



COLUMN JIB CRANE
ELECTRICALLY ROTATED - SERIES GBR



- INSTRUCTIONS -
INSTALLATION - USE - MAINTENANCE



KMAN09MI00

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1. - PRELIMINARY INFORMATION

1.1 Contents and use of the manual

§ This technical publication, identified by the code **KMAN09MG00**, refers to “**360° electrically rotated jib cranes - series GBR**”, built and put on the market by the company:

		<p>DONATI SOLLEVAMENTI S.r.l. Via Quasimodo, 17 - 20025 Legnano (MI) Tel. +39 0331 14811 - Fax +39 0331 1481880 E-mail: dvo.info@donaticranes.com www.donaticranes.com</p>
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§ It refers to their “intended use”, to their technical functional and performance characteristics and to the relevant installation, use and maintenance instructions. It is intended for:

- the supervisor of the factory, workshop, building site
- the staff in charge of transporting, handling and installation of the equipment
- the operators of the jib crane
- the maintenance staff

§ This manual must be kept by the person in charge of the above mentioned duties in a suitable place, so that it is always available for consultation and kept in the best possible state.

§ If the manual is lost or becomes unusable, replacement documentation should be requested directly from the manufacturer by quoting the code of this manual.

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1.2 Symbols: meaning and use

§ In this manual certain symbols are used to focus the reader’s attention and underline some particularly important aspects of the subject.

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

SYMBOL	MEANING	EXPLANATION, ADVICE, NOTES
	Danger	<ul style="list-style-type: none"> • Indicates a danger with risk of accident, possibly fatal. • Failure to follow the attached instructions can cause a situation of serious danger for the safety of the operator and for people in the vicinity! • Follow the instructions scrupulously !
	Warning	<ul style="list-style-type: none"> • Represents a warning note of attention of possible deterioration of the jib or of a personal object of the operator. • Important warning which requires one’s utmost care.
	Warning/Note	<ul style="list-style-type: none"> • Indicates a warning or a note about key functions or useful information.
	<ul style="list-style-type: none"> • Visual observation • Action to be taken 	<ul style="list-style-type: none"> • A printed eye can indicate to the reader that: <ol style="list-style-type: none"> a) He should proceed to a visual observation. b) He should proceed to the operating sequence. c) It is necessary to take a reading, to check a signal, etc.

1.3 Co-operation with the user

- § This manual reflects the configuration of the machine at the time the machine was put on the market..
- § Any change to the manual, a copy of which will be sent to the customer by the manufacturer, shall be kept together with the manual.
- § The manufacturer is willing to supply its customers with any additional information they may require, and welcomes any suggestions aimed at improving the manual so that it corresponds better to the customer's needs.
- § If the jib crane is no longer to be used the main user is invited to deliver, with the hoist, this manual and the relevant documentation enclosed with it (declarations, schemes, control register etc.).

1.4 Conformità normativa

§ The jib crane was designed and produced following the “**Essential Safety Requirements**” of **Attachment I of the Communitary Directive 2006/42/CE** the jib cranes can be put on the market with **CE Mark** and the **EC Declaration of Conformity - Attachment II A**.

CE EC DECLARATION OF CONFORMITY
as defined by machinery directive 2006/42/EC - Annexe IIA

The legal representative of the company:



DONATI SOLLEVAMENTI S.r.l.
Via Quasimodo, 17 - 20025 Legnano (MI) - Tel. 0331.1481.1 - Fax. 0331.1481.880

Declares under on own responsibility that the named machine:

Bridge crane with hoist and trolley type: <input type="checkbox"/> Suspended <input type="checkbox"/> Rested			
Crane structure: <input type="checkbox"/> Single girder <input type="checkbox"/> Double girder	Type:	Serial Nr:	Year:
Jib crane: <input type="checkbox"/> Bracket <input type="checkbox"/> Arm <input type="checkbox"/> Column	Type:	Serial Nr:	Year:
Electric hoist: <input type="checkbox"/> Wire rope <input type="checkbox"/> Chain	Type:	Serial Nr:	Year:
Trolley: <input type="checkbox"/> Electric <input type="checkbox"/> Mechanical <input type="checkbox"/> Push	Type:	Serial Nr:	Year:
Capacity (kg):			

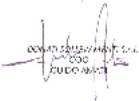
Is in according to the Comunitary Directives

- Machine Directive 2006/42/CE
- Low voltage Directive 2014/35/EU
- Electromagnetic Compatibility Directive, 2014/30/EU

Main technical regulations considered:

EN ISO 12100 /2010- Safety of the machinery
 EN ISO 13849-1/2008 General principles for design
 EN 12077-2/2008 Limiting and indication device
 EN 60204 - 32/2009 - Safety of machinery electrical equipment of machines
 EN 60529/97 - Degrees of protection provided by enclosures (IP code)
 ISO 4301-1/88 - Lifting equipment classification
 ISO 4308 - 1/2003 - Selection of wire ropes (for wire rope hoists DRH series)
 UNI 9466/94 - Lifting appliances: shell drum. Design requirements: (for wire rope hoists: DRH series)
 DIN 15401 - Lifting hooks for lifting appliances: Single hooks
 FEM 1.001/98 - Rules for the design of hoisting appliances
 FEM 9.511/86 - Classification of mechanisms
 FEM 9.661/86 - Dimensions and design of rope reaving components
 FEM 9.671/88 - Chain qualities, selection criteria and requirements (for chain hoists DMK series)
 FEM 9.761/93 - Lifting force limiters for controlling the loading of motorized series hoists mechanisms
 FEM 9.683/95 - Selection of lifting and travel motors
 FEM 9.755/93 - Measures for achieving safe working periods for serial hoists units (S.W.P.)
 FEM 9.941/95 - Graphical symbols for control devices

Person authorized to compile the technical file
 Name and surname: **Alberto Tagliabue**
 Address: **Via Quasimodo, 17 - 20025 Legnano (MI) - Italy**



Date: 02.10.2017

TCERT01G00

Ediz:02/16 Rev.1

example EC Declaration of Conformity
Attachment II A

§ Furthermore the Jib crane GBR series in accordante with :

- **Low Voltage Directive 2014/35/UE**
- **Electromagnetic Compatibility Directive 2014/30/UE.**

1.5 The manufacturer's responsibility and the warranty

§ With reference to the contents of this manual **DONATI SOLLEVAMENTI S.r.l.** declines any **responsibility** in case of:

- use of the jib crane contrary to the national safety and accident prevention laws
- erroneous choice of the building site or buildings in which the jib crane is to be operated
- voltage and power supply faults
- lack of or erroneous observation of the instructions supplied in this manual
- non-authorized modifications to the machine
- use (of the machine) by untrained or unsuitable staff

§ To be able to use the **warranty**, the certification of which is shown below, the Customer must scrupulously follow the instructions indicated in this manual, and in particular:

- always work within the use limits of the jib crane
- always carry out constant, diligent maintenance
- appoint operators of proven capability, who have been adequately trained for the job to use the machine
- use solely original spare parts indicated by the manufacturer



- **The intended use and configurations of the hoist are the only ones allowed. Do not try to use the hoist disregarding the supplied instructions.**
- **The instructions in this manual do not replace but add to the obligations regarding the current legislation for accident prevention standards.**

2. - DESCRIPTION OF THE MACHINE AND TECHNICAL INFORMATION

2.1 The electrically rotated jib cranes

2.1.1 Intended use – Foreseen use – Designated use

§ **The jib cranes**, electrically rotated, “Column” version - series GBR, are intended to be fixed to the ground and are produced to move goods within the plant, in outdoor squares or for services of big operating units.

§ The jib cranes lifting a load vertically, by means of the hook of the lifting block, generally made using appropriate accessories for such an operation; moving the load with a trolley which runs along the radial axis of the arm and slave, with electrically rotation, a circular area delineated by the rotation radius of the jib.

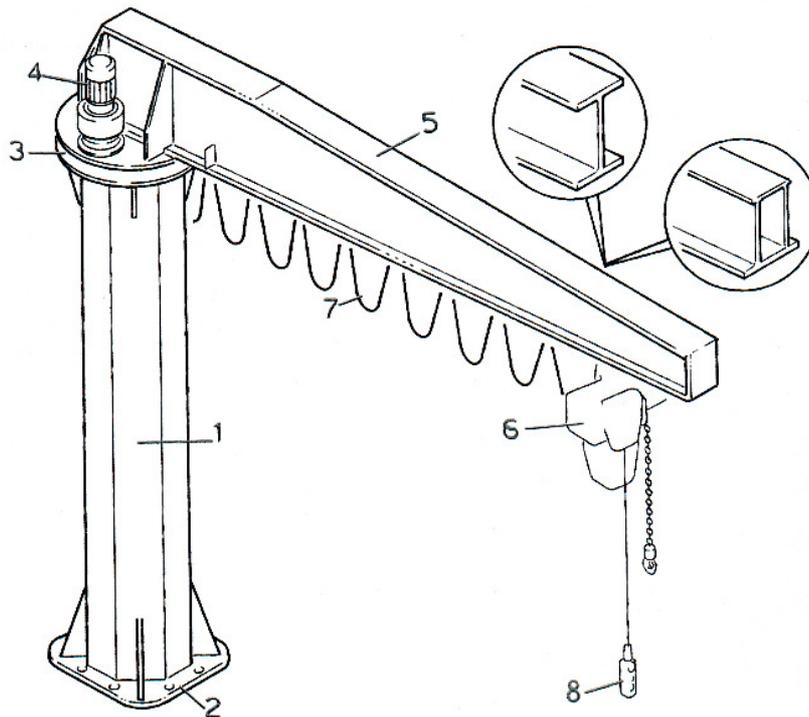
§ The rotation of the arm of the crane, which is mounted on a rotating thrust bearing, is ensured via a geared motor.

§ The circular area served by the arm can, according to necessity, be limited by electrical limit switches, or allow continual rotation, without end, of the arm itself in both directions by a collector ring.

§ **The electrically rotated jib cranes serie GBR** have then three functions:

- **lifting** the load, generally made by an electric chain or rope hoist
- **moving** the load with the aid of an electric trolley which runs along the arm of the crane
- **rotating** a load around the constraint axis of the arm mounted on a rotating thrust bearing.

§ All the movements are done with a push button panel.



Legenda:

- | | |
|-------------------|-----------------------|
| 1. column | 7. electric equipment |
| 2. base plate | 8. push button panel |
| 3. thrust bearing | |
| 4. geared motor | |
| 5. rotating arm | |
| 6. lifting unit | |

fig.1

2.1.2 The composition of the jib crane

§ Column:

- Made of press-forged steel section welded to the tubular structure with polygonal section it allows a high rigidity and stability; it is fixed with a base plate and a system of bolts and log bolts. The upper part is fitted with a flange for fixing the rotation thrust bearing.

§ Rotating arm:

- This is formed by a supporting girder and, in relation to the lifting capacity and/or the jib length, can be made with an H beam or with a box beam designed to guarantee the maximum flexotorsional stability. In the construction of the box beam high quality section steel is used and welding carried out with continuous line procedure to ensure optimal safety conditions and operative reliability of the crane.

§ Rotation mechanisms:

- **Base bearing or thrust bearing**, able to support both axial pushes, due to vertical forces and the tilting momentum due to the movement.
- **Geared motor**, fitted on the arm, fitted with a self-braking motor with progressive start-up and braking where the sprocket, keyed on the slow shaft, fits together with the internal toothing of the thrust bearing to which it gives movement.

§ Electric power supply:

- Made for powering the hoist and trolley which runs along the arm of the crane as well as to power the rotation geared motor.

The electric power supply includes:

- **The electrical panel** made of press-forged sheet. It contains the contactors and the timers to control all the movements of the crane, as well as protection fuses against short circuits. The control circuits are low voltage (48 V). A connection terminal box ensures simplicity and safety of cabling of the cables relative to all the external functions making any inspection easy to perform.
- **The electrical line** to power the trolley-hoist formed of flat flexible multipolar cables festooned on the trolleys which slide inside a channel section.
- **The push-button control panel**, with a shockproof thermoplastic casing, sliding, along the crane girder, via trolleys inside a channel section using festooned flexible multipolar cable. It is supported by a self supported round multipolar cable. It is generally fitted with a connector with fast connectors and obliged polarity, to make assembly and replacement easier.
- **la sirena**, quando prevista, è comandata tramite pulsante di "allarme" ed assolve alla funzione di avvisatore acustico per segnalare eventuali situazioni di pericolo durante la movimentazione.
- **Electric safety limit switches** on the movements of rotation installed to limit the rotation field of the arm of the crane. They act on the low voltage auxiliary circuits.
- **Rotating collector ring**. It is installed when the arm of the crane is free from obstacles in every point of its rotation and the arm itself is required to rotate continuously in both directions.

§ Foundation frame with log bolts:

- This is supplied on request for the fixing of the column itself to the base.

§ Finish:

- The protection of the steel structures from atmospheric and environmental agents (powders, gas, etc.) is guaranteed by the treatments which use yellow enamel paint, subject to preparation of the surfaces with metallic sanding of SA grade.
On request special anticorrosive paint is available.

§ Lifting and translation unit:

- **The electrically rotated jib cranes serie GBR** can be equipped with hoist with the relevant electric trolley.

§ The conception and construction of the jib cranes GBR:

- **The jib cranes**, electrically rotated, column version - serie GBR, are designed according to the conception of the modular components which put together in relation to commercial needs, as well as the standard models always available from the warehouse, allow the rapid economical realisation of numerous normalised and special executions.
- The base, column, bracket and arms components, thanks to their extreme compactness are assembly together, so as to guarantee the maximum use of the hook run and, thanks to the minimal side clearance allow an optimal use of the area in which the jib crane operates.
- The construction uses the most advanced technology which is based on production processes of high industrialization and allows the realization, using economies of scale, of totally reliable and technically innovative machines. The high level of quality is guaranteed and controlled by the company quality system according to the UNI EN ISO 9001-ISO 14001-OHSAS 18001.

2.1.3 Constraints when installing

§ The jib cranes “column” version - series GBR, are intended to be fixed to the round, the column is self-supporting and can be fixed to the round using jib bolts, on a foundation plinth.



- **The user MUST check, directly or using specialised staff, the suitability of the surfaces to be fixed on. These surfaces must guarantee the stability and safety of the crane in all its working conditions, supporting the lifting operations and the dynamic effects of the tilting momentum and of the type and speed of lifting.**

2.1.4 Criteria of use and conditions of use

§ The necessary indispensable conditions to obtain the full functional responsiveness of the jib crane for the service it is intended, as well as its optimal and lasting functioning, are in the correct choice of the model of machine. This choice must be made in relation to the real service performance required as well as the environmental conditions in which the jib crane will have to operate.

§ The parameters which must be carefully considered in the choice of jib crane are:

- **The lifting capacity:** this must be determined by the weight of the maximum load to be lifted and must never be less than this weight.
- **The functional dimensions:** the height of the sliding girder of the trolley which determines the hook run of the hoist and the range must be selected so as to guarantee the functional coverage of the space to be used considering the surrounding clearance.
- **The nature of the load:** the nature of the load determines for its positioning the choice of the speeds of movement (lifting and translating) suited to the task. In some cases it is indispensable to use two-speed hoists with a slow positioning speed.
- **The area to be used in:** the jib crane features in its conception intrinsic high elasticity which becomes even more evident when it is used for moving loads close to the maximum load and/or with prevalent localisation in the ends of the arm.
- **The environment to be used in:** the jib cranes are intended for service indoors and/or in a covered area, sheltered from bad weather and away from wind. In the case of use outdoors adequate steps must be taken in relation to the surface treatment (sanding, varnishing) as well as a system of stopping brake.

2.2 Technical information and service conditions

2.2.1 Safety reference list

§ In the planning and construction of the electrically rotated jib cranes - series GBR, the following standards and principal technical regulations have been taken into account:

- EN ISO 12100:2010 "Safety of the machinery"
- EN ISO 13849-1:2008 "General principles for design"
- EN 60204-32:2009 "Safety of machinery electrical equipment of machines"
- EN 60529:1997 "Degrees of protection provided by enclosures (IP code)"
- ISO 4301-1:1988 "Lifting equipment classification"
- FEM 1.001/98 "Rules for the design of hoisting appliances"
- FEM 9.683/95 "Selection of lifting and travel motors "
- FEM 9.755/93 "Measures for achieving safe working periods for serial hoists units (S.W.P.)"
- FEM 9.941/95 "Graphical symbols for control devices".

2.2.2 Protection and insulation of electrical parts

- Rotation motor: Protection IP54 (motors) - IP23 (brakes); Insulation class "F"
- Electrical panel: Protection IP55 – Maximum power of insulation 1500 V
- Push-button panel: Protection IP65 – Maximum tension of insulation 600 V
- Collector: Protection IP65 – Maximum power of insulation 500 V
- Rotation limit switch: Protection IP65 – Maximum power of insulation 300 V
- Cables : CEI 20/22 – Maximum power insulation 450/750 V

2.2.3 Electrical power supply

- The electrical jib cranes are designed to be powered with alternate electric power three phase of: 400V according IEC 38-1.

2.2.4 Environment conditions of use

- Temperature of use: minimum -10°C ; maximum $+40^{\circ}\text{C}$
- Maximum relative humidity:80%
- Maximum altitude 1000 m – above sea level
- The machine must be placed in a well-ventilated place, free from corrosive vapours (acid vapours, saline clouds, etc).



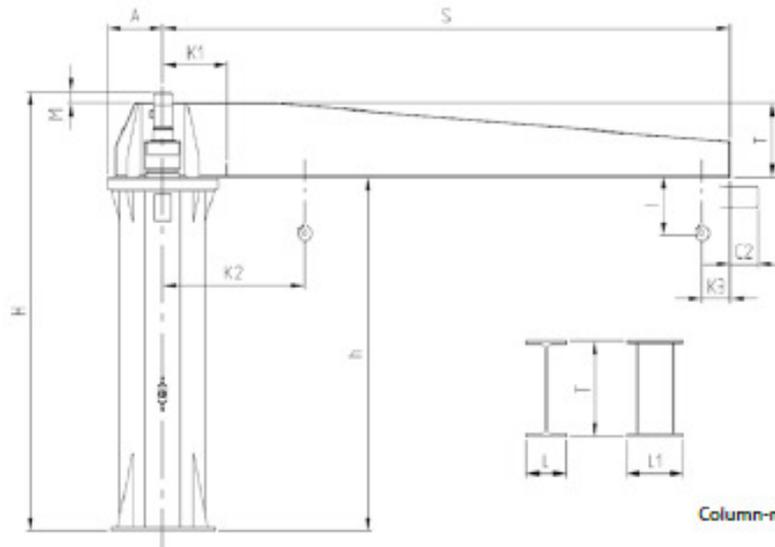
- **It is forbidden to use the machine in an explosive environment or one which is potentially so, or where the use of flameproof equipment is prescribed.**
- **It is necessary to allocate sufficient working space to ensure the safety of the operator and of the maintenance staff.**

2.2.5 Noise - Vibrations

- The level of acoustic pressure emitted by the rotation geared motor is always lower than 85 dB (A).
- The vibrations produced by the jib crane, during the manual rotation of the arm, are practically nil and in any case not dangerous for the health of the staff who operate them.
- Excessive noise or vibration can be caused by a fault which must be immediately notified and eliminated so as not to compromise the reliability of the jib crane.

2.2.6 Characteristics and technical data - Weights - Reactions on constraints

GBR SERIES COLUMN – MOUNTED JIB CRANE – ELECTRICALLY ROTATED AT 360° CONTINUOUSLY



Column-mounted jib crane - Rotation 360°

GBR jib cranes with DRH electric wire rope hoist:

K2 = K1+(C+I1-S3)* referring to the fixed mechanical limit switch

K3 = (C+S3)* referring to fixed mechanical limit switch

I* and C2* = (*) See commercial catalogue for DRH hoists

GBR jib cranes with DMK electrical chain hoist:

K2 = K1+(M/2)* referring to fixed mechanical limit switch

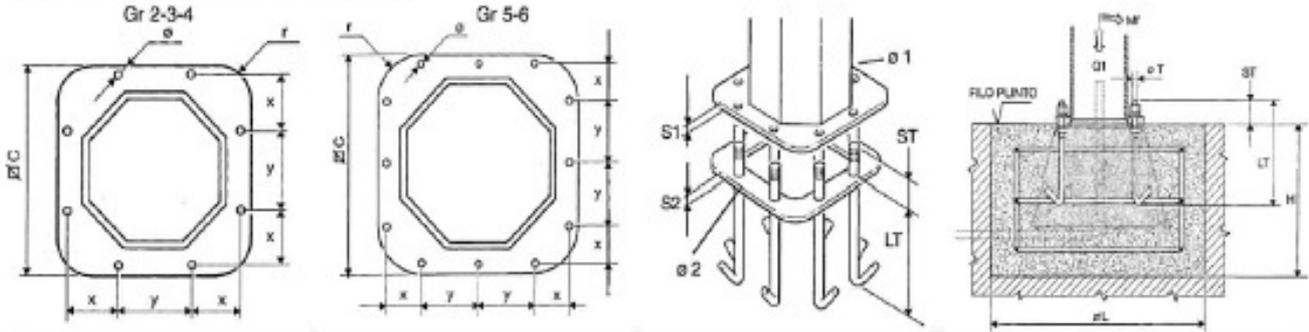
K3 = (M/2)* referring to fixed mechanical limit switch

I* = (*) See commercial catalogue for DMK hoists

LIFTING CAPACITY	ARM	SIZE OF JIB CRANE	TYPE	UNDER BEAM	OVERALL DIMENSIONS (mm)								ARM SPEED		MOTOR POWER	TILTING MOMENTUM	MAXIMUM PULL OF THE LUG BOLT	WEIGHT	
					h	II	K1	A	M	T	L	L1	NO. OF REVOLUTIONS	PERIPHERAL				R.P.M.	m/min
1000	4	2	2E4040	4000	4665	525	425	335	330	160	-	0.93	23.4	0.25	62	79	1100	122.5	
	4.5	2	2E4540	4000	4665	525	425	305	360	170	-	0.93	26.3	0.25	71	79	1140	122.5	
	5	2	2E5040	4000	4665	525	425	305	360	170	-	0.93	29.2	0.25	81	79	1170	122.5	
	5.5	2	2E5540	4000	4785	525	425	385	400	180	-	0.57	19.7	0.25	90	79	1300	122.5	
	6	2	2E6040	4000	4785	525	425	385	400	180	-	0.57	21.5	0.25	102	79	1335	122.5	
	6.5	2	2E6540	4000	4785	525	425	220	565	-	300	0.57	23.3	0.25	112	79	1460	122.5	
	7	2	2E7040	4000	4785	525	425	220	565	-	300	0.57	25	0.25	125	79	1500	122.5	
	7.5	2	2E7540	4000	4785	525	425	220	565	-	300	0.57	27.3	0.25	135	79	1540	122.5	
	8	3	3E8040	4000	4850	575	475	233	617	-	300	0.43	26.9	0.25	149	126	1800	141.6	
	8.5	3	3E8540	4000	4850	575	475	233	617	-	300	0.43	23	0.25	160	126	1850	141.6	
	9	3	3E9040	4000	4850	575	475	227	623	-	300	0.43	24.3	0.25	181	126	2280	141.6	
	9.5	3	3E9540	4000	4850	575	475	227	623	-	300	0.43	25.6	0.25	195	126	2360	141.6	
	10	3	3E1040	4000	4850	575	475	227	623	-	300	0.43	27	0.25	208	126	2440	141.6	
	10.5	3	3E1540	4000	4850	575	475	227	623	-	300	0.43	28.3	0.25	221	126	2520	176.5	
2000	4	2	2H4040	4000	4665	525	425	265	400	180	-	0.87	21.9	0.37	109	79	1160	122.5	
	4.5	2	2H4540	4000	4785	525	425	335	450	190	-	0.78	22	0.37	126	79	1300	122.5	
	5	2	2H5040	4000	4785	525	425	335	450	190	-	0.78	24.5	0.37	142	79	1340	122.5	
	5.5	2	2H5540	4000	4785	525	425	220	565	-	300	0.78	27	0.37	161	79	1380	122.5	
	6	2	2H6040	4000	4785	525	425	220	565	-	300	0.78	29.4	0.37	179	79	1530	152.6	
	6.5	3	3H6540	4000	4850	575	475	227	623	-	300	0.53	21.5	0.37	202	126	1860	141.6	
	7	3	3H7040	4000	4850	575	475	227	623	-	300	0.53	23.2	0.37	221	126	2045	176.5	
	7.5	3	3H7540	4000	4850	575	475	177	673	-	300	0.53	24.8	0.37	241	126	2130	176.5	
	8	3	3H8040	4000	4850	575	475	177	673	-	300	0.53	26.5	0.37	260	126	2185	176.5	
	8.5	4	4H8540	4000	4820	588	488	147	673	-	300	0.49	26.4	0.37	282	183	2550	219.7	
	9	4	4H9040	4000	4820	588	488	147	673	-	300	0.49	27.9	0.37	303	183	2590	219.7	
	9.5	4	4H9540	4000	4820	588	488	97	723	-	300	0.49	29.5	0.37	326	183	2870	273.5	
	10	5	5H1040	4000	4820	686	586	97	723	-	300	0.4	25.4	0.37	348	183	2880	183.6	
	10.5	5	5H1540	4000	4820	686	586	97	723	-	300	0.4	26.6	0.37	372	183	2925	183.6	

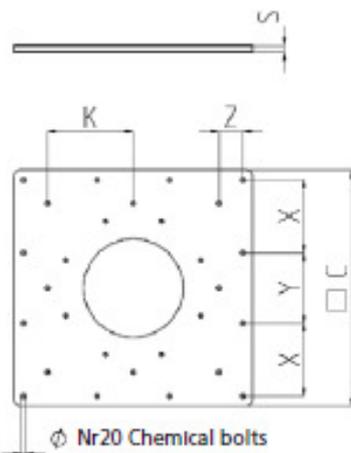
LIFTING CAPACITY	ARM	SIZE OF JIB CRANE	GBR SERIES COLUMN-MOUNTED JIB CRANE - ELECTRICALLY ROTATED AT 260° CONTINUOUSLY														WEIGHT	
			TYPE	UNDER BEAM	OVERALL DIMENSIONS (mm)						ARM SPEED		MOTOR POWER	TILTING MOMENTUM	MAXIMUM PULL OF THE LOG BOLT	JIB CRANE		
					h	H	X1	A	M	T	L	L1					NO. OF REVOLUTIONS	PERIPHERAL
3200	4	2	2J4040	4000	4785	525	425	335	450	190	-	0.93	23.4	0.37	164	79	1380	152.6
	4.5	3	3J4540	4000	4785	575	475	168	617	-	300	0.91	25.7	0.37	191	126	1490	141.6
	5	3	3J5040	4000	4785	575	475	168	617	-	300	0.91	28.6	0.37	215	126	1525	141.6
	5.5	3	3J5540	4000	4850	575	475	227	623	-	300	0.63	21.8	0.37	242	126	1755	141.6
	6	3	3J6040	4000	4850	575	475	227	623	-	300	0.63	23.8	0.37	268	126	1940	176.5
	6.5	4	4J6540	4000	4820	588	488	147	673	-	300	0.59	24.2	0.37	295	183	2330	219.7
	7	4	4J7040	4000	4820	588	488	147	673	-	300	0.49	21.8	0.37	322	183	2585	273.5
	7.5	5	5J7540	4000	4820	686	586	97	723	-	300	0.5	23.8	0.37	353	183	2575	183.6
	8	5	5J8040	4000	4820	686	586	47	773	-	300	0.5	25.4	0.37	381	183	2695	183.6
	8.5	5	5J8540	4000	4820	686	586	44	776	-	300	0.4	21.6	0.37	411	183	2990	229
	9	5	5J9040	4000	4820	686	586	44	776	-	300	0.4	22.8	0.37	440	183	3055	229
	9.5	5	5J9540	4000	4940	686	586	114	826	-	300	0.35	21	0.55	472	183	3235	229
	10	5	5J1040	4000	4940	686	586	114	826	-	300	0.35	22	0.55	502	183	3485	274
	10.5	5	5J1540	4000	4940	686	586	114	826	-	300	0.35	23.2	0.55	535	183	3555	274
4000	4	3	3K4040	4000	4785	575	475	112	673	-	300	0.91	22.9	0.37	208	126	1575	141.6
	4.5	3	3K4540	4000	4785	575	475	112	673	-	300	0.91	25.7	0.37	239	126	1770	176.5
	5	3	3K5040	4000	4785	575	475	112	673	-	300	0.91	28.6	0.37	270	126	1835	176.5
	5.5	4	4K5540	4000	4845	588	488	172	673	-	300	0.64	22.1	0.55	301	183	2415	273.5
	6	4	4K6040	4000	4845	588	488	72	773	-	300	0.64	24.1	0.55	335	183	2525	273.5
	6.5	5	5K6540	4000	4845	686	586	72	773	-	300	0.53	21.6	0.55	367	183	2510	183.6
	7	5	5K7040	4000	4845	686	586	69	776	-	300	0.53	23.3	0.55	402	183	2805	229
	7.5	5	5K7540	4000	4845	686	586	69	776	-	300	0.53	25	0.55	435	183	2860	229
	8	5	5K8040	4000	4845	686	586	19	826	-	300	0.53	26.6	0.55	471	183	2965	229
	8.5	5	5K8540	4000	4940	686	586	114	826	-	300	0.44	23.5	0.55	505	183	3280	274
	9	5	5K9040	4000	4940	686	586	114	826	-	300	0.44	24.9	0.55	540	183	3350	274
	9.5	5	5K9540	4000	4927	700	600	97	830	-	300	0.44	26.2	0.55	578	183	3575	274
	10	5	5K1040	4000	4927	700	600	97	830	-	300	0.35	22.1	0.55	619	183	3655	341.6
	10.5	5	5K1540	4000	4927	700	600	97	830	-	300	0.35	23.2	0.55	648	183	3725	341.6
5000	4	3	3L4040	4000	4785	575	475	112	673	-	300	0.91	22.9	0.37	253	126	1705	176.5
	4.5	4	4L4540	4000	4845	738	488	122	723	-	300	0.77	21.7	0.55	291	183	2105	219.7
	5	4	4L5040	4000	4845	738	488	122	723	-	300	0.77	24.1	0.55	328	183	2150	219.7
	5.5	5	5L5540	4000	4940	836	586	217	723	-	300	0.66	22.7	0.55	365	183	2415	183.6
	6	5	5L6040	4000	4940	836	586	164	776	-	300	0.66	24.8	0.55	405	183	2560	183.6
	6.5	5	5L6540	4000	4940	836	586	114	826	-	300	0.53	21.5	0.55	446	183	2850	229
	7	5	5L7040	4000	4940	836	586	114	826	-	300	0.53	23.1	0.55	485	183	2910	229
	7.5	5	5L7540	4000	4940	836	586	114	826	-	300	0.53	24.8	0.55	525	183	2980	229
	8	5	5L8040	4000	4927	850	600	97	830	-	300	0.53	26.5	0.55	567	183	3360	274
	8.5	5	5L8540	4000	4950	850	600	120	830	-	300	0.36	19.3	0.75	608	183	3715	341.6
	9	5	5L9040	4000	4950	850	600	120	830	-	300	0.36	20.4	0.75	649	183	3785	341.6
	9.5	6	6L9540	4000	4950	923	673	120	830	-	300	0.41	24.4	0.75	691	183	4025	311.5
	10	6	6L1040	4000	4950	923	673	120	830	-	300	0.33	20.6	0.75	733	183	4110	311.5
	10.5	6	6L1540	4000	4950	923	673	120	830	-	300	0.33	21.6	0.75	777	183	4180	311.5
6300	4	4	4M4040	4000	4845	738	488	122	723	-	300	0.96	24.1	0.55	327	183	2050	219.7
	4.5	5	5M4540	4000	4845	836	586	122	723	-	300	0.98	27.7	0.55	376	183	2250	183.6
	5	5	5M5040	4000	4845	836	586	72	773	-	300	0.78	24.6	0.55	425	183	2340	183.6
	5.5	5	5M5540	4000	4965	836	586	192	773	-	300	0.66	22.7	0.75	475	183	2470	183.6
	6	5	5M6040	4000	4965	836	586	189	776	-	300	0.66	24.8	0.75	526	183	2740	229
	6.5	5	5M6540	4000	4952	850	600	176	776	-	300	0.53	21.5	0.75	577	183	3045	274
	7	5	5M7040	4000	4952	850	600	126	826	-	300	0.53	23.1	0.75	630	183	3425	341.6
	7.5	6	6M7540	4000	4952	923	673	126	826	-	300	0.48	22.5	0.75	682	183	3675	311.5
	8	6	6M8040	4000	4952	923	673	122	830	-	300	0.48	24	0.75	736	183	3820	311.5
	8.5	6	6M8540	4000	4952	923	673	122	830	-	300	0.48	25.5	0.75	788	183	3910	311.5
8000	4	5	5N4040	4000	5005	736	586	179	826	-	300	0.88	22.1	1.5	401	183	2365	183.6
	4.5	5	5N4540	4000	5005	736	586	179	826	-	300	0.88	24.9	1.5	461	183	2425	183.6
	5	5	5N5040	4000	5005	736	586	175	830	-	300	0.7	22.1	1.5	522	183	2725	229
	5.5	5	5N5540	4000	5092	750	600	262	830	-	300	0.59	20.4	1.5	583	183	3130	274
	6	5	5N6040	4000	5092	750	600	262	830	-	300	0.59	22.3	1.5	644	183	3470	341.6
	6.5	6	6N6540	4000	5092	823	673	262	830	-	300	0.54	21.9	1.5	705	183	3670	311.5
10000	4	5	5O4040	4000	5092	750	600	262	830	-	300	0.88	22.2	1.5	487	183	2750	229
	4.5	5	5O4540	4000	5092	750	600	262	830	-	300	0.88	25	1.5	560	183	2985	274
	5	5	5O5040	4000	5092	750	600	262	830	-	300	0.74	23.2	1.5	633	183	3060	274
5.5	6	6O5540	4000	5092	823	673	262	830	-	300	0.67	23.1	1.5	707	183	3540	311.5	

Base plates, foundation frames and plinths for GBR/GBL series column-mounted cranes



SIZE OF JIB CRANE		2	3	4	5	6
Base plate and foundation frame (mm)	∅ C	750	860	910	1100	1220
	S1	20	25	30	35	40
	S2	10	10	10	10	10
	x	199	230	241	185	215
	y	281	325	341	320	350
	∅ 1	27	33	39	39	39
	r	150	170	180	220	240
Anchorage bolts (mm)	∅ T	M 24x3	M 30x3.5	M 36x4	M 36x4	M 36x4
	LT	600	700	800	800	800
	ST	90	105	125	130	135
Bolt clamping torque (Nm)		350	680	1200	1200	1200
Weight of frame with lug bolts (kg)		34.5	52.5	80	113	120
Foundation plinth (mm) (see warnings on the previous page)	∅ L	2500	3000	3200	4000	4200
	H	1150	1300	1300	1300	1300
Max jib crane weight (kg) (without hoist and trolley)	Q1	1540/1825	2520/2335	2870	3785/3475	4180
Maximum tilting movement allowed (kNm)	Mf	179/160	270/258	335	649/474	788

Counterplates for fixing to the floor with chemical bolts of the GBR-GBL size 2-3 column-mounted cranes



SIZE		2	3
Counterplate code		GBR250140	GBR350140
Counterplate dimensions (mm)	∅ C	1200	1400
	X	370	430
	Y	360	440
	Z	120	170
	K	430	480
	S	35	45
	∅	25	25
Counterplate weight (kg)		340	600
Maximum tilting movement allowed (kNm)	Mf	200	300
Fixing characteristics	Type of concrete of the floor: Class Rck minimum (kg/cm ²)	250	250
	Type of chemical bolts (e.g.: HILTI HVU with threaded bars HILTI HAS)	M 20	M20
	Minimum thickness of floor block (mm)	220	220
	Diameter of hole in the floor (mm)	24	24
	Depth of the hole of the concrete in the floor (mm)	170	170
	Clamping torques of the bolts (Nm)	150	150
	Project resistance of traction of one bolt (kN)	74,6	74,6

The fixing of the column using chemical bolts, needs a scrupulous check of suitability in relation to the type of support flooring. The suitability checks are the responsibility of the user and must be carried out by expert, qualified technicians who will evaluate the feasibility and formally undertake the relative responsibilities.

3. - SAFETY AND ACCIDENT PREVENTION

§ The electrically rotated jib cranes - series GBR and accessories have been designed and manufactured using the most modern technical knowledge and can be used safely.

§ The dangers for persons working with them can be totally eliminated and/or notably reduced only if the jib crane is used by authorised staff who are appropriately trained and sufficiently prepared in accordance with the instructions in this documentation.



THE STAFF ARE RESPONSIBLE FOR THE FOLLOWING OPERATIONS:

§ Completing the jib crane with any missing parts and installing it (e.g. hoist, electric controls, fixing accessories, etc.);

§ Setting up the crane and, in any case, the managing of its functioning;

§ Inspections and checks of the crane and its components, before starting up the machine, during its functioning or also after it stops.

§ Maintenance of the crane, the checking and the repair and/or replacement of its components.

§ Staff must be completely informed about the potential dangers in the execution of their duties, both regarding the functioning and the correct use of safety measures available on the machine.

§ These staff must, moreover follow the safety regulations carefully, as described in this chapter, to prevent dangerous situations occurring.

3.1 Qualifications of qualified operators

§ The following table is designed to define more clearly the field of intervention and the consequent assumption of responsibility of every single OPERATOR, given their specific training and qualification obtained. It shows with a pictogram the professional figures necessary for every kind of intervention.

PICTOGRAM	OPERATOR PROFILE
 OPERATOR	Jib crane operator: Persons qualified to perform simple tasks, that is the driving of the crane by use of the controls and the loading and unloading of the materials to OPERATOR be moved.
 MECHANICAL MAINTENANCE OFFICER	Mechanical maintenance officer: Qualified persons able to intervene on the crane in normal conditions, to carry out normal adjustments to the mechanisms, ordinary maintenance checks and mechanical repairs.
 ELECTRICAL MAINTENANCE OFFICER	Electrical maintenance officer: Qualified persons able to intervene on the crane in normal conditions and for normal interventions of an electrical nature, adjustments, maintenance and repairs. This person can operate with the presence of current in the control boards.
 MECHANICAL TECHNICIAN	Mechanical technician: Qualified technician authorised to carry out operations of a complex and exceptional mechanical nature.
 ELECTRICAL TECHNICIAN	Electrical technician: Qualified technician authorised to carry out operations of a complex and exceptional electrical nature.

3.2 General safety regulations

§ Before putting the jib crane into service it is necessary:

- to read the technical documentation carefully;
- to find out about the functioning and the positioning of the emergency stopping devices;
- to know which safety devices are installed on the jib crane and where they are positioned;

§ Some activities to be carried out on functioning components (e.g. replacing a hoist chain) expose the operators to situations of grave danger, so it is necessary to adhere strictly to the following rules:

- Staff must be authorised and properly trained regarding the operating procedures to follow, the dangerous situations that could occur and the correct methods for preventing them.
- If ,exceptionally, staff have to deactivate completely or partially, open or remove the protective covers to allow a particular specialised technical intervention of maintenance, inspection or repair to be carried out, it will be their precise duty to put back immediately the relevant protective covers at the end of the intervention. The staff in charge must make sure that at the end of the intervention mechanical parts, tools or other devices used are not forgotten on the crane, since this may provoke damages or malfunctions.
- Staff in charge of maintenance, inspection and repair operations must use all the necessary and possible preventive safety measures before beginning work for their own safety, and in particular, they must check that:
 - The jib crane is deactivated and the appropriate preventive measures have been taken (signs, blocking controls etc.) to avoid the accidental starting. To allow the execution of a technical intervention on an electric device, in the presence of voltage current, pay the maximum attention and operate with extreme caution.

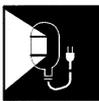
3.3 Safety symbols

§ In the manual and in danger zones, signs and pictograms are used to underline or bring attention to potentially dangerous situations due to residual risks, or to actions which must be performed obligatorily according to the safety procedures shown in this manual.

SIGNS USED TO INDICATE DANGERS	
SIGN	MEANING
 DANGER PARTS WITH LIVE TENSION	Signals the presence of live voltage and is fixed to electrical equipment and on any structure which has live electrical voltage inside.
 GENERAL DANGER	Warning: general danger (accompanied by diagram which indicates what kind of danger).
 DANGER OF CRUSHING	Warning danger of crushing due to mechanical machine-parts in movement.
 DANGER OF ENTANGLEMENT	Warning danger of entanglement or dragging from machine-parts in motion (chains, wheels, etc.).
 DANGER FROM SUSPENDED LOADS	Warning danger from suspended loads being moved by the crane.

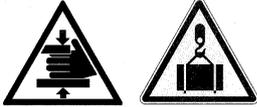
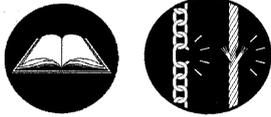
SIGNS USED TO INDICATE BANS	
SIGN	MEANING
 IT IS FORBIDDEN TO REMOVE THE PROTECTION	It is forbidden to remove the safety devices on a machine in motion.
 IT IS FORBIDDEN TO MANOEUVRE	It is forbidden to carry out manoeuvres during maintenance phases of moving machine-parts.

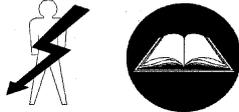
SIGNS USED TO INDICATE OBLIGATIONS	
SIGN	MEANING
 CONSULT THE MANUAL	Consult the manual when you see, preceding or positioned inside an indication (instructions, settings, maintenance, etc.).
 GLOVES MUST BE WORN	It is compulsory to wear protection gloves.
 HELMETS MUST BE WORN	It is compulsory to wear safety helmets.
 PROTECTIVE FOOTWEAR MUST BE WORN	It is compulsory to wear non-slip protective footwear.
 SAFETY HARNESSSES MUST BE WORN	It is compulsory to wear safety harnesses in operations at a height with the risk of falling down.
 CHECK LIFTING OF THE MACHINE-PARTS	The preventive checking of wire ropes, hooks, safety harnesses and accessories used for lifting and manoeuvring is compulsory.

SIGNS USED FOR SAFETY INDICATIONS	
SIGN	MEANING
 AUXILIARY ILLUMINATION	For the interventions indicated the use of auxiliary illumination is recommended.

3.4 Warning about remaining risks

§ Having carefully considered the possible dangers in all the operating phases of the jib crane, necessary measures have been taken to eliminate, as far as possible, risks to the operators and/or limit or reduce the risks derived from dangers not totally eliminable at source. Nevertheless, despite all the precautions taken, the following remaining risks which are eliminable or reducible with the relevant prevention activities, still exist:

RISKS DURING USE		
DANGER / RISK	BAN / WARNING	OBLIGATION / PREVENTION
 <p>Risk from danger of crushing during the manoeuvring of loads suspended when the operator or other staff are in relevant zones/areas in the path of the load.</p>	 <ul style="list-style-type: none"> • It is forbidden to lift loads while people are passing through the related manoeuvre area. • It is forbidden to transit, remain or manoeuvre under the suspended load. 	 <ul style="list-style-type: none"> • The operator must follow the indications to obtain maximum safety by observing the indications in this manual. • Obligation to do periodical checks of the wire rope and the hook.
 <p>Risk from dangers of entanglement and/or crushing after contact with the rotating arm and/or moveable parts of the trolley/hoist.</p>	 <ul style="list-style-type: none"> • Warning! Exposure to the parts in motion can create dangerous situations. • It is forbidden to touch the crane arm and the trolley/hoist in motion or to stand in their path. 	 <ul style="list-style-type: none"> • Obligation to use protective gloves during the phases of positioning of the harness and when moving the load by pushing it.

RISKS DURING MAINTENANCE		
DANGER / RISK	BAN / WARNING	OBLIGATION / PREVENTION
 <p>Risk from danger of electrocution electric shock during maintenance of electrical equipment without having deactivated the electric power supply.</p>	 <ul style="list-style-type: none"> • It is forbidden to intervene on electrical equipment before having switched off the jib crane from the electric power line. 	 <ul style="list-style-type: none"> • Entrust electrical maintenance operations to qualified staff. • Carry out checks on electrical equipment prescribed in the manual.
 <p>Risk from crushing in case of contact with the rotating arm during braking.</p>	 <ul style="list-style-type: none"> • Warning! Exposure to the parts in motion can create dangerous situations. 	 <ul style="list-style-type: none"> • Entrust wire rope replacement operations to qualified maintenance staff. • Obligation to use protective gloves and, if necessary, safety belts.

3.5 Safety measures and instructions

3.5.1 Control devices

§ **The electrically rotated jib cranes series GBR**, are controlled by push-button panel (being part or not of the supply) which sends electric signals to a low voltage control panel, usually fitted on the crane, to activated the related movements.

§ These movements are activated by means of the following buttons of the push-button panel (fig.2):

- **ascent and descent** buttons to control the **lifting of the hoist** (fast and/or slow)
- **right and left** buttons to control the **transit of the trolley** (fast and/or slow)
- **ahead** and **backward** control the **rotation of the arm**

§ The buttons for the functions **ascent**, **right** and **ahead**, have a **black symbol on a white background**, while those for **descent**, **left** and **backward** have a **white symbol on a black background**. They start the function when they are kept pressed down and the controls of the auxiliary slow speed, of lifting and of transit, can be activated with **separate buttons** or with two pushes, the first push for the command of the "slow" speed, the second push to command the "fast" one

§ To allow the functioning of the crane it's necessary to bring the button for the **emergency stop**, located on the push-button panel, to a raised position for the gearing and then push the function button.

§ When the crane is provided with a control panel, the push-button panel is of the pendant type and manoeuvrable by the operator from the ground.

§ The crane can be controlled also by remote control, the functionality of the buttons is unvaried with respect to that of the push-button panel in pendant execution.



When the crane is controlled by remote control, the operator must check that the control ensures the maximum possible safety with particular attention to the visibility of the load.

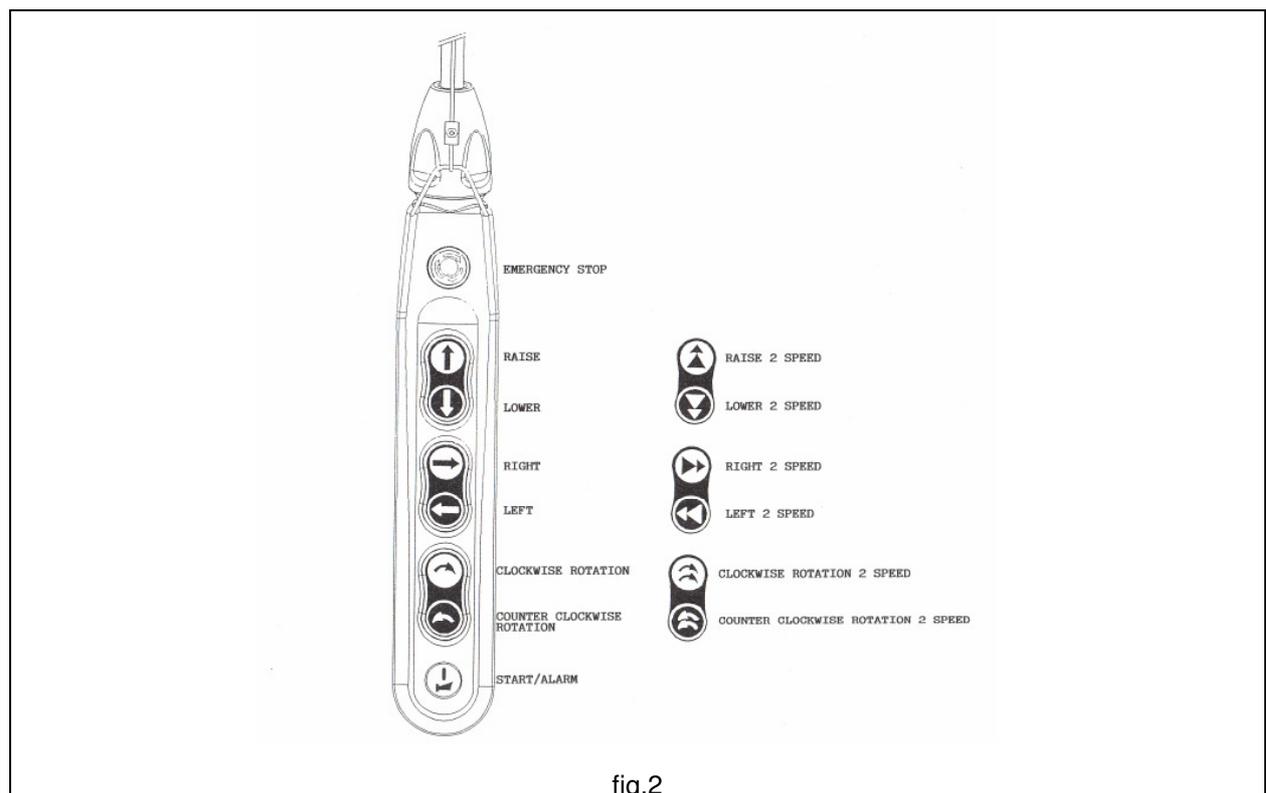


fig.2

§ The electrically rotated jib crane series GBR, according to contractual agreements, can be supplied **complete with or without control devices and systems** (control panel with push-button panel).



When the crane is supplied without control device or systems, it is forbidden to put it into service before it has been completed in conformity with the rules of the Machines Directive 2006/42/CE.

3.5.2 Safety and emergency device

§ The electrically rotated jib crane series GBR, are fitted with the following safety and emergency devices:

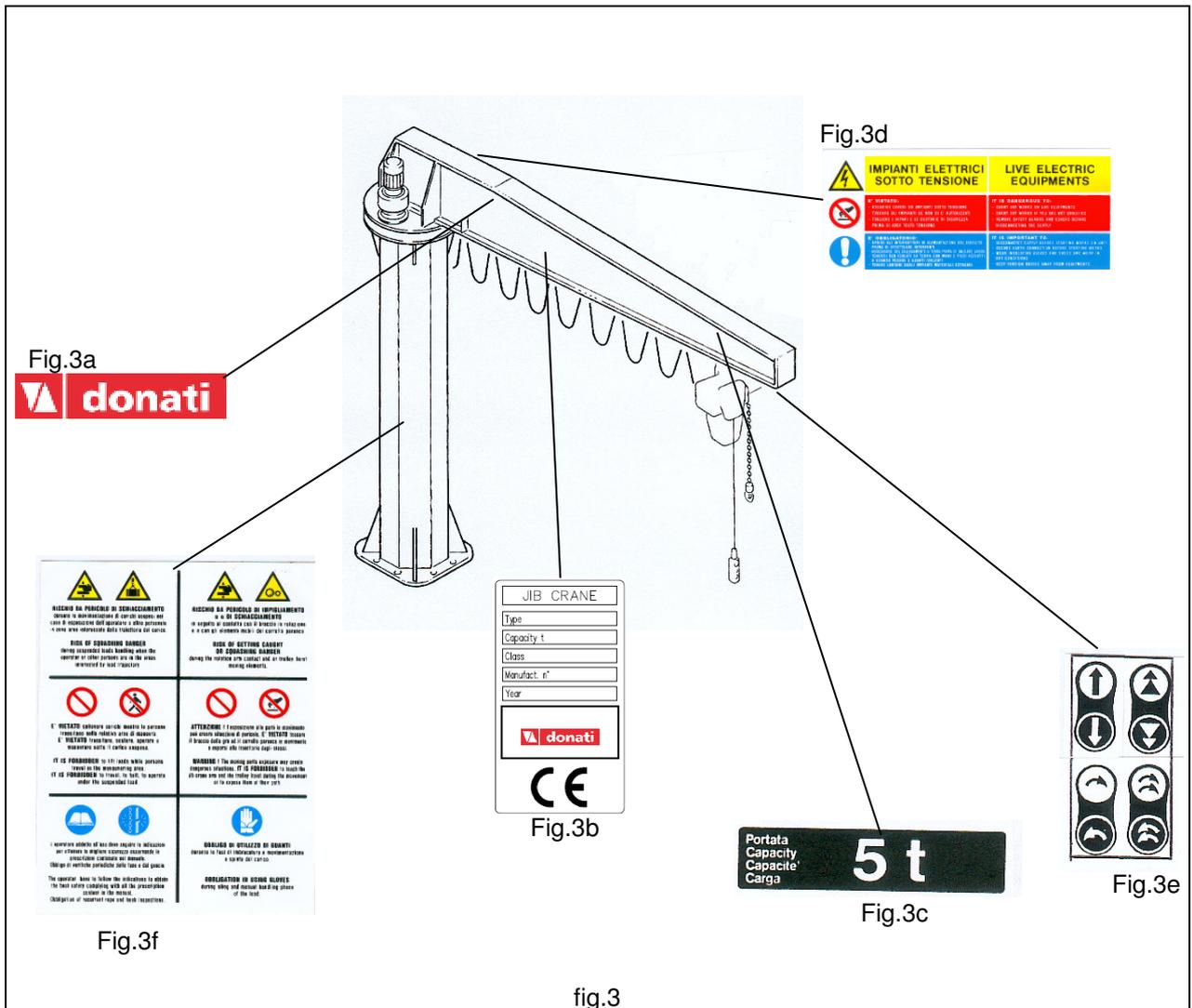
1. **Rotation brake**, of negative type on the rotation motor for the manoeuvres of ahead/backward, which works automatically in case of lack of feed supply and assure the stability of the arm position.
2. **Rotating limit switch**, available on request, it is composed by electric micro-contacts, with its relative mechanical actuators, that limit the rotation field of the arm of the crane.
3. **Trolley-end limit switches**, mechanical catches which limit the maximum run of the trolley along the arm's girder.
4. **Mechanical limit switch actuators**, limit switch striker plates of the trolley's electrical microswitches.
5. **Anti-collision device, available on request**, to avoid the telescoping of two or more arms which, operating in the same area, can interfere with each other; or to avoid the collision of the arm with surrounding structures.
6. **Emergency stop button**, fixed on the push button panel, has mushroom form of red colour, it starts the stop functions when completely pushed. It stops all the movements (fig.2).

	<p>WARNING!</p> <p>When the crane is supplied without control:</p> <ul style="list-style-type: none"> • The limit switches are not connected ! Before putting into service the crane, it's compulsory to connect the devices checking that the limit switches operate correctly, as described in paragraph 4.5 "setting up the machine". • It is supplied without push-button panel and this has no emergency stop button which has to be provided by the client in conformity with the current safety regulations.
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3.5.3 Warning and signalling devices - List of labels

§ **The electrically rotated jib crane series GBR, are fitted with the following labels (fig.3):**

- **Labels** on the machine:
 - logotype of the manufacturer (fig.3a):
 - label of jib crane data with the CE marque - (fig.3b)
 - label indicating the maximum lifting capacity of the jib crane (fig.3c)
 - label of low voltage control (fig.3d)
 - directional labels (fig.3e)
 - labels of the hoist and the trolley
 - label of the rotating motor (on the geared motor)
 - warning labels about remaining risks (fig.3f)



§ **Legibility and conservation of the labels**

The labels and the data written on them must always be kept legible and must be periodically cleaned. If a label deteriorates and/or is no longer legible, even only in one of the shown elements, then we recommend requesting another from the manufacturer, quoting the data contained in this manual or on the original label, and providing for its replacement.

! The labels must not be removed and it is absolutely forbidden to put other labels on the crane without previous authorization by DONATI SOLLEVAMENTI S.r.l.

4. - HANDLING - INSTALLATION - PUTTING INTO OPERATION

4.1 - General notes at delivery

	<ul style="list-style-type: none"> The electrically rotated jib crane series GBR are delivered not assembled, in their main components as column, arm, electric system and, when provided, the lifting unit. The user must therefore proceed to the phases of installation of the jib crane following the instructions contained in this chapter and assigning if possible the assembly to specialised installers.
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	<ul style="list-style-type: none"> The operations described in this chapter, because of their delicacy and importance, can cause, if badly performed, grave safety risks in particular for persons exposed during the installation and use phases of the jib crane. In any case, the operations must be carried out by professionally qualified staff who specialise in industrial construction installing, with knowledge in electromechanics, equipped with work equipment and personal protection conforming to the current safety and accident prevention legislation in the workplace, and who have first read carefully this publication.
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	<p>On receiving the supplied goods check and ensure that:</p>	
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- The despatch data (receiver's address n° of items, n° of order, etc.) correspond to the accompanying documentation (transport documents and/or related packing-list).
- Technical/legal documentation which comes with the jib crane includes (fig. 5):
 - The instruction manual for the use of the crane to be installed.
 - The EC Declaration of Conformity.
 - The instructions for the use of the hoist/trolley to be installed on the crane, if included in the supply.
- The packing, if it is part of the supply, is in good condition, in one piece and free from damage.

	<p>In case of damage or missing parts tell the courier, note it on the accompanying document and notify DONATI SOLLEVAMENTI S.r.l. within eight days of receiving the goods.</p>
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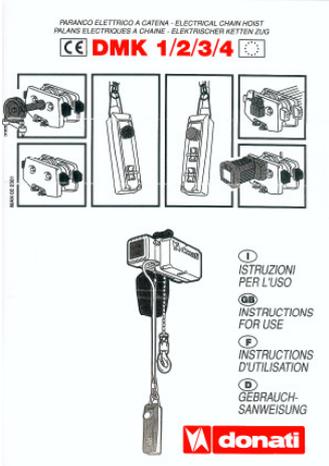
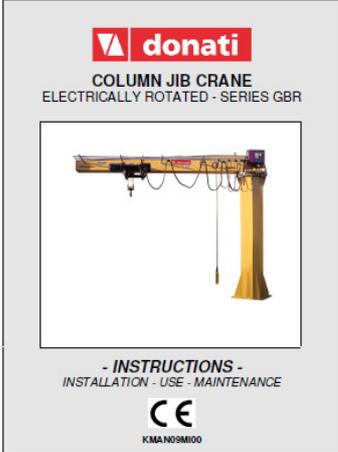
	 <p>- INSTRUCTIONS - INSTALLATION - USE - MAINTENANCE</p> 	
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fig.5

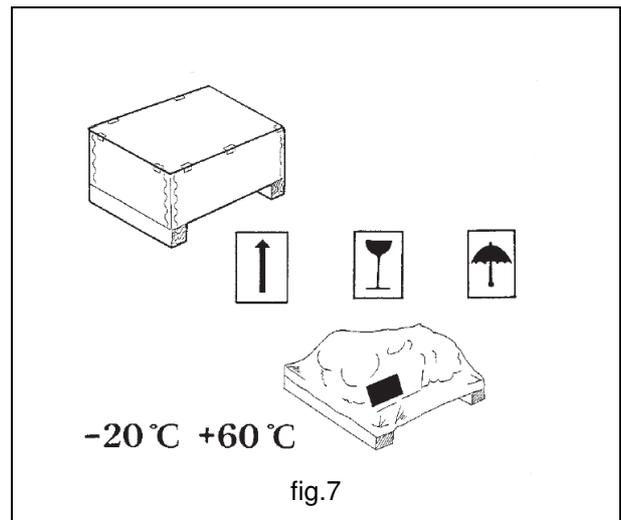
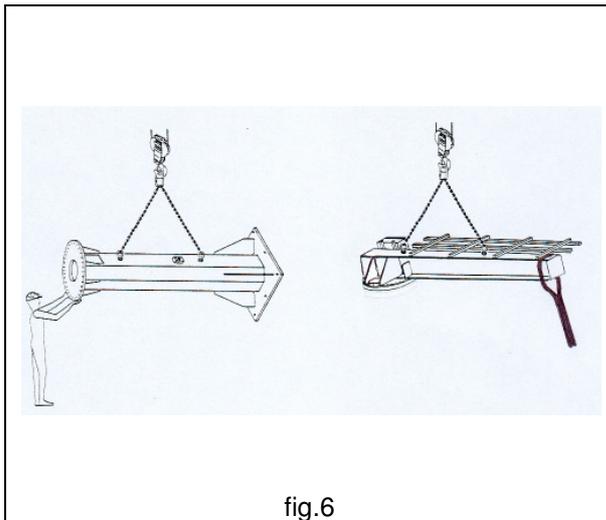
4.2 Packing, transportation and handling



Before handling the jib crane and accessories it is useful to know that:

4.2.1 Standard packing

- The steel structures of the jib crane (column or bracket or arm) are, generally, supplied without packing; on the columns and brackets there are hooking points to make moving easier during the operations of installation (fig.6).
- To facilitate the handling and assembling operations of the lifting unit, if this is part of the supply, the unit can be delivered in a cardboard box (fitted with or without a pallet) or, when necessary in a chest or wooden cage or also simply attached to a pallet.
- When the lifting unit is delivered on a pallet, this is usually covered by a polyethylene film to protect it from dust.
- Related accessories, being part of the supply (e.g. components of the electric system), can be delivered inside cardboard boxes which, in relation to the mass to be handled, can be fitted with or without a pallet.
- The standard packing is not rainproof and is intended for overland destinations, not overseas, and for covered and not damp areas. Therefore packing and special protection are not included in the supply, unless these have been specified in the contract.
- The packing, when necessary, can show signs and pictograms which give important information regarding the handling and transport (mass, handling points, storage information, etc.) - (fig.7).
- The items, stored in the right way, can be kept in a warehouse for a period of two years in covered areas in which the temperature is between -20°C and $+60^{\circ}\text{C}$ with relative humidity of 80%. For different environmental conditions it is necessary to provide special packing.



4.2.2 Transportation

- Transportation should be carried out by qualified haulage contractors able to ensure the correct handling of the transported material.
- During transportation, avoid putting weights on top of the jib crane or on other packed items, because they could cause them damage.
- During the transportation phases we recommend that the pallet, or chests / cages are not tilted or overturned to avoid dangerous variations in their centre of gravity and, therefore, to ensure the best stability.



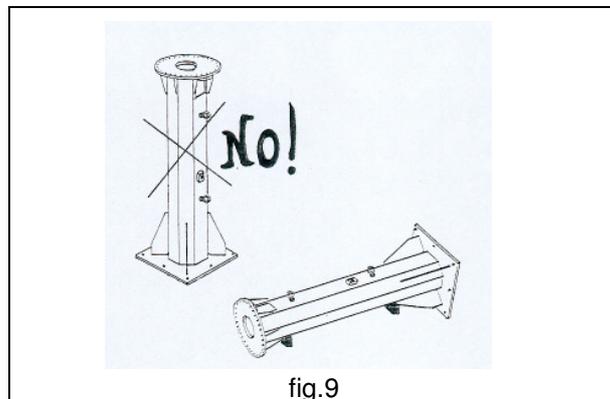
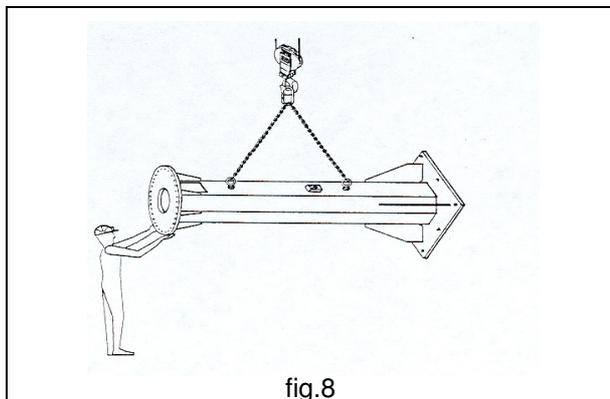
DONATI SOLLEVAMENTI S.r.l. takes no responsibility in the case of transportation by the client or haulage contractors chosen by the client.

4.2.3 Handling

	For the handling of jib cranes proceed as follows:	
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- Allocate a limited, suitable area, with a level floor or surface, for the unloading operations and setting down on the ground of the separate parts of the steel structure and the components contained in the packing.
- Considering the typology of the part/component or the intended packing, allocate the necessary equipment for the unloading and handling of the parts of the crane and its accessories taking into account their weight, headroom dimensions and handling and/or suspension elements.
- The unloading and handling can be done using a crane (e.g. travelling cranes, overhead travelling cranes, etc.) or lift trucks with an adequate lifting capacity and characteristics and the use of special equipment is not required.
- Items of any accessories with a weight lower than 30 kg (as opposed to those over 30 kg), do not carry any indication of weight and can be handled by hand.
- Sling the parts of the crane with suitable equipments so as not to damage the painted surfaces.
- Handling the components, with suitable equipments in the handling points (fig.8) and move the parts of the crane and its accessories very carefully, to the zone allocated for unloading and avoid oscillations, swinging and dangerous unbalancing.
- After handling, check that the parts and the loads are intact and that there has been no damage.

	<ul style="list-style-type: none"> • The handling of the parts of the jib crane and related accessories, must be carried out with great care and with adequate lifting and transport means so as not to create dangers due to the risk of losing stability. • All parts or components must be set down or fixed in a stable way in all phases of handling, transport and storage and they must not be tilted or laid down in a vertical position or on one side (fig.9).
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4.2.4 Removing the packing and/or check of the crane parts

- In the case of packed loads open the packing and take out the various parts by using suitable equipment according to their weight and handling points.
- Check that all materials making up the supply are intact and that no parts or accessories are missing. Inform the manufacturer as soon as possible of any damage or things missing.
- If storage of the material is required follow the instructions in paragraph 4.5.1 "Storage and conservation of parts".

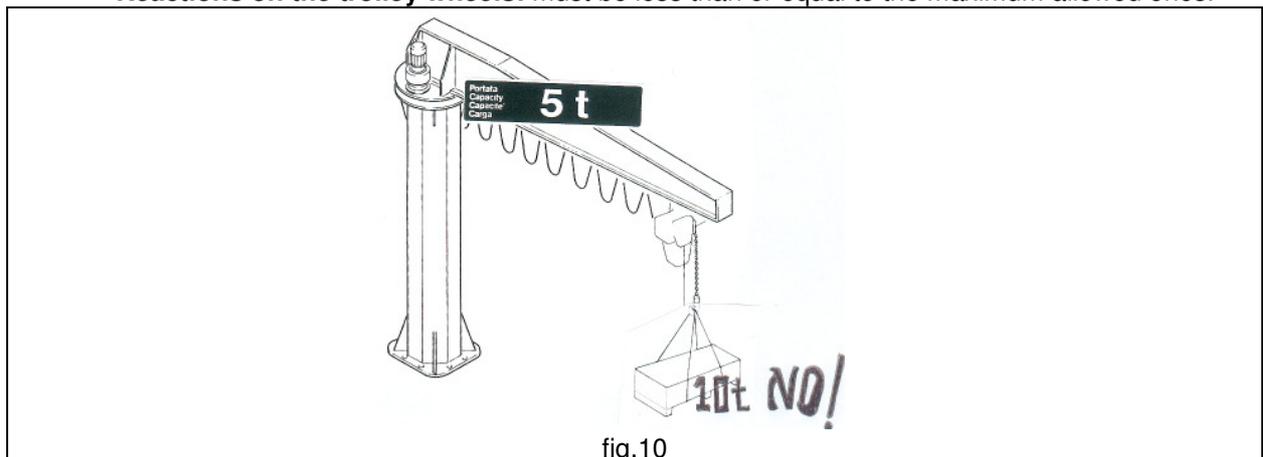
	<ul style="list-style-type: none"> • Check that all parts of the crane are intact and in particular check that: <ul style="list-style-type: none"> • there is no crushing, deformations, cracks or broken parts in the columns, the brackets and the arms. • there is no damage to the components of any related electrical system. • Dispose of any packing in accordance with regional laws regarding wood, plastic, cardboard by differentiated recycling.
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4.3 - Installation of the jib crane

4.3.1 Duties and responsibilities of the installer

	<ul style="list-style-type: none"> The installation of the jib crane, for the size of its operations, can pose, if not carried out correctly, serious risks to the safety of people exposed both at the assembly stage and at the successive stage of use of the crane. Therefore, the installation must be assigned to installers specialising in the assembly of industrial equipment. The lifting operations and positioning at a height of the parts of the crane must be carried out by installers equipped with: <ul style="list-style-type: none"> adequate individual safety measures (e.g. helmet, gloves, safety harness, etc.) work equipment (e.g. forklift truck, scaffolding etc.) suitable for the purpose. And following a careful evaluation of the following parameters: <ul style="list-style-type: none"> typology of the workplace, its environmental characteristics, (type of floor surface, etc.) height of the working space in relation to the loading surface dimensions and weight of the components to be installed available spaces for the handling of the parts to be installed. 	
	<p>Before assembling the parts and using the jib crane, the installer must check that the crane characteristics are suitable to what requested and for the foreseen use, in particular:</p>	

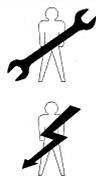
- The lifting capacity of the crane is greater than/equal to the loads to be lifted.
- The characteristics of the fixing structures (plinth, floor, wall, column, etc.) have been “**declared suitable**” by the user or expert technicians employed by the user.
- The characteristics of the lifting unit (trolley/hoist), if not part of the supply, are compatible with those of the jib crane (see point 2.2.6) in relation to: (fig.10)
 - Lifting capacity of the hoist:** must be less than/equal to the lifting capacity of the jib crane.
 - Weight of the trolley/hoist:** must be less than or equal to the maximum foreseen weight.
 - Speed of lifting/moving:** must be less than or equal to the maximum allowed ones.
 - Headroom of the size of the trolley/hoist:** must be less than or equal to the maximum allowed ones.
 - Reactions on the trolley wheels:** must be less than or equal to the maximum allowed ones.



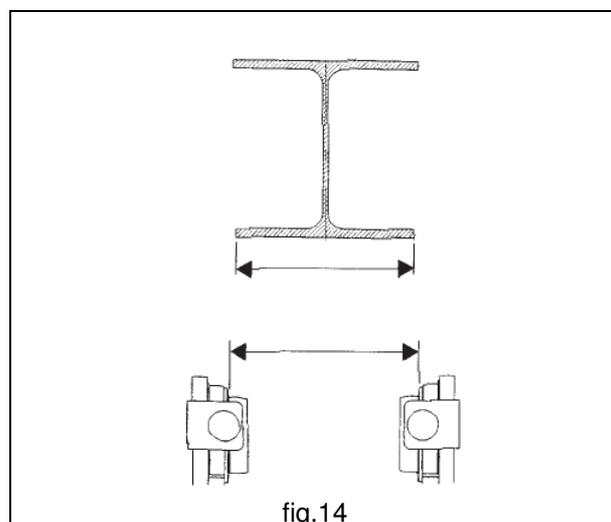
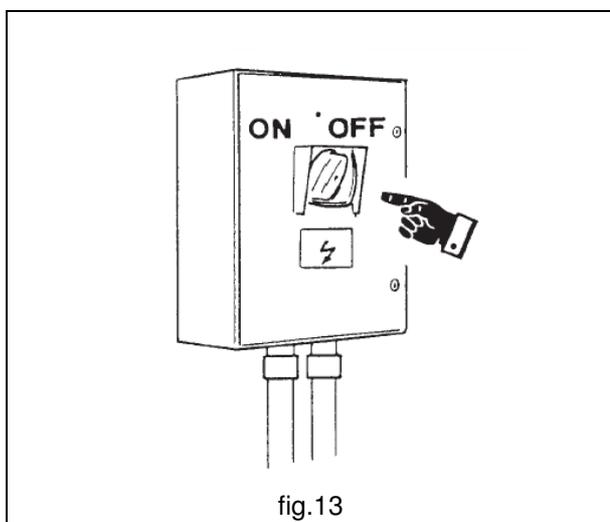
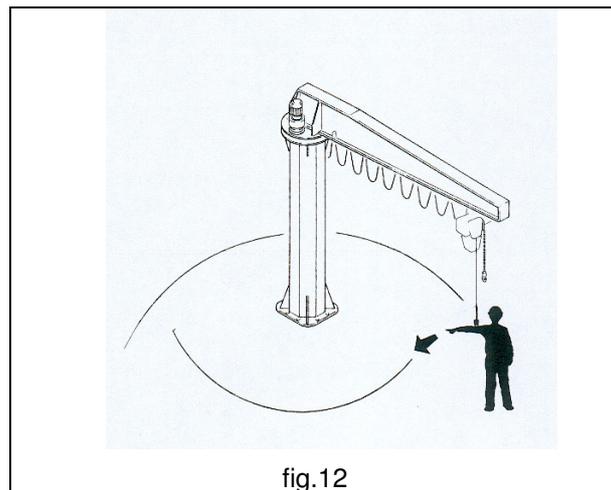
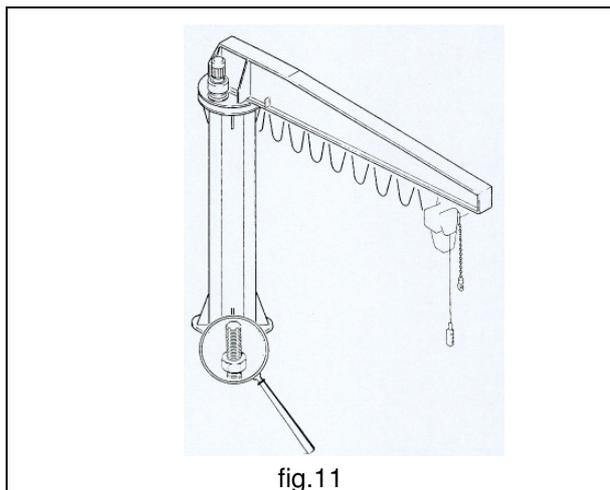
	<p>Following the installation of the jib crane, it is the precise duty of the installer to:</p>	
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- Carry out the activities of “**Putting into operation**”, as described in paragraph 4.4
- Update the “**Inspection**” report and decide on the “**Suitability for use**” of the jib crane

4.3.2 Preparing the place of installation

	<p>To allow the installation of the jib crane, the following operations must be carried out:</p>	
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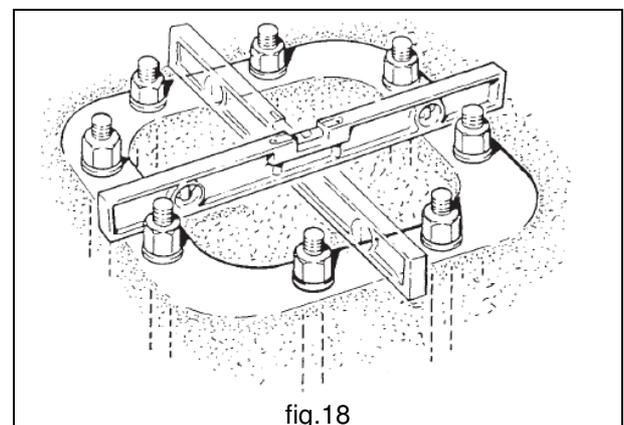
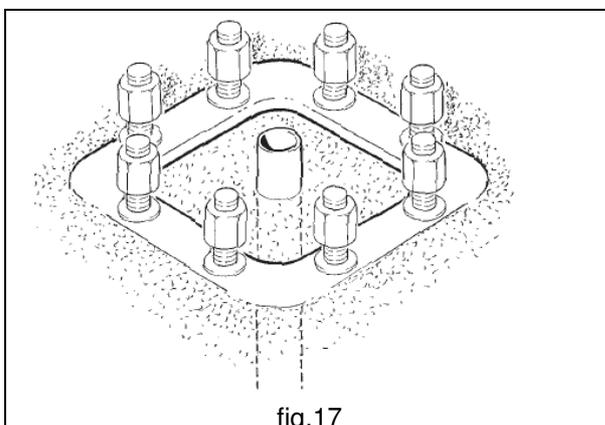
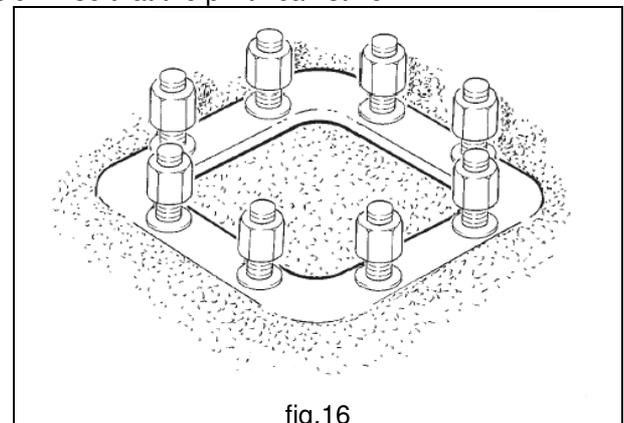
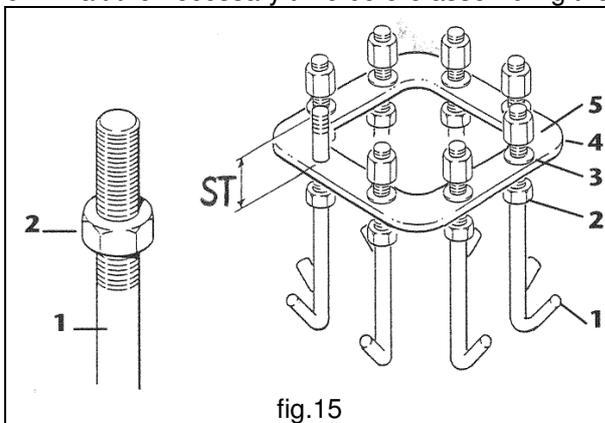
- Check that the declaration of suitability/adequacy of the support/fixing structures is present;
- Check that obvious defects of the support/fixing structures are absent (fig.11);
- Check the suitability of the manoeuvre spaces (rotation) available for the jib crane, especially if it operates in areas where there are other cranes or other manufacturing machines (fig.12);
- Check the suitability and correct functioning of the electric system: (fig.13)
 - 1) correspondence of the power line voltage with the voltage for the motors;
 - 2) that there is a suitable switch/disconnecting switch for the power line;
 - 3) adequacy of the section of the cable of the electrical power supply;
 - 4) that there is a suitable earthing system;
- Check the width of the flange of the girder which must correspond to that intended for the trolley wheels (fig.14).
- Prepare the masses for the **test runs** equal to: **nominal lifting capacity x 1,1**
- Prepare the masses for the **static test runs** equal to: **nominal lifting capacity x 1,25**
- Prepare the equipment for the slinging and lifting of the masses for the load test runs
- Check that there are the relevant signs to warn of the risks posed by the manoeuvring of the crane.



4.3.3 Assembly of the column

	<ul style="list-style-type: none"> • The fixing of the column to the ground can be done in the following ways: <ul style="list-style-type: none"> • using a foundation frame with log bolts sunk into a plinth made of reinforced concrete. • using bolts and screw anchors or dowelling. 	
	<ul style="list-style-type: none"> • The fixing of the column using bolts and screw anchors or dowelling requires a scrupulous check of suitability in relation to the type of support flooring. • The technical data, so that the user can choose the right size for the the foundation plinth, are shown in the table in paragraph 2.2.6 ("Fixing systems"p.14).The plinth size must be in relation to the real consistency of the ground and the specific maximum pressure that it can bear. • The suitability checks of the foundation are the responsibility of the user and must be carried out by technical experts who judge the feasibility and take responsibility for this. 	
	<p>Positioning of the foundation frame in the plinth:</p>	

1. Screw tight the low nuts **2** on the log bolts **1**, leaving a threaded part showing which corresponds to the level **ST** (fig.15) (for the protrusion **ST**, see "Fixing systems" on page 14).
2. Insert all the logbolts **1** in the holes on the foundation frame **4**, so that the plate of the frame is resting on the nuts and then tighten with the tall nuts **5**, interposing the washers **3**.
3. Sink the frame prepared in this way in the plinth casting, taking care that the upper plate remains on the same level as the floor (fig.16) Protect the threading of the logbolts to avoid damage.
4. When needed, insert a tube into the plinth through which the electrical cable which powers the crane can be passed (fig.17).
5. Level the foundation frame using if necessary a bubble and proceed to the filling and flint-glazing of the plinth (fig.18).
6. Wait the necessary time before assembling the column so that the plinth can stiffen.



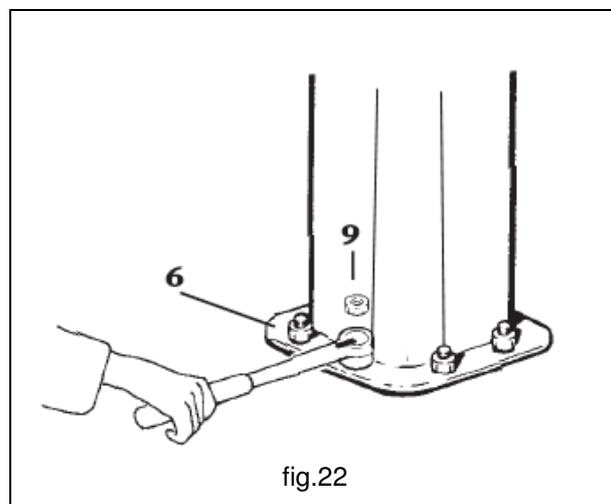
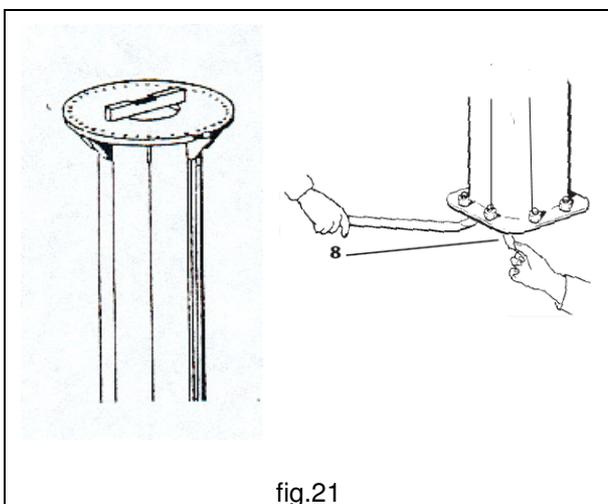
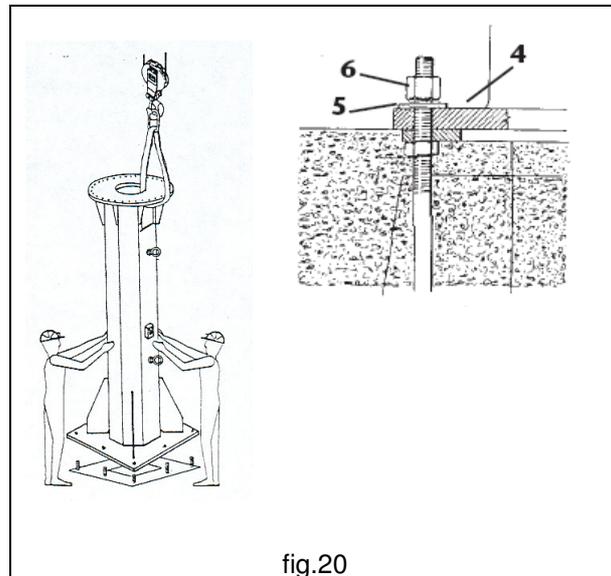
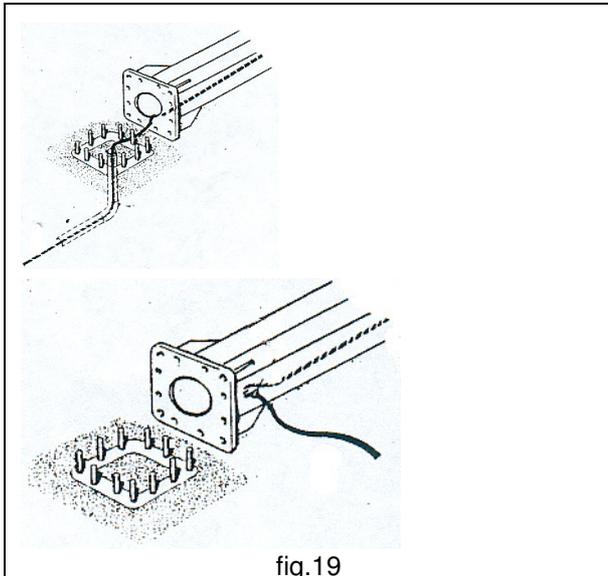

Column assembling:


1. Once the solidification of the plinth has taken place, remove the protection from the threading of the log bolts and check that the tall nuts can be unscrewed without being forced, remove them and the related washers.
2. Insert the electric cable in the column resting on the floor and push it through the collector inspection cover. Make the operation with the column on the floor. On the column there is a hole for the introduction of the electric cable from the external (fig.19).



Make this operation only if the cable come out of the allocated tube (pipe) in the plinth and if the crane is provided with collector.

3. Set up the column lifting it by the upper part with appropriate equipment.(fig.20)
4. Assemble it on the foundation frame positioning the base plate **4** correctly and lining up the nuts **6** subject to the interposition of the related flat washers **5**.(fig.20)
5. Check the verticality of the rotation axis by using a level **L** resting directly on the thrust bearing flange or, when installed, on the thrust bearing itself in order to check the right planarity. The perfect plumbing can be obtained, if necessary, inserting suitable shims corresponding to the log bolts, under the base plate.(fig.21)
6. Screw tight the nuts **6** using a dynamometric spanner, applying the clamping couplet stated in the table based on the diameter of the log bolts (pag.14)
7. Checking the nuts afterwards for unscrewing with the relative safety nuts **9** (fig.22).



4.3.4 Assembly of the arm



In relation with the various models of jib crane series GBR, the thrust bearing can be supplied fitted on the column or on the arm.
For this reason there are two different procedure of installation:



For the assembly of the arm, with thrust bearing fixed before on the arm, proceed as follow:



1. Verify that the support of the thrust bearing on the flange welded on the column is perfectly cleaned. The cleaning of the components is a very important condition to assure the perfect working of the parts and avoid their fast deterioration.
2. Verify that the thrust bearing and pinion teeth are greased with care.
3. Sling the arm corresponding to the handling points shown on the (fig.23), and lift it with suitable means (overhead travelling crane, travelling crane, etc).Keep the girder horizontal to the round. Take care to avoid damages to the electric box, the electric equipment (channels, cables, etc) and the rotating geared motor fixed before on the arm.
4. Avoid oscillations and swinging and, if necessary, to maintain the equilibrium use a rope tied to the ends of the arm. (fig.24)
5. Rest the thrust bearing on the flange welded on the column making coincide the holes between thrust bearing and plate. (fig.25)
6. Insert the screws and fit their relative washers and nuts. Tight the screws with dynamometric spanner applying the clamping couplet stated on the table. (fig.26)

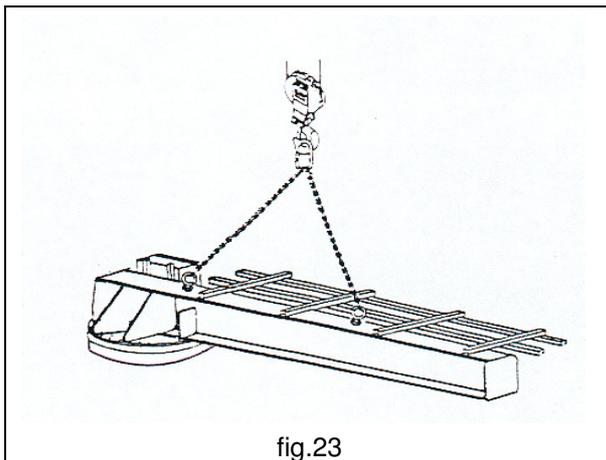


fig.23

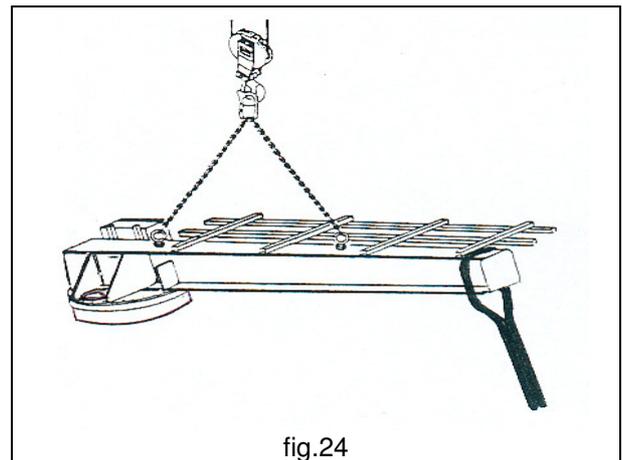


fig.24

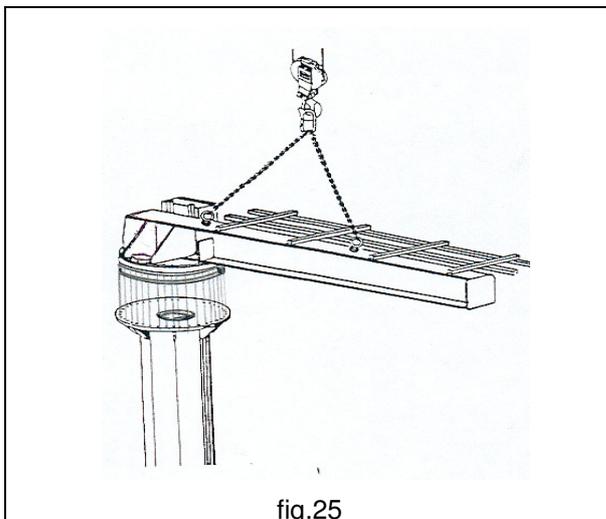


fig.25

CLAMPING COUPLES FOR THE THRUST BEARING BOLTS

M16 class 10.9: 288 Nm

M20 class 10.9: 562 Nm

fig.26



For the assembly of the arm, with thrust bearing fixed before on the arm, proceed as follow:



1. Verify that the support of the thrust bearing on the flange welded on the column is perfectly cleaned. The cleaning of the components is a very important condition to assure the perfect working of the parts and avoid their fast deterioration.
2. Sling the arm corresponding to the handling points shown on the (fig.27), and lift it with suitable means (overhead travelling crane, travelling crane, etc).Keep the girder horizontal to the round. Take care to avoid damages to the electric box, the electric equipment (channels, cables, etc) and the rotating geared motor fixed before on the arm.
3. Avoid oscillations and swinging and, if necessary, to maintain the equilibrium use a rope tied to the ends of the arm. (fig.28)
4. Rest the thrust bearing on the flange welded on the column making coincide the holes between thrust bearing and plate. (fig.29)
5. Insert the screws and fit their relative washers and nuts. Tight the screws with dynamometric spanner applying the clamping couplet stated on the table. (fig.26)
6. Fit the geared motor (verify that the pinion teeth are greased with care) in its side and verify that it is perfectly connected in its flange welded on the arm (fig.30). If this operation is difficult by misalignment between the teeth of the pinion and thrust bearing, move the arm or the geared motor up to there is a perfect alignment.
7. Lock the geared motor screws.

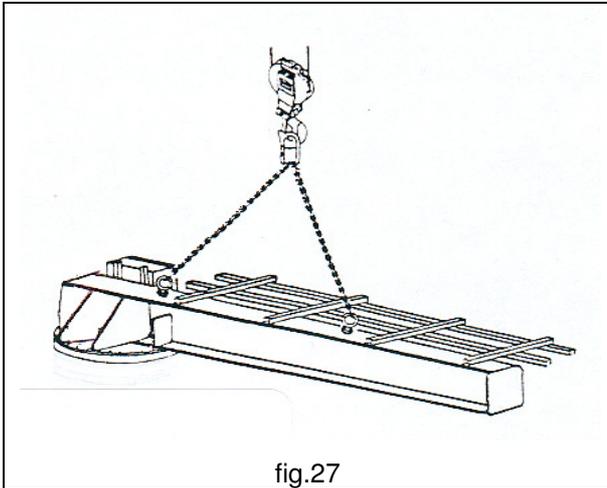


fig.27

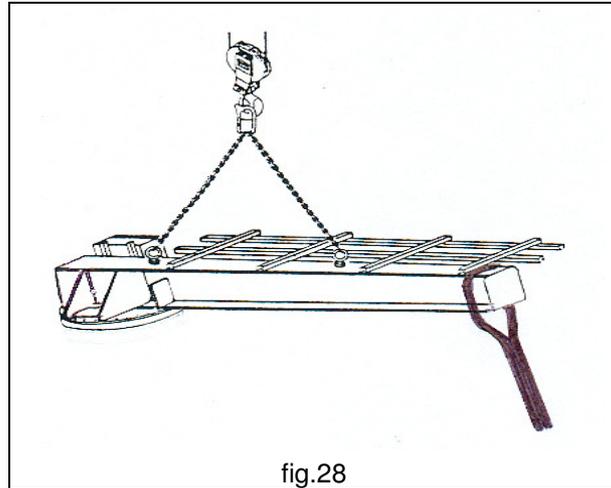


fig.28

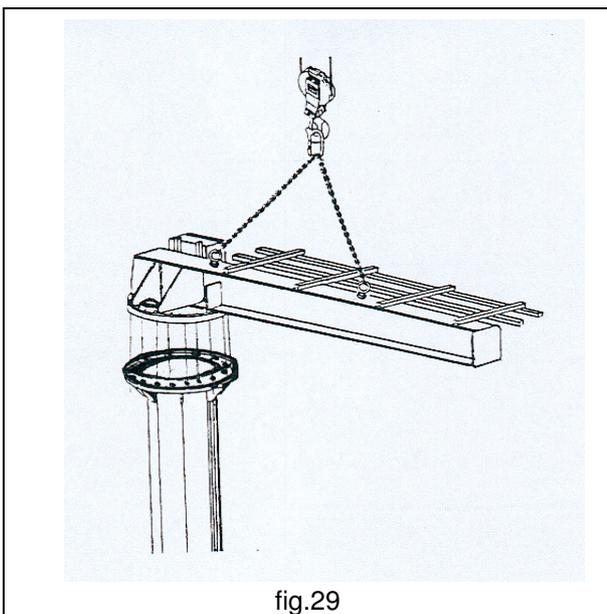


fig.29

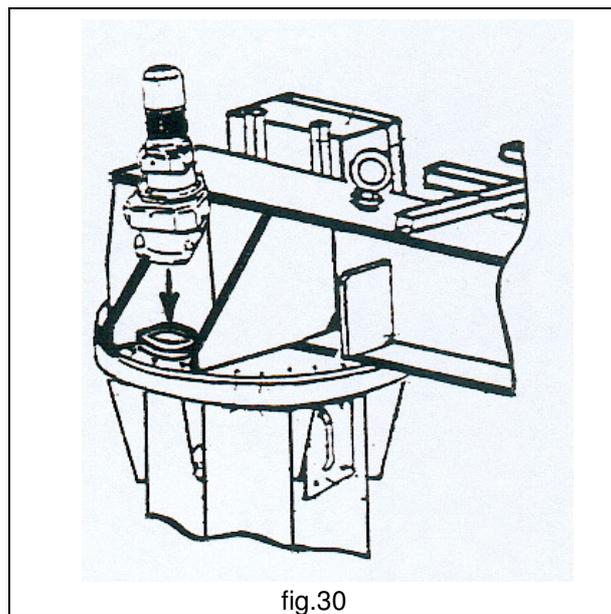
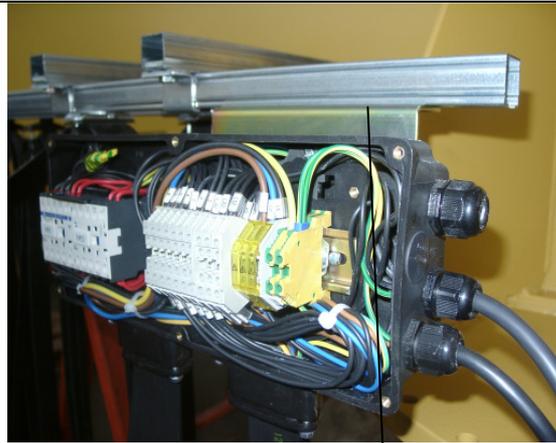


fig.30



6
fig.33



7
fig.34



8
fig.35



9
fig.36

§ **Assembly of the rotating collector ring (when expected):**

- Fix under the rotating plate of the arm on the suitable screwed holes the rotating collector ring support **10** and then the rotating collector ring **11**.(fig.37)
The rotating collector ring **11** usually has to be fitted inside the column through the inspection window **12** situated on the top of the column itself (fig.38).

§ **Assembly of the rotating limit switch (when expected):**

- Insert in the apposite site **13** situated on the rotating plate of the arm, the rotating limit switch **14** in order to delimit the area required.(fig.39).



11 10
fig.37

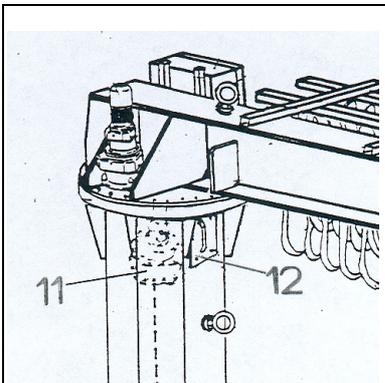


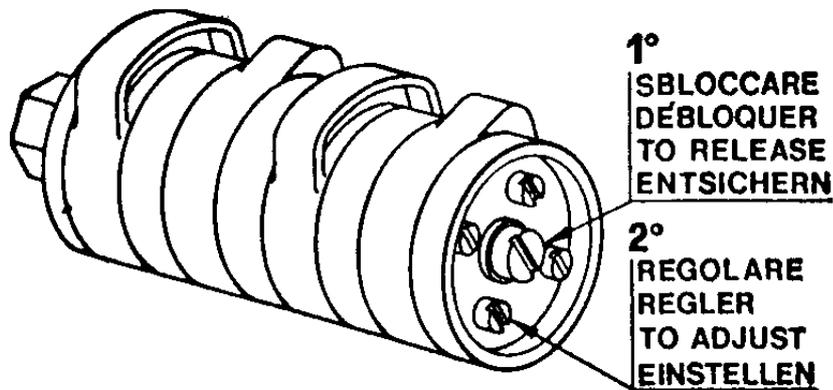
fig.38



13 14
fig.39

4.3.6.1 PUTTING INTO USE THE ROTATION LIMIT SWITCH

Operate as follows:



Function of the contacts:

SQ5A = RIGHT rotation service limit switch
 SQ6A = LEFT rotation service limit switch
 SQ5B = RIGHT rotation emergency limit switch
 SQ6B = LEFT rotation emergency limit switch

Adjusting the contacts:

1) Adjust the cam related to the SQ5B emergency contact immediately after the operation on the Adjust the cam related to the SQ5A contact to limit the rotation to the RIGHT, as required SQ5A contact.

2) Adjust the cam related to the SQ6A contact to limit the rotation to the LEFT, as required. Adjust the cam related to the SQ6B emergency contact immediately after the operation on the SQ6A contact.

	<p>Note: The operation on the emergency limit switch contacts blocks the functioning of the whole machine. To activate an emergency operation, once the cause is identified, it is necessary to operate on the limit switch, releasing momentarily the cam of the contact in question. Get out of the anomalous position with the opposite control to that of the operation. Restore the original position of the contacts.</p>
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4.3.7 Wiring connections – Version with two electrical control panels

	<p>For manufacture the wiring connections on the electrically rotated jib cranes proceed as follow:</p>	
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- Connect all the wires between the control panel for trolley/hoist, the festoons and the control panel for the rotating movement as indicated in the wiring diagrams.

§ Wiring diagrams

- The wiring diagrams are supplied inside the electrical control panel for the rotating movement (fig.40).
- The wiring diagrams include:
 - topographic diagram
 - functional diagram, power and auxiliary
 - terminal boards diagram

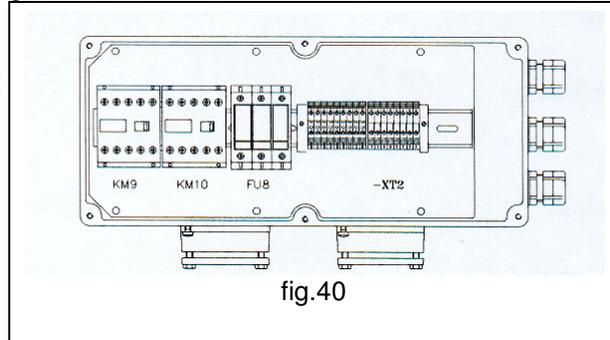


fig.40

- The following diagram (fig.41) shows the criteria to locate the electrical uses and the cable/wires path. All the uses and the cables are indicated and signed on their relative components.

Legend :

1. Main switch
2. Electrical control panel trolley/hoist
3. Electrical control panel rotation geared motor
4. Hoist motor
5. Trolley motor
6. Rotation motor
7. Hoist limit switch
8. Travel limit switch
9. Rotatine limit switch (when installed)
10. Push button panel
11. Overload device (only for wire rope hoist)
12. Push button panel connector
13. Rotating collector ring (when installed)

Legend :

- A Feed system
- B Trolley/hoist festoon
- C Independent push button panel festoon
- D Rotating limit switch (when installed)
- E Push button panel

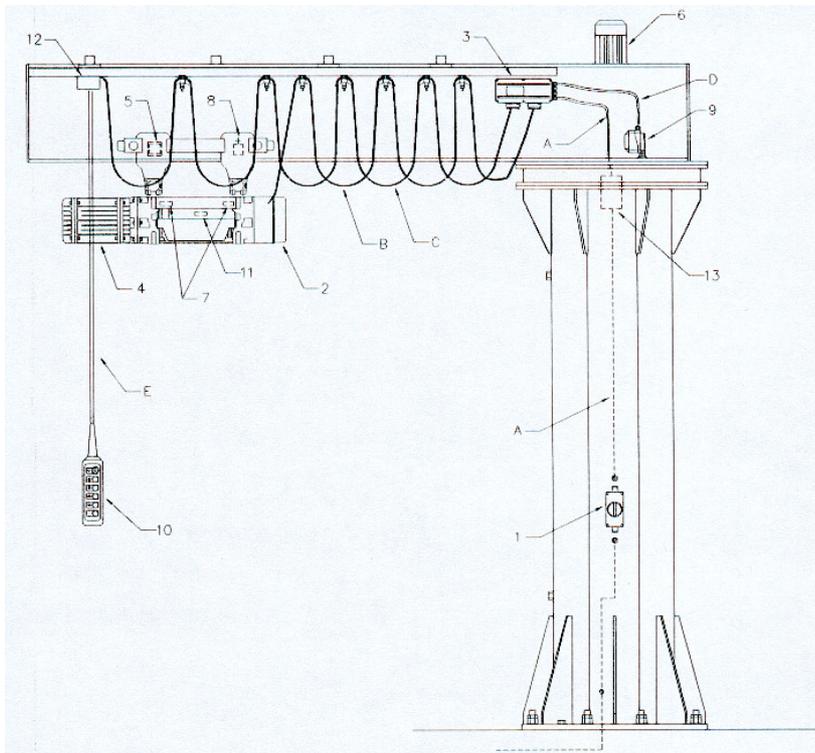


fig.41

	<p>To connect the festooned cable of the trolley/hoist and rotating geared motor, see “instruction for use” included in this publication or into the terminal boxes.</p>
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4.3.7.1 Wiring connections – Version with one electrical control panel



For manufacture the wiring connections on the electrically rotated jib cranes proceed as follow:



- Connect all the wires between the control panel for trolley/hoist, the festoons and the control panel for the rotating movement as indicated in the wiring diagrams.

§ Wiring diagrams

- The wiring diagrams are supplied inside the electrical control panel for the rotating movement (fig.40 bis).
- The wiring diagrams include:
 - topographic diagram
 - functional diagram, power and auxiliary
 - terminal boards diagram

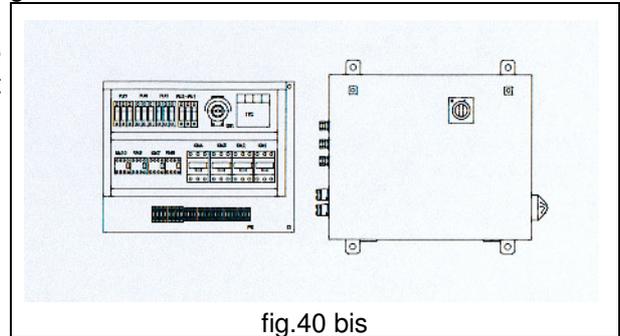


fig.40 bis

- The following diagram (fig.41 bis) shows the criteria to locate the electrical uses and the cable/wires path. All the uses and the cables are indicated and signed on their relative components.

Legend :

1. Main switch
2. Electrical control panel trolley/hoist
3. Electrical control panel rotation geared motor
4. Hoist motor
5. Trolley motor
6. Rotation motor
7. Hoist limit switch
8. Travel limit switch
9. Rotatine limit switch (when installed)
10. Push button panel
11. Overload device (only for wire rope hoist)
12. Push button panel connector
13. Rotating collector ring (when installed)

Legend :

- A Feed system
B Trolley/hoist festoon
C Independent push button panel festoon
D Rotating limit switch (when installed)
E Push button panel

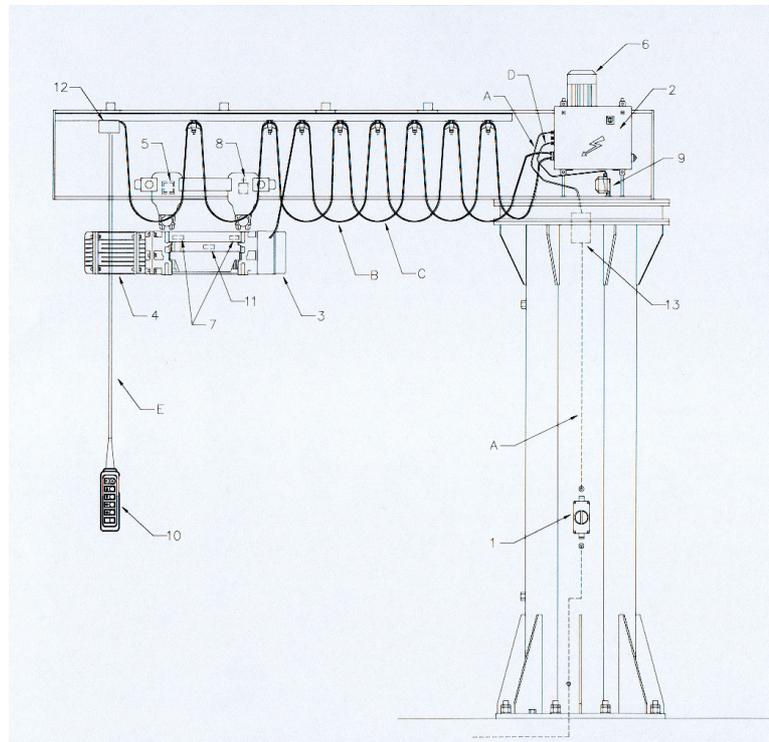


fig.41 bis



To connect the festooned cable of the trolley/hoist and rotating geared motor, see “instruction for use” included in this publication or into the terminal boxes.

	Connection of the power cable:	
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§ Jib crane with rotating collector ring:

1. Connect to the electrical control panel the short cable of the rotating collector ring inserting it through the hole (gland) of the rotation plate of the arm. (fig.42)
2. Connect the long cable **C** to the main switch.15 (fig.43)
3. Close the inspection cover taking care that in the fork **1** welded on the cover, the plug **2** is perfectly inserted. (fig.44)

§ Jib crane with electrical rotary limit switch (jib without rotating collector ring):

1. Connect the cable **C** to the terminal box of the electrical control panel **Q** inserting it through the hole of the rotation plate of the arm. (fig.45)
2. Connect the limit switch in its clamps inside the electrical control panel.

	<ul style="list-style-type: none"> Never carry out electrical connections with live power. Never make precarious connections or flying connections. Clamp down completely the cable presses. Procure the electrical circuit diagrams for the hoist/trolley on which you are working.
---	--

	<p>The user or installer assigned by the user must:</p> <ul style="list-style-type: none"> Install, in the immediate vicinity of the crane, a line switch, protected against short circuits, showing its function with the appropriate label (fig.46). Have hearing connected, to the structure of the crane, corresponding to the handling points for this purpose (fig.47).
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fig.42

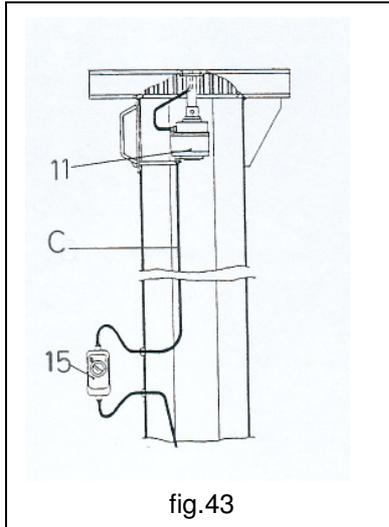


fig.43

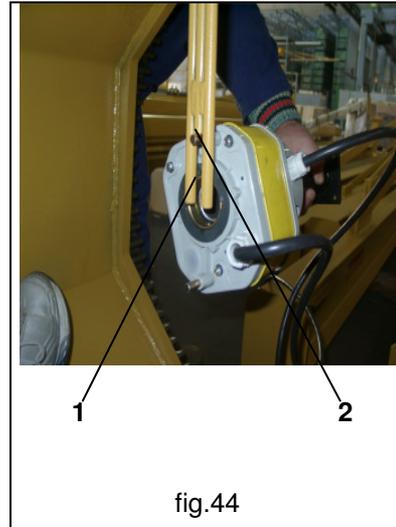


fig.44

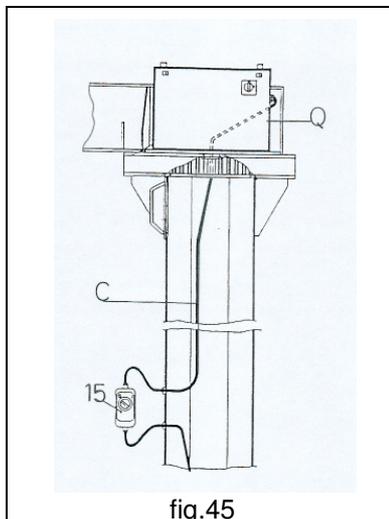


fig.45

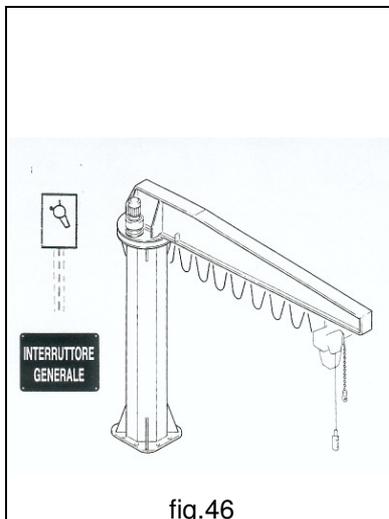


fig.46

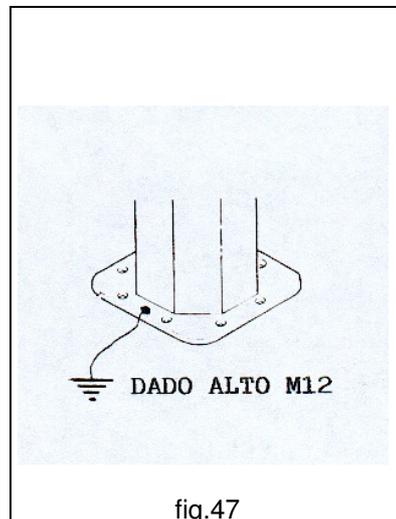


fig.47

4.4 - Putting the machine into operation

4.4.1 Preliminary operations - Adjustments and test runs

	Before putting the jib crane into use, carry out the following operations:	 
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- **Checking the electrical system is in a suitable condition:**
 - Check that the voltage and line frequency, shown on the respective motor plates, correspond to those designed for the functioning.
 - Check that the voltage value to the motors is within the limits of +/-10% of the nominal value.
 - Check there are ground clamps and that they are connected correctly.
- **Checking the correct installation of the crane:**
 - Check there are no obvious faults following the installation of the crane.
 - Check that all the bolted joints are correctly tightened.
 - Check that the sliding track of the trolley wheels is intact, which must be free from obstacles, upward projecting bumps, depressions, and foreign bodies.
 - Check that there are end catches and/or striker plates of the arm and trolley.
 - Check there are no leaks of lubricant.
- **Checking the functioning of the correct rotation direction of the motors:**
 - Operate the “right/left” direction buttons and check that the trolley moves following the directional arrows on the crane girder;

	<ul style="list-style-type: none"> • Proceed first to the check of the travel movements and then to the lifting and rotating check, avoid intervening using the lifting limit switch. If the rotation direction of the motors does not correspond to the controls of the push button control panel the limit switches do not halt the movement, and malfunctioning can occur. • If the direction of the movement does not correspond to the function shown on the push button control panel, halt the manoeuvre.
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- **Adjustments and test runs:**
 - Check that all the functions, manoeuvred electrically, follow the directional arrows of the push button panel.
 - Adjust the ascent limit switch of the electric hoist (see information in the related “instruction for use”), to allow the maximum possible run.
 - Adjust the descent limit switch so that the hook at its lowest point is about 10 cm from the ground.
 - Adjust the travel limit switch in order to avoid contact with the buffers.
 - Adjust the rotating limit switch, if installed, taking care to avoid contact/collision with obstacles and fix parts.
 - Check the rotation of the arm in its working area with absence of obstacles.
 - Check during the trial runs that there are no strange noises and/or vibrations and/or incorrect movements (skidding of the wheels or, spontaneous movements of the trolley and/or the arm, etc).

	The limit switches installed are emergency devices and it is forbidden to use them usually. If there is this necessity, additional limit switches have to be installed in order to work before the emergency switches.
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	Follow the “instruction for use” in order to adjust the limit switch.
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4.4.2 Inspection of the jib crane – Suitability for use

	<ul style="list-style-type: none"> • The jib crane is marketed considering inspections carried out by the manufacturer on similar prototypes, subjected to checks for their suitability for use on the structural parts (columns, brackets, arms, etc.). • DONATI SOLLEVAMENTI S.r.l. carries out its check of manufacture within the company “Quality system”, certified by ICIM with No.114, according to standard UNI EN ISO 9001: 2008. This guarantees the constant quality and conformity of the prototypes inspected of all the parts of the jib cranes. • The inspection procedure, described below, refers to ascertaining the functional and performance responsiveness of the jib crane installed in its place of use, complete in all its parts (fixings, structure, lifting unit, lifting accessories, etc.). • The inspection of the crane installed is the responsibility and task of the user and must be carried out by specialized staff (installer) who will assemble it, by scrupulously following the instructions in this manual. • The installer must carry out the inspection and complete all the “Inspection Report” and complete the “Suitability for use” certificate.
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§ After carrying out the “empty” test runs, carry out the dynamic test runs; these test runs are carried out with masses of value corresponding to the lifting capacity shown on the crane label uprated by the coefficient of overload 1,1 (load equals 110% of the nominal load). The static test runs are carried out with an overload coefficient of 1,25 (load equals 125% of the nominal load.).

	All tests must be carried out in no windy conditions.
---	--

	Proceed to the testing of the jib crane, in the following way:	
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§ Empty test runs:

- activate the switch/disconnecting switch
- put the emergency stop switch in the position which allows movement
- press the “gear/alarm” button (if available)
- check the lifting function by pressing the ascent/descent buttons
- check the travelling function by pressing the right/left buttons
- check the rotating function by pressing the “rotation” buttons
- in the case of movements at two speeds check the functionality
- check the functioning of the electrical limit switches of all the movements and/or the clutch device, when available

§ Dynamic test runs:

- prepare adequate weights for the test runs with load equal to **nominal lifting capacity x 1,1** and suitable equipment for the harnessing and lifting of the load
- harness the load, taking care to position the hook vertically to avoid skew rope falls
- slowly tension the sling so as not to cause tearing, if available do the test runs with load using the “slow” speed
- slowly lift the load and check that this happens with no difficulty and that there are no anomalous noises, clear deformations or sagging in the structure of the crane, in the support structures and/or the anchoring
- repeat the test run at maximum speed, if available, doing the preceding checks
- check the functionality of the “ascent and descent” limit switches, when installed, and/or any clutch device fitted
- check the functionality of the lifting brake, checking that the weight is braked in adequate time and that there is no skidding of the load, after releasing the button
- carry out the same checks also for the trolley travelling movements and rotation of the arm, checking the functionality of the limit switches, without bringing the load to the maximum height (lift it to a height of one metre from the ground).
- operate first at slow speed, if available, and then at maximum speed
- check the correct sliding of the trolley on the girder, and ascertain that there are no anomalous noises, evident permanent deformations or anomalous sagging of the structure of the crane, of the support structure and/or the anchoring
- check the functioning of the “emergency stop” button which must stop and inhibit all the movements. Any function of the hoist and/or trolley must stop, in the shortest possible time and space, without showing anomalies, side skids, dangerous oscillations, etc. which threaten the stability.
- check the operation of the load limiter, and either of the clutch device, if any.
- Check the braking distances during the lifting, travelling and rotating manoeuvres verifying the stability of the load. The maximum distances are the following:
 - in descent movement, with the maximum load, from 6 to 8 cm with a lifting speed of 8 m/min.
 - in rotating movement from 50 to 100 cm in the top of the arm with a rotating speed of about 1 round/min.
 - in both cases important oscillations of the load have not be present.
 - in travelling movement with a speed of 15 or 20 m/min, the distance is from 15 to 30 cm.

!	The dynamic test run must be carried out in the most unfavourable load conditions, that is combining lifting, travelling and rotation.
---	---

§ Static test runs:

- use suitable masses for the test runs equal to: **nominal lifting capacity x 1,25** and suitable equipment for slinging and lifting the load
- put in the sling the load **used for the dynamic test runs** (nominal capacity x 1,1) taking care to position the hook on the vertical to avoid skew runs
- tension the sling slowly to avoid tearing, if available carry out the test runs using the “slow” speed
- lift the load and stop it in a suspended position at a height of 10 cm
- gradually apply weight on it until reaching an overload value equal to 25% of the nominal lifting capacity
- leave the weight suspended for no less than 10 minutes.
- check that the weight suspended (load + overload) does not yield (the lifting brake and the clutch device/load limiting switch, if installed, must not skid).
- release the load and check that there are no evident deformations and/or sagging of the structures of the crane, the support structures and/or the anchoring.

!	<ul style="list-style-type: none"> • During the static test run NO movement of the crane must be activated. • The testing of the jib crane must be repeated at the annual checks (see paragraph 6.3.2).
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4.5 Out of service

4.5.1 Storage and conservation of parts

	If the jib crane and its component parts should be put in the warehouse and kept (storage), to avoid damage or deterioration proceed in the following way:	
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- Protect the machine surfaces of the plates and the mechanisms with antioxidant products, do not scratch the surfaces intended for assembling with other parts or the inside the holes.
- The materials are foreseen for indoor or outdoor installation and can be stored for a maximum period of two years in an environment with the following characteristics:
 - protected from atmospheric agents
 - relative humidity no more than 80%
 - temperatures: minimum -20°C ; maximum $+60^{\circ}\text{C}$
- For a storage period longer than two years ask for conservation procedures from the manufacturer
- If these values should change during the storage, it will be necessary to carry out preliminary checks before putting the crane into use (see 4.5.2 "Reuse after storage")
- If in the storage place the temperature exceeds or goes below the values indicated and the relative humidity is more than 80% prepare protection for the packed packages with barrier bags and hygroscopic salts.
- For storage in open areas provide:
 - raised bases for all items without pallets
 - protect all items with barrier bags and hygroscopic salts
 - if the crane has been built to operate outside, the parts of the steel structure do not require special protection; on the contrary, the parts machined on a machine tool (machined surfaces, wheels, pivots, etc.) must be protected with antioxidant products (transparent varnishes, grease, etc.).

4.5.2 Reuse after storage

	Before putting the jib crane back into use after a long storage period, the following operations must be carried out:	
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- **Structure:**
 - eliminate traces of lubricant from the structure and from the sliding girder of the trolley
 - clean any grease residue from the holes and skim the threads of the holes
 - clean the mating surfaces at the joints
 - repair any structural damage (scratched surfaces, peeling paint, etc.)
- **Mechanisms:**
 - Check for any leakage and if necessary, refill the levels of lubricant
 - Verify that the mechanisms are correctly tightened to the related structure
 - Eliminate traces of rust from sliding parts which are accessory to the commands
 - lubricate the thrust bearing of the hook and the unpainted mechanisms (shafts, etc.)
 - eliminate any residual water from concave parts.
- **Electrical equipment:**
 - eliminate any condense from the motors and terminal boards; dry with jets of air.
 - check the integrity and functioning of the brakes.
 - clean the surfaces of the brake gaskets thoroughly, eliminating all traces of humidity, lubricants and varnishes.
 - check the integrity and functioning of the limit switches.
 - check the parts and the electrical components are intact
 - dry contactor contacts
 - clean closure surfaces thoroughly, clean threaded holes of all containers
 - check the smoothness of the festooned electric lines
 - carefully check the functioning and efficiency of the push-button control panel.

5. - FUNCTIONING AND USE OF THE JIB CRANE

5.1 - Functions of the jib crane

5.1.1 Intended use - Foreseen use - Designated use

§ **The jib cranes, electrically rotated, “Column” version - series GBR**, are intended to be fixed to the ground and are produced to move goods within the plant, in outdoor squares or for services of big operating units.

The jib cranes lifting a load vertically, by means of the hook of the lifting block, generally made using appropriate accessories for such an operation; moving the load with a trolley which runs along the radial axis of the arm and slave, with electrically rotation, a circular area delineated by the rotation radius of the jib.

The rotation of the arm of the crane, which is mounted on a rotating thrust bearing, is ensured via a geared motor.

The circular area served by the arm can, according to necessity, be limited by electrical limit switches, or allow continual rotation, without end, of the arm itself in both directions by a collector ring.

§ **The electrically rotated jib cranes serie GBR** have then three functions:

- **lifting** the load, generally made by an electric chain or rope hoist
- **moving** the load with the aid of an electric trolley which runs along the arm of the crane
- **rotating** a load around the constraint axis of the arm mounted on a rotating thrust bearing.

These movements are done by the buttons of the push-button control panel:

- buttons **ascent** and **descent** to control the lifting of the load (fast and slow)
- buttons **right** and **left** to control the travelling of the load (fast and slow)
- buttons **of rotation** to control the rotation of the jib

§ The buttons activate the functions when they are held down and control of the auxiliary slow lifting and travelling speeds, they can be activated with separate push-buttons or with a single push-button with two positions, the first position is the “low” speed and the second position is the “high” speed”.

§ The **emergency stop button** is red and mushroom-shaped, and activates the **stop** function when pressed right down. To allow the jib crane to work it is necessary to bring the **emergency stop button** to its most “raised” gear speed position and then push the green start button.

§ When the jib crane is supplied with the electrical control panel the push-button panel. Is attached to the crane itself and it used by the operator from the floor.

§ The crane can also be radio controlled, and the functions of the command buttons remain unvaried with respect to those on the push-button panel.



- **When the jib crane is controlled using the radio-control the push-button panel is not attached to the crane itself, therefore the operator must always take the utmost care during manoeuvres and never lose sight of the work area or of the load being moved so as not to threaten his own safety and/or that of other people present.**
- **It is forbidden to control the jib crane movements while sitting or standing on it.**

5.1.2 Permitted loads, loads not permitted

§ I carichi devono essere:

- Be of a form, dimensions, mass, balancing and temperature suitable to the characteristics of the place in which they will be handled and they must be compatible with the performance of the hoist.
- Have suitable handling points and/or fitted with accessories which prevent accidental falls
- Be stable and not subject to changing their static or physical configuration during handling.

	<p>§ Handling of the following loads is not permitted:</p> <ul style="list-style-type: none"> • one with a weight (including accessory) greater than the nominal capacity of the crane (fig. 47) • with an uneven mass with respect to the centre of gravity. • with surfaces which are not resistant enough to withstand the pressure of the hold. • those which are classified as dangerous (e.g. flammable, explosive, radioactive material), because of their chemophysical characteristics. • harmful toxic materials or products, unless handled in suitable safety containers (e.g.: corrosive chemical products, products having biological risks, etc.). • loose foodstuffs, which may come into direct contact with parts of the hoist or with its lubricants. • those which may change their static and/or chemophysical configuration or their centre of gravity during handling. • those without the accessories outlined in the following point.
---	---

5.1.3 Lifting accessories

§ The following are usually allowed:

- Slings consisting of ropes and/or chains and/or strips made of textile fibres
- Lifting accessories which are located between the load and the lifting hook including: balances, plies, holdfasts, magnets and electromagnets, etc.
- The use of such accessories must strictly comply with the specifications supplied by the manufacturers

	<p>§ The following accessories are not usually allowed:</p> <ul style="list-style-type: none"> • those with functional characteristics which may provoke a level of dynamic stress superior to that admissible for the hoist or accidental overloading. • those which may collide with parts of the jib crane (fig.48). • those which compromise free handling of the load. • those which are connected to independent electrical lines.
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	<p>The weight of the lifting accessories must be subtracted from the nominal capacity of the jib crane.</p>
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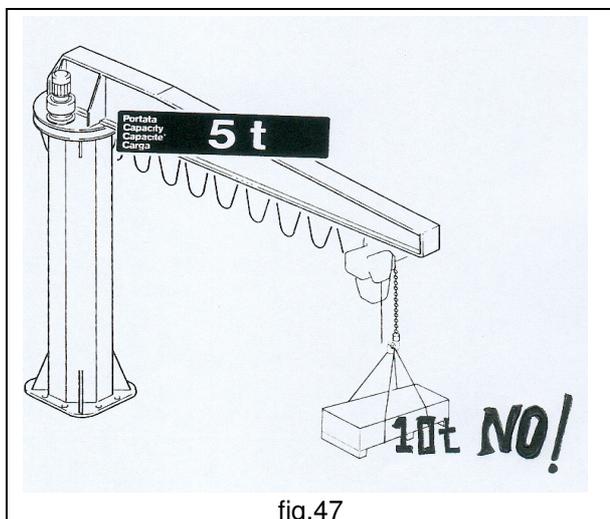


fig.47

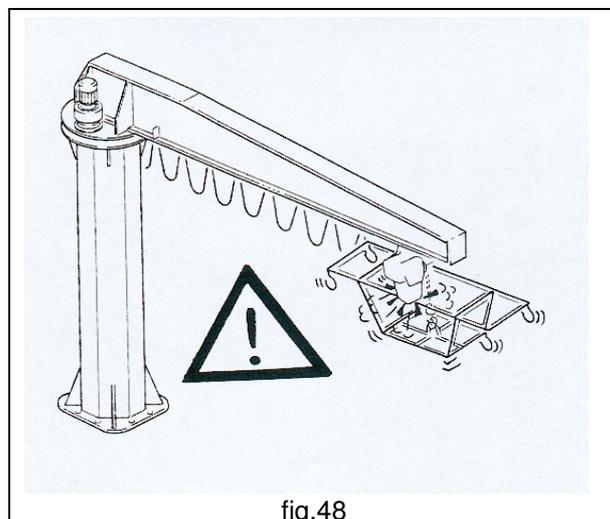


fig.48

5.2 - Operating conditions

5.2.1 Operating environment

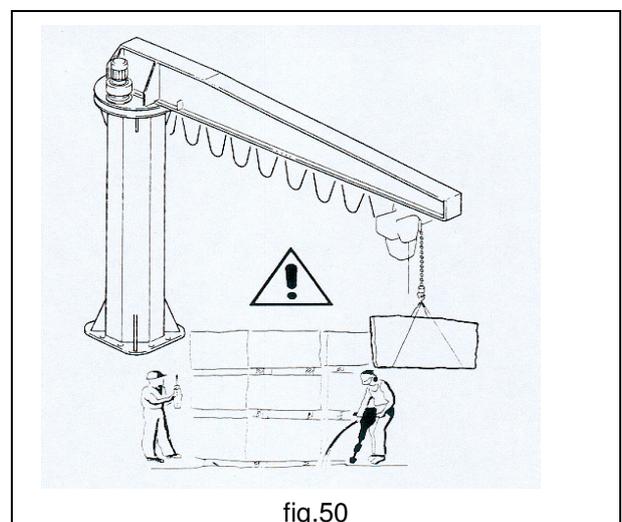
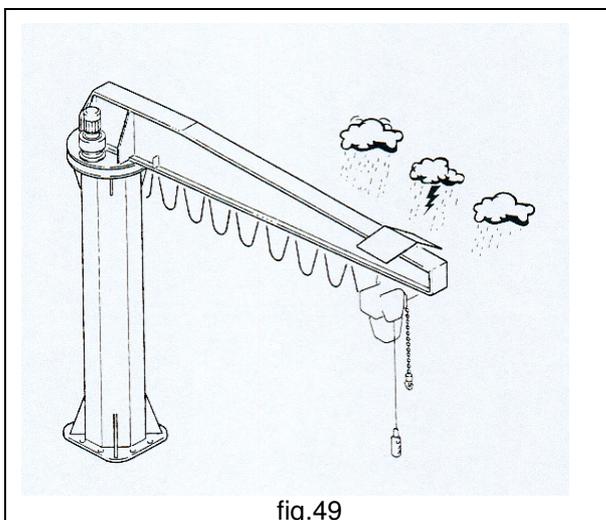
- **The operating environment must have the following characteristics:**
- **temperature:** min. -10°C ; max. $+40^{\circ}\text{C}$, max. relative humidity 80%.
- **indoor use:** as the jib crane is not exposed to atmospheric conditions no particular precautions need be taken.
- **operation outdoors:** the jib crane can be exposed to the elements outdoors during and after its operation. Electrical parts on the hoist, trolley and crane (control panel and rotation motor) must be protected in accordance with the IP55 standard, and it is also recommended to protect the hoist, trolley and rotation gearmotor under adequate roofing or other type of shelter (fig.49). To avoid damage caused by rust, protect the structure with suitable rust-proofing treatments (e.g. sanding SA 2 1/2 and coats of special paintwork), and lubricate the rotation mechanisms. Use of the jib crane outdoors is permitted in the absence of exceptional atmospheric conditions, which can modify expected load carrying parameters, for example: driving rain, heavy snowfall, storm winds, etc.

	<p>In the standard version the crane must not be used in environments or areas:</p> <ul style="list-style-type: none"> • With highly corrosive and/or abrasive vapours, smoke or dust (when this cannot be avoided intensify the maintenance cycles). • Where there are flames and/or heat above the temperature permitted. • With risks of fire or explosion and where flameproof and spark-proof components are required. • Where strong electromagnetic fields are present which can generate an accumulation of electrostatic charge. • In direct contact with loose foodstuffs.
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5.2.2 Danger zones and people exposed to risk

§ Danger zones are all areas, in any operative phase, where the people present can be subjected to a risk which constitutes a danger for their safety, health or psychophysical integrity. It is necessary to inform the **people potentially exposed**, that the jib crane operator does not always work with sufficient visibility to prevent all potential risks of crushing, hitting and dragging. These people must, therefore, take care to avoid exposing themselves to such risks during manoeuvres in these areas (fig.50).

	<p>The purchaser must adequately signal danger zones to forbid or limit access by outside people or unauthorised staff in the areas where the hoist operates, as outlined by the current regulations in force.</p>
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5.2.3 Illumination of the work area

§ GBR series electrical rotation jib cranes are not equipped with a lighting system. Consequently, the crane operator’s work station and work areas must be suitably lighted so as to ensure conditions of maximum visibility.

	<ul style="list-style-type: none"> • The level of illumination must guarantee the maximum level of safety possible for the operation of the crane (fig.51). • The installation of a supplementary lighting system is obligatory in zones with insufficient illumination, avoiding shadows which impede or reduce visibility in the operative and/or neighbouring areas. 	
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5.2.4 The operator

§ **The operators** are all those who, from time to time, perform the following activities on the jib crane:

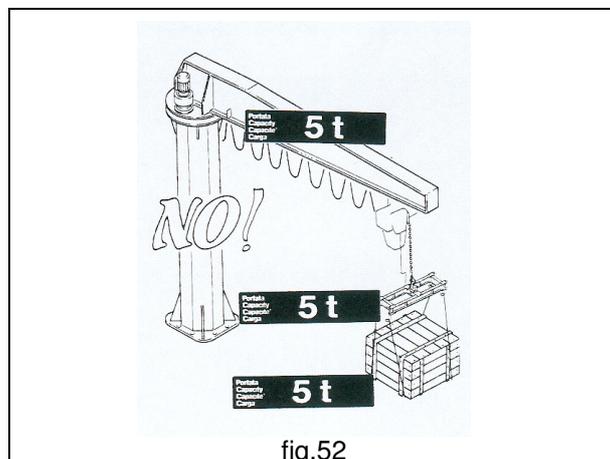
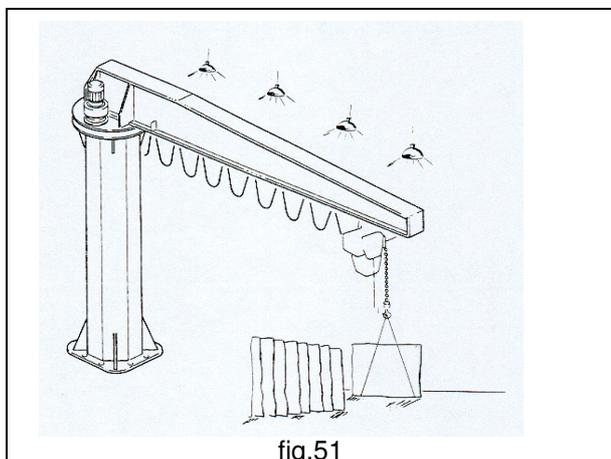
- transportation, handling, assembling, installation, regulation and testing
- starting, use, cleaning, maintenance and repair
- disassembly, dismantling, and demolition
- **The operators** must be people suited to the work and psychophysically able to cope with the demands connected to the activities related to the jib crane during all operative phases and in particular during the slinging and handling phases.
- **The crane operator** must position himself so as not to compromise his own safety, foreseeing and/or preventing and, therefore, avoiding possible dropping of the load being transported, and dangerous movements. He must follow the specifications supplied to ensure maximum safety for himself and for others during use of the machine, in particular, he must strictly adhere to the specifications contained in this manual.

	<ul style="list-style-type: none"> • The operator must not let anybody come near during the handling of the jib crane and forbid the use to external people, in particular to people under 18 years of age. • The use of the crane is forbidden to non-authorized or untrained people. • The operator must use suitable personal protection devices (PPD = gloves, protective footwear). 	 
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5.2.5 The lifting capacity of the jib crane

§ **The lifting capacity** of the jib crane, in its original operative configuration, is clearly indicated on a plate attached to it and also to the hook block and is visible from the command post.

	<ul style="list-style-type: none"> • The loading capacity of the crane and its accessories must never be overcome by applying overloads or modifying the calibration of the hoist’s load limiter. (fig.52). • The crane must never be equipped with a lifting device (hoist) with a nominal lifting capacity superior to that of the crane. • The speed limit for lifting of 24m/min must never be exceeded if not reducing the lifting capacity of the crane accordingly.
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5.2.6 Manoeuvres: lifting, trolley traverse and arm rotation

§ It is a good rule to perform one movement at a time, because only in this way can a manoeuvre be started, stopped and constantly followed by the operator, who also has to avoid continuously switching the machine on and off even for little movements.

- Engagement of the load by the hook of the hoist and by the lifting accessories must be carried out with great care, delicately and without jolting.
- Begin a lifting operation by slowly stretching the chain until the load has been lifted by a few centimetres, stop the manoeuvre and check the hold and stability of the load.
- At the end of the manoeuvre, place the load on the ground carefully and remove the hook of the hoist.

- **For lifting operations:**

The operator must ensure that the ropes and lifting chains are always maintained taut, avoiding leaning or placing the hook on the ground or on loads to be lifted (fig.53). The ropes or chains can become twisted, or become undone from the drum coils or pulley blocks, forming knots, thereby becoming seriously damaged and creating possible sudden dangerous situations. The operator must at all times avoid manoeuvres at excessive angles, which can engender dangerous and uncontrollable situations, especially pulling from oblique angles parallel to the axis of the drums, which can also provoke damage to the rope guides and channels, resulting in irregular winding of the ropes (fig.54).

- **For trolley traversing and arm rotation operations:**

The operator must in all cases avoid violent collisions between the trolley or arm and terminal bumpers, so as to avoid causing serious repercussions to mechanical parts and the crane's frame structure. Keep in mind that the limit switches are positioned so as to enable a complete travel when they are overtaken at a reduced speed, and that the braking space required increases proportionally with the operating speed. Consequently, the operator must always slow down the operating speed of the trolley or lifting arm when the latter near their terminal points (fig.55).



- **Operate with care and diligence, follow the manoeuvre constantly and visually check the balance of the mass being moved.**
- **Avoid sharp or jolting movements which are very damaging to the stability of the load because of the dynamic effects which are generated.**
- **Never lift loads with an unbalanced and non barycentric engagement. Never neglect to hook the load and secure all original sling accessories. Do not secure the load with improvised slinging.**
- **Never leave the load suspended, once the handling operation has begun it must be completed in the shortest time possible and the load must be positioned without crushing the lifting accessories.**

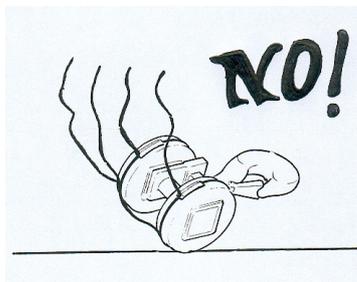


fig.53

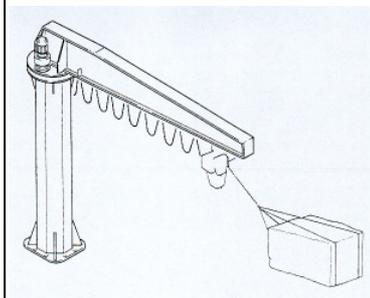


fig.54

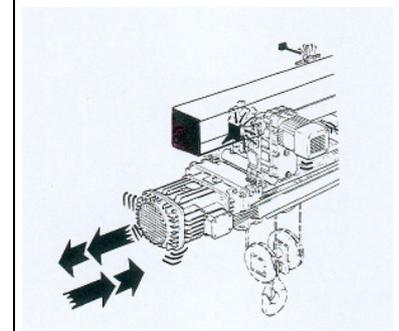


fig.55

5.2.7 Safety devices

- § Power off the crane by switching off the line switch (not included) and/or pressing the "emergency stop" button on the push-button panel.
- § An electrical and/or mechanical interblock inhibits a simultaneous command in both motor rotation directions, whether in slow or fast operating speed.
- § A power failure causes the immediate blocking of all movements on the trolley hoist and crane arm, since the electrical motors are equipped with automatic braking devices.
- § A safety snap-shackle is installed on the lifting hook, guarding against an accidental unhooking of the hoist and/or load.
- § The limit switches on the lifting, traversing and rotation mechanisms limit the load's maximum vertical and horizontal travel.

	The automatic limit switches are emergency devices which must not be subjected to ordinary operation. If the need arises, supplementary limit switches must be installed for continuous use, arranged so that they act in advance on the safety devices already in place.
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	<ul style="list-style-type: none"> • Safety devices not included by a commission by <i>DONATI SOLLEVAMENTI S.r.l.</i> <u>must be installed</u> by the buyer. 	
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5.3 - Setting up – Starting the jib crane

	To begin operational activities with the crane carry out the following operations:	
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1. Visually check the integrity of the crane and the structures on which it is installed. Pay particular attention to the rope, hook and related safety latch.
2. Carry out all preliminary checks as described in paragraph 5.5 "Criteria and precautions of use".
3. Turn on the power supply by putting the main switch in the "ON" or "1" position.
4. Ensure that no people are exposed in danger zones.
5. Place the red mushroom-shaped "**emergency stop**" button in the position which allows movement.
6. Activate all functions by pushing, if available, the "**forward**" button.
7. Verify proper functioning of the safety devices by checking the movements as described in paragraph 5.1 "Functions of the jib crane".

5.4 - Switching off at the end of use

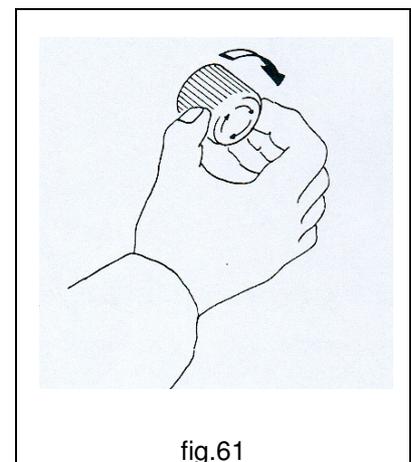
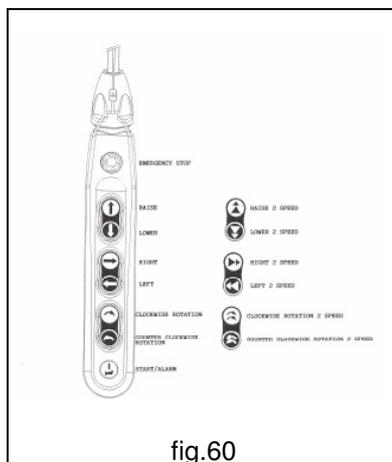
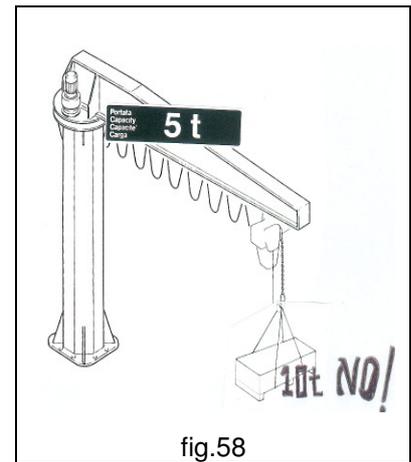
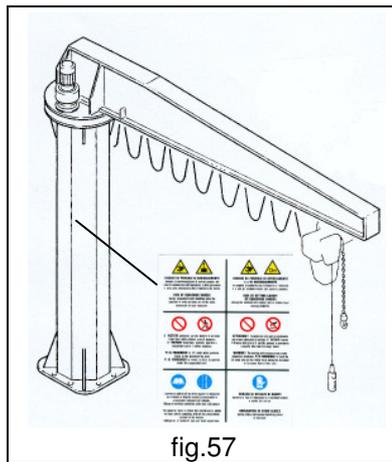
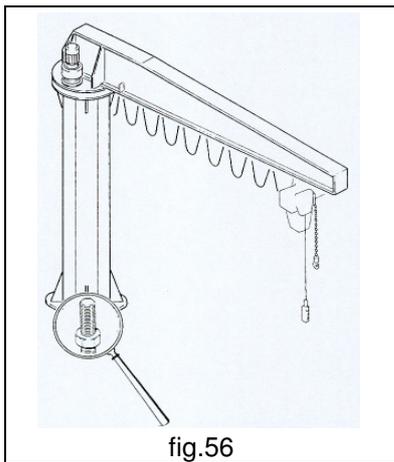
	To shut down the crane at the end of work it is necessary to:	
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1. Position the arm in recovery position ensuring it is stable and taking care that it does not create a risk of collision or interference with the surrounding structures and/or machines.
2. Free the lifting hook of any slinging used to move the load.
3. Lift the hook, when possible, to a height of no less than 2.5 m so that it does not obstruct or create danger for people or things below the crane.
4. Check that the manoeuvre chain does not create risks caused by entangling.
5. Put the push button control panel in the "obstruction" position.
6. Cut off the power supply by turning the general switch to "OFF" or "0" (zero).

5.5 - Criteria and precautions of use

	<ul style="list-style-type: none"> • The correct use of the jib crane guarantees the safe and full performance of the machine. • These potentialities are only guaranteed if the following instructions are strictly adhered to: 	
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- **ALWAYS** follow the directions and instructions in the use and maintenance manuals and check the integrity of the components and parts of the crane (fig.56).
- **ALWAYS** heed the instructions and warnings displayed on the machine; the warning label plates located on the crane and in the manoeuvre zone are accident-prevention signs and must always be perfectly legible (fig.57).
- **ALWAYS** ensure that the crane operates in an environment protected from atmospheric agents (rain, wind, snow, etc.), or, if in the open, that it has adequate shelter or protection.
- **ALWAYS** check that the capabilities of the crane correspond with the job which needs to be done (work cycles –intermittence – duration of use – load to be moved) - (fig.58).
- **ALWAYS** check the solidity and suitability of adjoining structures (ground; pavement; foundation; plinth) which act to sustain the jib crane, before its initial start-up and operation, or verify that this precaution has been carried out by professionally qualified personnel.
- **ALWAYS** check that the sliding track of the trolley is at a height which does not allow the operator to interfere with the hoist/trolley and/or its moving parts. If this isn't possible arrange appropriate shelters or signs positioned in the danger zone (fig.59).
- **ALWAYS** check the interrelation of the crane rotation movements, trolley traversing and hoist lifting movements (fig.60).
- **ALWAYS** test the functioning of the emergency stop button (fig.61).



- **ALWAYS** check, before beginning manoeuvres, that the arm's rotation area is unhindered by obstacles.
- **ALWAYS** verify the suitable state of conservation (cleaning, lubrication) and maintenance of the crane and its main components (ropes or chains, drum or block, pulleys, coil-hook, push-button panel, limit switches, gearmotors, wheels, electrical system, etc.).
- **ALWAYS** check the suitability and operating status of the electrical system; in particular, check that there are no precarious or dangerous connections.
- **ALWAYS** check the correct operation of all the crane's motors.
- **ALWAYS** and constantly check the efficiency of the brakes and limit switches, verifying their operation in all the jib crane's movements.
- **ALWAYS** carry out controls on the hook-block ropes/chains, load limiter or friction device and push-button panel, verifying their integrity and efficiency.
- **ALWAYS** make certain the lifting hook is not worn out, damaged, lacking safeties (snap-shackles).
- **ALWAYS** check the suitability and efficiency of the slings (ropes; chains; bands; etc.); in particular, check that there are no lacerations, compressed parts, broken strands or non-lubricated parts (fig.62).
- **ALWAYS** make certain to have centred the lifting group (hoist and hook) on a perpendicular with the load before slinging and handling the load.
- **ALWAYS** make certain to have corrected the slings on the load to the lifting hook, after having balanced the load before lifting it, and correctly tension the slings with slow and secure manoeuvres (fig.63).
- **ALWAYS** ascertain that the load is secure during handling operations (lifting, rotation and traversing) and is unhindered by obstacles (fig.64).
- **ALWAYS** provide warning, using a siren if installed, to personnel working in proximity to the jib crane's handling area, of the start of load handling operations (fig.65).
- **ALWAYS** operate in suitable lighting conditions in the work area to ensure the load 's visibility (fig.66).
- **ALWAYS** operate outside the maneuvering area of the lifted load (fig.67).

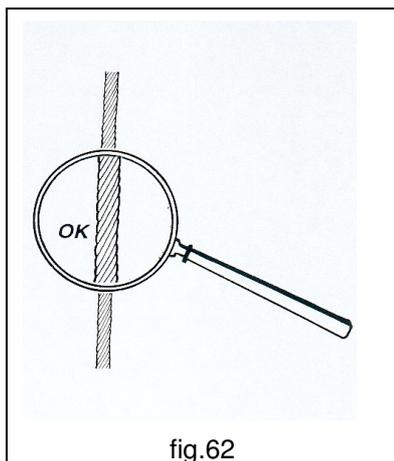


fig.62

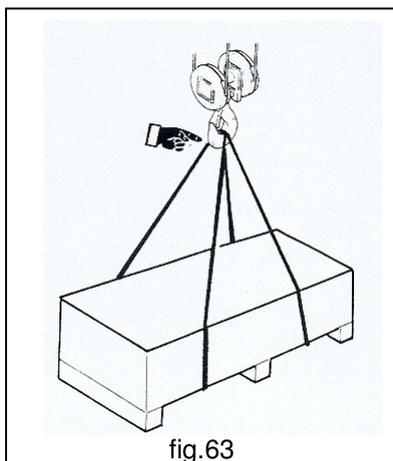


fig.63

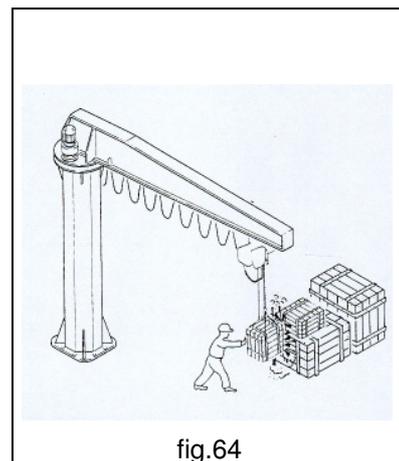


fig.64

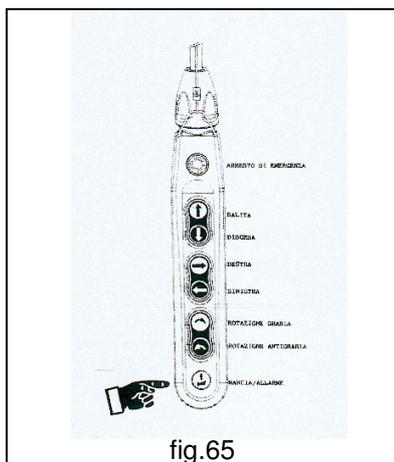


fig.65

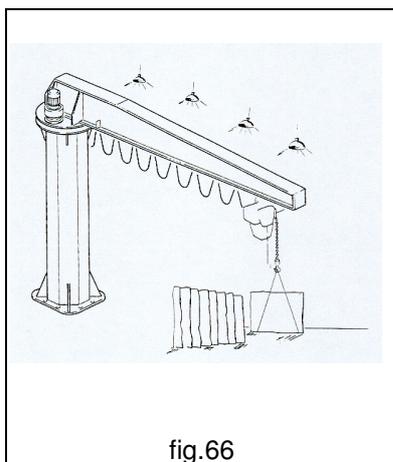


fig.66

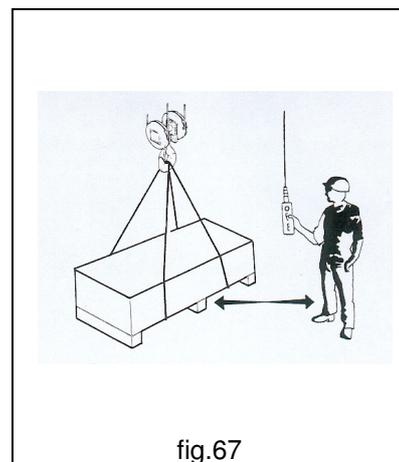
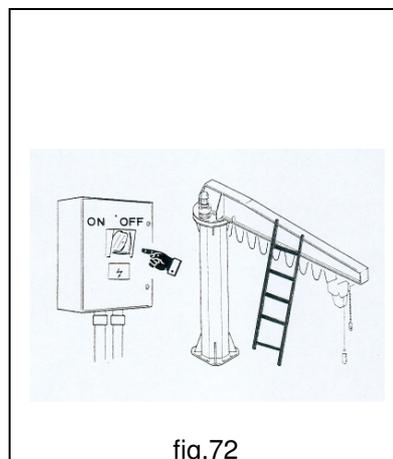
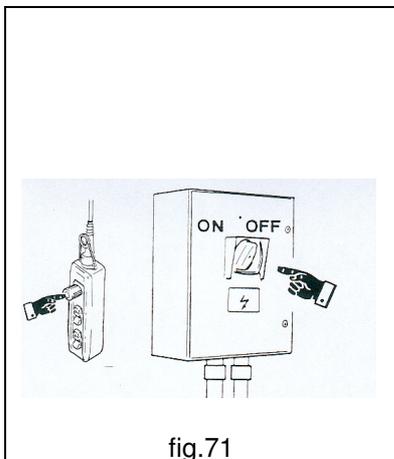
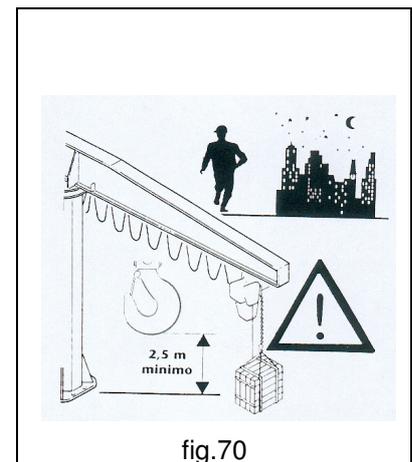
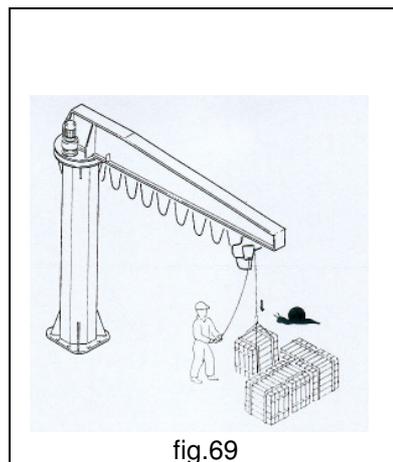
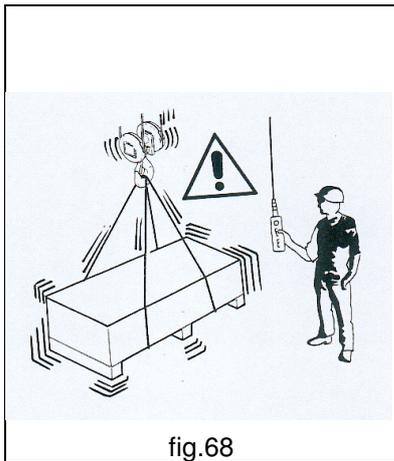


fig.67

- **ALWAYS** activate the various movements in such a manner as to avoid proceeding with command impulses in rapid succession (fig.68).
- **ALWAYS** use “slow” speeds for approaching and positioning operations (fig.69).
- **ALWAYS** position the crane arm, hook and push-button panel at the end of work operations so that they do not pose a danger of collision. Raise the hook, where possible, to a height \geq than 250 cm. (fig.70).
- **ALWAYS** push the red emergency stop button on the push-button panel before leaving the command post and switch off the cutout switch of the crane (fig.71).
- **ALWAYS** switch off power to the machine during checks, repairs, ordinary maintenance. (fig.72).
- **ALWAYS** for all operations, use adequate safety protection devices (DPI, gloves, etc.) (fig.73).
- **ALWAYS** point out any functioning anomalies (faulty working, possible breakings, incorrect movements and unusual noise) to the person in charge of the specific department and put the machine out of service.
- **ALWAYS** follow the maintenance programme and record, for each check, any specific observations, especially regarding the hook, chains/ropes, brakes, and limit switches.

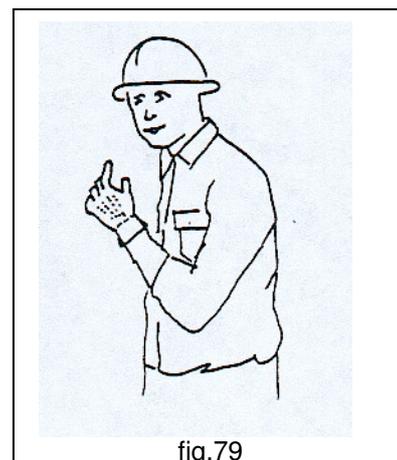
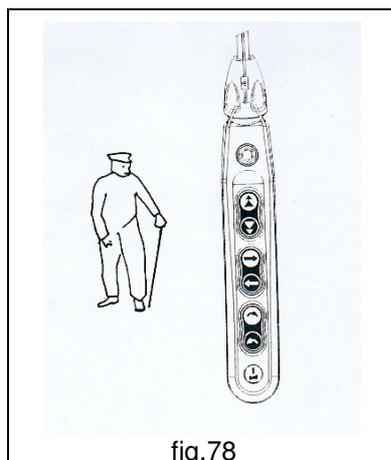
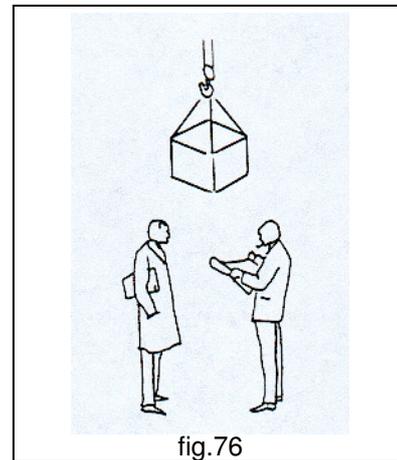
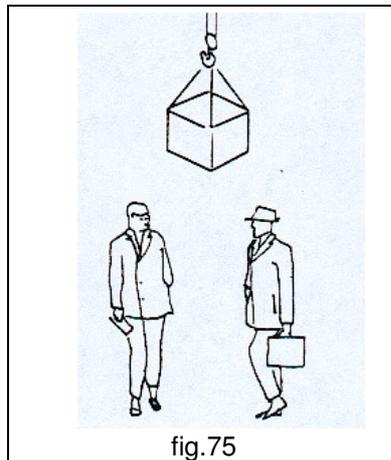
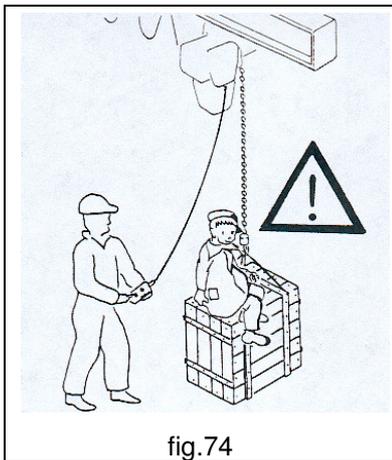


5.6 - Contraindications of use

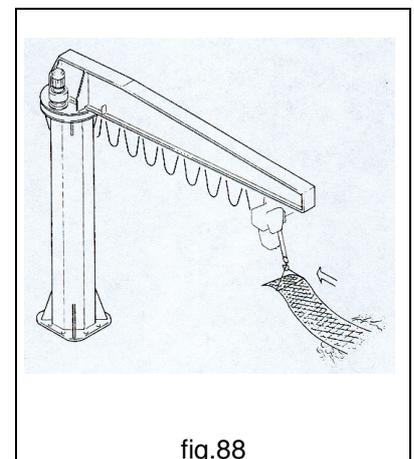
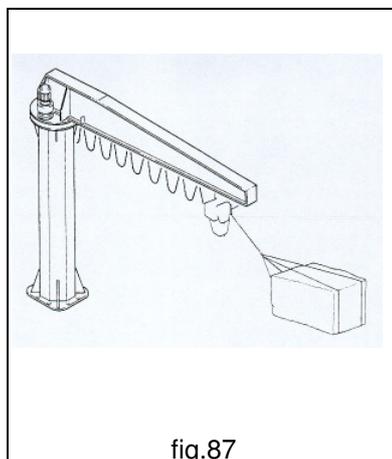
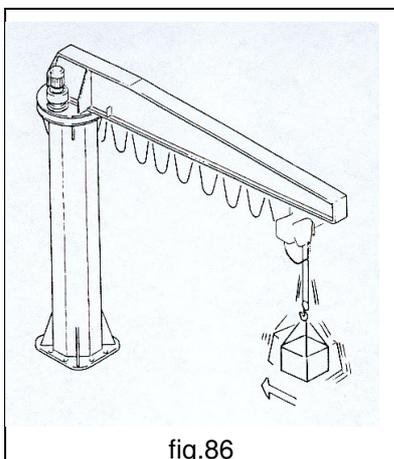
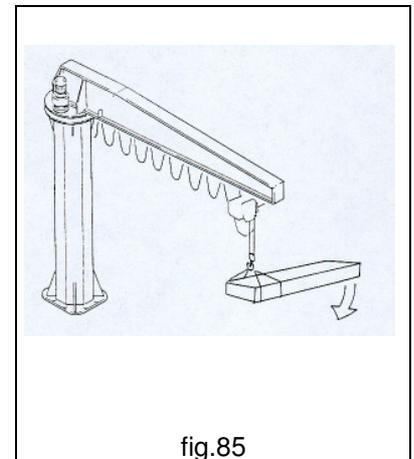
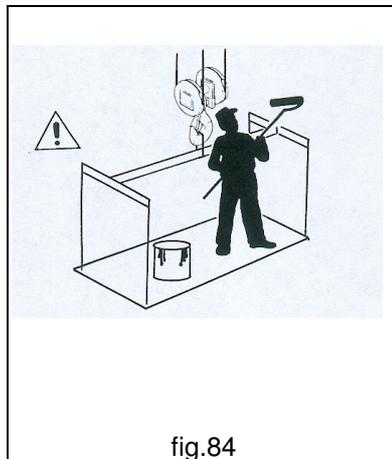
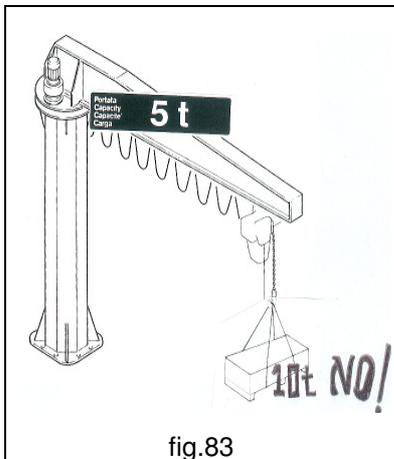
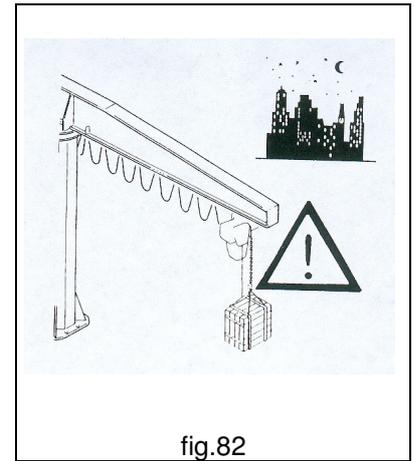
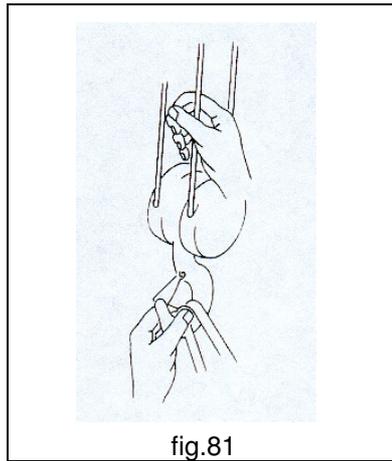
	<ul style="list-style-type: none"> The use of the jib crane for manoeuvres which are not permitted, improper use and a lack of maintenance can carry risks of grave danger for the health and safety of the operator and of the people in the area, as well as risks of damage for the work environment and can compromise the functionality and intrinsic safety of the machine. The actions described below, which obviously cannot cover the entire range of possible “bad uses” of the crane, are the most predictable ones, and are absolutely forbidden: 	
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5.6.1 Use not intended and not allowed - Foreseeable and unforeseeable inappropriate use

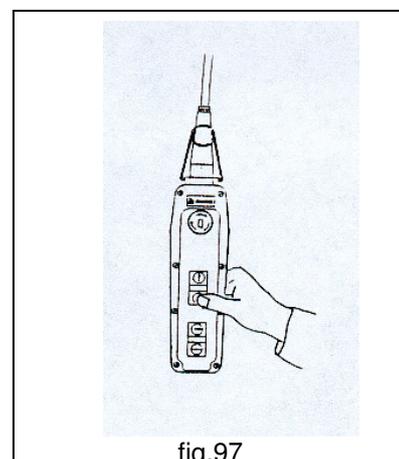
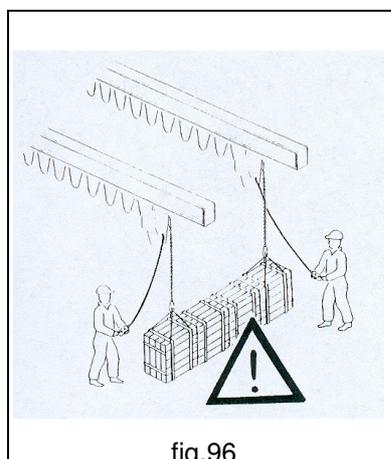
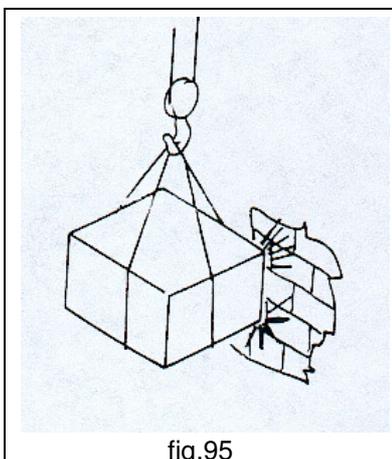
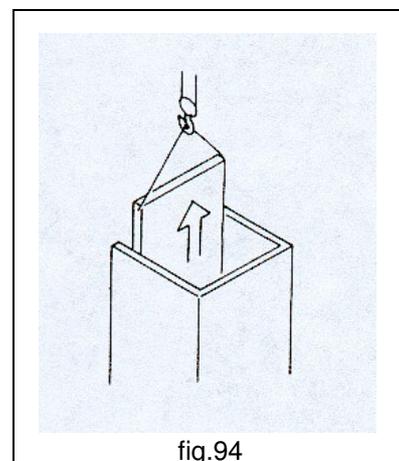
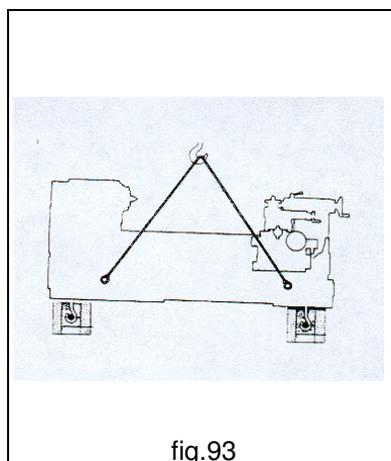
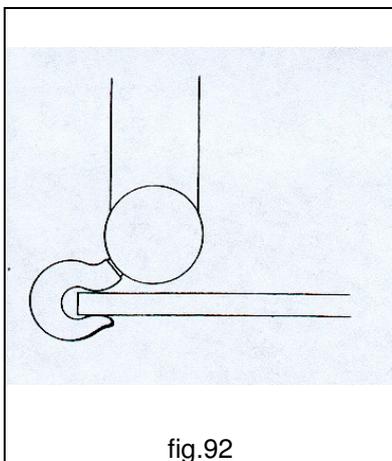
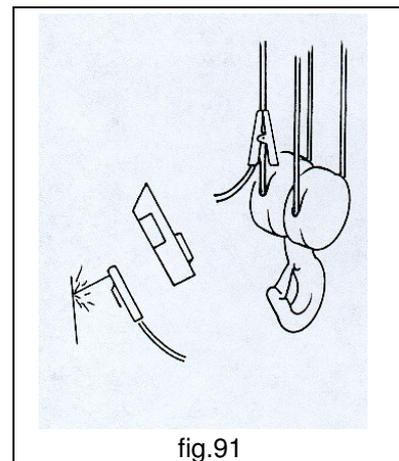
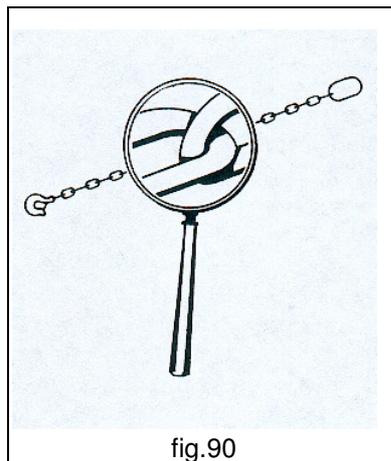
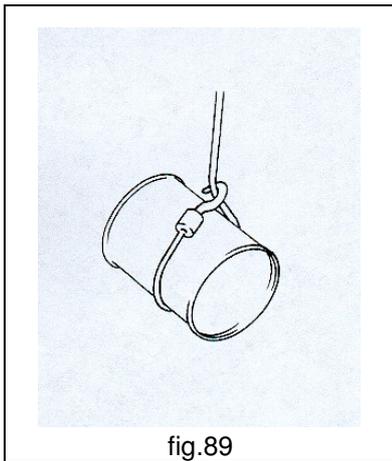
- NEVER** use the crane to lift and transport people (fig.74).
- NEVER** lift loads while people are walking under the suspended load. (fig.75).
- NEVER** walk, stop, operate and maneuver under the suspended load (fig.76).
- NEVER** permit unqualified staff or under 18 years of age to use the crane (fig.77).
- NEVER** use the crane unless psychophysically suited to the work (fig.78).
- NEVER** use the crane unless provided with suitable personal protection (PPD, gloves,etc.) (fig.79).



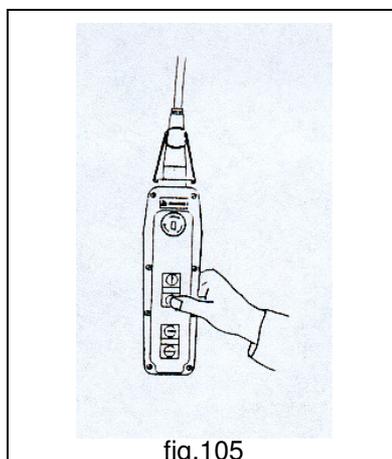
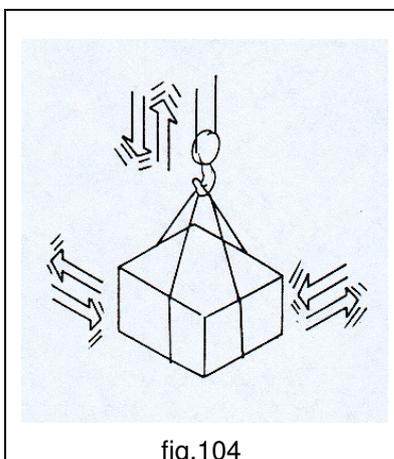
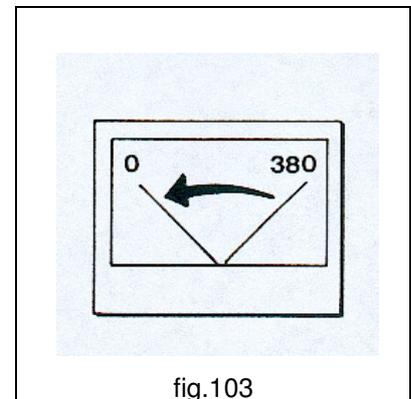
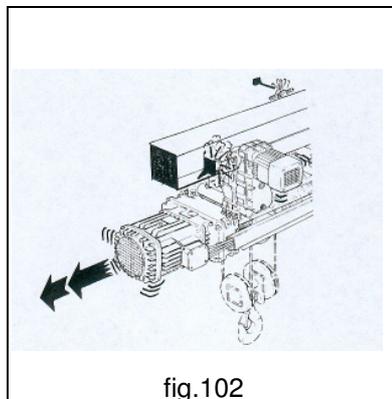
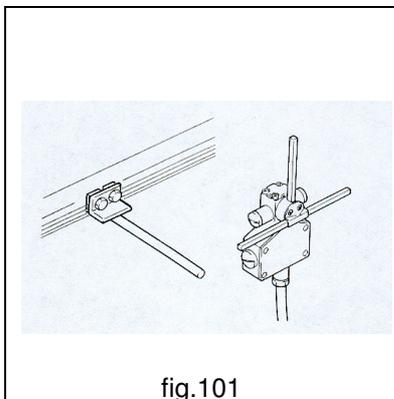
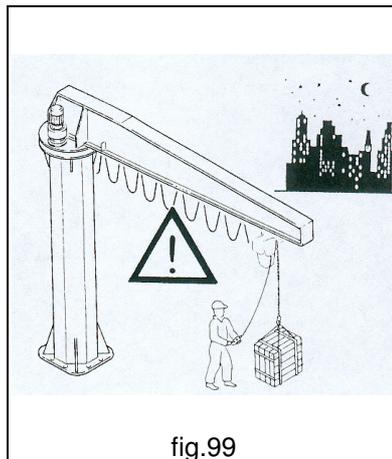
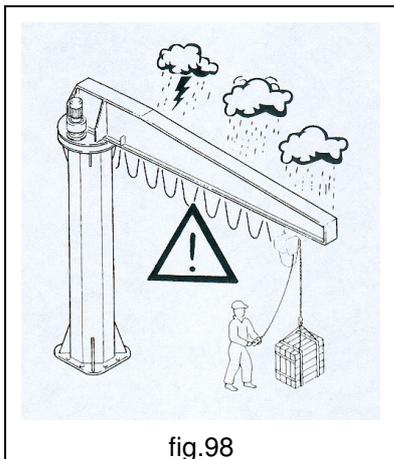
- **NEVER** operate without taking the necessary care during lifting and travelling of the trolley and rotation of the arm maneuvers (fig.80).
- **NEVER** place your hands in the rotation pulleys, on the ropes or chains in movement, and on the slings during "tensioning" phases, in the areas coming into contact with the load and between the hook and sling (fig.81).
- **NEVER** leave the suspended load unattended (fig.82).
- **NEVER** lift loads heavier than the nominal lifting capacity nor equip the crane with hoists with a nominal lifting capacity greater than that of the crane itself (fig.83).
- **NEVER** use the crane for jobs other than those for which it was designed, do not use it for other operations such as painting ceilings, changing light bulbs, a place to rest scaffolding on, etc.. (fig.84).
- **NEVER** lift unbalanced loads (fig.85).
- **NEVER** allow the load or the hook to swing during translation or rotation (fig.86).
- **NEVER** place the rope or chain in a diagonal pulling position (fig.87).
- **NEVER** use the crane or its lifting apparatus for pulling or dragging (fig.88).



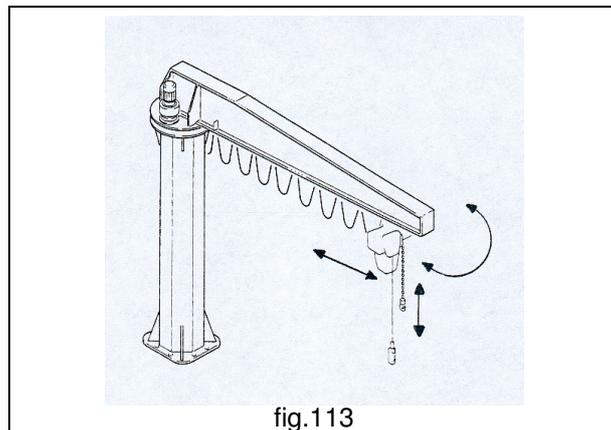
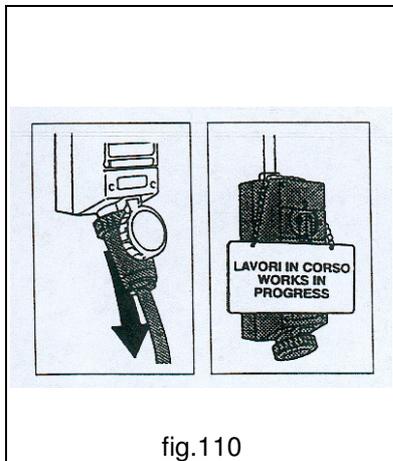
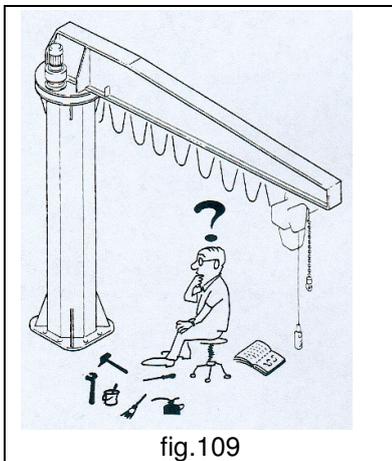
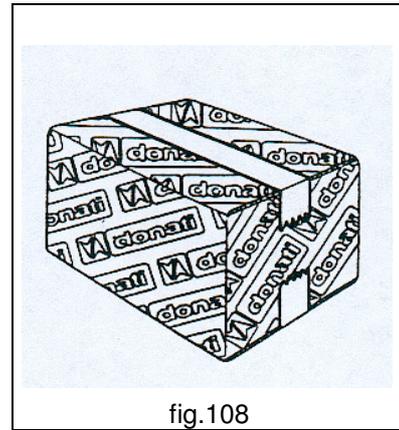
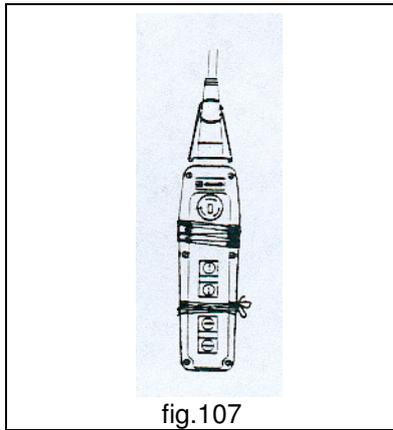
- **NEVER** use the rope or chain on the hoist as a sling for the load (fig.89).
- **NEVER** use slings without having checked their suitability beforehand (fig.90).
- **NEVER** use the rope or chain as a ground wire for a welder (fig.91).
- **NEVER** use the tip of the hook as a support base for the load (fig.92).
- **NEVER** employ the crane to maintain elements held to the ground in tension (fig.93).
- **NEVER** perform a hook run, after having positioned a load, in a way which causes the chain to wobble (fig.94).
- **NEVER** proceed with the hook's travel after having let down the load, causing the bending of the ropes or chains.
- **NEVER** collide load bearing structures or other machinery and installations with the load (fig.95).
- **NEVER** simultaneously make use of two cranes to lift the same load, without having enacted suitable security procedures (fig.96).
- **NEVER** use the crane with two simultaneous movements; wait for the completion and stoppage of one movement before initiating another movement (fig.97).



- **NEVER** employ the crane in unforeseen environmental conditions (- 10°C + 40°C; 80%) or, if installed outdoors, in unfavourable and/or dangerous environmental conditions (strong winds, heavy rain, snow, etc.). (fig.98).
- **NEVER** employ the crane, or perform maintenance operations on the crane in conditions poor lighting and/or visibility (fig.99).
- **NEVER** employ the crane in areas in which the use of anti-explosive components is prescribed (fig.100).
- **NEVER** allow the automatic limit switches to intervene continuously (fig.101).
- **NEVER** reach the "stroke extremities" at full operating speed during rotation and traversing movements (fig.102).
- **NEVER** employ the crane in the presence of a sudden power shortage or accidental failure of one of the three phases (fig.103).
- **NEVER** perform sudden changes of direction during lifting, travelling and rotation operations (fig.104).
- **NEVER** repeatedly activate the crane's control command buttons (fig.105).
- **NEVER** modify the operating and performance specifications of the crane and/or its components.



- **NEVER** modify or de-calibrate the parameters on the safety devices on board (limit switches, load limiter, friction device, etc.) and/or provoke the mishandling of the crane or its components (fig.106).
- **NEVER** carry out provisional repairs or restoration work not conforming to the operating instructions (fig.107).
- **NEVER** use non-original spare parts or parts not recommended by the manufacturer (fig.108).
- **NEVER** leave the crane at the end of a job without having implemented the safety procedures (fig.109).
- **NEVER** abandon the crane at the end of the work shift without having enacted all safety procedures (fig.110).
- **NEVER** carry out ordinary maintenance operations, inspections or repairs without having placed the crane out of service and activated the required procedure (fig.111).
- **NEVER**, during maintenance work (fig.112):
 - use unsuitable equipment
 - lean ladders on the column, on the hoist, on the trolley, or on the arm of the crane
 - work without personal protection devices
 - carry out work without having removed the load
- **NEVER** use the crane if it is not totally responsive in all its operating functions (fig.113).



6. - MAINTENANCE OF THE JIB CRANE

6.1 Safety precautions

§ The precautions to prevent accidents contained in this paragraph must always be strictly adhered to during maintenance work, with the aim of avoiding damage to staff and to the jib crane.

	<p>Maintenance staff of the jib crane must:</p> <ul style="list-style-type: none"> • be well trained • have read this publication • have an excellent knowledge of the accident prevention regulations • Unauthorised staff must be outside the work area during operations. 	 
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§ Such precautions are covered in greater detail in this chapter, whenever a procedure which may carry a risk of damage or accident is required, through **WARNING** and **DANGER** notes:

	<p>WARNING notes precede an operation which, if not correctly carried out, may cause damage to the crane and its components.</p>
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	<p>DANGER notes precede an operation which, if not correctly carried out, may cause injury to the operator.</p>
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	<p>Pay attention to the following WARNING NOTES during maintenance work:</p>
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	<p>Before putting the jib crane back into operation after a breakdown, it must be inspected thoroughly and checked for evidence of any damage which may have occurred and the procedure in paragraph 5.3 must be repeated.</p>	
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	<p>Never alter the settings or positioning of the safety devices, unless expressly required in order to deal with a breakdown. Tampering with them can cause serious damage to the crane and its components.</p>	
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	Pay attention to the following WARNING NOTES during maintenance work:	
	When not required cut out the electricity supply of the crane before carrying out any maintenance work on it. Affix a sign reading: MACHINE UNDER MAINTENANCE – DO NOT INSERT ELECTRICITY SUPPLY	
	NEVER exclude the safety and protection devices installed on the jib crane. If this became necessary, mark with suitable warning signs and operate with maximum care.	
	Always check the presence and suitability of earthing connections and that they correspond to regulations. If earthing is not installed with electric equipment serious harm could be done to people.	
	Avoid use of flammable or toxic solvents (petrol, ether, alcohol, etc.). Avoid long periods of contact with solvents and inhalation of their vapours. Avoid, in particular, use near open flames.	
	Before turning on the crane always ensure that the maintenance staff are at a safe distance (not at a height) and that tools or other materials have not been left on the crane.	
	Always use protective gloves during maintenance work.	
	All accessible moving parts, with the sole exception of the chain/rope and underblock/block, are as far as is possible protected against accidental contacts. Rearrange all safety guards before readying for operation.	
	Never use water in case of fire; disconnect all electrical currents and use suitable fire extinguishers.	
	Ensure that all tools to be used are in perfect condition and have insulating handles where required.	
	Pay utmost attention to all the REMAINING RISKS highlighted on the hoist and in this publication.	

6.2 The qualifications of maintenance staff

§ To be capable to adequately carry out maintenance work of jib cranes maintenance staff must:

- know the laws in force related to accident prevention during work carried out on machines with motor transmissions and be able to apply them.
- have read and understood chapter 3 “Safety and Accident Prevention”.
- be able to use and consult this document.
- know the functioning of the machine.
- recognise irregularities regarding functioning and when necessary take necessary measures to rectify them.

§ Professional figures appointed and authorised to carry out maintenance on the crane are:

	Operator of the jib crane.	
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- **Typical maintenance activities:**
 - Verification of proper functioning of the jib crane. Cooperation with staff appointed to periodical and/or extra maintenance work, after having informed them of any anomalies found in the functioning.
 - Cleaning and lubrication of the parts of the crane (hoist) which the operator is normally in contact with (push-button panel, hook) and simple maintenance work which does not require intervention at a height (e.g. lubrication of the thrust bearing of the hook).
- **Technical knowledge required:**
 - knowledge of the functions and use of the jib crane
 - knowledge of the lubricants utilised in the crane and in the hoist and of the dangers associated with their use.
- **Qualification required:**
 - suitability to the work in relation to the specific operative and environmental characteristics.

	Mechanical maintenance officer	
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- **Typical maintenance activities:**
 - mechanical regulation of the clearance of brakes and mechanisms
 - test movements and mechanical regulation of the safety devices
 - check mechanical clearance and wear of the components (chain, hook, etc.)
 - replacement of components which can wear out (chain or rope, hook, chain guide, pulleys) according to this publication
 - ordinary maintenance of mechanical units after substitution of parts with original spare parts.
- **Technical knowledge required:**
 - good knowledge of mechanical lifting systems and handling with a manual and motor driven system
 - good knowledge of safety devices used on the hoist (limit switches, brakes, overload switch, etc.)
 - basic knowledge of the moderately difficult techniques for electric checking and adjustment (limit switch adjustment, replacement of fuses, motor connection, etc.)
 - knowledge of the methods of measurement and testing to determine the actual state of the conditions of the crane and of the hoist (tests of: brakes, chain and hook wear, wheel wear, anomalous noise, etc.)
 - logical trouble-shooting methods of non complex breakdowns and evaluation of the results
 - ability to arrange the necessary measures to put the hoist back into working order
 - ability to write a maintenance intervention report.
- **Qualification required:**
 - Complete training of an industrial mechanic having a specialisation in and experience of lifting-system maintenance or of industrial handling.

	Electrical maintenance officer	
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- **Typical maintenance activities:**
 - intervention on the electrical equipment beginning from the electrical circuit diagrams
 - test of the execution of movements and electric adjustment of the safety devices
 - check of the wear of electrical components (contacts of the electrical equipment)
 - repairs of the electric units after replacement of parts with original spare parts.
- **Technical knowledge required:**
 - good knowledge of electrical plants and installations
 - good knowledge of the electrical componentry and of the safety devices used in the hoist (limit switches, brakes, etc.)
 - knowledge of moderately difficult electrical checks and adjustments (replacement according to the original diagrams: motors, limit switches, push-button panel, control console, cables, etc.)
 - basic knowledge of moderately difficult techniques for mechanical checks and adjustments (wear testing, adjustment of mechanical stops, etc.)
 - knowledge of the methods of measurement and testing to determine the actual state of the conditions of the hoist (tests of the efficiency and reliability of the electrical equipment)
 - knowledge of trouble-shooting methods in case of power failure or breakdown and experience of electric command and control systems of lifting and handling equipment
 - ability to arrange the necessary measures to put the hoist back into working order
 - ability to write a maintenance intervention report.
- **Qualification required:**
 - Complete training of an industrial electrician having a specialisation in and experience of lifting-system maintenance or of industrial handling.

	Electromechanical maintenance officer: He is an operator whose professional profile, as well as including the typical characteristics of the electrical maintenance officer, also combines and synthesizes the competence and abilities required of the mechanical maintenance officer.	
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	Mechanical technician	
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- **Typical maintenance activities:**
 - mechanical adjustments of the safety devices, calibrations and tests (annual load test)
 - normal maintenance work after substitution of complex and/or critical mechanical components in order to maintain safety levels (fixing components, arm, reducers, motors, etc.)
 - repair of mechanical units after extra maintenance work has been carried out (structural repairs requiring soldering, mechanical work on board of the crane, etc.).
- **Technical knowledge required:**
 - knowledge of industrial mechanical lifting and handling systems with proof of specific training
 - specific knowledge of safety devices used on the hoist (limit switches, brakes, overload switch, etc.)
 - basic knowledge of techniques for electric checking and adjustment (motor test)
 - specific competence about the methods of measurement and testing to determine the actual state of the conditions of the crane and the hoist (test of: brakes, push-button panel, control console, limit switch etc.)
 - specific competence of logical trouble-shooting methods in case of breakdown and evaluation of the results
 - ability to direct the necessary measures to put the jib crane back into working order
 - ability to write a maintenance intervention report.
- **Qualification required:**
 - Complete training as industrial mechanical technician and specific competence in lifting and handling systems.

	Electrical technicians	
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- **Typical maintenance activities:**

- electrical adjustment of safety devices, calibrations, and tests (annual load test)
- normal maintenance work after substitution of complex and/or critical electrical componentry in order to
- maintain safety levels (lifting limit switch, motors, B.T. switchboard)
 - repair of electrical units after extra maintenance work has been carried out (repair of the electric motors with partial replacement, replacement of limit switches with variation in position, etc.).

- **Technical knowledge required:**

- very good knowledge of electrical systems and installations on industrial lifting and handling equipment
- specific knowledge of the electrical componentry and of the safety devices used in the hoist (limit switches, brakes, overload switch, etc.)
- experience of the techniques used in electrical checks and adjustments (ability to alter the original diagrams to make improvements on: limit switches, push-button panel, control consoles, cables, etc.)
- knowledge of the techniques for mechanical checks and adjustments (wear testing, test performance of mechanical components, adjustment of mechanical stops, test noise level, etc.)
- specific competence in the methods of measurement and testing to determine the actual state of the conditions of the hoist (tests of the efficiency and reliability of the electrical equipment)
- specific competence in trouble-shooting methods in all types of breakdown and evaluation of the results on the command and control electrical equipment of lifting machines
- capacity to manage the measures necessary to put the jib crane and the hoist back into action and performance
- ability to write a maintenance intervention report.

- **Qualification required:**

- Complete training of an industrial electrical technician having a specialisation in and specific experience of electrical apparatus of lifting and handling systems.

	<p>Electromechanical technician: He is a highly specialised and specifically trained operator, whose professional profile combines and synthesizes not only the abilities and knowledge typical of the electrical technician, but also those of the mechanical technician.</p>	
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	Special recommendations regarding maintenance:
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1. If performed correctly maintenance work guarantees the safety of jib crane operators and reduces downtime to a minimum after a breakdown.
2. Repairs carried out opportunely prevent further deterioration of the crane and its components.
3. Use original spare parts and products.
4. To prepare the crane for maintenance work the following rules must be followed:
 - The staff appointed to do the ordinary or extraordinary maintenance work must have read and understood well all the instructions contained in this chapter and in chapter 3.
 - Extraordinary maintenance work must only be carried out by authorised, qualified staff, trained for the job.

	<p>Maintenance work must be carried out, when possible, while the crane is not connected to the power supply and in safe conditions, using suitable tools and adequate personal protection devices, in accordance with the regulations in force, and affixing a sign with the warning: “MAINTENANCE WORK IN PROGRESS”.</p>
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	<p>For problems which may come about or to order spare parts contact the <i>DONATI SOLLEVAMENTI S.r.l.</i> Technical Assistance Service.</p>
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6.3 Maintenance plan

§ The maintenance plan includes ordinary types of work, such as inspections, checks and tests conducted by the operator and/or by qualified staff appointed for normal company maintenance and periodical maintenance, which includes replacement, adjustments and lubrication, carried out by technical staff trained for the job through specific courses and publications.

	<ul style="list-style-type: none"> • As maintenance work can be carried out at a dangerous height, staff must have appropriate means of support (scaffolding, platform, ladders etc.) which allows the work to be performed in safe conditions. • Staff must also have suitable personal protection devices (PPD) as set out by legislation in force. 	
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6.3.1 Daily and periodical maintenance

§ It includes maintenance work which can be performed directly by the crane operator or by qualified staff, as instructed in this publication and/or in attached documentation, which do not require the use of special instruments or equipment.

§ **Maintenance operations are divided into:**

	<p>Daily intervention to be performed by the crane operator:</p> <ul style="list-style-type: none"> • general visual check • functional checks: motors, limit switches, clutch device, empty test runs, push-button tests of “stopping” and of the other functions of the push-button panel • check the conditions of the rope or chain and lifting hook • check the correct rotation of the crane arm. 	
	<p>Monthly intervention to be performed by qualified staff:</p> <ul style="list-style-type: none"> • Visual check of every gear and for possible lubricant leakage • Function check of the break at full load • Check that anomalous noise and/or vibration are not present • See to the lubrication of the gears and limit switches to guarantee normal functioning and to limit wear • Check the functionality and integrity of the push-button panel and relative cable. 	
	<p>Quarterly checks to be performed by qualified staff:</p> <ul style="list-style-type: none"> • check the efficiency and wear of the: hook, rope or chain and rope guide or chain guide • check for wear on the hoist block, drum, pulleys, block/underblock • Check wear of wheels, sprocket wheels, guide rollers of the trolley • Verify efficiency and functionality of overload switch or friction device. • Visual check inside switchboard for the presence of dust • Check and cleaning of oxidised contacts and of any connectors outlets/plugs • Check of lubrication of mobile trolley of any festooned cable and cable check • Check efficiency and integrity of electricity supply line and its components • Loaded check of motors and brakes and verify level of wear • Check of efficiency and conservation of the structure (paintwork, corrosion, etc.). 	

6.3.2 Frequency and deadlines for maintenance work

§ The periodicity of the following operations is for jib cranes used in normal working conditions and is valid up to the M4 group (ISO norm 4301/88) or 1Am (FEM rule 9.511).

§ If the jib crane is used normally and correctly for a daily 8 hour shift, overhaul can take place after a period of about 10 years (FEM rule 9.755 – S.W.P.). If used during a number of shifts then the maintenance periods must be reduced proportionately.

Table of periodic checks and maintenance						
Object of the check ↓	Verifiche periodiche					Page
	Daily	Monthly	Quarterly	Annually	Annually	
Checks Inspections - Testing	 General visual checks. Verify good functioning	 General visual inspections	  Wear check	  Annual test		pag. 37-38-39
Signs pictograms warning signs and plates	 Legibility of signs and pictograms, warning signs and plates	 Visual inspections of wholeness and cleaning of plates and signs	  Check suitability			pag. 16-21
Structural elements Welding Bolted couplings				 Wear and efficiency check Check bolted and soldered joints		pag. 62
Rope/Chain Securing elements	 Visual inspection		 Wear and efficiency check			Hoist manual
Lifting hook	 Visual inspection and check safety latch		 Wear and efficiency check			Hoist manual
Drum / Load whorl Chain guide Rope guide/Pulleys Transmission of the hook block			 Wear and efficiency check			Hoist manual
Lifting reducer Traversing reducer Rotation reducer		 Noise check				Hoist manual and pag. 63
Lifting motor Traversing motor Rotation motor	 Check correct functioning		 Loaded testing			Hoist manual and pag. 64
Lifting brake Traversing brake Rotation brake	 Check correct functioning	 Loaded testing of braking distances	 Loaded testing Wear check			Hoist manual and pag. 63
Wheels Pinions Rotation thrust block			 Wear check			Hoist manual and pag. 63
Trolley buffers	 Visual check			 Wear and efficiency check		Hoist manual
Electrical system Push-button panel and cable Collector	 Check correct functioning	 Visual inspection for external breakage push-button panel/cable	 Wear and efficiency check			Hoist manual and pag. 65
Overload switch Clutch device			 Loaded testing	 Calibration check		Hoist manual
Lifting limit switch Traversing limit switch Rotation limit switch	 Check correct functioning		 Loaded testing Wear and efficiency check			Hoist manual and pag. 64
Cleaning and lubrication	 Check correct state of cleanliness and lubrication	 Inspection of general lubrication	 Leakage check Rubricate chain, hook and mechanisms			Hoist manual and pag. 66

6.3.3 Check of efficiency of parts and components

 For the individual parts of the jib crane the following instructions must be strictly adhered to:

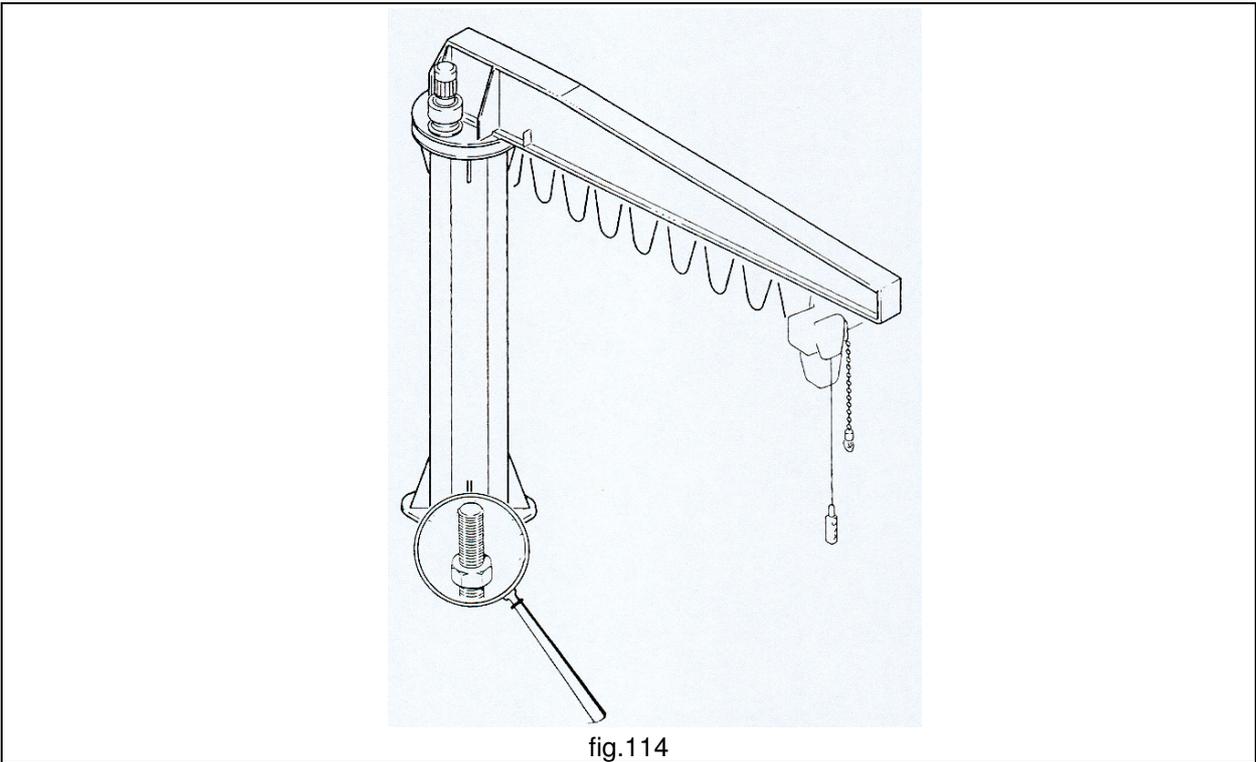
 **Annual check of the efficiency of structural elements, welding and bolted couplings (fig.114):** 

- The metal structures of the jib crane, as well as normal alterations due to environmental factors and wear of mobile parts (hinges), can be subject, even inadvertently or during handling operations, to bumps, contact or grazing with other equipment or to anomalous strain which can cause damage to the frames, welding .Therefore, after careful cleaning, the structures must periodically undergo scrupulous checks to ensure their suitability and if necessary, any damage be remedied.
- Check the clamping couple of the fixing bolts of the column, according to the given couples (see tables on page 14)

 **Repair structures which show signs of:**

- **deformation:** lengthening, crushing, staining, bending
- **wear:** worn parts, scarcement , incisions, abrasions, corrosion, oxidation, scratching, peeling point
- **breakage:** cracks in the welding, cracking, cuts or incisions, broken parts
- **variation of a section $\geq 10\%$, or of the diameter or thickness $\geq 5\%$ compared to initial values.**

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	Every three months, verify the efficiency of the thrust block and its pinion:	
<ul style="list-style-type: none"> • Use the push-button panel to activate the arm's "forward and reverse" movements, check that the thrust block and its pinion run smoothly, silently and regularly. • If necessary, in relation to the mode of operation and/or service location (e.g. intense operation, operation outdoors or under extreme heat, etc.), when conducting annual inspections, disassemble the geared motor and verify the wear and lubrication of the teeth on the thrust block and reducer pinion. Lubricate with grease if necessary. 		
	Replace the pinion on the geared motor and/or thrust block if the following occurs: <ul style="list-style-type: none"> • Strong variations in noise emissions from the geared motor, and thrust block squeaking. • Excessive friction on the thrust block and/or strong vibrations from the geared motor. • Difficult and/or irregular rotation of the arm resulting in "snaps" and/or "bursts". 	DONATI TECHNICIAN  DONATI SERVICE

	Every three months, verify the efficiency of the rotation motor brake:	
<ul style="list-style-type: none"> • Check the stability of the arm on empty, and that of the mass being handled at full load, controlling that braking and stopping spaces for the arm in rotation are comprised between 50 and 100 cm, estimated with respect to the tip of the arm. • Where necessary, adjust the crane's brake, as outlined under section 6.4.1 "Adjusting the rotation brake on the crane arm," at page 67 		
	<ul style="list-style-type: none"> • Replace the brake gasket when the arm encounters instability, even after having adjusted the brake. IN THE CASE OF A MALFUNCTION: <ul style="list-style-type: none"> • It is forbidden to intervene on the jib crane's rotation arm with corrective maintenance. • Any extraordinary maintenance operation on the crane's rotation arm brake must be conducted by <i>DONATI SOLLEVAMENTI S.r.l.</i> technical service personnel or by technicians authorized by the manufacturer. 	DONATI TECHNICIAN  DONATI SERVICE

	On a monthly basis, verify the efficiency of the crane's rotation reducer:	
<ul style="list-style-type: none"> • Check that the noise emitted from the reducer does not vary in intensity. Vibrations or excessive noise reflect wear on the teeth, or a worn out bushing. • Make certain there are no lubrication leaks, and check the lubricator level at least every four years. 		
	WARNING: <ul style="list-style-type: none"> • The reducers are lubricated for life and do not require any maintenance, nor, with the exception of leaks, any filling of lubricant. IN THE CASE OF A MALFUNCTION: <ul style="list-style-type: none"> • It is forbidden to intervene on the rotation reducer with corrective maintenance. • Any extraordinary maintenance operation on the rotation reducer must be conducted by <i>DONATI SOLLEVAMENTI S.r.l.</i> technical service personnel or by technicians authorized by the manufacturer. 	DONATI TECHNICIAN  DONATI SERVICE

	<p>Every three months, verify the efficiency of the crane's rotation motor:</p>	
<ul style="list-style-type: none"> • Clean the motor, eliminating dust on the frame which may hinder regular cooling; check that the vent openings are not clogged up. • With a nominal load, check that there are no unusual noises (rubbing, chaffing). • Check that the temperature of the frame does not exceed 110°C. Contrarily, search out the causes and check the service for which the hoist is designed (see point 6.5 "Troubleshooting"). • Check the power absorption and tension specifications, comparing them with the nominal values indicated on the motor's identification nameplate. 		
	<p>IN THE CASE OF A MALFUNCTION:</p> <ul style="list-style-type: none"> • It is forbidden to intervene on the rotation motor with corrective maintenance. • Any extraordinary maintenance operation on the rotation motor must be conducted by <i>DONATI SOLLEVAMENTI S.r.l.</i> technical service personnel or by technicians authorized by the manufacturer. 	<p>DONATI TECHNICIAN</p>  <p>DONATI SERVICE</p>

	<p>Every three months, verify the efficiency of the rotation limit switches (if installed):</p>	
<ul style="list-style-type: none"> • Check for wear and correct operation (activate the limit switches repeatedly) and in particular, verify their operation during a normal manoeuvre with a full load, testing at low operating speeds. • Check that the cable glands, covers and seals are properly tightened. • Check the mechanical integrity of moving elements (levers and springs) and verify that all setscrews are properly fastened. 		
	<ul style="list-style-type: none"> • The limit switches are devices displaying safety functions, and their malfunction can compromise the safety of persons in the work area! • Do not hesitate to replace limit switches being examined if they do not offer sufficient guarantees of reliability. • Never carry out makeshift repairs on the limit switches! • Use original spare parts. 	

 	<p>Every three months, verify the efficiency of the electrical control system: (in the case of jib cranes equipped with BT controls installed on board).</p> <p>WARNING! Some of the operations described hereunder are performed with the power on, therefore proceed with maximum caution.</p>	
<ul style="list-style-type: none"> • Control equipment: perform internal controls. Operating using the control panel, verify that moving parts from contactors move with minimum friction; if this is not the case, it may be that the power of the electromagnet is insufficient to guarantee a proper pressure between the contacts. To avoid improper contacts, check for overheating or noise, and that the power voltage on the coils is correct. • Conductors and ground connections: check for efficiency by performing a control, and if necessary fastening all ground terminal screws. • Terminals: check that they are properly fastened; make certain the identification number is clearly visible and integral with the terminal; verify the integrity of the thermo-insulation material, and replace promptly in the case of cracks or breaking. • Fuses: keep a normal store of each type of fuse installed (see electrical diagram), so as to quickly replace burnt out fuses with the same type. • Seals and gaskets: check all seals and gaskets on the covers and cable glands. • Warning labels: check for the presence and legibility of all warning labels on the cover. • Rotating collector: if installed, verify its efficiency and condition, controlling the ring tracks and current runners. 		
	<ul style="list-style-type: none"> • Do not hesitate to replace electrical components if they do not offer sufficient guarantees of reliability. • Never carry out makeshift repairs. • Use original spare parts. 	

	<p>On a monthly basis, verify the control panel and its cables</p>	
<ul style="list-style-type: none"> • Verify the condition of the control panel, checking the operation and efficiency of all command buttons, cleaning as required and removing dirt or grease which may have formed. Verify the legibility of the nameplates. Check the seals and washers for wear. • Verify the condition of the multi-polar cable on the control panel, as well as all flexible cables, making certain there are no cuts, abrasions, stripping or bare conductors. Check the condition of the suspension cables on the control panel and check that they are properly fastened to the hoist frame. 		
	<p>If any broken parts, abrasions, cuts and stripped cables are encountered on the control panel, inform electrical maintenance personnel for their replacement.</p>	

	<p>For information on control checks to all structural, mechanical and electromechanical components on the jib crane's lifting and traversing units, consult the related documentation attached to this technical manual.</p>
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	<ul style="list-style-type: none"> • Do not hesitate to replace parts and/or components being examined if they do not offer sufficient guarantees of safety and/or operating reliability. • Never carry out makeshift repairs!
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6.3.4 Cleaning and lubrication of the jib crane

	<ul style="list-style-type: none"> • Cleaning can be carried out by staff who are not highly specialised. • It is necessary to keep clean the following elements at regular intervals: <ul style="list-style-type: none"> • structure of the jib crane (column, arm, etc.) • mechanisms of the jib crane (thrust block, rotation geared motor) • electric parts (control panel, push-button panel, festoon cables, trolleys) • components of the lifting unit and the translation unit (wheels, chain, hook, hook block, push-button panel, etc.). • Cleaning at a height must be carried out by qualified staff equipped with suitable means and personal protection measures. • These operations are necessary every three months to allow the performing of the periodical checks. 	 
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- Cleaning can be simply done using means, equipment, and detergents and solvents commonly used in general cleaning operations of industrial equipment as there are no particular contraindications regarding the use of products or materials.
- Clean away any foreign fouling substances with aspirators, absorbent cloths, etc.
- Dry the grease and/or oil in excess on the parts.

	<p>The careful lubrication of the mechanism of the jib crane is necessary to guarantee the efficient service the hoist is intended for, as well as its duration.</p>	
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- Over time, lubricating power diminishes due to mechanical stress, and lubricants must be restored or replaced.
- Lubrication operations on the GBR series electrical rotation jib crane is very simple and is limited to the application of a light coat of grease on the thrust block teeth and its pinion.
- Every three months, check the lubrication on the thrust block teeth and its pinion through the inspection hole on the upper flange next to the geared motor.
- The rotation geared motor is lubricated by a screw system. At least once every four years, check the lubricant level, and if necessary, restore the level.
- Carry out control checks, and if necessary, lubricate using recommended lubricants, or corresponding products, as indicated in the following **“Table of periodic lubrication checks”**.
- It is very important to lubricate the lifting and translation mechanisms and the lubrication cycles for them are contained in the relevant technical publications included with this one.

Table of periodic lubrication checks			
Component	Type of lubricant		Frequency
	Oil	Greasy	
Ralla e relativo pignone	Agip Blasias GR MU3		Check every 3 months
Riduttore di rotazione	Agip Blasias S 220		Check every 4 years
Meccanismi di sollevamento	See user instructions for electric hoist		
Meccanismi di traslazione	See user instructions for electric trolley		

	<ul style="list-style-type: none"> • Lubricants, solvents and detergents are products which are toxic or damaging to health: <ul style="list-style-type: none"> • if they come into direct contact with the skin they can cause irritation • if inhaled they can cause serious poisoning • if swallowed they can cause death. • Use them with care using adequate personal protection measures (DPI). Do not dump them, dispose of them in conformity with the legislative measures currently in force for toxic/harmful waste.
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6.4 Adjusting and regulating

6.4.1 Adjusting the rotation brake of the crane arm

REMAINING RISKS IF ON THE CRANE DURING THE ADJUSTMENT OF THE BRAKE		
DANGER / RISK	BAN / WARNING	OBLIGATION / PREVENTION
		
Risk of crushing in case of contact with the rotation arm when adjustments of the brake are being made.	Warning! Exposure to moving parts can cause danger.	Adjustments of the brake must be carried out by qualified maintenance staff. Use of protective gloves and, if necessary, safety harness.

	<ul style="list-style-type: none"> The brake of the jib crane must be adjusted so as to guarantee the stability of the arm in any of its positions with a maximum load. Register the braking device situated on the rotation motor, if the following conditions are encountered: <ul style="list-style-type: none"> the arm moves uncontrollably in positions other than those required at the moment in which the rotation action fails. braking spaces have been lengthened, with respect to initial settings, and no longer guarantee a controlled positioning and stopping of the load.
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 	<p>To register the rotation motor brake on the jib crane arm, proceed as follows:</p> <p>WARNING! When this operation is carried out at a height, on a scaffolding or other mobile equipment, the use of safety harnesses is obligatory.</p>	 
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	<ul style="list-style-type: none"> The brake seal is subject to wear which can be more or less accentuated depending on operating intensity. The greater the wear on the seal the more the air-gap increases between the fixed part and movable part of the electromagnetic circuit. This condition results in a delayed and/or partial opening of the brake, with a consequent overheating of the motor and a risk of burning the winding coils. To prevent this situation, periodically check the air-gap and, if necessary, restore to its appropriate value.
---	--

§ Adjusting the brake air-gap (★★):

- When the air-gap exceeds the maximum value indicated (fig.117), the brake must be regulated as follows:
 - Disassemble the hood **14**, shift the elastic band **19** and remove any dust deposits.
 - Screw on the hexagonal nuts **16** so as to uniformly restore the minimum air-gap indicated in the table between the solenoid **15** and disc thrust **3**.
 - Use a thickness gauge to check the regularity of the air-gap in the area of the fastening screws **17**.
 - For double disc brakes, screw on before the hexagonal nuts, the counter bearing in the brake hood **1**; this bearing must be fastened once more to the solenoid after the adjustment of the air-gap.
 - Reconnect the elastic band **19** and reassemble the hood **14**.

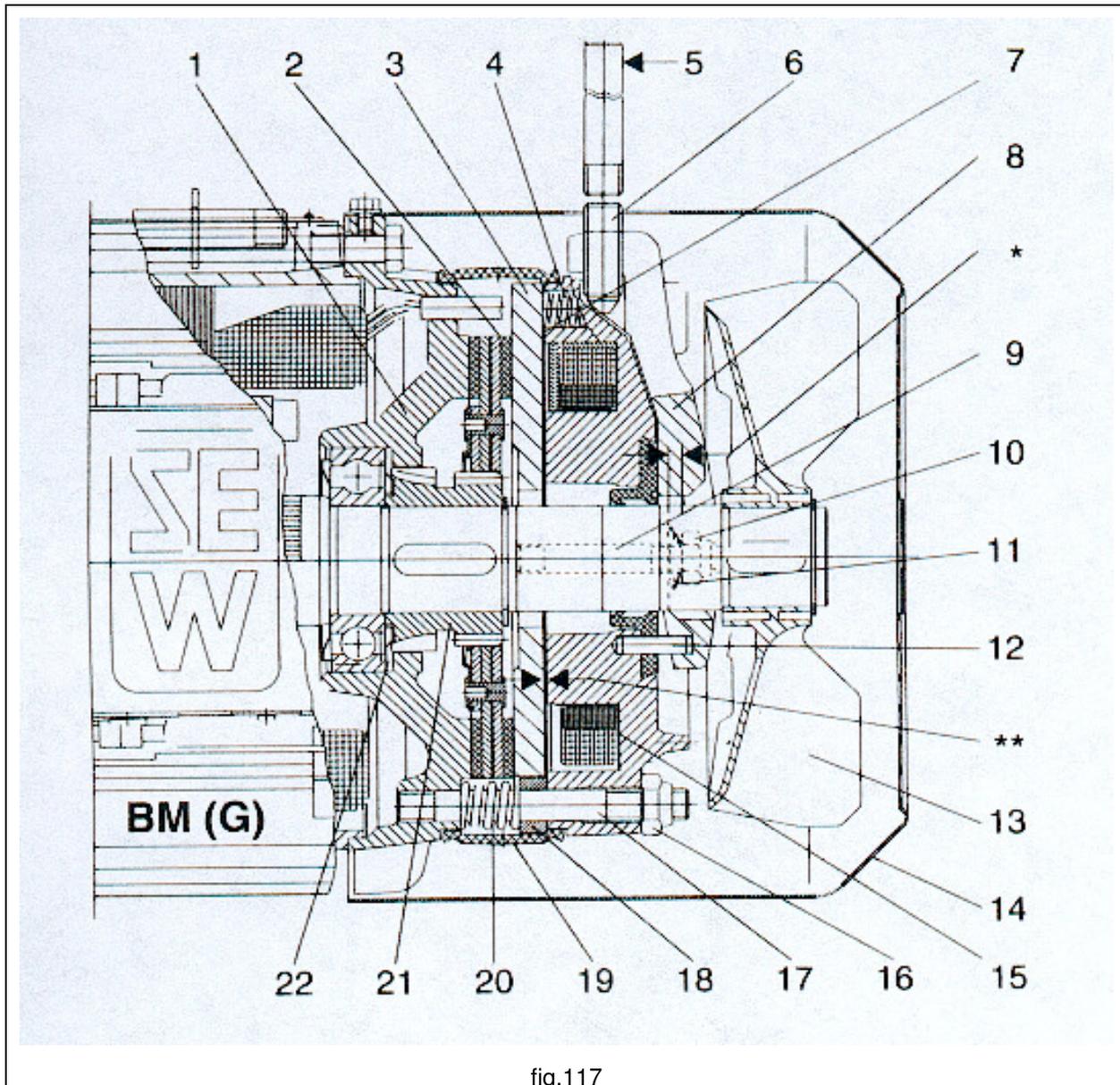


fig.117

§ Modifying the braking torque:

- The braking torque can be modified by assembling different numbers and types of springs, as outlined below (fig.117):
1. Remove the hood **14**, vent **13** and elastic band **19**.
 2. Unscrew the hexagonal nuts **16** and push back the solenoid **15** by approx. 50 mm.
 3. Modify the combination of springs **4** and check that they are arranged symmetrically.
 4. Reassemble the brake with its minimum air-gap as indicated (see "Adjusting the brake air-gap").



If the brake has been registered repeatedly and the stability of the crane arm is not guaranteed following the last registration, replace the friction discs.

§ Brake disassembly and replacement:

- When the brake disc **2** is reduced to a thickness of **9-10 mm** due to wear, it must be replaced.
- To carry out this operation, proceed as outlined at the previous point "**Modifying the braking torque**".



The new brake disc must not come into contact with grease or oil.

6.5 Breakdowns and solutions

6.5.1 Principal causes of malfunctions or breakdowns

§ In relation to individual operating functions on the jib crane, the columns in the table below provide a list of the main causes of reasonably foreseeable machine malfunctions or breakdowns, as well as the type of inconvenience and possible cause of the malfunction.

PROBLEM	Hoist lifting	Trolley traversing	Jib crane rotation	POSSIBLE CAUSE OF MALFUNCTION
won't start				<ul style="list-style-type: none"> - ascent/descent contactor switches - ascent/descent command buttons - hoist motor - fuses - electric load limiter (if available)
won't start				<ul style="list-style-type: none"> - right/left contactor switch - right/left command button - trolley motors - fuses
won't start				<ul style="list-style-type: none"> - forward/reverse contactor switch - forward/reverse command button - jib arm rotation motor - fuses
won't start				- check hoist/trolley power festoon
won't start				<ul style="list-style-type: none"> - power line - collector (if available) - low tension transformer - line contactors - fuses
starts partially (in one direction only)				- limit switch, contactor or command button for the non-responding function
the movement does not stop at the end of the stroke or does not come to a stop in the required space				<ul style="list-style-type: none"> - limit switch - brake (in this case check the "sliding" action)
the movement continues even after having released the button				<ul style="list-style-type: none"> - command button - contactor switch - "false contact"
excessive noise on the reducer				<ul style="list-style-type: none"> - poor lubrication - malfunction on reducer for noisy function
grating noise during braking				<ul style="list-style-type: none"> - presence of dust - excessive mechanical play - worn out braking seal
all crane functions move slowly and/or the hoist lifts the load with difficulty				<ul style="list-style-type: none"> - line power shortage - insufficient section for power cable - missing line phase (mono-phase operation)
current can be heard on the hook or structure				<ul style="list-style-type: none"> - electrical system - grounding

6.5.2 Troubleshooting

PROBLEM	CAUSE	SOLUTION
sliding brakes	- wear on the braking seal - presence of oil/grease	- register the amount of play or replace the braking seal - clean the braking seal
vibrating disc brakes	- line tension too low) - mono-phase operation - air-gap too high	- restore correct initial operating conditions - register the air-gap
excessively overheated brakes	- incorrect servicing - operating in unsuitable environmental conditions - incorrect registration	- restore correct operating conditions - regulate the brake
the brake won't release	- power shortage - incorrect registration	- restore correct tension values - regulate the brake
the brake tends to "stick"	- operating in unsuitable environmental conditions or outside operating parameters	- restore correct operating conditions
the limit switch is blocked on opening, does not restore	- counter plate obstructed - interrupted connections	- cleaning - restore correct initial operating conditions
the buttons on the panel are blocked or "closed"	- obstruction	- cleaning - check conductors
the contactor switches are "stuck"	- lacks maintenance - operating in unsuitable environmental conditions or unforeseen operation	- restore correct operating conditions
the motor is overheated	- variations in tension are > than 10% - poor cooling, obstructed air passages - ambient temperature > than foreseen temp - crane used outside operating parameters	- ensure correct line tension - restore correct air circulation - adapt to motor specifications - adapt to foreseen operating conditions
the motor won't start	- burnt out fuse - the contactor switch has interrupted power - overload, blocked due to high start-up frequencies, insufficient protection	- replace fuse - check function contactor - rewind the motor and ensure better protection - check the command device
the motor has difficulty starting	- on start-up the tension or frequency lowers compared to the nominal value	- improve conditions on the line or mains
the motor buzzes and absorbs too much current	- defective winding, the rotor comes into contact with the stator - missing power phase - the reducer is blocked - the brake is blocked - short circuit on the power cables - short circuit on the motor	- carry out repairs by specialised servicing technician - check mains and/or contactor - request servicing intervention from a specialised technician - verify, and register if necessary - eliminate the short circuit - request servicing intervention from a specialised technician
short circuit on the motor	- winding malfunction	- rewind motor
false contact	- involuntary activation of function	- check conductors on push-button panel

6.5.3 Authorised staff for intervention in case of breakdown

§ The staff authorised to intervene in most cases of breakdown, or where not indicated differently, are expert maintenance people or trained with a specific preparation on mechanical and electrical parts. Where shown, however, the intervention of specialised suitably-trained staff or the technical staff of the manufacturer is necessary.

6.5.4 Putting out of service

§ If the jib crane cannot be repaired, proceed to the putting out of service operations, signalling the breakdown with a sign; request the intervention of the assistance service.

6.6 Dismantling, disposal and scrapping

	<p>If the jib crane or its components, whether broken, worn out or at the end of their designated life, should no longer be usable nor repairable their demolition must be carried out.</p>	
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- The demolition of the jib crane must be carried out using suitable equipment chosen according to the nature of the material on which to intervene (e.g.: shears, oxyhydrogen flame, saw, etc.).
- All the components must be dismantled and scrapped having been reduced to small pieces so that none of them can reasonably be used again.
- When the jib crane is scrapped their parts must be disposed of taking into account the different nature of them (metals, oils and lubricants, plastic, rubber, etc.) using possibly specialised companies and in any case according to what the relevant law requires regarding solid industrial waste.

	<p>Do not try to use again parts or components of the jib crane which look intact but, after checks and/or replacements carried out by specialised staff, or by the manufacturer itself, have been declared no longer fit for use.</p>
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7. - SPARE PARTS

	<ul style="list-style-type: none"> • The jib cranes are designed and manufactured, so as not to normally require spare parts DUE TO BREAKDOWNS or BREAKAGES, if used correctly and according to adequate maintenance as described in this manual. • The parts and components subjected to normal wear and tear or deterioration are to be obtained from the manufacturer for a minimum period of 10 years.
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	<ul style="list-style-type: none"> • Do not hesitate to replace the part and/or component under examination, if it does not give sufficient safety guarantees and/or functional reliability. • Never carry out improvised repairs!
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§ If it is necessary to replace broken parts it is compulsory to use only original spare parts, requesting them directly from:

		<p>DONATI SOLLEVAMENTI S.r.l. Via Quasimodo, 17 - 20025 Legnano (MI) Tel. +39 0331 14811 - Fax +39 0331 1481880 E-mail: dvo.info@donaticranes.com www.donaticranes.com</p>
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	<p>In addition to rendering the warranty void, the use of non-original spare parts can compromise the proper operation of the jib crane and/or its components.</p>
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