtained during the annual calibration checks of the overload device be recorded in the audit log.

► Do not tamper with or disconnect the overload device, or change the preset calibration values.

► If it becomes necessary to recalibrate the limiter, this operation must be carried out by the DONATI SOLLEVAMENTI S.r.l. support service or by personnel authorised for this purpose.

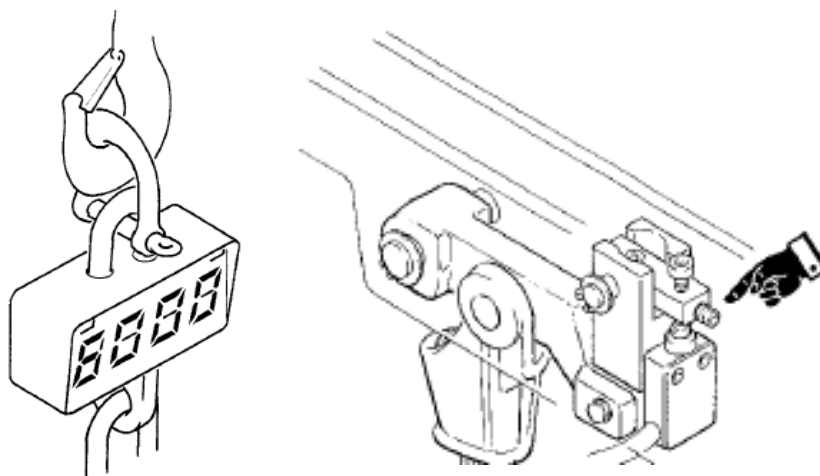


fig.81



Quarterly check of the efficiency of the hoist and trolley limit switches (fig.82):

- ▶ Check their state of repair and proper operation (activate the limit switches several times) and, in particular, check their operation during a normal manoeuvre at full load, testing them first at low speed when available.
- ▶ Check the mechanical integrity of the moving parts (lever and springs) and verify the tightness of the fixing screws.



- ▶ Limit switches are devices with safety functions and their failure or malfunction can compromise the safety of exposed persons!
- ▶ Do not hesitate to replace the limit switch in question if it is not able to offer sufficient guarantees of functional reliability.
- ▶ Never carry out improvised or makeshift repairs on the limit switches!
- ▶ Use original spare parts.

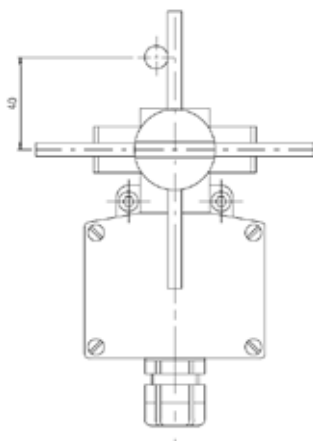


fig.82

6.3.4 CLEANING AND LUBRICATING THE HOIST



Cleaning can be carried out by personnel who are not highly specialised. It is periodically necessary to keep the hook and the push-button panel clean.



Cleaning work at height must be carried out by qualified personnel equipped with suitable means and personal protective equipment.

These operations are required on a quarterly basis to allow the periodic checks to be carried out.

- ▶ Cleaning can simply be carried out using the equipment, detergents or solvents commonly employed for the general cleaning of industrial equipment, as there are no particular contraindications regarding the products or materials used.
- ▶ Clean by removing any foreign substances and dirt with vacuum cleaners, absorbent cloths, etc.
- ▶ Wipe off excess grease and/or oil from the parts.



Proper management of the lubrication of the hoist mechanisms is essential to ensure their optimal use for the longest possible time.



- ▶ The lubricating properties decrease over time due to stress, so the lubricants must be replenished or replaced.
- ▶ Lubrication of the hoist is very simple and can be carried out by scrupulously following the instructions contained in this manual.
- ▶ The hoist and trolley gear reducers are lubricated for life and do not require the lubricants to be replaced.
- ▶ Carry out the checks according to the frequencies indicated in the following table "Periodic lubrication operations" using the recommended types of lubricants or equivalent ones, wiping away excess oil or grease with a cloth.

COMPONENT	TYPE OF LUBRICANT		FREQUENCY
	OIL	GREASE	
Trolley wheels and sprockets	3 cm	Agip Blasla GR MU3	3 months
Chain	IP Mellana OIL320 SHELL Omala OIL 320 Agip Blasla OIL 320 BP Energol GR-XP320 ESSO Spartan OIL 320 KLUBER Lamora OIL 320		3 months



- ▶ Lubricants, solvents and detergents are toxic/harmful to health:
 - ▶ if placed in direct contact with the skin, they can cause irritation.
 - ▶ if inhaled, they can cause severe poisoning.
 - ▶ if swallowed, they can lead to death.
- ▶ Handle them with care using appropriate personal protective equipment (PPE)
- ▶ Do not release them into the environment; dispose of them in accordance with current legislation on toxic/harmful waste.

6.3.5 CLEANING AND LUBRICATING THE HOIST CHAIN



Be careful not to remove the fitted chain from the hoist's nut and do not remove the extractor. If the chain accidentally slips off the hoist's nut during maintenance, do not continue; instead, contact the DONATI Sollevamenti service network only.

The chain is the part most stressed by lifting the load, and must therefore be kept in a state of constant efficiency.

Periodic washing and lubrication of the chain extend its life, especially in abrasive atmospheres (glassworks, ceramics, etc.). Washing allows visual inspections to be carried out with better results.

To clean the chain, you need: a basin, a long-bristled brush, a container with kerosene, waterproof gloves, clean cloths, pliers and an oiler. A ladder for heights up to 3 m or a scaffolding tower for greater heights. (fig.83)

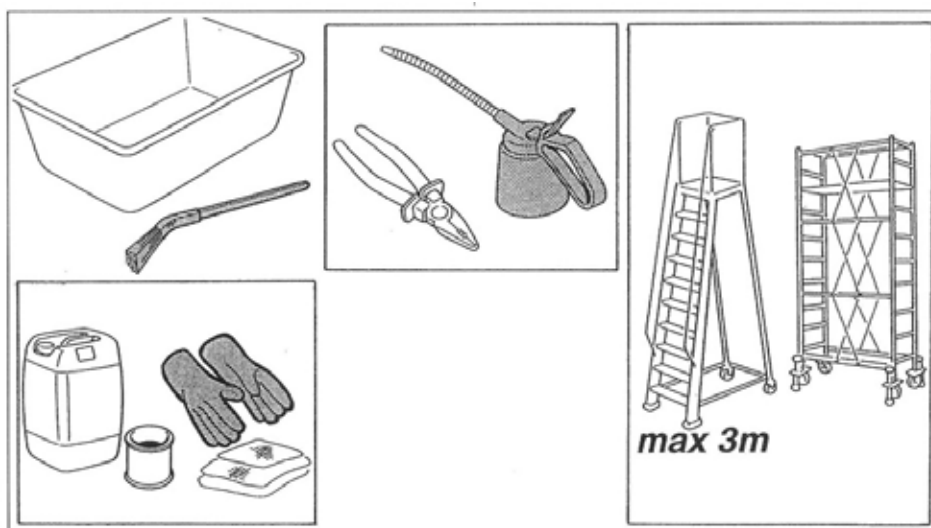


fig.83

To perform this operation, proceed as follows:

1. Place the collection basin under the hook. (fig.84)
2. Press the hook descent button "3" until it stops at the descent limit switch, then release the button. (fig.84)



This operation must be carried out with no loads on the hook and after disconnecting the power supply via the line disconnecter and signalling that work is in progress. The maintenance technician must wear a protective helmet, gloves and goggles.



3. Place the ladder or scaffolding to the side of the chain as required. (fig.84)

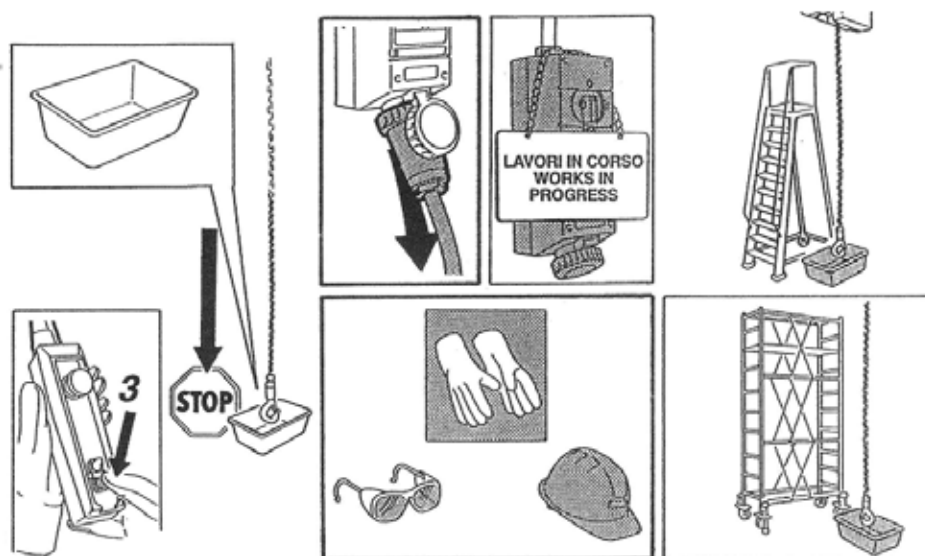


fig.84



The use of the forklift for lifting people is not permitted.

4. Climb onto the ladder or scaffolding and use the pliers to remove the cotter pin, remove the pin and bring the chain box to the ground. (fig.85)
5. Wash the inside of the chain collector with kerosene and dry it. (fig.86)
6. Wash the entire length of the chain, starting from the top, with the brush and kerosene, taking care to remove any type of dirt, especially dust, which becomes a real abrasive. (fig.87)



This operation must be carried out weekly if the hoist is installed in very dusty environments with aggressive atmospheres. (fig.87)

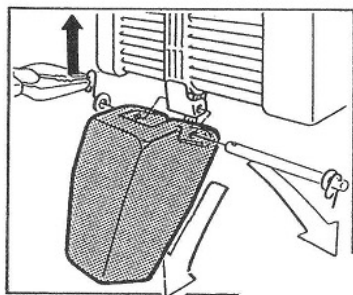


fig.85

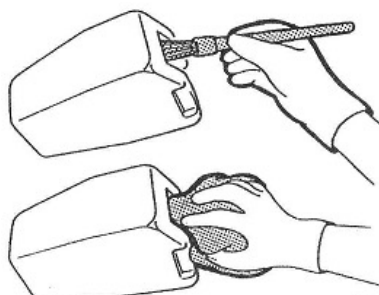


fig.86

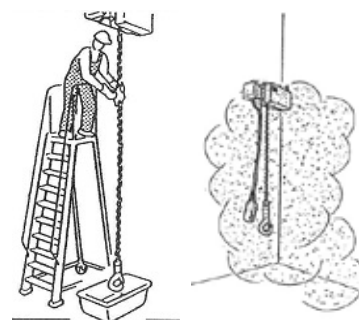


fig.87

7. Dry the entire length of the chain with clean cloths. (fig.88)
8. At this point, it is possible to carry out the dimensional and visual check of the chain and pin as described in the following sections.
9. Spray the oil generously and spread it over the entire length of the chain, taking particular care to lubricate the chain's contact points. See also point 6.3.4 for the types of oil. (fig.89)

If operation takes place in the presence of corrosive atmospheric agents, a dry lubricant must be used.

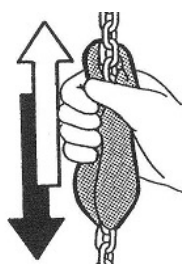


fig.88

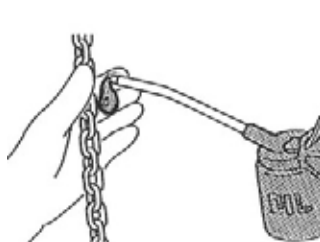


fig.89



Do not use the hoist for any reason with a dry or insufficiently lubricated chain: danger of excessive wear or breakage of the chain.

10. Fit the chain box onto the hoist attachment, insert the supplied pin and the cotter pin. (fig.90)



Do not dispose of the substances used to wash the chain in the environment; contact companies authorised to dispose of them. (fig.91)

11. Insert the connector and energise the line disconnector. (fig.92)

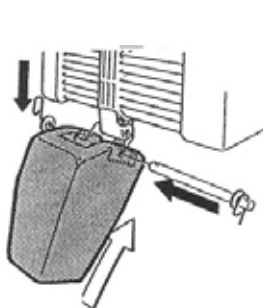


fig.90



fig.91

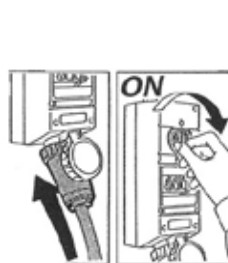


fig.92



fig.93

12. Press button "3" and then "2" to carry out a few upward and downward movements in order to distribute the oil evenly and also lubricate the hoist nut. (fig.93)

The cleaning and lubrication operation of the lifting chain is now complete

6.4 CALIBRATIONS AND ADJUSTMENTS



Information on the overload device for the version with two chain falls:



The overload device of the DMK4 chain hoist has been appropriately adjusted and calibrated by Donati Sollevamenti S.r.l. considering the hoist's intended capacity. Following testing, the micrometer screw -1-, for adjusting the calibration values, was locked with the grub screw 2-2 and sealed with a tamper-proof seal. The overload device is a component that has the safety function of preventing overloads, and the calibration values **MUST NOT** be altered. (fig.94)

If a new calibration is necessary, this operation MUST BE carried out by the technical service of Donati Sollevamenti S.r.l. or by personnel trained by the company and authorised for the purpose.



It is **MANDATORY** to connect the overload device to the control panel referring to the wiring diagrams. It is **FORBIDDEN** to tamper with the overload device or alter its calibration.

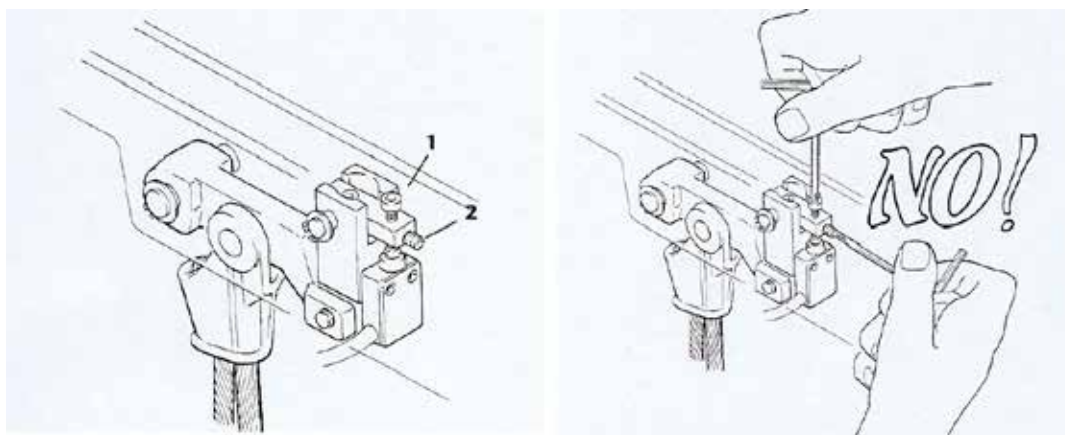


fig.94

Checking the operation of the clutch device for the single chain fall version

This operation must be carried out every 3 months as follows:

1. Place a sample weight, fitted with an eyebolt ring, whose value equals the hoist's nominal load capacity, under the hoist hook. (fig.95)
2. Hook the sample weight. (fig.96)
3. Press the raise button "2" or "2A" in the case of a two-speed hoist. Check that the load is lifted without any difficulty. (fig.97)
4. Also check that, when a load equal to the hoist's capacity plus 40% (max. 60%) is applied and you give short upward and downward impulses, the clutch device tends to slip.

If it does, operation is correct



If the conditions referred to in points 3 and 4 are not met, the clutch device must be adjusted and the 'out of service' conditions must be indicated IMMEDIATELY.



fig.95

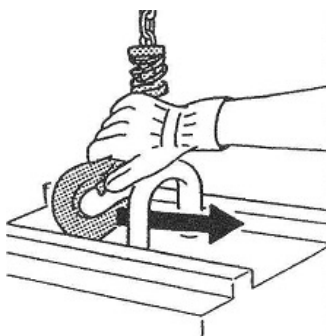


fig.96

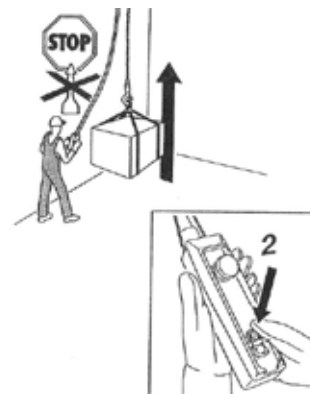


fig.97

6.4.1 ADJUSTING THE CLUTCH DEVICE



This adjustment requires care and expertise and can therefore only be carried out by the trained maintenance manager (or by a person delegated by him or her) who must have good technical knowledge and must follow the procedure below:



1. Place a sample weight, fitted with an eyebolt ring, under the hoist hook whose value is equal to the hoist's load capacity plus 40% (max 60%). (fig.98)
e.g.: nominal load capacity 1000 Kg - sample weight 1400 Kg (max. 1600 kg)
2. Hook the sample weight onto the appropriate eyebolt. (fig.99)
3. For heights up to 5 m, place a mobile scaffold with side rails on the side of the hoist's gearbox. For greater heights, carry out the operations using a mobile platform. (fig.100)
4. Secure the scaffolding with the appropriate feet.



fig.98

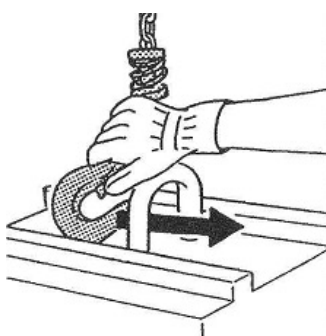


fig.99

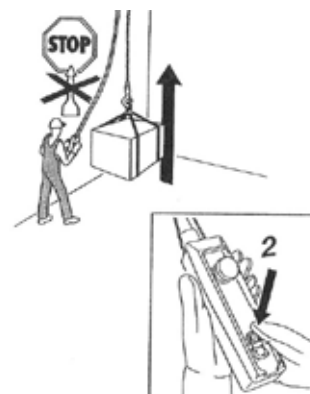


fig.100



This operation must be carried out by a specialised technician who, due to it being at a height, must wear a protective helmet, gloves, safety shoes, a harness with a locking safety carabiner and a rope harnessed to the anchorage point or to a stable point, NOT TO THE MOBILE SCAFFOLDING.



5. Climb onto the scaffolding and raise the hoist's push-button panel. (fig.101)
6. Completely unscrew the four screws of the gear reducer cover and remove it. (fig.102)



Make sure there are no people in the immediate vicinity of the sample weight.

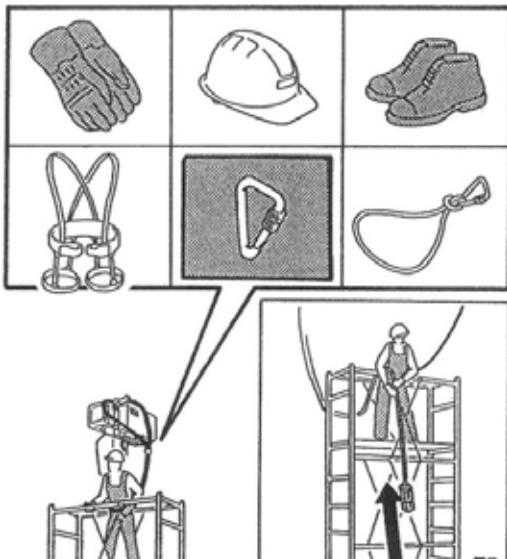


fig.101

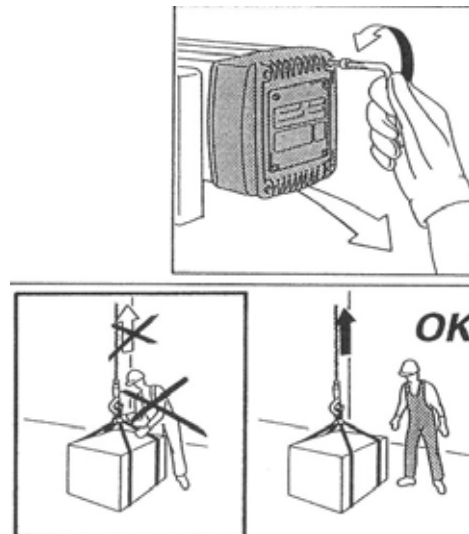


fig.102

7. Press the 'up' button (2) to tension the chain and attempt to lift the sample weight. (Fig. 103) If the sample weight is not lifted, do not insist on making the clutch "slip" but press the START/STOP button to secure the hoist.



Before adjusting the clutch device, position the lifting hook chain as shown in the figure.

8. Gradually tighten the screw of the clutch device and lift. Repeat the operation until sufficiently tight to lift the sample weight and NOT OVER. (fig.104)



Always remove the key from the device nut before carrying out a lifting test.

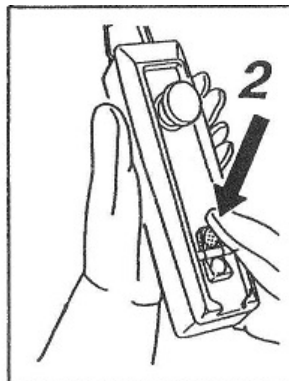
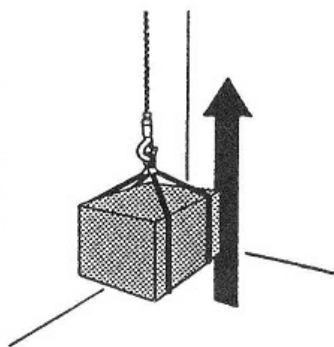


fig.103

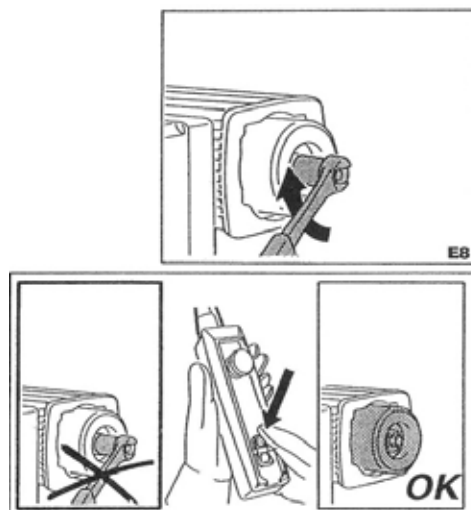


fig.104

9. Adjustment is completed when performing raise/lowering movement with the sample weight the clutch device tends to slip. (fig.105)



Do not tighten the clutch device screw fully and beyond the adjustment point specified above: danger of possible failure of structural parts due to exceeding the load capacity safety margins.

10. Reassemble the gear reducer cover and tighten the four screws while holding the nut in place. Remove any tools used for adjustment from the hoist. (fig.106)
11. Lower the push-button panel from the scaffolding and move the scaffolding away. (fig.107)
12. Release the hoist hook from the sample load and move it away from the loading area. (fig.108)

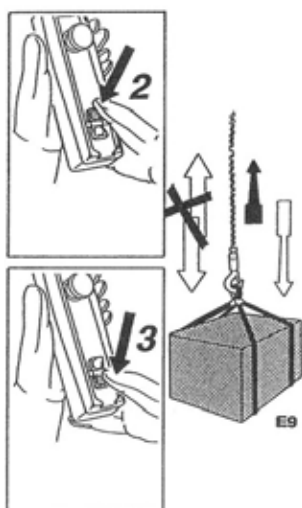


fig.105

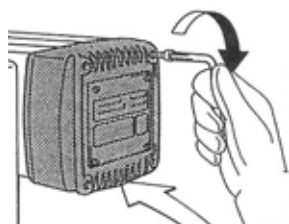


fig.106

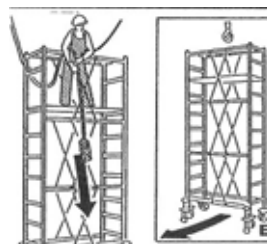


fig.107

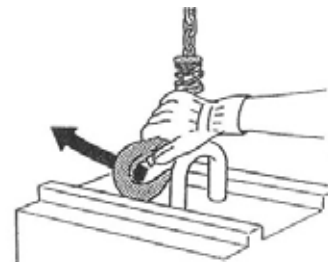


fig.108

6.4.2 CHECKING OPERATION OF THE BRAKE



This operation must be carried out upon initial installation and then every three months, proceeding as follows:



- 1. Place a sample weight, fitted with an eyebolt ring, whose value equals the hoist’s nominal load capacity, under the hoist hook. (fig.109)
- 2. Hook the sample weight. (fig.110)
- 3. Press the up button “2” to lift the sample weight off the ground, then release the button. (fig.111)
- 4. Check that when the lowering button “3” is released, the braking distances correspond to those indicated and that the load does not show any sign of descending further. (fig.112)

In this case, the operation is correct.



fig.109

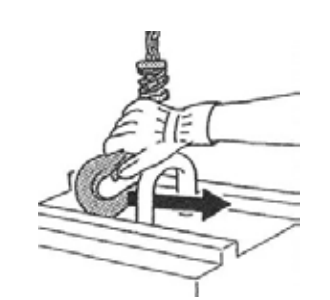


fig.110

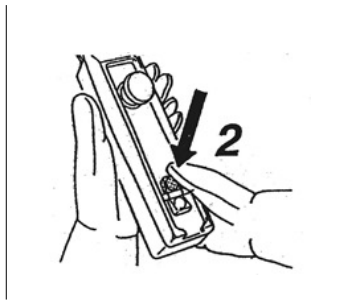


fig.111

DMK	MAX BRAKING DISTANCE
1	3 cm
2	3 cm
3	4 cm
4	4 cm

fig.112



If the braking distance has increased excessively or the sample weight starts to drop, check the calibration of the clutch device and, if necessary, take up the brake clearance, IMMEDIATELY indicating the 'out of service' condition.



6.4.3 BRAKE CLEARANCE COMPENSATION



This adjustment requires care and expertise and can therefore only be carried out by the trained maintenance manager (or by a person delegated by him or her) who must have good technical knowledge and must follow the procedure below:



1. For heights up to 5 m, position a mobile scaffold with side rails on the side of the hoist motor. For greater heights, carry out the operations using a mobile platform. (fig.113)

2. Secure the scaffolding with the appropriate feet. (fig.113)



This operation must be carried out by a specialised technician who, due to it being at a height, must wear a protective helmet, gloves, safety shoes, a harness with a locking safety carabiner and a rope harnesses to the anchorage point or to a stable point, NOT TO THE MOBILE SCAFFOLDING.



The use of the forklift for lifting people is not permitted.

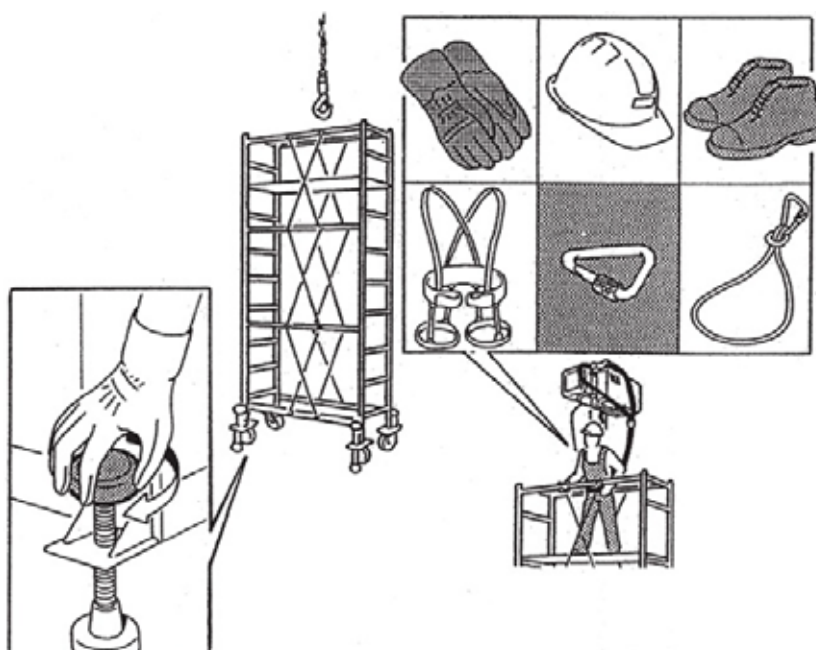


fig.113

6.4.4 BRAKE CLEARANCE COMPENSATION FOR DMT TROLLEYS

1. Disconnect the power at the line disconnecter and signal that work is in progress. (fig.114)
2. Completely unscrew the four screws of the nameplate on the motor side and remove it. (fig.115)
3. Measure dimension 'A' with a calliper (see drawing). If the difference exceeds 1.5 mm, restore the brake clearance to its initial value of 0.7 mm. (fig.116)



Danger of the rotor being ejected due to the spring when removing the cover.

4. Completely unscrew the four screws while holding the nut in place and remove the motor-side cover. (fig.117)

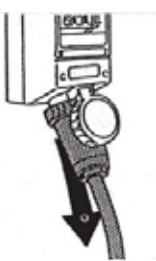


fig.114

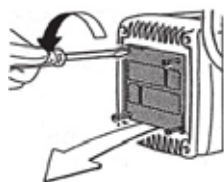


fig.115

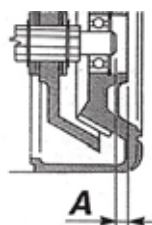


fig.116



fig.117



Do not knock or scratch the insulation paint on the motor winding wires with tools: danger of short circuit.

5. Remove the snap ring from the splined shaft and remove the shim washers and brake block from the splined shaft, taking care not to remove the rear washers. (fig.118)
6. Insert a number of shim washers onto the broach equal to the difference noted in point 5. (fig.119)
- 6.1 If the clearance recovery operation has been carried out several times, the motor cover must be replaced (see the SPARE PARTS manual).
7. Reposition the brake block and the remaining shim washers, then reinsert the snap ring into its seat on the broached shaft. (fig.120)

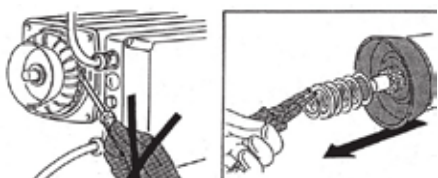


fig.118

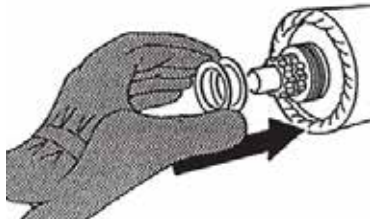


fig.119

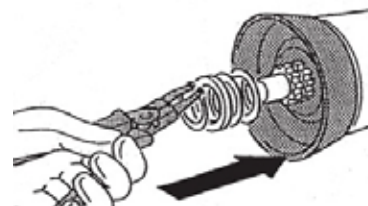


fig.120



Check that the clearance has been taken up correctly; if so, the cover will come to a stop freely. Otherwise, repeat the clearance adjustment operations with more care.

8. Reassemble the motor cover and fully tighten the four screws while holding the nuts in place. (fig.121)
9. Reposition the motor nameplate and tighten the four screws again. (fig.122)
10. Remove any tools used from the hoist. (fig.123)
11. Remove the scaffolding. (fig.124)
12. Repeat the brake operation checks described in point 4.5.4.

At this point, clearance adjustment is complete.



fig.121

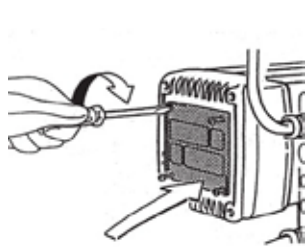


fig.122



fig.123



fig.124

6.4.5 BRAKE CLEARANCE COMPENSATION FOR DMK

1. Disconnect the power at the line disconnecter and signal that work is in progress. (fig.125)
2. Remove the protective grille (vent) located on the brake cover by fully unscrewing the four screws. (fig.126)
3. Completely unscrew the three screws from the locking ring of the brake block. (fig.127)
4. Remove the ring from the block, releasing it if necessary with a screwdriver inserted into the notch. (fig.128)
5. Turn the ring anti-clockwise by 360° (1 full revolution), bearing in mind that one full revolution of the ring generates an axial movement of 1 mm of the brake block.



fig.125

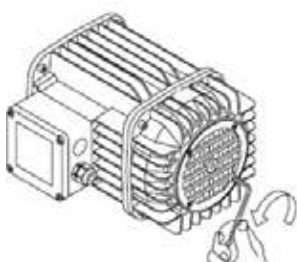


fig.126

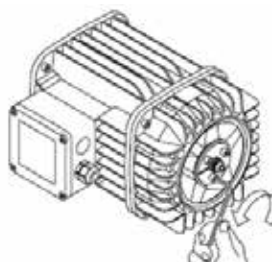


fig.127

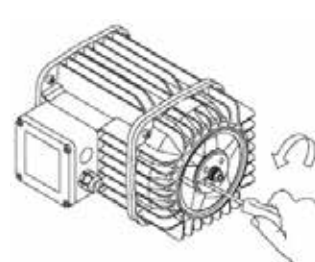


fig.128

6. Bring the block back into contact with the ring nut, aligning the corresponding holes.
7. Put back the three screws in the original place on the ring screwing them up again on the block. (fig.129)
8. Put the grille (vent) back in place and fully tighten the four screws. (fig.130)

When done, check that the brake and its clearance have been adjusted correctly, verifying (first without a load and then with nominal load) that:

- ▶ The motor rotates freely, without abnormal noise, rubbing of the brake or overheating of the brake cover.
- ▶ The brake engages silently without showing any slippage.

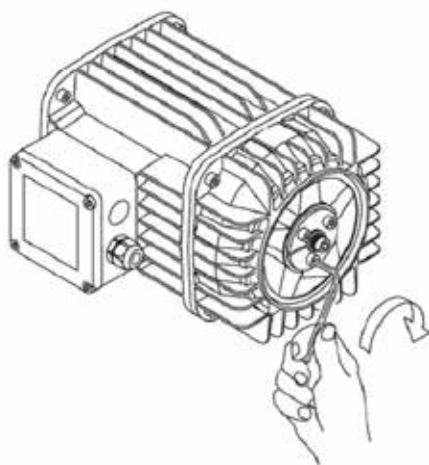


fig.129

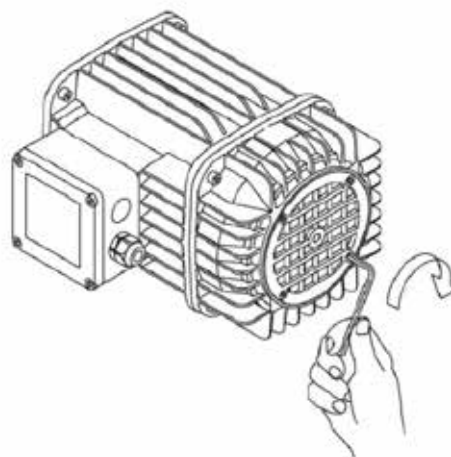


fig.130



Video tutorial on HOW TO REPLACE THE BRAKE BLOCK
<https://youtu.be/ABurypmore!>

6.5 DISASSEMBLING THE HOIST AND ANY TRAVEL TROLLEY



If it is necessary to disassemble the DMK chain hoist and any travel trolley in order to use them for a new installation or to subject them to maintenance and/or repairs that require work on the ground (e.g. replacement of the trolley wheels), proceed as described in the following points.



The disassembly operations must be carried out by qualified personnel equipped with the accident prevention equipment required by the laws in force, namely:

- ▶ suitable personal protective equipment (e.g. helmet, gloves, safety belts, etc.)
- ▶ work equipment (e.g. forklift, scaffolding, etc.) suitable for the purpose

And following a careful assessment of the following parameters:

- ▶ type of workplace, its environmental characteristics, type of ground
- ▶ height of the beam in relation to the loading surface and available spaces.
- ▶ dimensions and weight of the hoist to be uninstalled.



- ▶ For hoists installed on trolleys, even if it is necessary to disassemble only the hoist, it is recommended to disassemble the entire hoist/trolley unit.

- ▶ When possible or necessary, position the hook at a height that does not hinder the disassembly operations.

6.5.1 DISASSEMBLING THE HOIST/TROLLEY

- ▶ Disconnect the power supply to the trolley by pressing the emergency stop button -1-; set the main on/off switch lever to the "O" or "OFF" position, safely reach the work area, raising the control panel to prevent it from being operated from the ground. (fig.131)
- ▶ While working at height, disconnect all electrical connections.



The hoist/trolley must be handled by **AT LEAST** two operators.

- ▶ Place a pallet under the hoist/trolley release point.
- ▶ Move the mobile scaffold to the side and secure it with the feet. (fig.132)

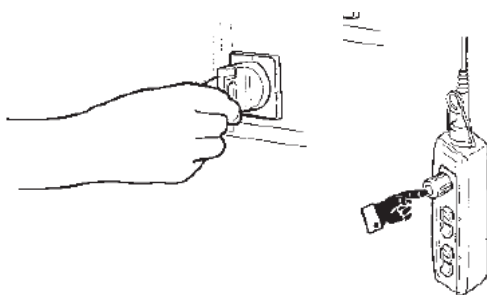


fig.131

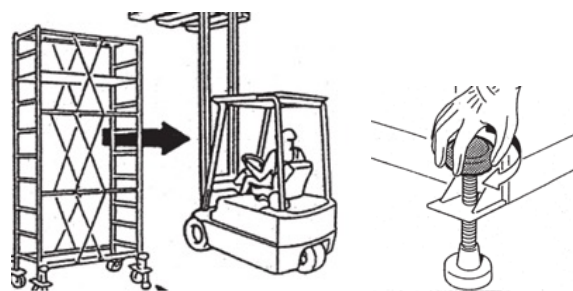


fig.132

- At this point, one of the two installers climbs onto the mobile scaffolding and secures himself to a stable point with the safety line, NOT TO THE MOBILE SCAFFOLDING. The other operator stays in contact with the installer on the scaffold and directs the forklift driver during the approach. (fig.133)



The installer on the scaffolding must keep a safe distance and communicate only visually. The positioning of the hoist on the attachment point or on the beam must be controlled by slow and short movements.



The use of the forklift for lifting people is not permitted.

- Once positioning is complete, the second installer climbs onto the scaffolding and secures themselves to a stable point, NOT TO THE SCAFFOLDING. (fig.133)

Remove the hoist from the suspension bracket if it is a fixed one, or from the running beam if it is a trolley one, by loosening the plate-tie-rod nuts to spread the plates and clear the running flange.

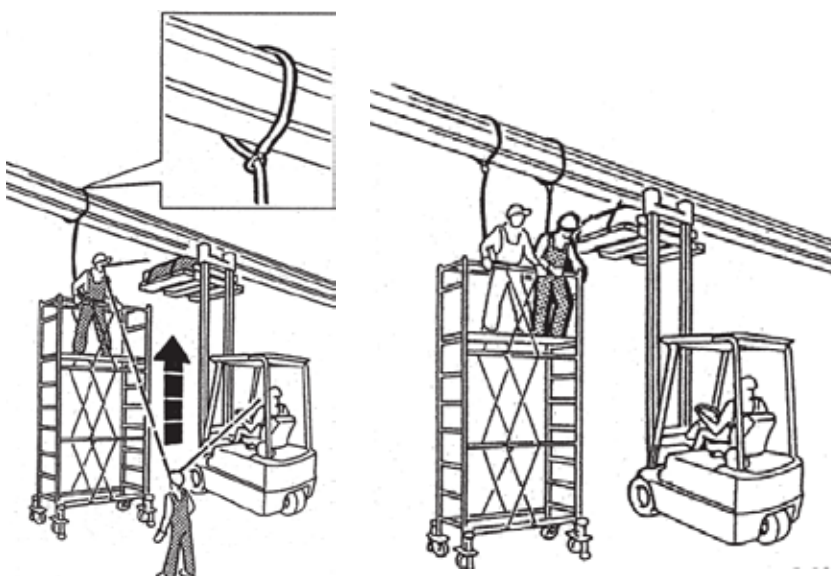


fig.133

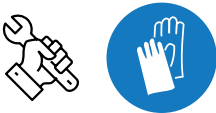
6.6 REPLACEMENT OF PARTS AND COMPONENTS



To ensure the operational safety of the DMK chain hoist and any trolley, it is mandatory to use original spare parts or those specified by DONATI SOLLEVAMENTI S.r.l.

6.6.1 HOW TO REPLACE THE HOIST CHAIN AND CHAIN MASTER PIN

RESIDUAL RISKS WHEN REPLACING THE CHAIN

HAZARD / RISK	PROHIBITION / WARNING	OBLIGATION / PREVENTION
 Risk of entanglement/crushing in the event of contact with the moving chain.	 Warning! Exposure to moving parts can create hazardous situations. It is forbidden to restart the hoist if the removed guards have not been put back in place.	 Entrust the chain replacement operations to qualified maintenance technicians Protective gloves must be worn



If the checks carried out on the chain and the pin reveal any anomaly, the compromised part must be replaced without delay.



To remove the old chain, proceed as follows:



To carry out the replacement, you must have: (fig.134) a basin, a hammer, a pin punch, a pair of pliers, a set of spanners, the SPACER LINK, THE NEW CHAIN, THE NEW MASTER LINK PIN, and a stable ladder for heights up to 3 m or a scaffolding tower for greater heights.

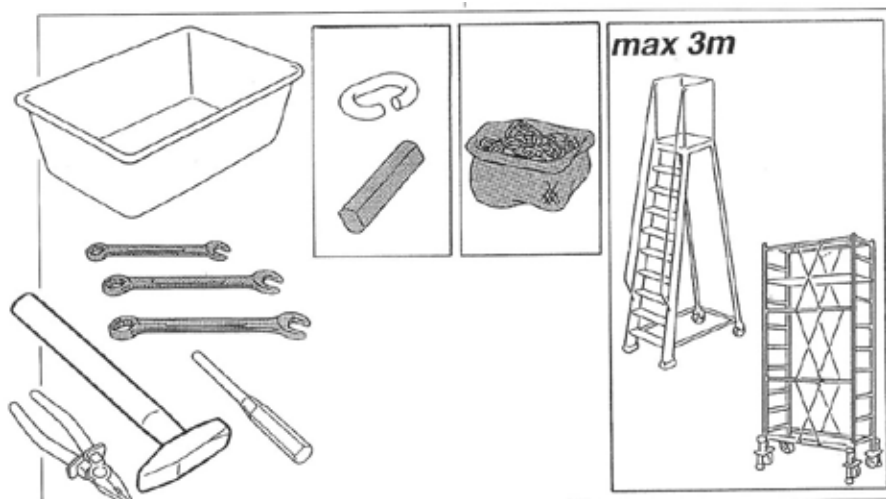


fig.134

Carry out replacement as follows:

1. Place the collection basin under the hook. (fig.135)
2. Press the hook down button "3" until the lower limit switch stops. (fig.135)



This operation must be carried out with no loads on the hook and after disconnecting the power supply from the line disconnector and signalling that work is in progress. The maintenance technician must wear a protective helmet and gloves. (fig.136)

3. Place the ladder or scaffolding to the side of the chain as required. (fig.136)



The use of the forklift for lifting people is not permitted.

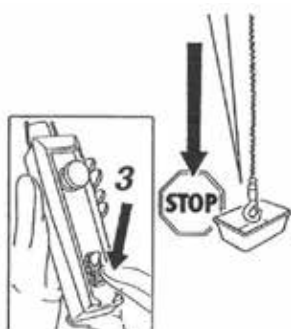


fig.135



fig.136

4. Climb onto the ladder or scaffolding and use the pliers to remove the cotter pin, remove the pin and bring the chain box to the ground. (fig.137)
5. Remove the hook with its bottom block. (SEE REPLACEMENT OF THE BOTTOM BLOCK)



Under no circumstances should the chain be removed from the nut of the hoist. If this should happen accidentally, contact only the DONATI service network, given the expertise and precision required for the reinstallation process. (fig.138)

6. Place the new chain beneath the hoist, keeping it protected in its bag to prevent it from getting dirty before it is used. (fig.138)



fig.137

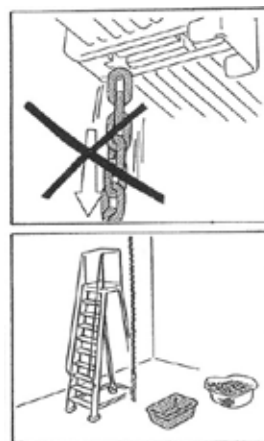


fig.138



The new chain must be of the same length and, above all, of the same type as the original; the use of chains other than the original is not permitted.

7. On one end of the new chain, insert the two plates, the spring and the sub-block with the hook for the version with an electric limit switch, or the shock absorber pad with its guides. (fig.139)
8. Refit the hook with its sub-block. (SEE REPLACEMENT OF THE BOTTOM BLOCK)



The chain end pin must also be replaced each time the chain is changed.

9. Insert the supplied false ring on the first link of the new chain at the opposite end to where the hook has been refitted. (fig.140)



fig.139



fig.140



The vertical ring of the new chain must be inserted so that its welding faces the outside of the hoist for proper insertion and extraction from the nut. (fig.141)

10. Insert the connector and energise the line disconnector.
11. Press the "2" up button until the hook stops at the limit switch, then release the button. (fig.142)



During this operation, if necessary, untangle the new chain and, in any case, verify that the condition described in step 9 is met; if not, take the necessary steps to ensure it is.

12. Using a hammer and a pin punch, remove the spring pin from the downward travel limit switch stop located on the old chain, noting its position on the ring. (fig.142)

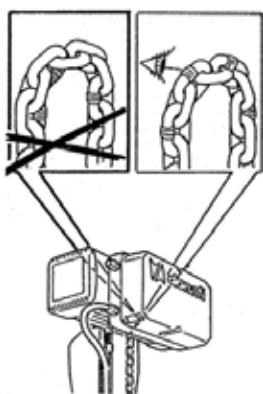


fig.141

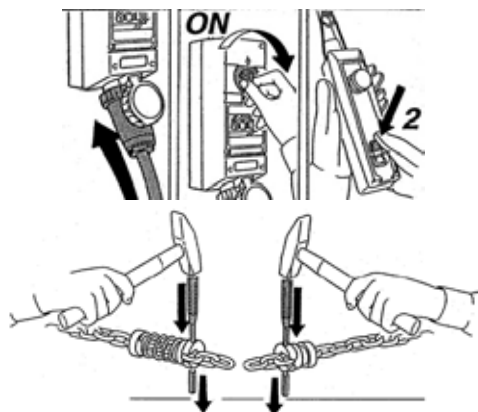


fig.142

13. Remove the two plates with the buffer from the old chain, or the two plates and the spring for a hoist equipped with a raise/lower limit switch. (fig.143)
14. Detach the old chain and the spacer link from the new chain, and keep them for future replacement. (fig.144)
15. Insert the spring-loaded feeler on the end of the new chain for the version with electric limit switches, or the mechanical stop with the rubber pad in the same position as on the previous chain. (fig.145)
16. Insert the spring pin into the chain link on which the chain stop has been positioned (not the last link). (fig.146)
17. Press the hook descent button "3" until it stops at the descent limit switch. (fig.147)



In the lower limit switch position, the chain must not touch the floor, otherwise the descent stop must be repositioned to take up the excess length. (fig.148)

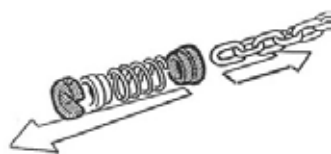


fig.143



fig.144

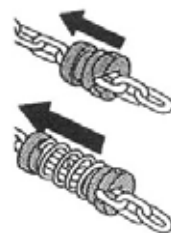


fig.145

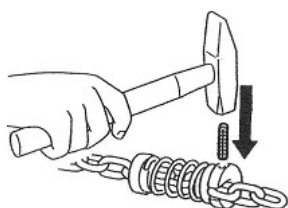


fig.146

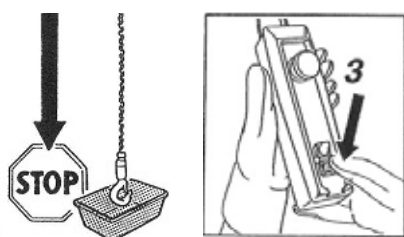


fig.147



fig.148

18. Use of the hoist must always be terminated by using the "2" up button to bring the hook to the disengaged position at a height of not less than 3 m from the ground. (fig.149)
19. Disconnect the power at the line disconnector and signal that work is in progress. (fig.150)
20. Insert the chain into the chain collector. (fig.151)
21. Fit the chain box onto the hoist attachment, insert the supplied pin and the cotter pin. (fig.152)

The chain replacement is now complete.

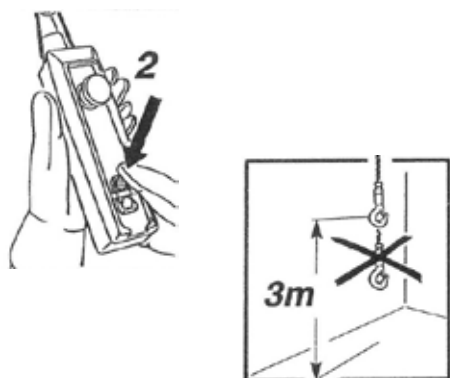


fig.149

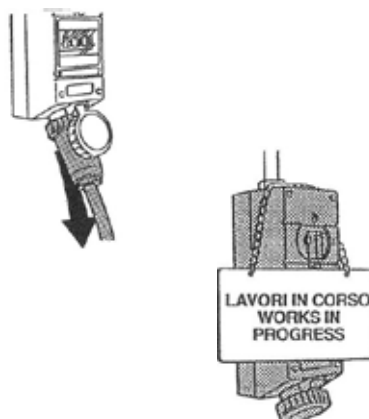


fig.150

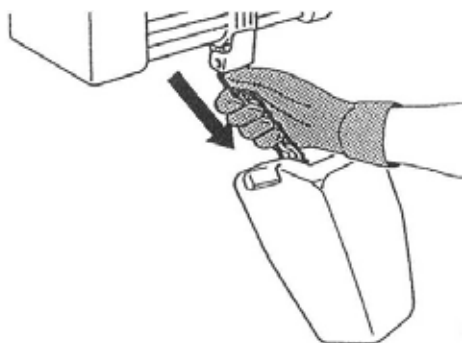


fig.151

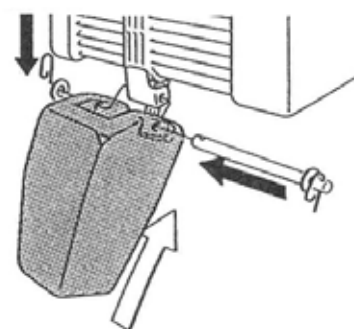


fig.152

6.6.2 REPLACEMENT OF THE HOOK-BOTTOM BLOCK



To replace the sub-block, proceed as follows: (fig.153)



1. Remove the existing bottom block by loosening the screws 1.
2. Insert the chain into the half-shell housing (3) and insert the master link pin (2).
3. Fit the bearing (4) and the two half-flanges (5) onto the hook (6).
4. Position the hook in the half-shell and lubricate the bearing.
5. Assemble the half-shells with their nuts and screws.
6. Tighten screw (1) to the torque values shown in the table. (fig.154)
7. Check that the chain end pin (2) has been inserted through the inspection hole
8. Attach the load capacity plates according to the type of machine

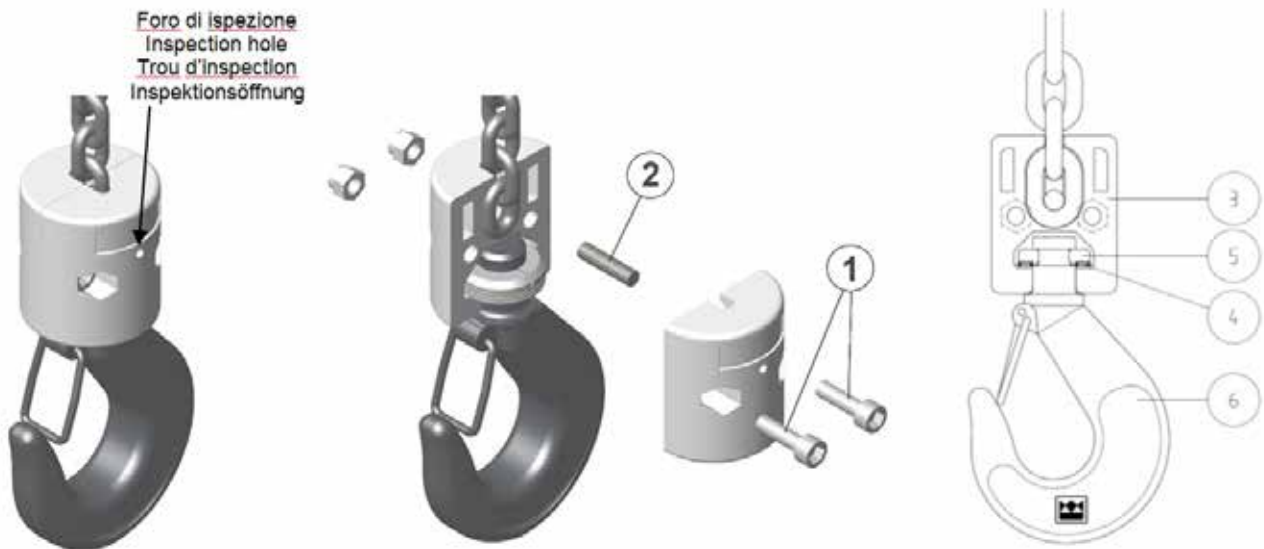


fig.153

Tightening torques (Nm)	
DMK1	5.6
DMK2	9.6
DMK3	24
DMK4	48

fig.154

6.6.3 REPLACING THE WHEELS OF THE DMT TROLLEYS



This operation must be carried out after dismantling the hoist/trolley from the beam on which it is installed. (see paragraph 6.5)



- It is advisable to replace all four wheels even if some of them appear to be in good condition.
- Also consider replacing the drive sprockets.



To replace the wheels, proceed as follows: (fig.155)



1. Remove the snap ring -3- and remove the wheels -4- (if necessary, apply leverage to the edges or use special extractors).
2. Assemble the new wheels -4-, the snap rings -3-.
3. Reinstall the hoist/trolley on the sliding beam as described in paragraph 4.4.

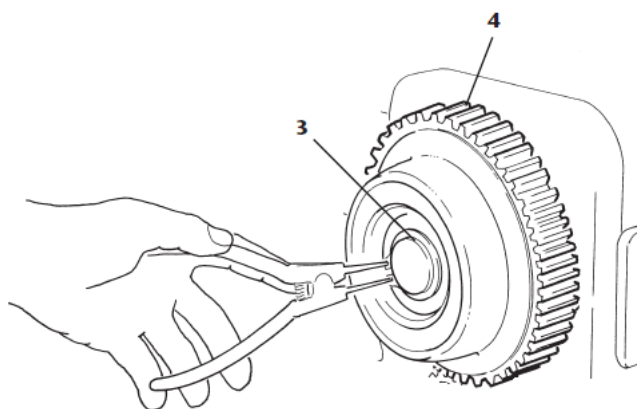


fig.155

6.7 FAULTS AND REMEDIES

6.7.1 MAIN ANOMALIES AND MALFUNCTIONS

The main reasonably foreseeable malfunction conditions are listed in relation to the individual operating functions of the DMK electric chain hoist and its travelling trolleys.

TYPE OF FAULT	FUNCTION		POSSIBLE CAUSE OF THE FAULT
	LIFTING OF THE HOIST	TRAVEL OF THE TROLLEY	
does not start	✓	-	- raise/lower limit switch - up/down/phase contactor – emergency stop button - up/down button - overload device (two-fall version) - hoist motor - hoist motor fuses
does not start	✓	✓	- hoist/trolley power supply cable - power supply line - low-voltage transformer - line contactor - line fuses
does not start	-	✓	- right/left limit switch - right/left contactor - right/left button - trolley motor
starts partially (in one direction only)	✓	✓	limit switch, contactor or button of the inhibited function (independent of each other)
the movement does not stop in the required space	✓ in addition, the load slips and is not held	✓	function brake
the movement does not stop at the limit switch	✓	✓	- function brake - function limit switch
movement in the function continues even after the button is released	✓	✓	- faulty directional button - related contactor "intermittent contact"
lifting gear reducer excessively noisy	✓	-	- lack of lubrication - out of service cycle
excessively noisy trolley gearbox	-	✓	- lack of lubrication - service is incorrect/too intense
squeaky brake noise during braking	✓	✓	- presence of dust - excessive play - worn brake lining
squeaky noise from wheels (jerky operation)	-	✓	- incorrect clearance between wheel and beam flange - lack of lubrication - service is incorrect/too intense
squeaky chain	✓	-	- worn chain/nut - lack of lubrication - service is incorrect/too intense
the hoist jerks during travel	-	✓	- incorrect contact between track and wheel - joints of the sliding beam not aligned
the hoist and/or trolley move slowly or the hoist struggles to lift the load	✓	✓	- voltage drop - overload (in the absence of the overload device) - gear reducer starting to seize - incorrect contact between track and wheel
a current can be felt at the hook	✓	-	defective or faulty power supply
The trolley skids on the rails and does not move	-	✓	- clearance between wheel and beam flange is too tight - obstruction on the beam flange - oil or grease on the beam flange

6.7.2 COMPONENT FAULTS AND POSSIBLE REMEDIES

Causes of malfunctioning of individual parts and possible solutions

TYPE OF FAULT	POSSIBLE CAUSE OF THE FAULT	POSSIBLE SOLUTION
the chain moves upward in 'jerks' and a high-pitched noise is heard	▶ failure of the chain and/or the load nut ▶ lack of lubrication	▶ replace the chain and, if necessary, the load nut ▶ lubricate the chain
brake slippage	▶ wear of the brake lining ▶ presence of oil/grease	▶ adjust the clearance or replace the gasket ▶ clean the gasket
brake overheating	▶ incorrect service ▶ incorrect adjustment ▶ operates in unsuitable environmental conditions	▶ restore the intended working conditions ▶ adjust the brake
the brake does not release	▶ no power supply ▶ incorrect adjustment	▶ restore the voltage values ▶ adjust the brake
the brake tends to "stick"	▶ operates in unsuitable environmental conditions or outside the operating range	▶ restore suitable conditions
the limit switch is blocked in the open position and does not reset	▶ clogging of the drive head ▶ incorrect feedback ▶ interruption of connections	▶ cleaning and restoration to proper conditions
the buttons on the pushbutton panel are locked in the "closed" position	▶ clogging of the push-button panel	▶ cleaning ▶ check the conductors
the contactors have "stuck" contacts	▶ use in unsuitable environmental conditions or for an unintended service	▶ restore proper conditions of use
the motor is too hot	▶ voltage variations are > 10% ▶ poor cooling ▶ ambient temperature higher than the intended one ▶ the use of the hoist does not comply with the intended operating conditions	▶ ensure the correct mains voltage ▶ restore proper air circulation ▶ adjust the motor characteristics ▶ adapt the conditions of use to the intended ones
the motor does not start	▶ blown fuse ▶ the contactor has cut off the power supply ▶ overload, blocking due to high starting frequencies, insufficient protection	▶ replace the fuse ▶ check the function contactor ▶ rewind the motor and ensure better protection ▶ check the control device
the motor has difficulty starting	▶ at start-up, the voltage or frequency is lower than the nominal value	▶ improve the conditions of the power supply line or network
the motor hums and draws a lot of current	▶ faulty winding, the rotor is in contact with the stator ▶ a phase is missing in the power supply ▶ the gear reducer is blocked ▶ the brake is blocked, short circuit in the power cables ▶ short circuit in the motor	▶ have it repaired by a specialist ▶ check the power supply and/or the contactor ▶ request the intervention of a specialist ▶ check and adjust the brake if necessary ▶ eliminate the short circuit ▶ request the intervention of a specialist
short circuit in the motor winding	▶ winding failure	▶ rewind the motor
intermittent contact	▶ involuntary activation of the function	▶ check the conductors of the push-button panel

6.7.3 PERSONNEL AUTHORISED TO INTERVENE IN THE EVENT OF A FAILURE

The personnel authorised to intervene in most cases of breakdown, unless otherwise specified, are experienced or qualified maintenance technicians with specific training in mechanical and electrical components. Where indicated, however, the intervention of specialised or specially trained personnel or technical personnel from the manufacturer is required.

6.7.4 DECOMMISSIONING

If the hoist cannot be repaired, proceed with the operations to take it out of service, indicating the fault with a special sign; request assistance from the service department.

6.8 DISMANTLING, DISPOSAL AND SCRAPPING



If the hoist or its components are no longer usable or repairable due to being broken, worn or at the end of their expected life, they must be scrapped.



- ▶ The demolition of the DMK chain hoist and its travel trolleys must be carried out with the use of suitable equipment chosen in relation to the nature of the material being worked on (e.g. shears, blowtorch, hacksaw, etc.).
- ▶ All components must be dismantled and scrapped after being reduced to small pieces so that none of them can reasonably be reused.
- ▶ When the hoist and/or trolley are scrapped, their parts must be disposed of separately, taking into account their different nature (metals, oils and lubricants, plastic, rubber, etc.), possibly by appointing specialised companies authorised for the purpose and in any case in compliance with the provisions of the law on the disposal of solid industrial waste.



Do not attempt to reuse parts or components of the hoist and any trolley—even if they appear intact—once they have been declared unfit for use following inspections, checks, and/or replacements carried out by specialized personnel or the manufacturer.

7. PARTI DI RICAMBIO



- ▶ The DMK electric chain hoists and their travelling trolleys are designed and constructed in such a way that, if used correctly and following adequate maintenance as described in this manual, they do not normally require spare parts **AS A RESULT OF FAULTS OR BREAKAGES**.
- ▶ If necessary, consult the "DMK Spare Parts and Components" manual with the code: KMAN03RU00.
- ▶ Parts or components subject to normal wear or deterioration as a result of use are available from the manufacturer for a minimum period of 10 years.



- ▶ Do not hesitate to replace the part and/or component in question if it is not able to offer sufficient guarantees of safety and/or functional reliability.
- ▶ Never carry out improvised or makeshift repairs!

If it is necessary to replace damaged parts, only original spare parts must be used. These can be requested directly from:



DONATI SOLLEVAMENTI S.r.l.

Via Archimede, 45/47 - 20864 Agrate Brianza (MB)

Tel. +39 0331 14811 - Fax +39 0331 1481880

E-mail: dvo.info@donaticranes.com

www.donaticranes.com



The use of non-original spare parts, in addition to voiding the warranty, may compromise the proper functioning of the electric chain hoist and/or any associated trolley.

8. AUDIT LOG

As evidence of the correct execution of the installation, testing, commissioning, inspection and maintenance activities of the DMK electric chain hoist and any trolley, as well as in order to keep track of any responsibilities regarding the activities carried out in accordance with the provisions of this publication, **it is mandatory to diligently complete and maintain for the entire expected life of the hoist** (10 years) the appropriate logbook referred to in EHSR 4.4.2 letter b) of Annex I of the Machinery Directive 2006/42/EC.

In addition to all activities concerning the life and use of the hoist and any associated trolley (adjustments, repairs, replacement of parts, overhauls, major faults, etc.), the audit log must record all the operations provided for in the maintenance plan on a quarterly and annual basis, as indicated in the “**Table of periodic inspection and maintenance work**”, point 6.3.2.

It shall be the responsibility of the maintenance technician appointed by the customer to complete this log in its entirety, noting the results of the activities carried out and any observations in the spaces provided.

The name of the inspector and/or maintenance technician must also be clearly identifiable, as well as the dates of the relevant operations.



It is recommended that the logbook be diligently completed and kept for the entire expected life of the hoist and any associated trolley (10 years).



After 10 years of operation, the hoist and any trolley may have reached the end of their expected life and/or completed the available operating cycles, in relation to the FEM/ISO service group in which they have been classified. For this reason, in accordance with FEM regulation 9.775/93, at the end of the 10th year, the lifting equipment must NOT be put back into service unless an inspection has been carried out by DONATI SOLLEVAMENTI S.r.l. or by expert technicians appointed for this purpose.

By way of example only, the essential contents of the logbook are shown below. This must be prepared by the user of the machine if the logbook is not already provided as an annex to this publication:

1. The audit log must first of all include a sheet with the “**summary of the essential characteristics of the hoist and optional trolley**”, where the technical functional data of the machine in question are highlighted.

CHARACTERISTIC DATA OF THE ELECTRIC HOIST AND OPTIONAL TROLLEY					
Electric hoist:		Serial number:		Year of manufacture:	
Series:		Type:		Capacity (kg):	
Trolley:		Serial number:		Year of manufacture:	
Series:		Type:		Capacity (kg):	
DATI CARATTERISTICI DEL PARANCO ELETTRICO					
Lifting speed (m/min): Main		Auxiliary/Slow		FEM/ISO service group:	
Motor power (kW): Main speed		Slow speed		R.I. (%): Main Slow	
Power supply voltage: AC - x		V	Hz	Control voltage: AC - V Hz	
Max. calibration limit for the overload device / clutch (kg):					
Rope / chain length (m):		Hook run (m):		No. of rope / chain falls:	
Ø Wire rope / chain (mm):		Min. breaking load of the rope / chain (kN):		No. of rope strands:	
CHARACTERISTIC DATA OF THE OPTIONAL TROLLEY					
Travel speed (m/min): Main		Auxiliary/Slow		FEM/ISO service group:	
Motor power (kW): Main speed		Slow speed		R.I. (%): Main Slow	
Beam wing width / Wheel track (mm):		Wheel pitch (mm):		Ø Wheels (mm):	

2. Considering that the life of the hoist and any trolley is expected to be a minimum of 10 years, when used within the limits of the service conditions defined by their classification (FEM/ISO Group), prepare **30 monthly inspection sheets and 10 annual inspection sheets** for this period, as shown below:

QUARTERLY AND ANNUAL CHECKS – YEAR..... – Period from..... to.....
Operational notes: (1) Mark ☒ the box ☐ corresponding to the result of the check (2) If suitability for use is achieved following corrective action , describe the relevant interventions in the Notes: (3) Requirement not available in the version in question (e.g. trolley motor/brake in the case of a push trolley)

QUARTERLY CHECK	Date of the check _____	Deadline for next check _____				
Verification	Result of the check (1)					Verifier
	Suitability for use	Suitability following the corrective action of: (2)			Verification not applicable (3)	
		Registration	Repair	Replacement		
General visual checks	☐	☐	☐	☐	☐	Name, surname and signature
Signs and pictograms - Signs and plates	☐	☐	☐	☐	☐	
Lifting hook	☐	☐	☐	☐	☐	
Hook block pulleys / Return sprocket	☐	☐	☐	☐	☐	
Chain / Wire rope - Fastening elements	☐	☐	☐	☐	☐	
Drum / Load nut	☐	☐	☐	☐	☐	
Rope guide / Chain guide	☐	☐	☐	☐	☐	
Hoist motor and its brake	☐	☐	☐	☐	☐	
Trolley motor and its brake	☐	☐	☐	☐	☐	
Trolley wheels, pinion and guide rollers	☐	☐	☐	☐	☐	
Electrical system / Push-button panel and cable	☐	☐	☐	☐	☐	
Overload device / Clutch device	☐	☐	☐	☐	☐	
Hoist limit switch	☐	☐	☐	☐	☐	
Trolley limit switch	☐	☐	☐	☐	☐	
Cleaning and lubrication	☐	☐	☐	☐	☐	
Notes:						

QUARTERLY CHECK	Date of the check _____	Deadline for next check _____				
Verification	Result of the check (1)					Verifier
	Suitability for use	Suitability following the corrective action of: (2)			Verification not applicable (3)	
		Registration	Repair	Replacement		
General visual checks / Annual testing	☐	☐	☐	☐	☐	Name, surname and signature
Signs and pictograms - Signs and plates	☐	☐	☐	☐	☐	
Structures / Welds / Pins and hinges	☐	☐	☐	☐	☐	
Check of bolted joints	☐	☐	☐	☐	☐	
Lifting hook	☐	☐	☐	☐	☐	
Hook block pulleys / Return sprocket	☐	☐	☐	☐	☐	
Chain / Wire rope - Fastening elements	☐	☐	☐	☐	☐	
Drum / Load nut	☐	☐	☐	☐	☐	
Rope guide / Chain guide	☐	☐	☐	☐	☐	
Hoist motor and its brake	☐	☐	☐	☐	☐	
Trolley motor and its brake	☐	☐	☐	☐	☐	
Trolley wheels, pinion and guide rollers	☐	☐	☐	☐	☐	
Trolley buffers	☐	☐	☐	☐	☐	
Electrical system / Push-button panel and cable	☐	☐	☐	☐	☐	
Calibration of the overload device / clutch	☐	☐	☐	☐	☐	
Hoist limit switch	☐	☐	☐	☐	☐	
Trolley limit switch	☐	☐	☐	☐	☐	
Cleaning and lubrication	☐	☐	☐	☐	☐	
Notes:						



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