JIB CRANE

360° MANUAL AND ELECTRIC
*CONTINUOUS ROTATION –**GRL** SERIES*

- USE INSTRUCTIONS -

INSTALLATION - USE - MAINTENANCE

MARCH 2022

CE

KMAN60MG00

Translated from the original instructions in Italian

INDICE DEL CONTENUTO

1 PRELIMINARY INFORMATION

1.1 Manual contents and recipients

This technical publication, marked with the code **KMAN60MI00**, refers to the **"Jib crane, with manual/electric rotation, "Column" type - GRL series.**

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It is related to their "intended use", their functional technical specifications and performance and the relative installation, use and maintenance instructions. It is addressed to:

- the manager of the plant, garage or job site
- operators assigned to transport, handling and installation
- operators assigned to use of the jib crane
- personnel assigned to maintenance

The manual must be kept by a person in charge of doing so, in a suitable place, so that it is always available for consultation in the best possible conditions.
If it is lost or deteriorates, replacement documentation must be requested directly from the manufacturer, quoting the code of this manual.

1.2 Symbols: meaning and use

Certain symbols are used in this manual to call the reader's attention and underline some particularly important aspects.
The following table shows the list and meaning of the symbols used in the manual.

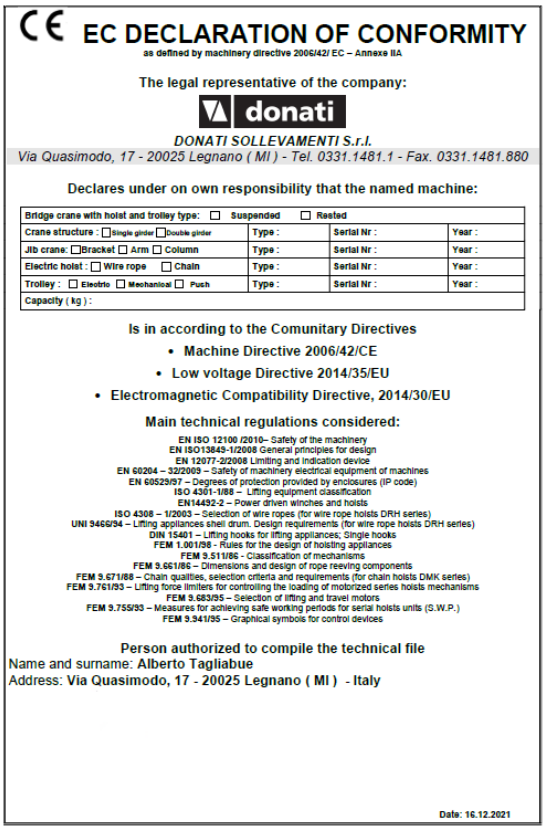
SYMBOL	MEANING	EXPLANATION, RECOMMENDATIONS AND NOTES
	**Hazard**	• Indicates a hazard with the risk of an accident, including fatal. • The failure to comply with the instructions marked with this symbol may result in a seriously hazardous situation for the operator's and/or exposed persons' safety! • **Carefully follow the instructions!**
	Warning	• Represents a warning note of a possible deterioration of the jib or a personal item of the operator. • **Important warning to pay attention to.**
	**Warning Note**	• Indicates a warning or a note on key functions or useful information.
	• **Visual observation** • **Actions to perform**	• A stylized eye may indicate to the operator that: **a)** He/she needs to make a visual inspection. **b)** He/she must proceed with the operating sequence. **c)** A measurement value needs to be read, a warning needs to be checked, etc.

1.3 Collaboration with the user

The manual reflects the state of the art at the time the machine was placed on the market and is an integral part of the machine.
Any supplements to the manual that the manufacturer considers appropriate to send to the users must be kept together with the manual.
The manufacturer is available to its customers to provide additional information and to consider proposals for improvement in order to make the manual closer to the needs for which it was prepared.
If the jib crane is sold, the main user is asked to deliver, along with the crane, this manual and the relative attached documentation (declarations, diagrams, test logbook, etc.).

1.4 Regulatory compliance

The GRL series jib cranes are designed and constructed in consideration of the "**Essential Health and Safety Requirements**" of **Annex 1 of Machinery Directive 2006/42/EC** and are put on the market with **the CE marking** and **CE Declaration of Conformity** - as per **Annex II A** of the same Directive.



CE EC DECLARATION OF CONFORMITY

as defined by machinery directive 2006/42/ EC – Annexe IIA

The legal representative of the company:

donati

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: ☐ Suspended ☐ Rested			
Crane structure : ☐ Single girder ☐ Double girder	Type :	Serial Nr :	Year :
Jib crane: ☐ Bracket ☐ Arm ☐ Column	Type :	Serial Nr :	Year :
Electric hoist : ☐ Wire rope ☐ Chain	Type :	Serial Nr :	Year :
Trolley : ☐ Electric ☐ Mechanical ☐ 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

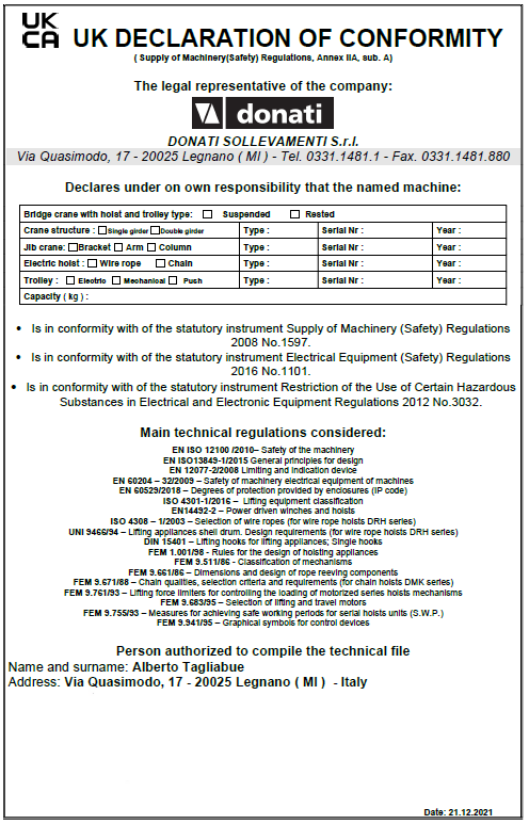
Main technical regulations considered:

EN ISO 12100 /2010– Safety of the machinery
EN ISO13849-1/2008 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
EN14492-2 – Power driven winches and hoists
ISO 4308 – 1/2003 – Selection of wire ropes (for wire rope hoists DRH series)
UNI 9465/94 – 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 reeving 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: 16.12.2021

fig. 1 Example of CE Certificate



UK CA UK DECLARATION OF CONFORMITY

(Supply of Machinery(Safety) Regulations, Annex IIA, sub. A)

The legal representative of the company:

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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: ☐ Suspended ☐ Rested			
Crane structure : ☐ Single girder ☐ Double girder	Type :	Serial Nr :	Year :
Jib crane: ☐ Bracket ☐ Arm ☐ Column	Type :	Serial Nr :	Year :
Electric hoist : ☐ Wire rope ☐ Chain	Type :	Serial Nr :	Year :
Trolley : ☐ Electric ☐ Mechanical ☐ Push	Type :	Serial Nr :	Year :
Capacity (kg) :			

- Is in conformity with of the statutory instrument Supply of Machinery (Safety) Regulations 2008 No.1597.
- Is in conformity with of the statutory instrument Electrical Equipment (Safety) Regulations 2016 No.1101.
- Is in conformity with of the statutory instrument Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No.3032.

Main technical regulations considered:

EN ISO 12100 /2010– Safety of the machinery
EN ISO13849-1/2015 General principles for design
EN 12077-2/2008 Limiting and indication device
EN 60204 – 32/2009 – Safety of machinery electrical equipment of machines
EN 60529/2018 – Degrees of protection provided by enclosures (IP code)
ISO 4301-1/2016 – Lifting equipment classification
EN14492-2 – Power driven winches and hoists
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FEM 9.941/95 – Graphical symbols for control devices

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

Date: 21.12.2021

fig. 2 Example of UKCA Certificate

In addition, the GRL series jib cranes are in compliance with the following directives:

- **Low Voltage Directive 2014/35/EU;**
- **Electromagnetic compatibility directive 2014/30/EU.**

1.5 Manufacturer's liability and warranty

In terms of the contents of this manual the company shall not be held **liable** in the following cases:

- use of the jib crane not in compliance with national laws on safety and accident prevention
- incorrect selection or set-up of structures on which the crane will be installed

- defects in voltage and the mains supply
- no or incorrect compliance with the instructions provided in this manual
- unauthorised modifications to the machine
- use by personnel who are not trained or not suitable

To be able to use the **warranty**, the customer must scrupulously follow the instructions indicated in this manual, and in particular:

- always operate within the limits of use of the jib crane
- always perform a constant and diligent maintenance
- assign use of the machine to operators with a proven capacity, adequately instructed for the purpose
- only use the original spare parts indicated by the manufacturer

- **The intended use and the configurations of the jib are the only ones allowed. Do not try to use it ignoring the provided instructions.**
- **The instructions contained in this manual do not replace but summarise the obligations to comply with current accident prevention laws.**

2 DESCRIPTION OF THE MACHINE AND TECHNICAL INFORMATION

2.1 The jib cranes with manual/electric rotation

2.1.1 Intended use - Expected use - Intended purpose

The jib cranes, with manual/electric rotation, in “Column” version - GRL series are created to locally handle goods inside a plant, on a loading dock or along with operating stations.

Jib cranes perform three operations:

- **they lift** the load vertically in space, via a hook on the lifting unit, generally composed of a manual or electric chain hoist and using accessories suitable for this operation;
- **they traverse** the load in space, with the assistance of an electric or manual hoist holder trolley, which runs along the radial axis of the crane arm;
- **they rotate** the load in space, around the constrained axis of the arm, through a manual push action of the load using the circular area below, limited by the rotation radius of the arm.

2.1.2 Installation restrictions

The “Column-mounted” - GRL series jib cranes, are generally designed to be attached to the ground, the column is self-bearing and can be anchored to the ground with stay bolts, on a specific foundation plinth or, in special cases after verifying the feasibility, also with expansion bolts or chemical anchoring.

⚠	• **The user must verify, either directly or through personnel specialised in the matter, the suitability of the anchoring surfaces which must ensure the stability and safety of the crane in all operating conditions, withstanding the stress and dynamic effects induced by the overturning moment and the lifting type and speed.**

2.1.3 The composition of the jib cranes

The composition of the jib crane is relatively simple: the metalwork structure, lifting unit composed of a hoist (electric or manual), the traverse unit formed by hoist holder trolley (electric or by pushing) and a series of accessories (tie-rods, foundation plinth, electrical system, etc.).

The GRL series crane is composed of a column with polygonal section attached via stay bolts or bolts to the specifically dimensioned base and of a rotating arm situated on the column itself.

Column: Made of press-forged steel sheet welded to the tubular structure with polygonal section it allows high rigidity and stability for the crane; it is fixed to the base with a base plate and a system of bolts or stay bolts. In the upper part a pair of plates supports the crane arm and allows it to rotate (fig. 3).

Rotating arm: The arm, turning around its axis on thrust bearing, is composed of a weight-bearing beam for travel of the hoist holder trolley and is created for **capacities from 125 to 2,000 kg and jibs up to 7 m** (fig. 4).Made using a laminated double T-beam form: the hoist carrying trolley runs on the lower flanges of the T-beam. The beam is self-bearing with cantilever, therefore it does not have support bolts. Allows optimal use of the available overhead space due to the absence of bolts. The crane can be used in combination with electric or mechanical push-trolleys.

fig. 3

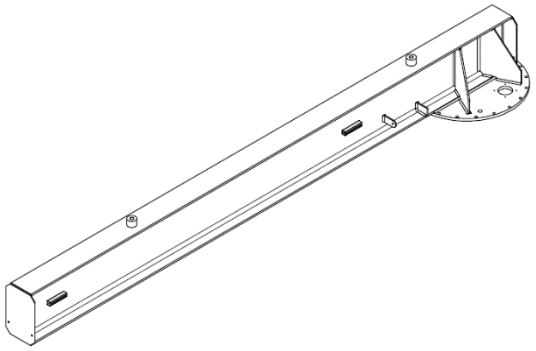


fig. 4

Electrical system:
It is intended for the electrical input of the hoist and/or trolley (if electric) which slides along the arm of the crane. It has a connector block, situated on the top of the crane, for the connector between the line and the festooned cable. The electrical system is built using a flame retardant type generally flat cable with festoons, sliding on specific trolleys.

Foundation frame with stay bolts:
Upon request, supplied for fixing the column itself to the base (foundation plinth) (fig. 6).

Counterplate with chemical bolts:
Upon request, supplied for fixing the column itself to the floor (fig. 7).

Finishing:
Protection of the metalwork structure from inclement weather and environmental agents (dust, gases, etc.) is guaranteed by treatments performed using the application of yellow (std RAL1007) enamel, after preparing the surfaces with metallic sandblasting.

Lift and traverse unit:
The manually or electrically rotated jib cranes can be equipped with a hoist with relative trolley in both electric and manual version.
For the dimension specifications, weights and maximum reactions allowed on the trolley wheels see the relative table in the “Technical specifications” in paragraph 2.2.

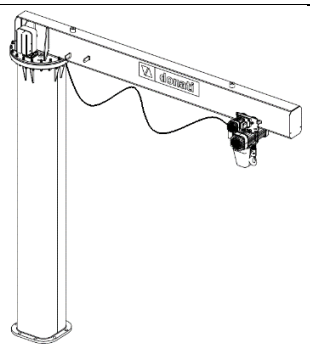


fig. 5

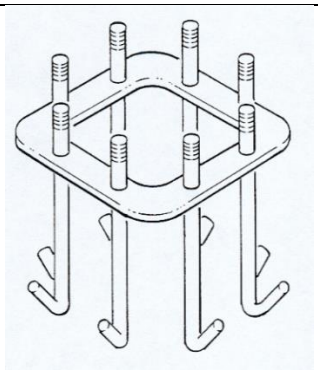


fig. 6

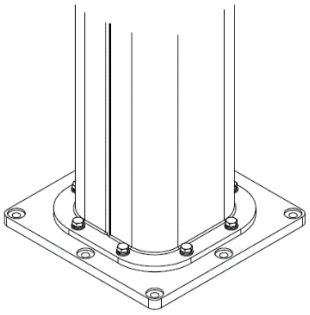


fig. 7

The concept and construction:

- The 360° rotating **jib cranes** of the GRL series are built based on the concept of modular components which, assembled to each other based on commercial needs, as well as the standard versions always available in the warehouse, they allow fast and economic creation of many standardised and special configurations.

- The base components, columns and arms, thanks to their extreme compactness can be assembled together so as to guarantee the maximum use of the hook run and, thanks to their minimum lateral encumbrance, allow the optimal use of the area where the jib crane operates.

- The construction uses the most evolved technology based on high industrialisation production processes and allows the creation of completely reliable and technically innovative machines through economies of scale.

Arm electric rotation device:

Formed by a gear motor (fig. 8) fixed vertically in the upper part of the arm, made with a motor of epicycloid type, with gears in a thermally treated oil bath and self-braking conical brake motor.
The pinion protruding from the gear motor is coupled with a toothed thrust bearing attached to the column.
Progressive starting and braking are ensured by a frequency variator (inverter).
Electric safety limit switch (fig. 9) on the rotation movements, installed, if necessary, to delineate the rotation field of the arm of the crane.
Working on the auxiliary circuits at low voltage, it is a worm screw type with two thresholds of intervention both in right rotation and left and also carries out the emergency function in safety if there is any fault or malfunctioning of the first threshold of intervention.

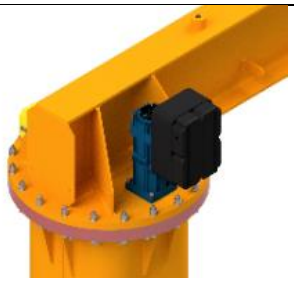


fig. 8

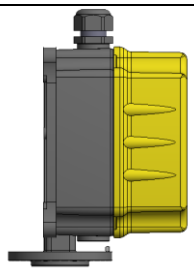


fig. 9

2.2 Technical information and service conditions

2.2.1 Regulatory reference framework

In the designing and construction of the manually rotated jib cranes, the following standards and main technical rules have been taken into consideration:

- EN ISO 12100:2010 “General principles for design”
- EN ISO 13849-1:2008 “Safety-related parts of control systems” (where required).
- EN 6020432:2009 “Safety of machinery. Electrical equipment of machines. Requirements for hoisting machines”
- EN – 60529/97 “IP code”
- ISO 4301-1/88 “Cranes and lifting appliances --. 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 “Measure for achieving safe working periods for motorised serial hoist units (S.W.P.)””
- FEM 9.941/95 “Graphical symbols for control devices”
- EN 16851/16 “Cranes – Light crane systems”

2.2.2 Protection and insulation of electrical parts

- Rotation motor: Protection IP55 (motor) IP23 (brake); insulation class “F”
- Electrical panel: Protection IP55 - Maximum voltage insulation 1500V
- Push-button panel: Protection IP65 - Maximum voltage insulation 600V
- Collector: Protection IP00 (IP55 upon request) - Maximum voltage insulation 500V
- Limit switch: Protection IP65 - Maximum voltage insulation 300V
- Cables: CEI 20/22 II - Maximum power insulation 450/750V

2.2.3 Electrical supply

- The jib cranes have been designed to be powered with alternating electric current with maximum three phase voltage of 480V- Standard GRL gear motor with three phase inverter.

2.2.4 Ambient use conditions

- Operating temperature: minimum - 10°C; maximum + 40°C
- Maximum relative humidity: 80%
- The machine must be installed in a well ventilated area, free from corrosive fumes (acid fumes, salt mist, etc.).

- **It is forbidden to use the machine in an explosive atmosphere or potentially explosive one or where the use of non-explosive components is required**
- **Sufficient work spaces must be provided in order to ensure the safety of the operator and personnel assigned to maintenance.**

2.2.5 Noise - Vibration

- For both manual and electrical rotation jib cranes, noise level during functioning is below the prescribed limits adopted (70 dBA).
- The vibrations produced by the jib crane, during arm rotation, are practically zero and are not hazardous for the health of the personnel who operates it.
- Excessive noise or vibration may be caused by a fault which must be immediately reported and eliminated in order not to compromise the reliability of the job crane.

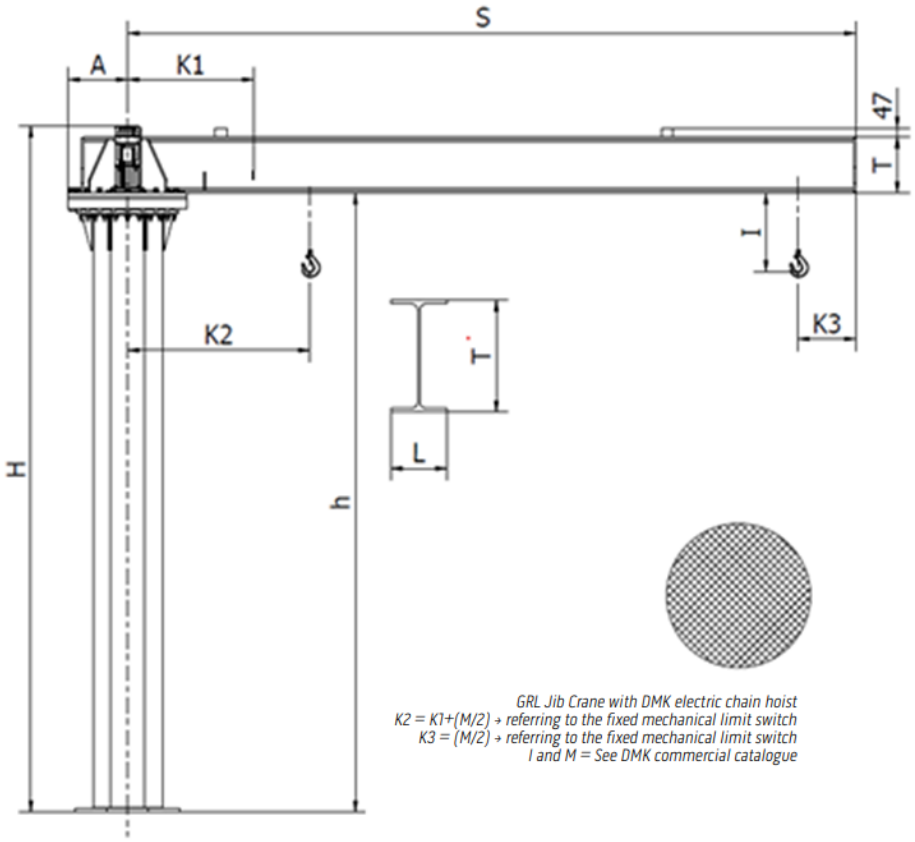
2.2.6 Use criteria and operating conditions

One of the necessary and indispensible conditions to obtain the complete operating compliance of the jib crane, for the use it is intended for, as well as excellent and long-lasting operation of the same, consists of the correct selection of the machine model. This selection must be made based on the real service performance required as well as the ambient conditions where the crane will operate.
The parameters which must be carefully considered in the choice of jib crane are:

- **The capacity**: the maximum load weight to lift must be calculated and must not ever be less than the same.
- **The functional dimensions**: the height of the trolley beam which determines the hook run of the hoist, and its jump (jib) must be selected so as to guarantee the functional coverage of the area to be served in consideration of the surrounding encumbrances.
- **Type of travel**: manual or electric based on the characteristics of the mass to move.
- **Nature of the load**: delicate or not determines by its positioning the choice of the most suitable handling (lifting and travel) speeds. In some cases it is indispensable to use hoists with two speeds with a slow positioning speed
- **Area of use**: the jib crane is characterised, by its conception, by intrinsic high elasticity which becomes even more evident when it is used for handling with loads close to the maximum lifting capacity and/or with prevalent localisation at the ends of the arm.
- **Ambient of use**: the jib cranes are intended to be used inside and/or in a covered area, sheltered from bad weather and wind. Measures must be taken for outdoor use for a suitable surface treatment (sandblasting - painting) as well as a self-braking system.
- **Frequency of use**: if use is very high (frequent and/or repeated manoeuvres) with loads close to the maximum load the consequent fatigue of the operator due to manual handling must be taken into consideration.

- **The correct evaluation of the parameters indicated above, may lead, if they are close the their limit values, to the need to use a crane with higher performance characteristics that, once declassed, may ensure greater rigidity and duration.**
- **The use of an electric trolley instead of a push trolley can also reduce operator fatigue.**

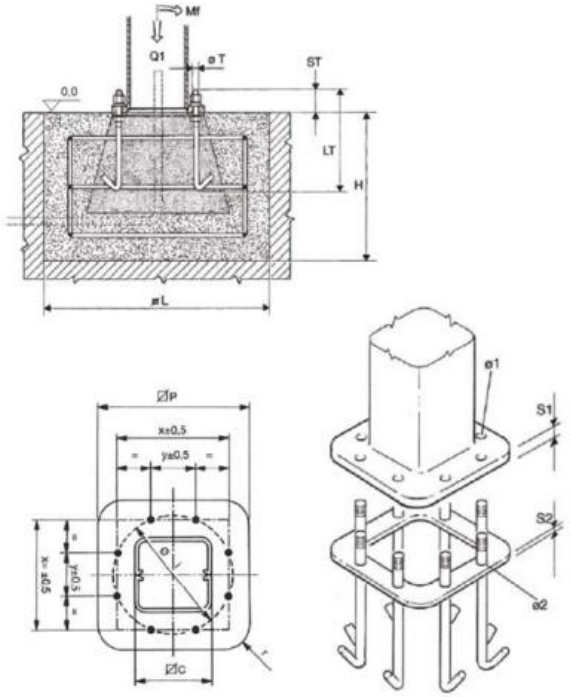
2.2.7 Electrically rotated GRL: characteristics and technical data



GRL Jib Crane with DMK electric chain hoist
K2 = K1+(M/2) → referring to the fixed mechanical limit switch
K3 = (M/2) → referring to the fixed mechanical limit switch
I and M = See DMK commercial catalogue

Lifting capacity	Outreach	Jib Crane size	Counterplate	Code	Under beam	Maximum under beam	Total height H		Overall dimensions (mm)				Arm speed		Motor power	Jib Crane weight	Column weight
	S				h minimum	h maximum			K1	A	T	L	rpm	Peripheral			
kg	m				mm	mm	Electric	Manual	mm	mm	mm	mm	r/min	m/min	kW	kg	kg/m
250	4	U	U	E30544	2810	4810	3260	3100	676	318	240	120	0.75	18	0.4	480	43.5
	5	U	U	E30554	2810	4810	3260	3100	676	318	240	120	0.6	19	0.4	510	43.5
	6	U	U	E30564	2810	4810	3260	3100	676	318	300	150	0.5	20	0.4	620	43.5
	7	V	V	E30674	3060	5060	3510	3465	758	400	360	170	0.5	22	0.4	960	64
500	2	U	U	E30525	2810	4810	3260	3100	676	318	240	120	1	13	0.4	415	43.5
	3	U	U	E30535	2810	4810	3260	3100	676	318	240	120	1	19	0.4	450	43.5
	4	U	U	E30545	2810	4810	3260	3160	676	318	300	150	0.75	18	0.4	540	43.5
	5	U	U	E30555	2810	4810	3260	3160	676	318	300	150	0.6	19	0.4	580	43.5
	6	V	V	E30665	3060	5060	3510	3465	758	400	360	170	0.5	20	0.4	910	64
	7	Z	Z1	E30775	3060	5060	3510	3505	758	400	400	180	0.5	22	0.4	1080	75.2
1000	2	U	U	E30527	2810	4810	3260	3100	676	318	300	150	1	13	0.4	450	43.5
	3	U	U	E30537	2810	4810	3260	3100	676	318	300	150	1	19	0.4	490	43.5
	4	V	V	E30647	3060	5060	3510	3465	758	400	360	170	0.7	18	0.4	800	64
	5	Z	Z1	E30757	3060	5060	3510	3465	758	400	360	170	0.6	20	0.4	900	75.2
	6	Z	Z1	E30767	3060	5060	3510	3465	758	400	400	180	0.5	20	0.4	1010	75.2
	7	Z	Z1	E30777	3060	5060	3510	3465	758	400	450	190	0.5	22	0.4	1170	75.2
2000	2	V	V	E30629	3060	5060	3510	3465	758	400	360	170	1	13	0.4	680	64
	3	Z	Z1	E30739	3060	5060	3510	3465	758	400	360	170	1	19	0.4	770	75.2
	4	Z	Z2	E30749	3060	5060	3510	3505	758	400	400	180	0.7	18	0.4	870	75.2
	5	Z	Z2	E30759	3060	5060	3555	3555	758	400	450	190	0.5	16	0.4	1100	75.2

Fixing systems for jib cranes



ATTENTION!

The dimensions of the foundation plinths are purely indicative. The foundation plinth must be dimensioned by expert, qualified technicians considering the real consistency of the ground and the maximum pressure it can withstand.

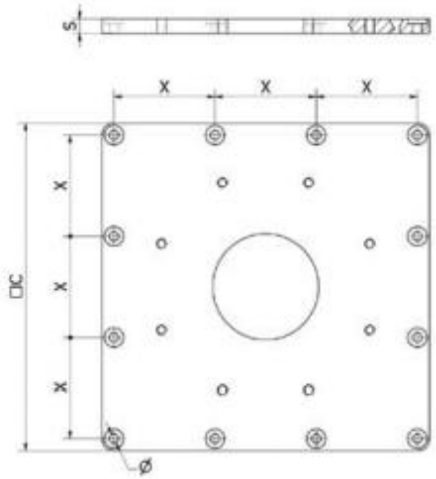
Size		U	V	Z
Base plate and foundation frame (mm)	⊠ C	372	435	515
	⊠ P	475	555	660
	S1	20	20	25
	S2	8	8	8
	x	432	506	599
	y	179	210	248
	Ø	468	548	248
	r	145	165	197
	Ø1	25	29	35
	Ø2	21	25	31
Anchor bolts (mm)	ØT	M20	M24	M30
	LT	550	600	700
	ST	55	60	75
Tightening torque (Nm)		200	350	680
Frame/anchor bolt weight (kg)		17	26	47
Foundation plinth (mm)	⊠ L	1700	2000	2400
	H	900	1100	1100
Reaction (kN)	Q1*	18.4	28.7	29.35
Momentum (kNm)	Mf*	57	107	164

Note: the foundation frame with anchor bolts, used in the column-mounted version for fixing the column itself to the foundation plinth is supplied on request.

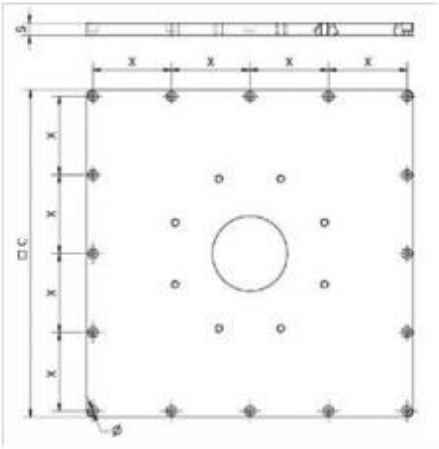
** M = 1.11· Q1 = 1.15*

Counterplates for fixing the following pillar-mounted cranes to the floor with chemical bolts: GRL

- **M16 chemical bolts - minimum floor thickness 170mm**



Nr 12 Chemical bolts for
COUNTERPLATE U - V - Z1



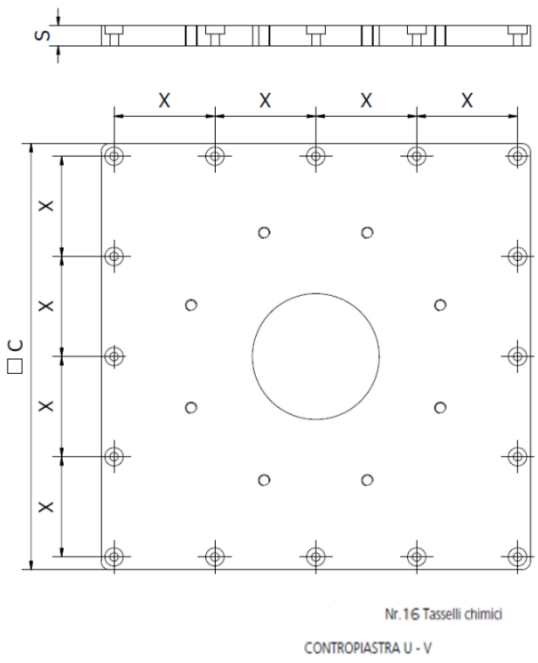
Nr 16 Chemical bolts for
COUNTERPLATE Z2

Size			U	V	Z1	Z2
Counterplate and chemical bolts code			GBA2U0KPS	GBA2V0KPS	GBA2Z1KPS	GBA2Z2KPS
Counterplate dimensions (mm)		C	680	995	1130	1310
		S	30	40	40	50
		x	210	315	360	315
		Nr x Ø	12x19	12x19	12x19	16x19
Counterplate weight (kg)			100	285	375	640
Maximum tilting momentum allowed (kNm)		Mf*	56.7	107.3	135.6	164
Fixing characteristics	Type of concrete floor: minimum Fck/Rck class (N/mm^2)		C20/25	C20/25	C20/25	C20/25
	Minimum concrete floor thickness (mm)		170	170	170	170
	Diameter of hole in the floor (mm)		18	18	18	18
	Depth of hole in concrete floor (mm)		135	135	135	135
	Tightening torque of the bolts (Nm)		60	60	60	60
	Bolt height from top plate surface (mm)		35	25	25	15

For the tightening torque of the bolts between the column and counterplate, see the relative tightening torques for the anchor bolts in the table alongside.

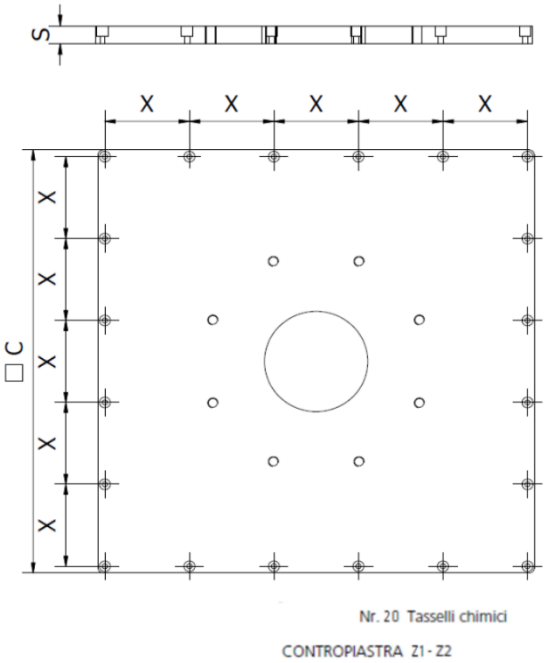
!	**The fixing of the pillar with chemical bolts requires a scrupulous check of suitability in relation to the type of support flooring. The suitability checks are the responsibility of the user and must be carried out by expert, qualified technicians who will evaluate the feasibility and formally undertake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

- **M12 chemical bolts - minimum floor thickness 140mm**



Nr.16 Tasselli chimici

CONTROPIASTRA U - V



Nr. 20 Tasselli chimici

CONTROPIASTRA Z1 - Z2

Size			U	V	Z1	Z2
Counterplate and chemical bolts code			GBA2U5KPS	GBA2V5KPS	GBA2Z5KPS	GBA2Z6KPS
Counterplate dimensions (mm)		C	745	1140	1265	1540
		S	35	45	50	50
		x	175	275	245	300
		Nr x Ø	16x15	16x15	20x15	20x15
Counterplate weight (kg)			139	430	594	897
Maximum tilting momentum allowed (kNm)		Mf*	56.7	107.3	135.6	164
Fixing characteristics	Type of concrete floor: minimum Fck/Rck class (N/mm^2)		C20/25	C20/25	C20/25	C20/25
	Minimum concrete floor thickness (mm)		140	140	140	140
	Diameter of hole in the floor (mm)		14	14	14	14
	Depth of hole in concrete floor (mm)		110	110	110	110
	Tightening torque of the bolts (Nm)		40	40	40	40
	Bolt height from top plate surface (mm)		30	20	15	15

For the tightening torque of the bolts between the column and counterplate, see the relative tightening torques for the anchor bolts in the table alongside.

!	**The fixing of the pillar with chemical bolts requires 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 GRL series rotating jib cranes and relative accessories were designed and built based on the most modern technical knowledge and can be used safely.
The hazards for assigned personnel can be completely eliminated and/or significantly reduced only if the crane is used in accordance with the instructions contained in this documentation by authorised and specifically instructed personnel, in possession of sufficient preparation.

!	**PERSONNEL IS RESPONSIBLE FOR THE FOLLOWING OPERATIONS:**

Any installation and completion of the jib crane parts which may be missing (e.g. hoist, electric controls, anchoring accessories, etc.);
Commissioning of the crane and management of its operation.
Inspections and tests of the crane and its components, before start-up, during operation and even after it stops.
Maintenance of the crane and repair and/or replacement of its components.
The personnel must be absolutely informed on potential hazards they may encounter in performing their jobs, both in terms of operation and the correct use of safety devices available on the machine.
These personnel must also carefully comply with the safety rules contained in this chapter in order to prevent the occurrence of hazardous situations.

3.1 Authorised operator qualifications

To better define the field of operation and the consequent undertaking of responsibility by each OPERATOR, given the specific training and achieved qualification, the following table has been prepared of the professional profiles with relative pictogram, necessary for all types of operation.

PICTOGRAM	OPERATOR PROFILE
 ASSIGNED TO USE	**Operators assigned to use of the jib crane:** Personnel assigned to perform only simple jobs, i.e. drive the crane through the use of controls and the loading and unloading operations of materials to handle.
 MECHANICAL MAINTENANCE PERSONNEL	**Mechanical maintenance personnel:** Qualified personnel able to intervene on the crane in normal conditions, make normal adjustments of the mechanisms, perform routine maintenance and mechanical repairs
 ELECTRICAL MAINTENANCE PERSONNEL	**Electrical maintenance personnel:** Qualified personnel able to intervene on the crane in normal conditions and assigned to normal interventions of an electrical nature, adjustments, maintenance and repair. Able to work in the presence of voltage inside the panels.
 MECHANICAL TECHNICIAN	**Mechanical technician:** Qualified and authorised technician for performing complex and extraordinary operations of a mechanical nature
 ELECTRICAL TECHNICIAN	**Electrical technician:** Qualified and authorised technician for performing complex and extraordinary operations of an electrical nature

3.2 General safety regulations

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

- Carefully read the technical documentation;
- Become informed on the operation and positioning of the emergency stop devices;
- Know what safety devices are installed on the crane and their location;

Some of the activities to perform on operating components (e.g. replacing the hoist chain) expose the operators to serious hazardous situations, therefore personnel must be authorised and specifically instructed on the operating procedures to follow, hazardous situations that may occur and the correct methods for avoiding them.

3.3 Safety symbols

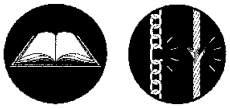
Pictograms have been used in the manual to highlight any hazardous situations due to residual risks or actions which must be performed according to the safety procedures indicated their description.

PICTOGRAMS USED IN THE MANUAL TO HIGHLIGHT HAZARDOUS SITUATIONS

PICTOGRAM	MEANING
	Risk of being crushed during handling of suspended loads in the case of exposure of the operator or other personnel in the zones/areas involved in the trajectory of the load.
	Attention risk of being crushed by moving mechanical parts.
	Attention risk of being drawn in and dragged by moving parts (chain, wheels, etc.).
	Risk of electrocution - being shocked in the case of maintenance on the electrical equipment without disabling the electrical supply.
	It is prohibited to move through, stand, work or manoeuvre under the suspended load.
	It is forbidden to touch the crane arm and the trolley/hoist when moving or expose yourself to their trajectories.
	It is prohibited to work on the electrical equipment before having disconnected the hoist.
	It is prohibited to restart the hoist if the removed guards have not been put back.
	Protective gloves must be used.
	Comply with all of the instructions contained in this instruction manual.
	It is mandatory to perform a preventive check of chains, ropes, hooks, slings and accessories used for lifting and handling.

3.4 Warnings on residual risks

After having carefully considered the hazards present in all of the jib crane operating phases, measures have been adopted that are necessary to eliminate, as much as possible, the risks for operators and/or to limit or reduce the risks resulting from hazards that cannot be completely eliminated at the source. However, despite all of the adopted precautions, the following **residual risks** are on the machine that can be eliminated or reduced through the relative prevention activities:

RISKS DURING USE		
HAZARD / RISK	HAZARD / RISK	HAZARD / RISK
 **Risk of being crushed** during handling of suspended loads in the case of exposure of the operator or other personnel in the zones/areas involved in the trajectory of the load	 • **It is prohibited** to lift loads while people are going through the relative manoeuvre area. • **It is prohibited** to move through, stand, work or manoeuvre under the suspended load.	 • The operator assigned to use must follow the indications to obtain the best safety by complying with the instructions contained in this manual. • The rope and hook must be checked periodically
 **Risk of being drawn in and/or crushed** following contact with the arm in rotation and/or with the moving parts of the trolley/hoist.	 • **Attention!** Exposure to moving parts may create hazardous situations. • **It is forbidden** to touch the crane arm and the trolley/hoist when moving or expose yourself to their trajectories.	 • It is mandatory to use gloves during the slinging and pushing phase of the load
RISKS DURING MAINTENANCE		
HAZARD / RISK	HAZARD / RISK	HAZARD / RISK
 **Risk of electrocution - being shocked** in the case of maintenance on the electrical equipment without disabling the electrical supply	 **It is prohibited** to work on the electrical equipment before having disconnected the jib crane from the electrical line.	 • Assign the electrical maintenance operations to qualified personnel • Perform the tests on the electrical equipment contained in the manual.
 **Risk of being crushed** in the event of contact with the rotation arm during the brake adjustment phase.	 • **Attention!** Exposure to moving parts may create hazardous situations.	 • Assign the brake adjustment operations to qualified maintenance personnel • Use protective gloves and, if necessary, safety harnesses

3.5 Safety devices and instructions

3.5.1 Control devices

Series GRL jib cranes - can be controlled in the following manner:

1. If equipped with an **electric hoist and push trolley** movements are activated:
   - **from a pushbutton panel** with “lift and lower” buttons to control the **lifting** movement.
   - **by pushing the load** to control the **traverse** trolley.
2. If equipped with an **electric hoist and electric traverse trolley** movements are activated:
   - **from a pushbutton panel** with “lift and lower” buttons to control the **lifting** movement.
   - **from a pushbutton panel** with “right and left” buttons to control the **traverse** movement.
3. If equipped with a **manual hoist and trolley** movements are activated:
   - **by mechanical activation** of the hoist chain for the **lifting** movement.
   - **by pushing the load** to control the **traverse** trolley.
4. The **rotation movement of the jib crane arm**, both clockwise and anticlockwise, is activated manually with P&T **pushing the load** (fig. 10) **or electrically from the pushbutton panel.**

3.5.2 Safety and emergency devices for GRL

The **GRL jib cranes** are equipped with the following safety and emergency devices (fig. 11):

1. **Trolley end limit switch**, mechanical stops that limit the maximum stroke of the trolley along the arm beam.
2. **Mechanical drives** (in the case of crane with electric trolley), limit switch matching parts of the traverse trolley electric microswitches.
3. **Electric safety limit switch** on the rotation movements, installed to delineate the rotation field of the arm of the crane.

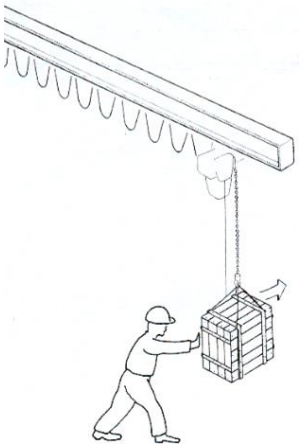


fig. 10

fig. 11

3.5.3 Warning and notice devices - Signage summary

The **GRL series jib cranes** are equipped with the following warning and notice devices. **Plates** present on the machine:

- manufacturer’s donati logo. (fig. 12a)
- jib crane data plate with CE mark (fig. 12b)
- plate indicating the maximum capacity of the jib crane. (fig. 12c)
- direction plate (if electrical rotation) (fig. 12d)
- warning plates for residual risks. (fig. 12e)
- hoist plates, and trolley plate (if any)

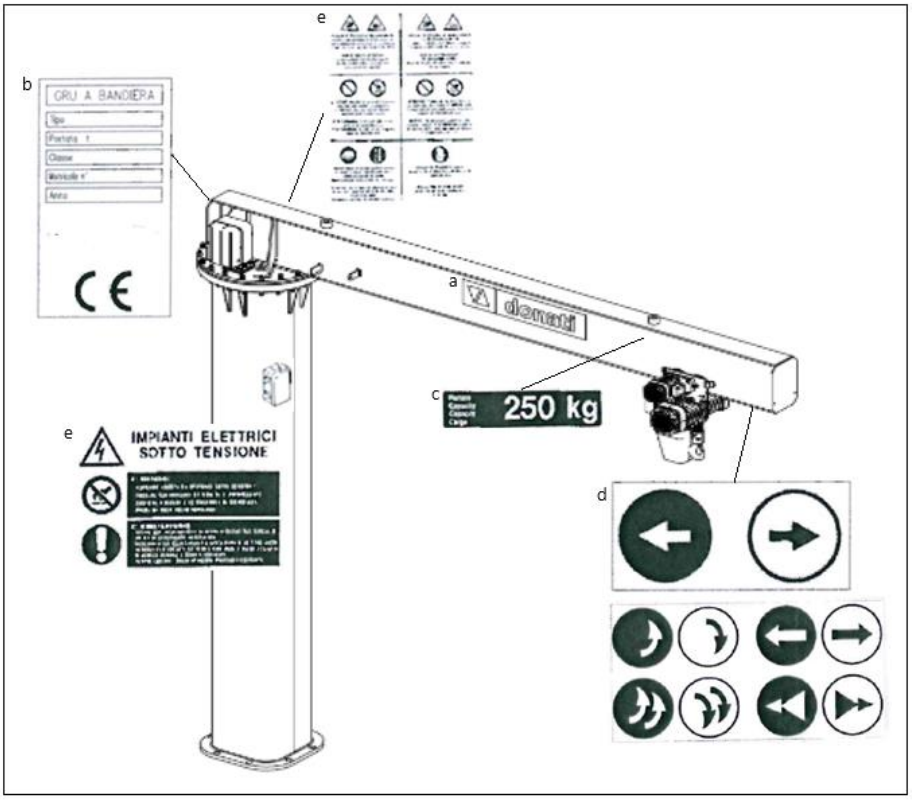


fig. 12

Legibility and preservation of the plates

The plates must always be kept legible in terms of all the data contained in them by periodically cleaning them.

If a plate deteriorates and/or is no longer legible, including just one of the informational items shown, it advisable to request another one from the manufacturer, quoting the data contained in this manual or on the original plate and then replace it.

!	**The plates must never be removed and it is absolutely prohibited to affix other plates on the crane without prior authorisation from DONATI SOLLEVAMENTI S.r.l.**

4 HANDLING - INSTALLATION - COMMISSIONING

4.1 General notes for delivery

☞	• **The GRL series jib cranes are delivered unassembled, in their main parts including the column, arm, electrical system and, if it is part of the supply, the lifting unit.** • **The customer must handle the installation phases of the jib crane, following the instructions contained in this chapter and possibly using specialised installers for the assembly.**

⚠	• **Due to their delicacy and importance, the operations described in this chapter if not performed correctly may result in serious risks for the safety and health of exposed persons during the installation and use phases of the jib crane.** . **Therefore, they must be performed by professionally qualified personnel with a specialisation in assembling industrial plants, with an electromechanical background, equipped with work equipment and personal protection equipment in compliance with current laws on occupational safety and after having carefully read this publication.**

👁	**After receiving the supply check and make sure that:**	

1. The shipping data (address of the recipient, no. of parcels, etc.) match what is contained in the accompanying documentation (transport document and/or any packing list).
2. The technical/legal documentation supplied with the jib crane includes:
   - the “User instructions” manual of the crane to install.
   - CE Declaration of Conformity.
   - Test logbook, when included.
   - instructions for using the hoist / trolley to install on the crane, if they are part of the supply.
3. The packaging, if part of the supply, is in good condition, intact, and free from damage.

!	**In the event of damage or missing parts report the problem to the shipper, putting a written reservation on the accompanying document and notifying the manufacturer within eight days from receiving the goods.**

4.2 Packaging, transport and handling

Before handling the jib crane and its accessories you should know that:

4.2.1 Standard packaging

- The metalwork parts of the jib crane (column and arm) are generally supplied with packaging, hooking points are present on the columns to make it easier to move them during installation operations (fig. 13).
- To make handling and assembly operations easier for the lifting unit, if it is part of the supply, it can be delivered in a cardboard box (with or without pallet) or, where included, in a crate or wooden cage or even simply on a pallet.
- When the lifting unit is delivered on a pallet, it is generally covered with a protection against dust composed of a polyethylene film.
- Any other accessories which are part of the supply (e.g.: electrical system components) can be delivered inside or in cardboard boxes that, based on the weight to move, can be with or without a pallet.
- The standard packaging is not waterproof against rain and is designed for destinations via land and not via sea, for covered and non-damp environments. Therefore, special packaging or protections are excluded from the supply unless they are contained in the contract.
- If necessary, the packaging can include signs and pictograms that provide important information regarding handling and transport (weight, lifting points, storage information, etc.) - (fig. 14).
- Appropriately preserved parcels can be stored for a period of around two years in covered environments where the temperature ranges from -20°C to +60°C with relative humidity of 80%. Specific packaging needs to be prepared for different environmental conditions.

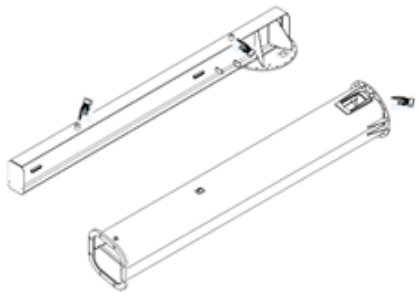


fig. 13

Hook points on the arm are suitable for UNI 2947 / DIN 580 eyebolts.

Eyebolt dimensions are as follows:

- **M27** - for Arm type **U-V-Z**
- **M14** – for Pillar type **U**
- **M16** – for Pillar type **V-Z**

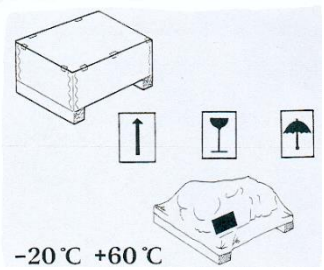


fig. 14

4.2.2 Transport

- The transport must be performed by qualified shippers able to guarantee correct handling of the transported material.
- Avoid placing parcels on the parts of the jib crane or other packaged parts that could cause damage during the transport.
- During transport phases it is advisable that the pallets or crates/cages not be turned over or upside down, to avoid dangerous changes in their barycentre and to thus constantly guarantee the best stability for them.

	DONATI SOLLEVAMENTI S.r.l. shall not be held liable for transports made by the customer or shippers chosen by the customer.

4.2.3 Handling

	To move the jib crane, proceed as follows:	

- Prepare a limited and adequate area, with flat flooring or ground, for unloading and placing the bulk metalwork parts and components contained in the packaging on the ground.
- Based on the type of part/component or the packaging, prepare the equipment necessary for unloading and handling of the crane parts and its accessories taking into account their weight, overall dimensions and gripping and/or suspension elements.
- Unloading and handling may be performed by crane (e.g. mobile cranes, bridge cranes, etc.) or forklifts, with adequate capacity and characteristics and the use of special equipment is not required.
- The parcels of any accessories with a weight less than 30 kg (unlike those with a weight greater than 30 kg) do not show any indication of their weight and can be handled by hand.
- Sling the crane parts with suitable equipment in order not to damage the painted surfaces. (fig. 15)
    - for columns and arms use stay bolts with rope or chain with end hooks positioned in the indicated points or slings with a textile fibre band and “loop” in a barycentric position or in the indicated lifting points.
- Very carefully grip and move the crane parts and its accessories to the area set up for unloading and avoid swinging, tilting and any dangerous unbalancing.
- When they have been moved check that the parts and parcels are intact and free from damage.

	• **Moving of the jib crane parts and relative accessories must be done very carefully and with adequate lifting and transport means, in order not to generate hazards due to the risk of a loss of stability.** • **All of the parts or components must be placed or fixed stably in all phases or the movement, transport and storage phases and must not be flipped over or placed vertically or on their sides (fig. 16).**

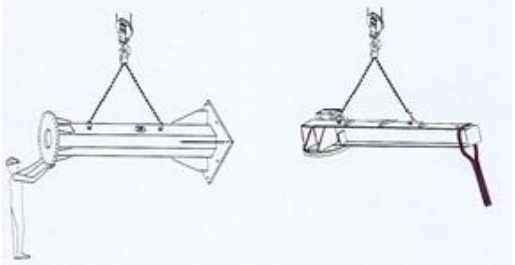


fig. 15

fig. 16

4.2.4 Removal of the packaging and/or checking of the crane parts

- In the case of packaged parcels, open the packaging and extract the various parts using suitable equipment chosen in relation to their weight and grip points.
- Check the conditions of all of the material of the supply and make sure no parts and/or accessories are missing. Notify the manufacturer immediately if anything is damaged or missing.
- If the material is going to be stored follow the instructions in paragraph 4.5.1 “Storage and preservation of parts".

!	• **Check the conditions of all the crane parts and in particular check that:**
	  ○ **the columns and arms have not been crushed, deformed, bent or have any broken parts.**
	  ○ **there is no damage to the components of the electrical system (if included)**
	• **Dispose of the packaging as required by regional waste disposal laws based on the nature of the waste (wood, plastic, cardboard), after sorting it.**

4.3 Jib crane installation

4.3.1 Installer duties and responsibilities


 
	• **Installation of the jib crane, due to the importance of the operations, may cause, if not correctly performed, serious risks for the safety of exposed persons both in the assembly phase and subsequent crane use phase. Therefore, if not performed by the manufacturer it must be entrusted to installers specialised in the assembly of industrial plants.**
	• **Lifting and overhead placement of crane parts must be performed by installers equipped with:**
	  ○ **adequate and suitable personal protection equipment** (e.g. helmet, gloves, safety belt, etc.)
	  ○ **equipment** (e.g.: forklift, scaffolding, etc.) **adequate for the purpose.**
	• **And after a careful evaluation of the following parameters:**
	  ○ **environmental characteristics of the work site** (e.g.: walk on surfaces, etc.)
	  ○ **height of the work surface compared to the loading surface**
	  ○ **dimensions and weight of the parts to install**
	  ○ **spaces available for handling the parts to install**
		

	**Before carrying out the assembly of the parts and installation of the jib crane, the installer must make sure that the crane specifications are in compliance with what was requested and the intended use and in particular:**	

1) The crane capacity is ≥ compared to the loads to lift.
2) The specifications of the anchoring structures (plinth, floor, wall, pillar, etc.) have been **“Declared suitable”** by the customer or expert technicians appointed by the customer.
3) The specifications of the lifting unit (trolley/hoist), if not part of the supply, are compatible with those of the jib crane in relation to: (fig. 17)
   a) **Hoist capacity:** must be ≤ compared to the jib crane capacity.
   b) **Weight of the trolley/hoist:** must be ≤ compared to the maximum weights.
   c) **Lift/traverse speed** must be ≤ compared to the maximum ones allowed.
   d) **Overall dimensions of the trolley/hoist:** must be ≤ compared to the maximum ones allowed.
   e) **Reactions on the trolley wheels:** must be ≤ compared to the maximum ones allowed.

fig. 17

	**Following the jib crane installation activities, the installer must:**	

1. Conduct the **"Commissioning"**, activities as described in paragraph 4.4;
2. Draft the "**Acceptance test**" report and approve the jib crane "**Suitable for use**";

4.3.2 Preparation of the installation site

	**To allow the jib crane installation, first perform the following operations:**	

1. Verify the presence of the suitable/adequate declaration of the support/anchoring structures;
2. Verify the absence of clear defects of the support/anchoring structures;
3. Verify the suitability of the manoeuvre (rotation) spaces for the jib crane, especially if operating in areas where other cranes or operating machines are present (fig. 18)
4. Verify the suitability and correct operation of the mains: (fig. 19)
    a. correspondence of the line voltage with the voltage required for the motors
    b. presence and suitability of the electrical line switch/circuit breaker;
    c. adequacy of the cable cross section of the electrical line;
    d. presence and suitability of the earthing system;
5. Verify the width of the beam wing which must correspond to that required for the trolley wheels (fig. 20).
6. Prepare the masses for the **dynamic tests** equal to: **rated capacity x 1.1**
7. Prepare the masses for the **static tests** equal to: **rated capacity x 1.25**
8. Prepare the equipment for slinging and lifting of the masses for the load tests
9. Verify the presence of signs warning of the risks due to handling with the crane.

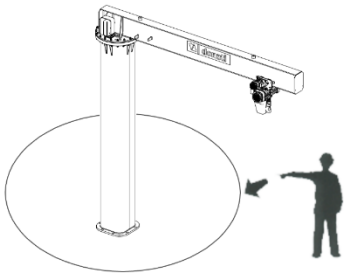


fig. 18

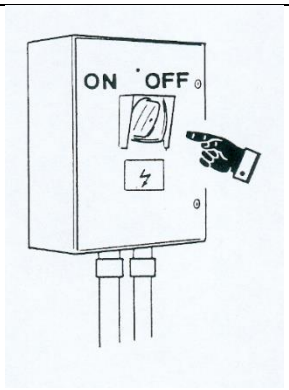


fig. 19

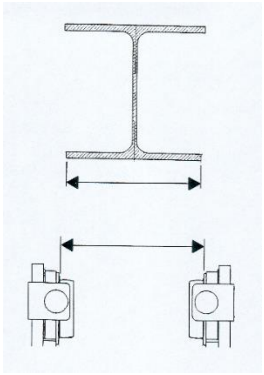


fig. 20

4.3.3 Assembly of the column (foundation plate, counterplate, column)

- **The column can be anchored to the ground in the following manners:**
  - **using the foundation frame with stay bolts embedded in a plinth formed in reinforced concrete.**
  - **using bolts and expansion bolts or with chemical anchoring.**

- **The anchoring of the column using bolt, expansion bolts or with chemical anchoring, needs a scrupulous check of suitability in relation to the type of support flooring.**
- **The technical data so that the customer can dimension the foundation plinth, are indicated in the table shown in paragraph 2.2.7 "**Electrically rotated GRL: characteristics and technical data**". The plinth must be dimensioned in relation to the real consistency of the ground and the specific maximum pressure that it can allow.**
- **The suitability checks of the foundation are the responsibility of the user and must be carried out by expert, qualified technicians who will evaluate the feasibility and assume the relative responsibilities.**

Positioning of the foundation frame in the plinth:

1. Screw the lower nuts **2** on the stay bolts **1** letting the threaded portion protrude until obtaining the corresponding protrusion **ST** (see paragraph 2.2.7) (fig. 21). Carry out this operation on all 8 (eight) stay bolts.
2. Insert all of the bolts **1** in the holes of the foundation frame **4** so that the plate of the frame sits on the nuts and tighten with the high nuts **5** inserting the washers **3**.
3. Embed the frame prepared this way in the plinth casting making sure that the upper plate remains flush with the floor (fig. 22). Protect the threading of the bolts to prevent damage.
4. If required, prepare insertion of a pipe in the plinth adequate for passage of the electrical cable to supply the jib crane (fig. 23)
5. Level the foundation frame, possibly using a level and fill and scrape the plinth (fig. 24)
6. Wait for the time necessary for the plinth to solidify before mounting the column.

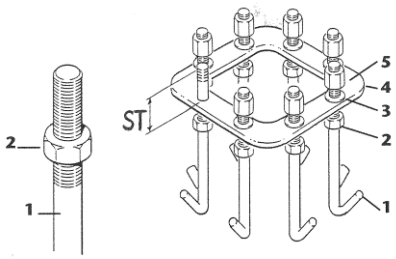


fig. 21

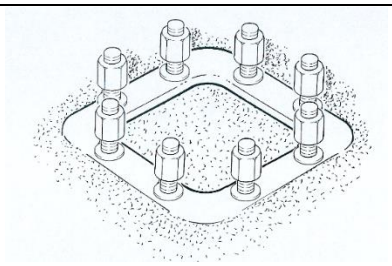


fig. 22

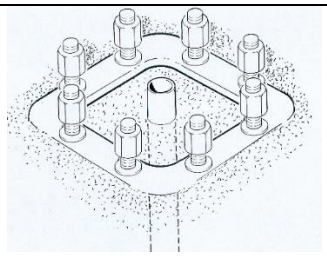


fig. 23

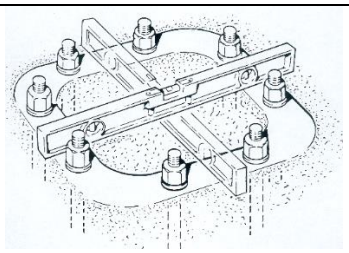


fig. 24

	Positioning of the counterplate with chemical bolts:	

To ensure the hold of the fixing operate as follows:

a) Check that the inclination of the surface where the counterplate is to be fitted is within the tolerances shown in fig. 25; otherwise level the surface. Do not insert shims between the floor and counterplate.
b) Drill the cement surface with a punching machine or core borer using the counterplate as a template.
c) Accurately clean with sprayed water and a pipe cleaner.
d) Follow the assembly instructions for the bolts used.
e) Once it has been embedded, the work time when the bars need to be positioned and the time in which it is necessary not to work in order to let it harden completely, are specified on the instruction booklet present in every package of bolts.
f) After the time required for curing has elapsed, position the counterplate with the hole slits (if present) facing upwards and fix it following the instructions in the bolt booklet.

!	**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 assume the relative responsibilities.**

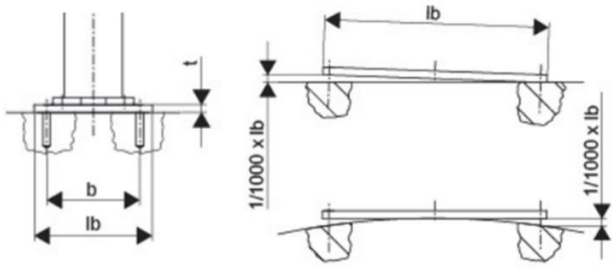


fig. 25

Pillar assembling:

On a **foundation frame** (plinth):

1) When the plinth has solidified, remove the protection of the bolt threading and check that the high nuts unscrew without forcing, then remove them and the washers.
2) Where required insert the power supply cable 1 in the column positioned on the ground and let it protrude from the hole located at the top of the column based on the following lay-out positions:
   a) In the case of cable 1 that protrudes from the pipe set up in the plinth, directly insert the cable in the column until reaching hole 2 located at the top of the column (fig. 26)
   b) In the case of cable 1 coming from the outside, insert it into the column using the specific grommet 3 located at the base of the column, until reaching hole 2 at the top (fig. 27)
3) Erect the column without arm, lifting it in the upper part with suitable equipment after having slung it as indicated, mount it on the foundation frame positioning base plate 4 correctly and approaching the nuts 6 after placing the relative flat washers 5 (fig. 28).

On a **counterplate with chemical bolts**:

1) Once the counterplate has been fixed, push the power cable 1 into the pillar on the ground and through the hole at the top of the pillar, according to the following layout: if the cable 1 comes from outside, push it into the pillar using a suitable fairlead 3 placed at the bottom of the pillar, until it reaches hole 2 at the top (fig. 27)
2) Set up the pillar without the arm, lifting it by the upper part with appropriate equipment having put it in the sling as shown, assemble it on the counterplate positioning the base plate 4 correctly and secure it using the special Kit supplied with the counterplate (fig. 29) (proceed with step 4)

4) Check the verticality of the rotation axis as follows:
   a) Use a spirit level to check that the upper plate of the column (where the arm will be fixed) is perfectly horizontal (fig. 30);
   b) Perfect levelness can be obtained, if necessary, by inserting 8 appropriate spacers (not part of the supply, in correspondence with the stay bolts, under the base plate (fig. 31);
5) Stably screw the 6 nuts using a torque wrench, applying the clamping couples (see table on page 19) based on the diameter of the log bolts/bolts, checking the nuts afterwards for unscrewing with the relative safety nuts 9. (fig. 32).
6) For correct tightening in torque of the nuts/bolts at the bottom of the column all of the nuts/bolts need to be brought into contact with the plate applying a light torque in order to prevent free movement. Once in this situation, using a torque wrench, tighten the nuts in torque (see the nuts/bolts clamping table on page 9 for the correct value) following the shown cross pattern (fig. 33) and being careful that

the column does not lose its vertical alignment. It is recommended to tighten in two steps: the first at 70% of the clamping couple and the second at 100%.

7) Once the bolts are tightened, control and, if needed, fix the paint around the bolts in order to avoid possible corrosion.

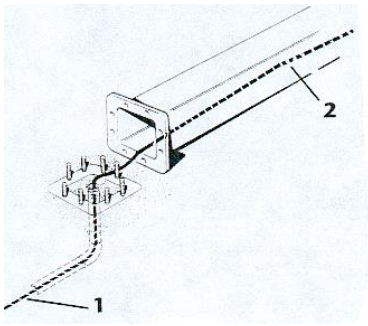


fig. 26

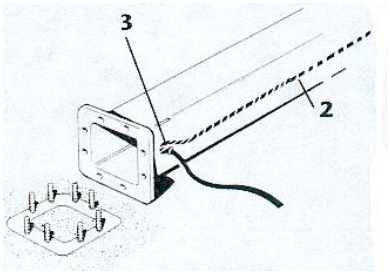


fig. 27

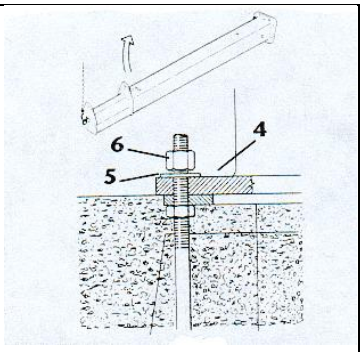


fig. 28

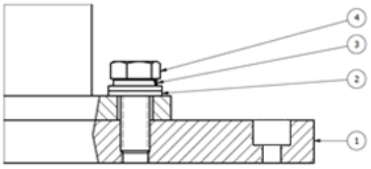


fig. 29

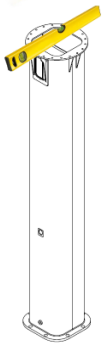


fig. 30

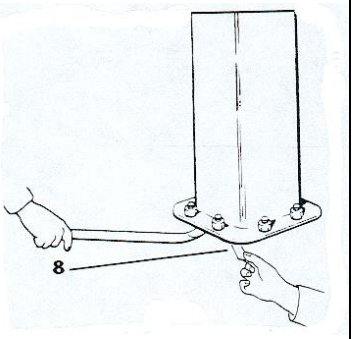


fig. 31

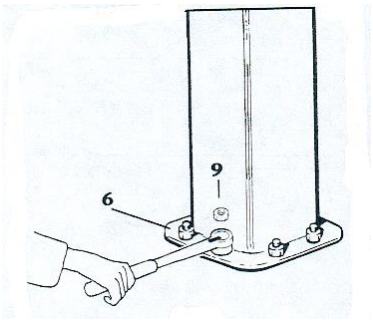


fig. 32

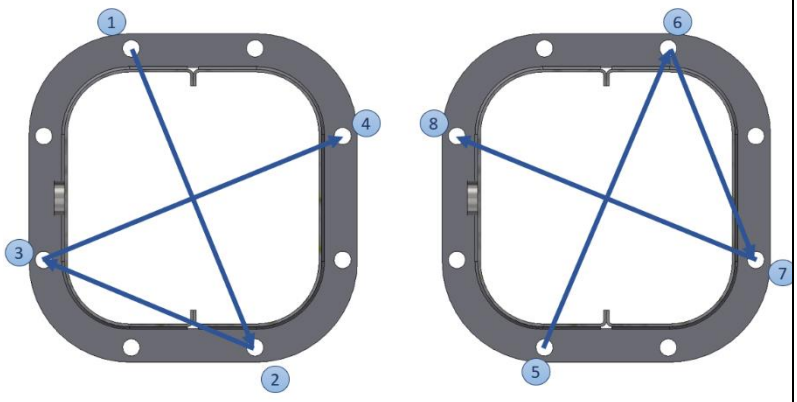


fig. 33

!	**After the first lifting operations it is advisable to check nut tightening again, to take up any play due to settlement of the plinth.**

!	**Donati Sollevamenti SRL shall not be held liable for any fixings other than those indicated in fig. 28 e fig. 29.**

4.3.4 Assembly of the thrust bearing, arm and gear motor

	**To assemble the arm, in the case of a thrust bearing already fixed on the column proceed as follows:**	

1) Check that the teeth of the thrust bearing have been carefully greased and that the upper and lower surfaces of the same are perfectly clean. Cleaning is one of the indispensable conditions for perfect operation of the components and to avoid their early deterioration.
2) Sling the thrust bearing and place it on the upper plate of the column matching up the holes (fig. 34).
3) Insert the supplied bolts from the top and tighten them with the correct torque (see table).
4) Place the supplied spacer flange above the thrust bearing coupling the hole (fig. 35).
5) Sling the arm in the points as indicated in (fig. 36) and lift it with means suitable for the purpose, i.e. bridge crane or mobile crane and relative slings with adequate capacity and specifications in relation to the weight to move, being careful to maintain the beam horizontal to the ground.
6) Avoid swinging and tilting and, if necessary, to maintain equilibrium use a rope or cord tied to the end of the arm (fig. 37).
7) Place the arm with perforated plate on the thrust bearing matching up the holes (fig. 38).
8) Insert the longest screws with connected flat washer from the top in the side drilled holes (not threaded) and tighten with nut and PAL nut.
9) Insert the shortest screws with connected elastic/Groover (penso che questo dovrebbe essere Grower oppure split washer, grower type) washer from the bottom of the threaded holes (present under the beam).
10) Tighten all bolted joints with a dynamometric spanner following the couples shown in the figure on the next page.

Manual rotation model

11) Cover the gear motor housing hole with the relative cover (supplied) and tighten it with the supplied screws.

Electric rotation model

11) Mount the gear motor (make sure that the pinion teeth have been greased) inserting it in its seat and checking that it is perfectly settled (fig. 39). If this operation becomes difficult, due to imperfect alignment of the pinion teeth and thrust bearing, slightly turn the arm until the point where there is correct coupling of the teeth.
12) Insert the 4 TCEI M10 screws in the flange holes and tighten with a torque equal to 32 Nm.

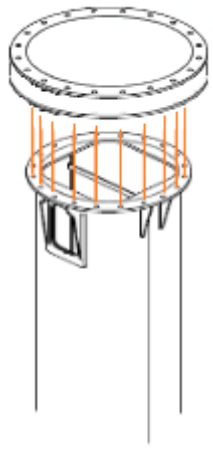


fig. 34

TORQUE FOR THRUST BEARING BOLTS

M14 class 8.8: 135 Nm
M16 class 10.9: 288 Nm

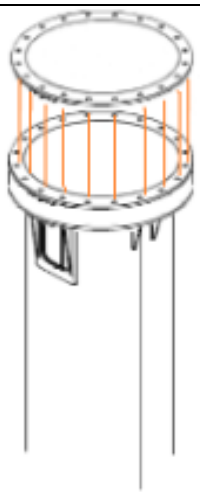


fig. 35

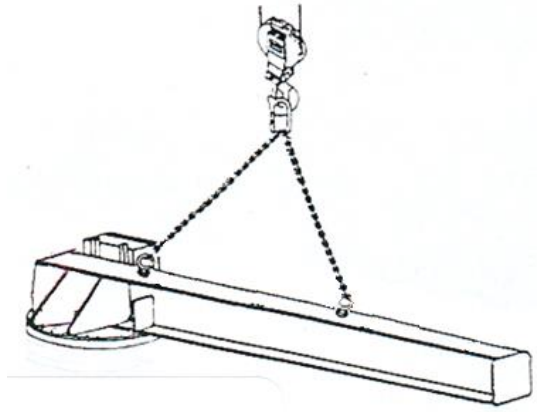


fig. 36

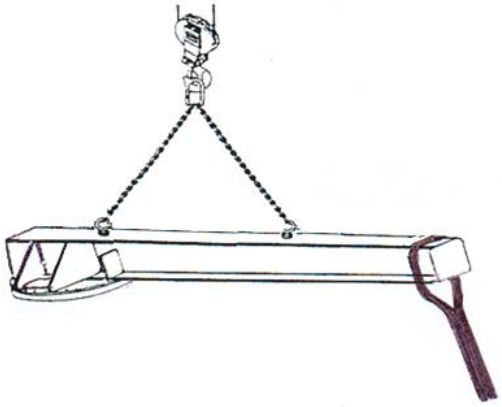


fig. 37

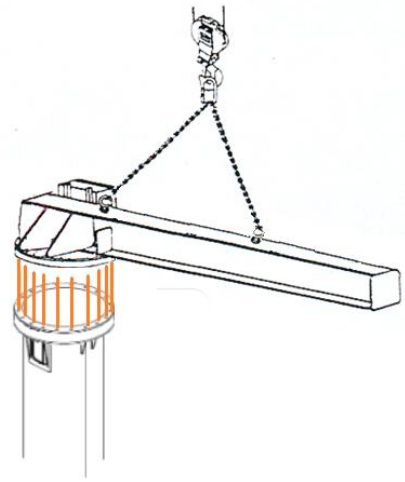


fig. 38

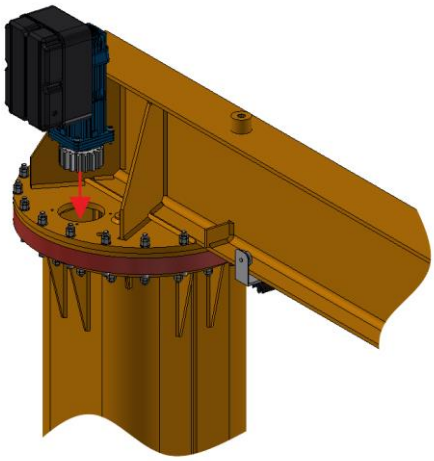


fig. 39

4.3.5 Assembly of the electrical system

	To assemble the electrical system proceed as follows:	

1) Extract the cable, trolleys and other electric components from the packaging
2) Insert the power supply cable **1** in the slides **3** (fig. 40), to form a series of festoons of the same size. Lock the cable with the relative seats.
3) Mount the sliders on the lower flange beam (fig. 41).
4) Mount the collector ring assembly (support + collector ring) () under the turning plate of the arm on the specific threaded holes) (fig. 42). Generally, the collector ring must be inserted inside the column making it pass from the inspection window 12 located at the end of the column (fig. 43). The shortest cable will be used to connect the collector ring to the rotation equipment (fig. 44) making it pass through the hole drilled on the turning plate attached to the arm, using the supplied grommet. The longest cable will be connected to the line circuit breaker.
5) Mount the rotation limit switch (fig. 45) (if included).
6) Mount the circuit breaker as per fig. 46, by assembling the components 1-2-3-4-5.

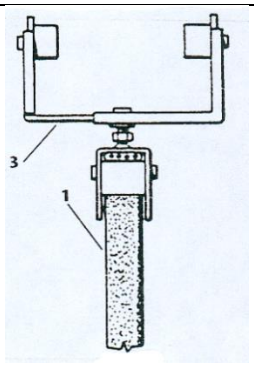


fig. 40

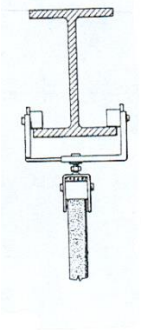


fig. 41

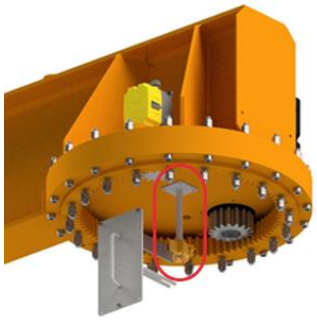


fig. 42

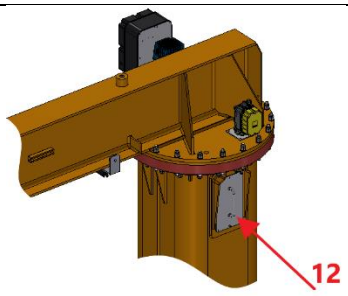


fig. 43

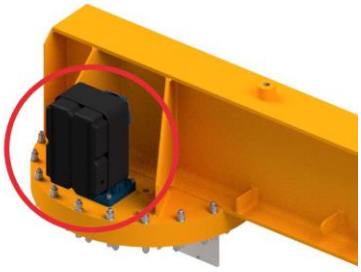


fig. 44

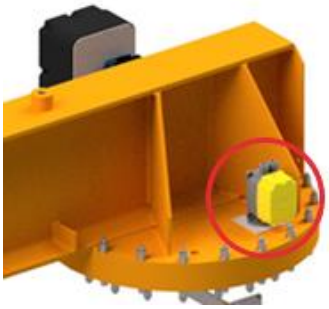


fig. 45

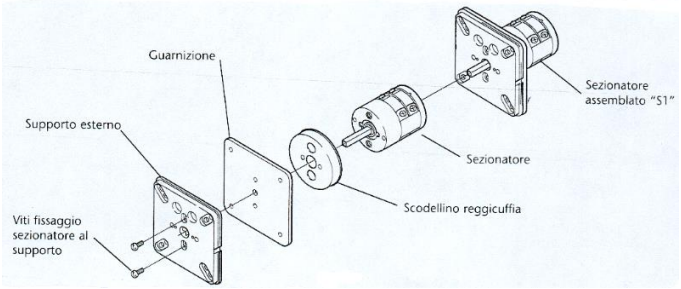


fig. 46

4.3.5.1 Electrical connections

	• **Never make the electrical connections with the voltage on** • **Never make temporary connections or jump or makeshift connections** • **Completely tighten all of the grommets** • **Use the wiring diagrams corresponding to the trolley/hoist being worked on**

	**To create the electrical connections on the jib crane arm, proceed as follows:**	

Make all of the electrical connections between the equipment for hoist/trolley control, the power cable and the equipment for rotation control integrated with the gear motor as indicated in the topographical and functional wiring diagrams.

Wiring diagrams

The wiring diagrams are supplied inside the electrical equipment and include:

- topographical diagrams
- functional, control and power diagrams, terminal diagrams

Rotating collector ring control

After carrying out the assembly as shown in the previous paragraph, make the connection as follows:

1. Connect the shortest cable to terminals L1-L2-L3 of the rotation equipment integrated in the gear motor (fig. 47) or the connector block (fig. 48) for a manually rotated jib crane,
2. Connect cable **C** of the slip ring to the respective terminals of the line switch (**15**) (fig. 49)
3. Assemble the inspection window cover, taking care to insert the plate (or fork) welded to the cover into the slip ring stop (fig. 50).

fig. 47

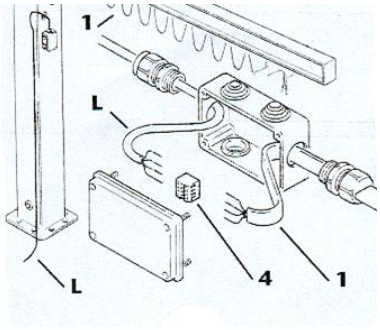


fig. 48

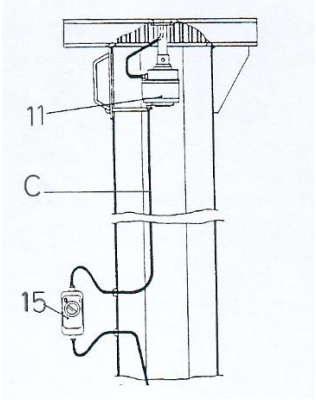


fig. 49

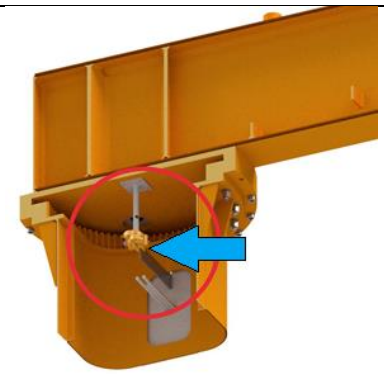


fig. 50

Column circuit breaker connection (fig. 51):

1. Position the circuit breaker in the specific hole of the column connecting the relative cables to the respective terminals.
2. Complete the assembly with application of the casing and the red handle.

Connection and adjustment of the field limit switch (fig. 53):

1. Connect the arm rotation limit switch in the specific terminals of the rotation equipment, as indicated in the wiring diagrams.
2. Follow the procedure below for adjusting the limit switch cams.

Contact function:

SQ5A = service limit switch RIGHT rotation

SQ6A = service limit switch LEFT rotation

SQ5B = emergency limit switch RIGHT rotation

SQ6B = emergency limit switch LEFT rotation

Contact settings:

1. Set the cam for contact SQ5A to limit the RIGHT rotation as needed.
2. Set the cam related to the emergency contact SQ5B immediately after the intervention of contact SQ5A.
3. Set the cam for contact SQ6A to limit the LEFT rotation as needed.
4. Set the cam related to the emergency contact SQ6B immediately after the intervention of contact SQ6A.

☞	**N.B.:** Intervention of the emergency limit switch contacts, blocks operation of the entire machine. To reset after an emergency intervention, once the cause is identified, act on the limit switch, by momentarily unblocking the involved contact cam. Exit from the anomalous position with an opposite control with that of the intervention. Reset the original position of contacts.
⚠	**The customer or installer appointed by the customer must:** • **Install a line switch in the immediate vicinity of the crane to protect against short circuits, indicating its function with a specific plate.** • **Make the connection of the crane structure to the earthing system, at the grip points provided for this purpose (fig. 52).**

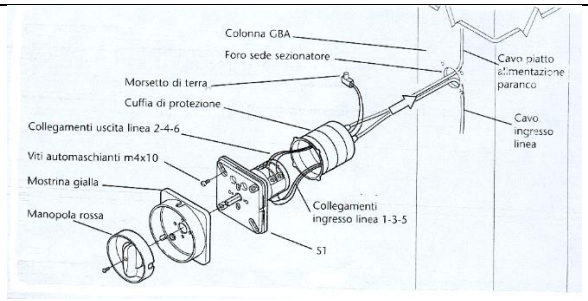


fig. 51

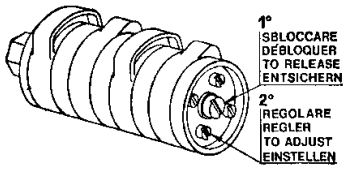


fig. 53

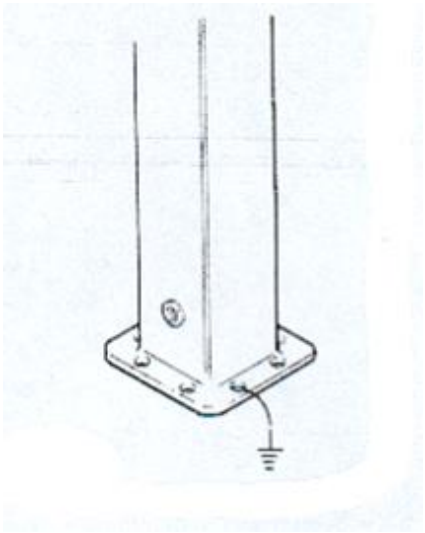


fig. 52

4.3.6 Assembly of the trolley/hoist

👁	**Assembly of the trolley/hoist on the arm:**	🔧

☞	**See the "User instructions" for the trolley/hoist (if supplied), attached to this publication**

!	**In the case of a lifting unit equipped with electric traverse trolley, install the matching parts - 1 -, for the trolley limit switches, between the blocks located on the arm, fixing them with the relative screws (fig. 54).**

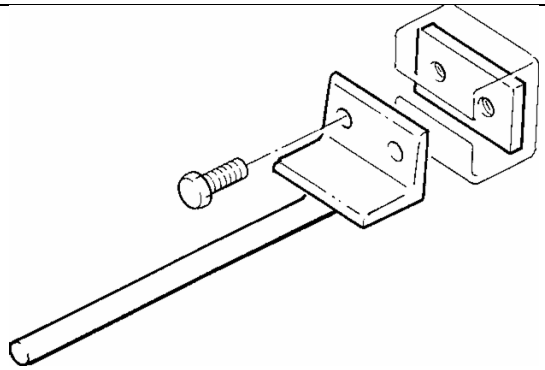


fig. 54

	Electrical connections of the lifting unit (trolley/hoist):	

	To connect the festoon power line cable in the lifting unit electrical equipment connector block, see the trolley/hoist "User instructions", attached to this publication

	• **Never make the electrical connections with the voltage on** • **Never make temporary connections or jump or makeshift connections** • **Completely tighten all of the grommets** • **Use the wiring diagrams corresponding to the trolley/hoist being worked on**

4.4 Commissioning

4.4.1 Preliminary tests - Adjustments and operating tests

	**Perform the following tests before commissioning the crane:**	

- **Check the suitability of the electrical system:**
  - Check that the line voltage and frequency, shown on the respective motor plates, correspond to those required for operation.
  - Check that the voltage value to the motors is within the limits of +/- 10% of the rated value.
  - Check for the presence and correct connection of the earth socket
- **Check the correct crane installation:**
  - Make sure that there are no clear defects after installation of the crane
  - Check that all of the bolted connections are correctly tightened
  - Check the conditions of the trolley wheel track, which must be free from obstacles, roughness, dips and foreign bodies.
  - Check the uniform arm P&T sensitivity, along its entire length
  - Check the arm rotation freedom, in relation to the absence of obstacles in all of the area where the crane operates and check for any interferences.
  - Adjust the electric hoist lift limit switch (see the information in the related “User instructions”) in order to allow the maximum stroke possible. The lower limit switch needs to be adjusted so that the hook, in its lowest point, is 10 cm from the ground.
  - Check that the matching parts are present and working for tripping the traverse limit switches, if the installation is with an electric trolley. Adjust them to prevent contact with the buffers.
  - Make sure there is no lubricant leakage.
  - Make sure that no noises, and/or anomalous vibrations and/or incorrect movements are detected during the tests (sliding of the wheels or spontaneous movements of the trolley and/or arm, etc.).
- **Checking the operation of the correct rotation direction of the motors:**
  - **In the case of crane with electric hoist and trolley:**
    - Activate the “right/left” direction buttons and check that the trolley movements occur as indicated by the direction arrows located on the crane beam;
  - **In the case of crane with electric hoist and push trolley:**
    - For short sections activate the “lift/lower” buttons, being careful to operate first in one direction (lower) and then in the other (lift) with two short pulses only necessary for verifying the correct rotation direction, without making any limit switches trip.

!	• **First check the traverse movements, if electric, then check lifting and, in any case, prevent the lifting limit switch from tripping.** • **If the motor rotation direction does not coincide with the pushbutton controls the limit switches will not stop their movement and may cause malfunction situations.** • **If the movement direction does not correspond with the pushbutton panel indications, stop the movement and invert the connection of the two-line phases of the connector block.**

4.4.2 Acceptance test of the jib crane - Suitability for use

☞	• **The jib crane is put on the market considering the acceptance tests conducted at the manufacturer on similar prototypes subjected to testing of their suitability on the structural parts (columns, shelves, arms, etc.).** • **The manufacturer performs a test on the manufacturing and guarantees the constant quality and the compliance to the tested prototypes of all the parts of the jib crane.** • **The acceptance test procedure, described below, refers to verification of the functional and performance compliance of the jib crane installed in its place of use, complete with all its parts (anchors, structure, lifting unit, lifting accessories, etc.).** • **The acceptance test of the installed crane is the responsibility of the user and must be conducted by the same specialised personnel (Installer) who performed the assembly, scrupulously following the instructions of this manual.** • **The installer must perform the acceptance test and fill out all parts of the "Acceptance test report" and draft the "Suitable for use" certificate contained in the "Test logbook" attached, when included, to this publication.**

After having performed the "no load" operating tests, perform the dynamic tests; these tests are performed with weights corresponding to the capacity of the crane plate plus an overload factor of 1.1 (load equal to 110% of rated load). The static tests are performed with an overload factor of 1.25 (load equal to 125% of the rated load).

!	**All the tests must be performed when there is no wind.**

👁	**To perform the acceptance test of the jib crane, proceed as follows:**	

No load tests:

- activate the line switch/circuit breaker
- put the emergency stop button in the "start consensus" position
- press the "start/alarm" button (if available)
- check the lift function by pressing the lift/lower buttons
- check the travel function by pressing the right/left buttons, if in electric trolley version
- if there are two speed movements check its operation
- check swinging of the arm using manual/electric rotation
- check the operation of the limit switches on all movements and/or the friction device, when available

Dynamic test:

- prepare adequate weights for the load tests equal to **rated capacity x 1.1** and suitable equipment for slinging and lifting the load
- sling the load being careful to position the hook vertically to avoid oblique pulling
- slowly tension the sling to avoid tugging, perform the load tests using the "slow" speed if available
- slowly lift the load and check that this occurs without problems and that no anomalous noise is heard, or clear deformation or giving way of the crane structure, support structures and/or anchorages
- repeat the test at maximum speed, if available, performing the previous tests
- check the operation of the lift/lower electric limit switches, when installed, and/or any friction device
- check the operation of the lifting brake, checking that the mass is stopped in adequate time and that there is no shifting of the load, after releasing the button

- perform the same tests also for the trolley traverse movements and arm rotation, checking the operation of the limit switches without bringing the load to the maximum height (lift to a metre from the ground).
- work first at slow speed, if available, and then at maximum speed
- check the correct movement of the trolley on the beam and make sure that no anomalous noise is heard, or clear permanent deformations or giving way of the crane structure and/or anchorages
- check the operation of the “emergency stop” button which must stop and inhibit all movements. Any operation of the hoist and/or trolley must stop, in the shortest time and space possible, without any anomalies, shifting, hazardous swinging, etc. nor compromise its stability.
- check the operation of the load limiter, and or the friction device, if included.
- check the braking and stop spaces during the lifting, traverse and rotation movements, checking the stability of the mass.

!	**The dynamic test must be performed in the most unfavourable load conditions, i.e. by combining lifting, traverse and rotation movements.**

Static test:

- prepare adequate weights for the load tests equal to: **rated capacity x 1.25** and suitable equipment for slinging and lifting the load
- sling the load **used for the dynamic tests** (rated capacity x 1.1) being careful to position the hook vertically to avoid oblique pulling
- slowly tension the sling to avoid tugging, perform the load tests using the “slow” speed if available
- lift the load and stop it in suspended position at a height of 10 cm
- gradually apply weights on it for an overload equal to 25% of the rated capacity
- leave the weight suspended for a time not less than 10 minutes.
- check that the suspended weight (load + overload) does not give way (the lifting brake and friction device/load limiter, if installed, must not slide).
- release the load and make sure that clear deformations and/or giving way of the crane and support structures and/or anchorages are not detected.

!	• **No movement of the crane should be activated during the static test.** • **The jib crane acceptance test must be repeated for the annual controls (see paragraph 6.3.2).** • **The annual acceptance test results must be noted in the control booklet (see chapter 8) attached to this publication, when included**

4.5 Decommissioning

4.5.1 Storage and preservation of parts

	**If the jib crane and its components need to be stored, to prevent damage or deterioration, proceed as follows:**	

- Protect the machined surfaces of the plates and mechanisms with antioxidant products, do not scratch the surfaces used for assembly with other parts or inside of the holes.
- The materials, whether for indoor or outdoor installation, can be stored for a maximum period of two years in an environment with the following characteristics:
  - protected from inclement weather
  - relative humidity not greater than 80%
  - minimum temperature - 20°C - maximum temperature + 60°C
- For a storage period over two years ask the manufacturer for the storage procedures

- If during the entire storage period, these values do not comply with what is indicated, it will be necessary to perform some preliminary tests before putting the crane into service (see paragraph 4.5.2)
- If the temperature goes above or drops below the indicated values and the relative humidity is greater than 80% prepare protection packaging for the parcels with sacks and hygroscopic salts.
- Storage in outdoor areas requires:
  - wedges to lift off the floor for all parcels without pallet
  - protect all parcels with sacks and hygroscopic salts
  - if the crane has been built to operate outdoors the metal work parts do not require particular protections; on the contrary the parts machined on machine tool (machined surfaces, wheels, pins, etc.) must be protected with antioxidant products (transparent paints, grease, etc.).

4.5.2 Resetting after storage

	**Before putting a jib crane back into operation after a long period of storage, it is necessary to perform the following operations:**	

- **Structure:**
  - eliminate traces of lubrication from the structure and the trolley beam
  - go over the hole threading and eliminate any grease residue
  - cleaning the matching surfaces used for assembly
  - repair any structural damage (scratched surfaces, crumbling paint, etc.)
- **Mechanisms:**
  - check for any leaks and top up lubricant levels, if necessary
  - check the correct fixing of the mechanisms to the structure
  - eliminate traces of oxidation from the accessory sliding parts of the control parts
  - lubricate the bearings and unpainted mechanical parts (shafts, pins, etc.)
  - eliminate any water residue in the concave parts
- **Electrical equipment:**
  - eliminate any condensation from the motors and connector blocks; dry with jets of air
  - check the conditions and operation of the brakes
  - accurately clean the surfaces of the brakes eliminating any traces of moisture, lubricants and paints
  - check the conditions and operation of the limit switches
  - check the conditions of the electrical parts and components
  - dry the contactor contacts
  - accurately clean the closing surfaces and the threaded holes of all containers
  - check the movement of the electric lines with festoons
  - carefully check the operation of the control pushbutton panel

5 OPERATION AND USE OF THE JIB CRANE

5.1 Functions of the jib crane

5.1.1 Intended use - Expected use - Intended purpose

The jib cranes, with manual/electric rotation - GRL series are created to locally handle goods inside a plant, on a loading dock or along with operating stations.

Jib cranes perform three operations:

- **they lift** the load vertically in space, via a hook on the lifting unit, generally composed of a manual or electric chain hoist and using accessories suitable for this operation;
- **they traverse** the load in space, with the assistance of an electric or manual hoist holder trolley, which runs along the radial axis of the crane arm;
- **they rotate** the load in space, around the constrained axis of the arm, through a manual push action of the load using the circular area below, limited by the rotation radius of the arm.

If equipped with an **electric hoist and push trolley** movements are activated:

- **from a pushbutton panel** with “lift and lower” buttons to control the **lifting** movement
- **by pushing** to control the **traverse** trolley.

If the crane is equipped with an **electric hoist and electric traverse trolley** movements are activated:

- **from a pushbutton panel** with “lift and lower” buttons to control the **lifting** movement
- **from a pushbutton panel** with “right and left” buttons to control the **traverse** movement.

If the crane is equipped with a **manual hoist and trolley** movements are activated:

- **by mechanical activation** of the hoist manoeuvre chain for the **lifting** movement.
- **by pushing** to control the **traverse** trolley.

The **arm rotation** movement is activated manually by **push P&T or electrically from the pushbutton panel.**

When the controls are from the pushbutton panel, the buttons activate the function when they are pressed and the slow auxiliary speed control for lifting and traverse, can be activated as follows:

- **with separate buttons**, independently activating the “slow” speeds from the “fast” ones.
- **with a single button** with two clicks, the first click to control the “slow” speed, the second click to control the “fast” one

The **emergency stop** button, present on the pushbutton panel is mushroom shaped, red, and activates the **stop** function when pushed all the way down.
To allow crane operation the **emergency stop** button needs to be in the “lifted” position for start consensus and then the **function buttons** need to be pressed.
The pushbutton panel is suspended from the hoist and can be operated by the operator on the ground, following the traverse movement of the trolley and/or rotation of the arm.
The electrical movements of the jib crane can also be controlled by a remote-control system: the functions of the buttons are unchanged compared to those related to the pushbutton panel.

- **When the electric movements of the crane are controlled by remote control the pushbutton panel is not restricted by the crane, the operator thus must always pay utmost attention during manoeuvres without ever losing sight of the work area and the handled load in order not to compromise his safety and/or that of any exposed persons.**
- **It is prohibited to control the jib crane movements while on board it.**

5.1.2 Permitted loads, unpermitted loads

The loads must be:

- Of a shape, dimensions, weight, equilibration and temperature suitable for the characteristics where they need to be handled and must be compatible with the performance of the jib crane.
- Equipped with grip points and/or slung with specific accessories which prevent accidental dropping
- Stable and not subject to changing their static or physical configuration during handling.

Handling the following loads is not allowed:

- **whose weight, including any accessories, exceeds the crane capacity-**
- **with weights that are unbalanced compared to their centre of gravity.**
- **with surfaces that are not sufficiently resistant to the pressure exercised by the grip**
- **that, due to their chemical and physical characteristics, have been classified as hazardous, for example: flammable, explosive, radioactive, etc. materials**
- **toxic or handful materials or products, if not handled in specific safe containers, for example; corrosive chemical products, with biological risks, etc.**
- **bulk food products or substances that can come into direct contact with the hoist parts or with its lubricants.**
- **that can change their static and/or chemical and physical configuration or their barycentre during handling**
- **not equipped with accessories as per the following point**

5.1.3 Lifting accessories

The following are generally allowed:

- Slings consisting of ropes and/or chains and/or textile fibre bands
- Lifting accessories that are placed between the load and the lifting hook, such as: balances, pliers, suction cups, magnets and electromagnets, etc.
- The use of such accessories must be in compliance with the instructions supplied by their manufacturers.

The following accessories are generally not allowed:

- **with functional specifications that can cause dynamic overstress to the crane greater than those allowed or accidental overloading.**
- **that can collide with the parts of the jib crane.**
- **that limit the free movement of the load.**
- **that are connected with independent electrical lines.**

The weight of the lifting accessories must be subtracted from the rated capacity of the jib crane.

5.2 Operating conditions

5.2.1 Operating environment

- The operating environment must have the following specifications:
- **temperature:** min. - 10°C; max.: + 40°C: relative humidity max. 80%.
- **use in an indoor environment:** in this case the jib crane is not exposed to inclement weather and does not require any special precautions.
- **use outdoors:** the jib crane may be exposed to inclement weather during and after use. The electrical parts of the hoist and trolley must be equipped with protection IP55, it is also recommended to protect the hoist and trolley with overhangs and guards.
  To prevent oxidation, protect the structure with adequate treatments and lubricate rotating parts.
  Outdoor use of the jib crane is permitted if there is no exceptionally bad weather, which could modify the values of the expected loads, for example heavy rain, heavy snowfall, strong wind, etc.

The crane in the standard model, must not be used in environments and areas:

- **With vapours, fumes or dusts which are highly corrosive and/or abrasive (when this cannot be avoided intensify the maintenance cycles).**
- **In the presence of flames and/or heat greater than the allowed temperatures.**
- **With the risk of fire or explosion where the use of anti-explosion and/or fireproof components is required.**
- **In areas where strong electromagnetic fields are present which can generate electrostatic load accumulations.**
- **In direct contact with bulk food substances.**

5.2.2 Danger zones and exposed persons

The danger zones are all of those where, in any operating phase, the exposed persons can be subject to the risk that an event may occur hazardous for their safety, health of psychological/physical well-being. Specifically, it is necessary to inform **potentially exposed persons**, that the operator assigned with use of the jib crane does not always work, in the movement trajectories of the **danger zones**, with sufficient visibility conditions to be able to completely and immediately prevent all potential risks of being crushed, collisions and being dragged in in terms of any people who thus must avoid to exposing themselves to risk during the manoeuvres in these areas.

It is mandatory for the customer to place adequate signs in the danger zones to prohibit or limit access to unauthorised and/or unassigned personnel in the areas where the jib crane works, as required by current laws

5.2.3 Work area lighting

The GRL series jib cranes are not equipped with their own lighting system. Consequently, the workplace of the operator assigned to use the crane must be adequately lighted and ensure maximum visibility.

The level of ambient light must always be such as to ensure the maximum possible safety for crane operations.
It is mandatory to install supplementary lighting systems in areas that are not sufficiently lit, thus preventing shadow areas that inhibit or reduce the visibility in the operating and/or surrounding areas

5.2.4 Operator

The operators are all of those who carry out the following activities on the jib crane on a time-to-time basis:

- transport, handling, assembly, installation, adjustments and the acceptance test
- commissioning, use, cleaning, maintenance and repair
- disassembly, dismantling and demolition

The operators need to be persons suitable for the work and mentally and physically able to meet the needs connected with the activities correlated with the jib crane during all the operating phases and in particular during the slinging and handling phases.

The operator assigned to use of the cranes must position himself in a manner that is not dangerous for his safety, predicting and thus preventing possible falls or dangerous movements of the transported load. Instructions are provided below to obtain greater safety for himself and others in using the machine, specifically the instructions in the manual must be scrupulously followed.

⚠	**The operator must not allow anyone to come close during the use of the jib crane and prevent it from being used by unauthorised personnel, especially minors under age 16.** **The use of the crane by unauthorised and uninformed persons is prohibited.** **The operator must always use adequate personal protection equipment (P.P.E. = gloves, protective shoes)**	

5.2.5 Jib crane capacity

The capacity of the jib crane, in the planned operating configuration, is clearly indicated by the plate affixed on it and is visible from the manoeuvring position.

!	• **The capacity of the crane or its accessories must never be exceed by applying overloads.** • **The crane must never be equipped with lifting equipment (hoist) with a rated capacity over the same.** • **The lifting speed of 24 m/min must never be exceeded, unless the crane capacity is adequately reduced.**

5.2.6 Manoeuvres: lifting, trolley traverse and arm rotation

It is a good idea to perform one movement at a time, since it is only in this way that a manoeuvre can be started, stopped and constantly followed by the operator, who should also avoid continuously enabling and disabling including in the case of small movements.

- Gripping of the load with the hoist hook and the lifting accessories needs to be carried out carefully, gently and without abrupt movements.
- Start the lifting operation by slowly tensioning the chain until lifting the load a few centimetres, stop the manoeuvre and check the hold and the stability of the load.
- At the end of handling, carefully place the load and release the hoist hook,
- **During lifting manoeuvres,** the operator must avoid putting the hook on the ground or on the loads to lift, to prevent the chain from shifting. The operator must absolutely avoid making oblique pulls which are always dangerous and hard to control (fig. 55).
- **During trolley traverse manoeuvres** it is mandatory to avoid violent collisions between the trolley/hoist and the end bumpers, in order not to cause serious repercussions on the mechanical parts and metalwork.
- **In manual traverse and/or arm rotation manoeuvres** the operator must move the load by pushing it and never by dragging it towards himself, to prevent the risk of being crushed (fig. 56).

⚠	• **Work carefully and diligently constantly following the manoeuvres and visually checking the equilibrium of the handled weight** • **Avoid sudden manoeuvres and "small abrupt movements" that are very damaging for the stability of the load due to the dynamic effects which are generated.** • **Never lift loads with grips which are not barycentric and not balanced or omit to hang and secure all of the required slinging accessories or fix the load with temporary or makeshift slings** • **Never leave the load suspended, once a handling operation has been started, it must be completed as quickly as possible and the load needs to be placed without crushing the lifting accessories.**

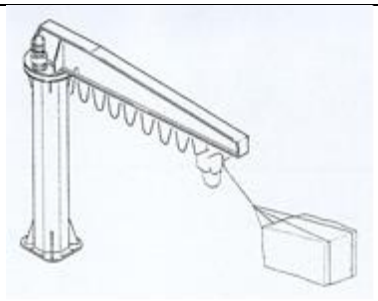


fig. 55

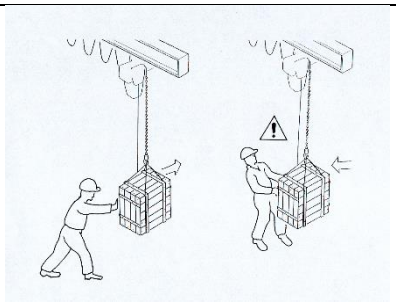


fig. 56

5.2.7 Safety devices

Disabling of the crane power must be performing by disabling the line switch/circuit breaker (not included in the supply) and/or by pressing the "emergency stop" button on the pushbutton panel.
An electric or mechanical interlocking device prevents simultaneous control in both motor rotation directions, both at slow and fast speed.
The lack of voltage causes an immediate block of all hoist and trolley movements, since the electric motors are equipped with automatic braking devices.
A safety catch is installed on the lifting hook to prevent accidental unhooking of the slings and/or load.
The lifting, traverse and rotation limit switches limit the maximum vertical and horizontal travel of the load. They are emergency devices and not suitable as operating stops.

☞	• **The safety devices, when excluded from the DONATI SOLLEVAMENTI S.r.l. supply must be installed by the customer.** • **It is prohibited to put the jib crane into service and/or affix the CE marking, shown on the side, before it has been completed in compliance with the instructions contained in this point**	CE

5.3 Activating the jib crane

👁	**To start the operating activity of the jib crane follow the instructions below:**	🚶

1. Visually inspect the conditions of the crane and the structures where it is installed.
2. Perform all of the tests as described in paragraph 5.5 – "Use criteria and precautionary measure"
3. Activate the power line by putting the general switch in the "ON" or "1" position
4. Check that there are no exposed persons in the hazardous operating areas

5. Put the **"emergency stop"** red mushroom head button in start consensus
6. Activate all of the functions by pressing the "**start**" button, if available
7. Check the operation of the safety devices by checking the movements as described in the paragraph 5.1 – "Functions of the jib crane"

5.4 Deactivating at the end of work

	**To deactivate the crane at the end of work follow the instructions below:**	

1. Position the arm in a recovery position making sure of its stability and taking care that it does not generate risks of collision or interferences with surrounding structures and/or machines
2. Release the lifting hook from the slings used to handle the load
3. Lift the hook, where possible, to a height not under 250 cm, i.e. so that it does not create disturbances and danger for the movement of people and things below the crane.

If used with a manual hoist:

4. Make sure the manoeuvre chain does not generate risks of being drawn in

If used with a electric hoist:

4. Stop all crane movements by pressing the "stop" button of the pushbutton panel
5. Put the pushbutton panel in the "do not disturb" position
6. Deactivate the power by putting the general switch in the "OFF" or "0" (zero) position.

5.5 Use criteria and precautionary measures

!	• **The correct use of the jib crane makes it possible to fully use the performance that is able to provide in completely safe conditions.** • **This potential is only guaranteed by scrupulously following the instructions below:**	

- **ALWAYS** follow the indications and instructions contained in the installation and user manuals and check the conditions of the crane components and parts.
- **ALWAYS** comply with the instructions and warning shown on the machine; the warning plates on the crane and the manoeuvre areas are accident prevention warnings and they must always be perfectly legible.
- **ALWAYS** make sure that the crane works in an environment protected from inclement weather (rain, wind, snow, etc.) or, if outdoors, that it is equipped with suitable guards.
- **ALWAYS** check the compliance of the crane performance in relation to its intended service (duty cycles - intermittence - use time - load to handle) .
- **ALWAYS** check the solidity and adequacy of the structures (columns, foundations) which support the jib crane (fig. 57).
- **ALWAYS** make sure the maintenance conditions of the crane are adequate (cleaning and lubrication) and of its main components (hook, chains, pushbutton panel, limit switches, gear motors, wheels, brakes, etc.).
- **ALWAYS** check the correspondence of trolley and hoist movements.
- **ALWAYS** test the operation of the emergency stop button.
- **ALWAYS** and constantly check the efficiency of the brakes, limit switches and electrical system.
- **ALWAYS** check the conditions of the chain, block, hook and pushbutton panel.
- **ALWAYS** check that the hook is not worn, damaged or missing its spring catch.
- **ALWAYS** check the suitability and efficiency of the slings (ropes, chains, bands, etc.).
- **ALWAYS** check that the track for movement of the trolley, is installed at a height which does not allow the operator to interfere with the shape of the trolley hoist and/or its moving parts. If this is not possible install appropriate guards or signs located in the risk area (fig. 58).
- **ALWAYS** act on the load by pushing it during manual handling and avoid pulling it towards yourself (fig. 59).
- **ALWAYS** make sure to have centred the lifting unit (hoist and hook), on the perpendicular axis of the load before performing the slinging and handling of the load.
- **ALWAYS** correctly secure the slings of the load to the lifting hook and tension the slings with slow and safe manoeuvres.
- **ALWAYS** work in the best lighting conditions of the area and visibility of the load.
- **ALWAYS** ensure, before any manoeuvres that arm rotation is free from obstacles and that the load does not encounter obstacles during lifting, traverse and rotation (fig. 60).
- **ALWAYS** work outside the manoeuvre range of the lifted load.
- **ALWAYS** activate the various movements avoiding the use of control impulses in rapid succession.
- **ALWAYS** avoid combining movements by activating the lift and traverse buttons at the same time and being careful not to generate swaying of the load.
- **ALWAYS** use the “slow” speeds for approach and positioning operations.
- **ALWAYS** position the crane arm, load hook and pushbutton panel at the end of working in a manner that they do not constitute elements of a collision risk.
- **ALWAYS** press the red emergency stop button on the pushbutton panel and disable the crane general switch before leaving the manoeuvre position.
- **ALWAYS** turn off the machine voltage for inspections, repairs and routine maintenance operations.

- **ALWAYS** use suitable personal protection equipment (PPE, gloves, etc.) for all operations
- **ALWAYS** report any operating anomalies (defective behaviour, suspected breakage, incorrect movements and noise that is not normal) to the department head and put the machine in non-working conditions.
- **ALWAYS** comply with the maintenance operation program and register, for each test, any observations related in particular to the hook, chains, brakes and limit switch.

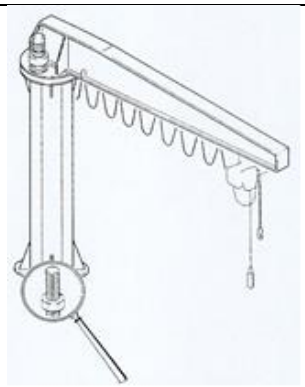


fig. 57

fig. 58

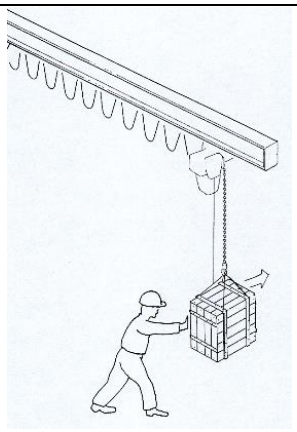


fig. 59

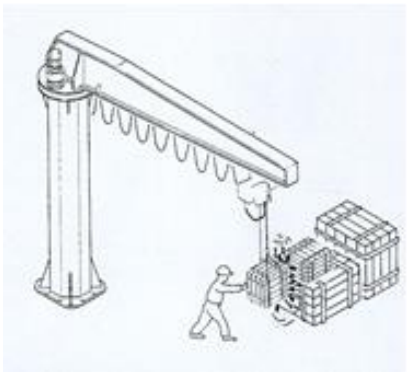


fig. 60

5.6 Use contraindications

⚠	• **The use of the jib crane for unpermitted manoeuvres, its improper use and lack of maintenance may result in serious risks for the health and safety of the operator and exposed persons, as well as compromise the operation and safety of the machine.** • **The actions described below, which obviously cannot cover the entire range of possible "misuses" of the crane, however constitute those which are "reasonably" more predictable, they are absolutely prohibited and therefore:**	

5.6.1 Unintended and unpermitted use - Predictable and unpredictable incorrect use

- **NEVER** use the jib crane to lift and transport people (fig. 61).
- **NEVER** use the jib crane to lift and transport people (fig. 57).
- **NEVER** lift loads greater than the rated capacity nor equip the crane with hoists with a rated capacity higher than the crane capacity.
- **NEVER** lift loads while people are transiting in the manoeuvring area below.
- **NEVER** move through, stand, work or manoeuvre under the suspended load.
- **NEVER** allow the crane to be used by unauthorised personnel or minors under 18 years of age.
- **NEVER** use the crane if not mentally and physically fit.
- **NEVER** use the crane without adequate personal protection equipment (PPE, gloves, etc.).
- **NEVER** operate without due attention during load lifting and traverse and arm rotation manoeuvres.
- **NEVER** rotate the load and/or crane arm and/or drag the push trolley using the pushbutton panel cable (fig. 62).
- **NEVER** put your hands on the slings during the “tensioning” phase in the contact areas with the load and between the hook and slings.
- **NEVER** leave a suspended load unsupervised.
- **NEVER** use the crane for services other than those for which it is intended, avoid using it for other operations for example painting ceilings, changing light bulbs, as a support for scaffolding, etc.
- **NEVER** lift unbalanced loads.
- **NEVER** swing the load or the hook during the traverse and/or rotation.
- **NEVER** put the chain in a diagonal pull position.
- **NEVER** use the crane or its lifting equipment for pulling or dragging operations.
- **NEVER** use slings without having previously checked their suitability.
- **NEVER** use the hoist chain as earthing for the welding machine.
- **NEVER** lift loads with the tip of the hook.
- **NEVER** use the crane to keep items attached to the ground tensioned or to extract them.
- **NEVER** lift “guided” loads without having set up adequate safety measures.
- **NEVER** continue the hook stroke after having placed the load causing the chain to shift.

fig. 61

fig. 62

- **NEVER** bump into the plant structures, machines and systems with the load or arm (fig. 63).
- **NEVER** use two cranes at the same time to lift the same load (fig. 64).
- **NEVER** use the crane with two simultaneous movements, wait until the movement in progress has completely stopped before starting another one.

- **NEVER** use the crane in unpermitted environmental conditions or, if installed outdoors, in harsh, unfavourable and/or dangerous environmental conditions (strong wind, heavy rain, etc.) **-** (fig. 65).
- **NEVER** use or work on the crane in insufficient lighting and/or visibility conditions.
- **NEVER** use the crane in areas where the use of non-explosive components is required.
- **NEVER** make the limit switches or load limiter trip continuously.
- **NEVER** reach the “stroke end” areas at full speed in traverse and rotation movements.
- **NEVER** use the crane in the presence of a sharp mains voltage drop or if one of the three phases is missing.
- **NEVER** perform abrupt changes in direction in the lifting, traverse and rotation manoeuvres.
- **NEVER** repeatedly activate the pushbutton panel control buttons.
- **NEVER** change the functional and performance characteristics of the crane and/or its components.
- **NEVER** tamper with the settings of the safety devices (limit switches, clutch device**) -** (fig. 66)
- **NEVER** perform temporary repairs or reset interventions not in compliance with the instructions.
- **NEVER** use non-original spare parts or those not prescribed by the manufacturer.
- **NEVER** entrust extraordinary maintenance and repair operations to personnel not instructed by the manufacturer.
- **NEVER** leave the crane at the end of work without having put the safety procedures into place (fig. 67).
- **NEVER** perform, maintenance, inspections or repairs without turning off the crane.
- During maintenance phases, **NEVER**: (fig. 68)
  - use unsuitable tools
  - lean ladders on the column, hoist, trolley or crane arm
  - work without personal protection equipment
  - intervene without having removed the lifted load
- **NEVER** use the crane if it is not perfectly compliant in all its operating functions.

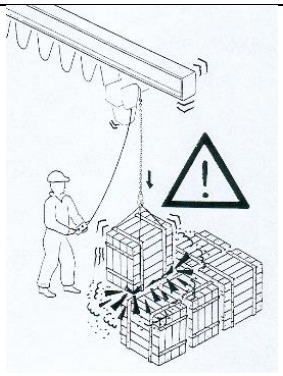


fig. 63

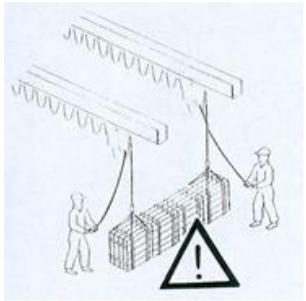


fig. 64

fig. 65

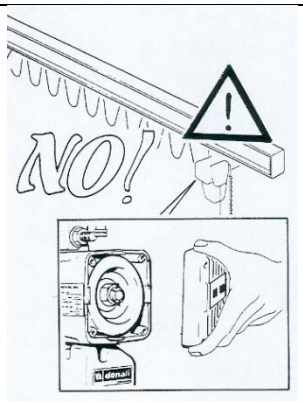


fig. 66

fig. 67

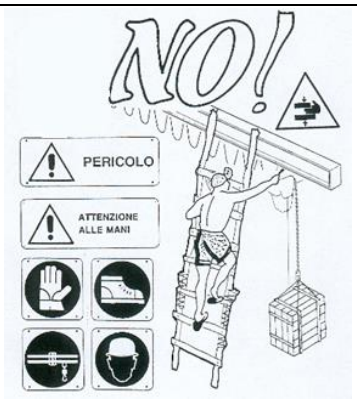


fig. 68

6 JIB CRANE MAINTENANCE

6.1 Safety precautionary measures

The accident prevention measures contained in this paragraph must always be strictly complied with during maintenance, in order to avoid personal injury and damage to the crane.

⚠	• **The personnel assigned to jib crane maintenance must:** ○ **be well trained** ○ **have read this publication** ○ **have an in-depth knowledge of accident prevention laws** ○ **Unauthorised personnel must remain outside of the work area during operations**	

These measures are cited and further described in this chapter, each time a procedure is required that may entail a risk of injury, damage or accident, using the **WARNING** and **HAZARD** notes:

!	**The WARNING notes precede an operation that, if not correctly performed, may cause damage to the crane or its components.**
⚠	**The HAZARD notes precede any operation that, if not correctly performed, may cause an operator accident.**
☞	**Pay attention to the following WARNING NOTES during the maintenance phases:**

!	**Before restarting the jib crane, after a fault, it must be carefully inspected and controlled to discover any damage and the procedure described in paragraph 5.3 must be repeated**	
!	**Never intervene on the setting and positioning of safety devices unless expressly required to eliminate a fault. Tampering with them may cause serious damage to the crane or its components.**	

☞	**Pay attention to the following HAZARD NOTES during the maintenance phases:**

⚠	**Disable the power to the crane electrical components before performing maintenance operations unless the power is necessary. Affix a sign stating: MACHINE MAINTENANCE - DO NOT TURN ON THE POWER**	
⚠	**Never disable the safety and protection devices installed on the jib crane. Use specific warning signs if it becomes necessary and work with utmost caution.**	
⚠	**Always make sure of the presence and suitability of the earth connections and their compliance with the law. Lack of an earth connection for the electrical equipment may cause serious injury to people.**	

⚠	**Avoid the use of flammable or toxic solvents (petrol, ether, alcohol, etc.). Avoid prolonged contact with solvents and inhalation of their fumes. Specifically avoid use near open flames.**	
⚠	**Always ensure, before starting the crane, that the personnel assigned to maintenance is at a safe distance (no longer above ground) and that tools and materials have not been left on the crane.**	
⚠	**Always use protective gloves during maintenance operations.**	
⚠	**All the accessible moving parts, with the sole exception of the chain and subblock/block, are protected against accidental contacts as much as possible. Replace the required guards before starting the crane again**	
⚠	**Never use sprayed water for fires, disconnect all the power and use adequate fire extinguishers.**	
⚠	**Make sure that the tools to use are in perfect conditions and have insulated handles, where required.**	
⚠	**Pay maximum attention to all the RESIDUAL RISKS shown on the jib crane and included in this publication.**	

6.2 Qualification of personnel assigned to maintenance

To be able to adequately perform maintenance of the jib crane, the personnel assigned to maintenance must:

- know the current laws related to accident prevention during the work performed on the machines with motor transmission and be able to apply them
- have read and understood chapter 3 – "SAFETY AND ACCIDENT PREVENTION"
- know how to use and consult this documentation
- be interested in the machine operation
- notice any operating irregularity and take the necessary measures if needed

The professional figures in charge and authorised to perform crane maintenance are:

	**Operator assigned to use of the jib crane**	

- **Typical maintenance activities:**
  - Testing of correct operation of the jib crane. Collaboration with the personnel assigned to routine and/or extraordinary maintenance, after prompt notification of the same if anomalies are discovered.
  - cleaning and lubrication of the crane parts (hoist) with which they are normally in contact (pushbutton panel and hook) and performance of simply performed maintenance activities which do not require overhead interventions (e.g. hook thrust bearing lubrication).
- **Required technical knowledge:**
  - knowledge of the functions and use of the jib crane
  - knowledge of the lubricant used in the crane and hoist and the hazards connected with their use
- **Required qualification:**
  - suitable for work in relation to the specific operating and environmental characteristics

	**Mechanical maintenance personnel**	

- **Typical maintenance activities:**
  - mechanical adjustment of brake and mechanism clearances.
  - testing of performance of movements and mechanical adjustment of safety devices
  - checking of mechanical clearances and component (chain, hook, etc.) wear
  - replacement of worn components (chain, hook, chain guide, pulleys) through the use of this publication.
  - routine maintenance of the mechanical units after replacement of parts with original spares
- **Required technical knowledge:**
  - good knowledge of the mechanical lifting and manual and motor handling systems
  - good knowledge of the safety devices used in the hoist (limit switch, brakes, load limiter, clutch, etc.)
  - elementary knowledge of moderately difficult electrical setting and control techniques (limit switch adjustment, fuse replacement, motor connections, etc.)

- knowledge of the measurement and test methods to determine the actual state of the crane and hoist conditions (testing of: brakes, wear on chain and hook wear, wheel wear, anomalous noise, etc.)
- non-complex logical troubleshooting methods and result assessment
- ability to organise the measurements aimed at restoring the hoist operation and performance
- ability to write a maintenance intervention report

- **Required qualification:**
  - Complete training as an industrial mechanic with specialisation and experience in maintenance of lifting or industrial handling systems

	**Electrical maintenance personnel**	

- **Typical maintenance activities:**
  - intervention on electrical equipment starting from functional diagrams
  - testing of performance of movements and electrical adjustment of safety devices
  - testing of wear of electrical components (contacts of electrical equipment)
  - repair of electrical units after replacement of parts with original spares
- **Required technical knowledge:**
  - good knowledge of electrical systems and installations
  - good knowledge of electrical components and safety devices used in the hoist (limit switch, brakes, etc.)
  - knowledge of average difficult electrical control and adjustment techniques (replacement based on the original diagram of: motors, limit switch, pushbutton panel, control panels, cables, etc.)
  - elementary knowledge of moderately difficult mechanical control and adjustment techniques (testing of wear, adjustment of mechanical stops, etc.)
  - knowledge of the measurement and test methods to determine the actual state of the hoist conditions (testing of the efficiency and reliability of the electrical equipment)
  - knowledge of electrical troubleshooting methods and experience on electrical command and control systems for lifting and handling equipment
  - ability to organise the measurements aimed at restoring the hoist operation and performance
  - ability to write a maintenance intervention report
- **Required qualification:**
  - Complete training as an electrical mechanic with specialisation and experience in maintenance of lifting or industrial handling systems

	**Electromechanical maintenance personnel:** **operator whose professional profile, in addition to possessing the typical characteristics of electrical maintenance personnel, also possesses the skills and technical abilities required of mechanical maintenance personnel**	

	**Mechanical technician**	

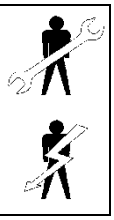
- **Typical technical activities:**
  - mechanical adjustments of safety devices, calibrations and acceptance tests (annual load tests)
  - routine maintenance operations after replacement of complex mechanical components and/or those which are critical for safety purposes (anchoring components, arm, gear motors, motors, etc.)
  - repair of mechanical units after extraordinary maintenance operations (repair of structural parts with welding, mechanical machining on the crane, etc.)
- **Required technical knowledge:**
  - knowledge of lifting and industrial handling mechanical systems certified by specific training
  - specific knowledge of the safety devices used in the hoist (limit switch, brakes, load limiter, clutch, etc.)
  - basic knowledge of electrical control and adjustment techniques (testing of motors)
  - specific competence in measurement and test methods for determining the actual state of the crane and hoist conditions (testing of: brakes, pushbutton panel, control panel, limit switch, etc.)
  - specific competence on logical troubleshooting methods and result assessment
  - ability to oversee the measurements aimed at restoring the jib crane operation and performance
  - ability to write a maintenance intervention report
- **Required qualification:**
  - Complete training as an industrial mechanic technician with specialisation and specific competence in lifting and handling systems.

	**Electrical technician**	

- **Typical maintenance activities:**
  - electrical adjustments of safety devices, calibrations and acceptance tests (annual load tests)
  - routine maintenance operations including replacement of complex electrical components and/or those which are critical for safety purposes (lifting limit switch, motors, LV panel)
  - repair of electrical units after extraordinary maintenance operations (repair of electrical motors with partial replacements, replacement of limit switch with changes in layout, etc.)
- **Required technical knowledge:**
  - excellent knowledge of electrical systems and installations on lifting and industrial handling equipment
  - specific knowledge of electrical components and safety devices used in the hoist (limit switch, brakes, load limiter, etc.)
  - experience with electrical control and adjustment techniques (ability to intervene on the original diagram for improvements on; limit switch, pushbutton panel, control panels, cables, etc.)
  - knowledge of mechanical control and adjustment techniques (testing of wear, testing of mechanical component performance, adjustment of mechanical stops, noise testing, etc.)
  - specific competence on the measurement and test methods to determine the actual state of the hoist conditions (testing of the efficiency and reliability of the electrical equipment)
  - specific competence on the logical troubleshooting methods and risk assessment on the command and control electrical equipment of lifting equipment
  - ability to oversee the measurements aimed at restoring the crane and hoist operation and performance

- ability to write a maintenance intervention report

- **Required qualification:**
  - Complete training as an industrial electrical technician with specialisation and specific competence in the electrical equipment of lifting and handling systems

	Electromechanical technician: **Operator highly specialised and specifically trained, whose professional profile includes, in addition to the typical competences and knowledge of an electrical technician, those of a mechanical technician.**	

	Special recommendations regarding maintenance:

1. If correctly performed, maintenance operations guarantee the safety of workers assigned to use of the jib crane and reduce downtime after a fault to a minimum.
2. A promptly executed repair avoids additional deterioration of the crane or its components
3. Use original spare parts and products
4. The following instructions need to be complied with for maintenance work:
   - Personnel assigned to perform routine and extraordinary maintenance work must have read and clearly understood all of the indications contained in this chapter and chapter 3
   - Extraordinary maintenance jobs must only be performed by authorised and qualified personnel who have been trained for this purpose

	Maintenance operations must be performed, when possible, with the crane power off and in safe conditions, using suitable equipment and adequate personal protection equipment, based on the requirements of current laws, and affixing a sign with the warning: "MACHINE MAINTENANCE".

	For any problems which should arise or to order spare parts contact the *DONATI SOLLEVAMENTI S.r.l.* Technical Assistance Service

6.3 Maintenance plan

The maintenance plan includes all ordinary type operations, that entail inspections, tests and checks conducted by the operator assigned to use of the crane and/or qualified personnel assigned to normal company and periodic type maintenance which include replacement, setting and lubrication operations performed by technical personnel instructed for the purpose through specific courses or publications.

⚠	• **Since maintenance operations can be performed at a dangerous height above ground, the assigned personnel must have appropriate means (scaffolding, platform, ladders, etc.) that make it possible to perform the activity in safe conditions.** • **Personnel must also be in possession of adequate personal protection equipment (P.P.E.) required by current laws.**	

6.3.1 Daily and routine maintenance

This involves maintenance operations that can be directly performed by the operator assigned to use the crane or qualified personnel, as prescribed in this publication and/or in any attached documents, which do not require the use of special instruments and equipment.

Maintenance operations are divided into:

👁	**Daily operations, handled by the operator assigned to crane use:** • general visual inspections • functional tests with testing of motors, limit switches, clutch device, brakes with no load, "stop" button, and other functions of the pushbutton panel • testing of the chain and hook conditions testing of correct crane arm rotation	
👁	**Monthly operations, handled by qualified personnel:** • visual inspection of each mechanism and for lubricant leaking • functional testing of full load brakes • checking that no anomalous noises and/or vibrations exist • greasing of the mechanisms and limit switches to ensure regular operation and limit wear testing of the operation and conditions of the pushbutton panel and relative cable.	
👁	**Quarterly operations, handled by qualified personnel:** • check the efficiency and wear of: hook, chain and chain guide • check the nut, block/subblock wear • check the wheel, pinion, guide roller of the traverse trolley wear • check the efficiency and operation of the load limiter. • inspect the interior of the panels to check for the presence of dust • check and clean oxidised contacts and any plug/socket connectors • check the greasing of the mobile trolleys of the cable line and check the cables • check the efficiency and conditions of the power line and its components • test the motors and brakes with load with check of wear • check the efficiency and preservation of the structure (paint, oxidation, etc.)	

6.3.2 Frequency and deadlines for maintenance interventions

The frequency of the following operations refers to a jib crane used in normal operating conditions and are valid up to service group M5 (standard ISO 4301/86) or 2m (FEM 9,511 rule). If the use of the jib crane is normal and correct for a daily 8 hour shift, the following overhaul may be performed after a use period of approximately 10 years (FEM 9,755 - S.W.P. rule) If use is over various shifts, the maintenance periods need to be reduced proportionately.

Table of periodic checking and maintenance operations

Subject of the check ⇓	Periodic checks				Useful notes
	Daily	Monthly	Quarterly	Annual	
Checks Inspections - Acceptance tests	General visual checks Correct operation	General visual inspections	Check wear	Annual acceptance test	pag. 31
Warnings and pictograms, Signs and plates	Legibility of warnings and pictograms, signs and plates	Inspections of conditions and cleaning of plates and signs	Check suitability		pag. 16
Structural elements Welding - Pins Bolted connections				Check wear and efficiency Check bolted/welded	pag. 53
Chain Anchoring parts	Visual inspection		Check wear and efficiency		Hoist manual
Lifting hook	Visual inspection and check spring catch		Check wear and efficiency		Hoist manual
Loading nut Chain guide Block return			Check wear and efficiency		Hoist manual
Lifting gear motor Traverse gear motor Rotation gear motor		Noise test			Hoist manual
Lifting motor Traverse motor Rotation motor	Check correct operation		Load test		Hoist manual
Lifting brake Traverse brake Rotation brake	Check correct operation	Load tests Check wear	Load tests Check wear		Hoist manual and pag. 55
Wheels and pinions Guide roller Rotation bearings			Check wear		Hoist manual and pag. 54
Trolley buffers Jib anti-collision	Visual inspection			Check wear and efficiency	Hoist manual and pag. 54
Electrical system Pushbutton panel and cable	Check correct operation	Inspection of external pushbutton panel/cable	Check wear and efficiency		Hoist manual and pag. 55
Load limiter Clutch device			Load test	Check the calibration	Manuale paranco
Lifting limit switch Traverse limit switch	Check correct operation		Load tests Check wear and efficiency		Hoist manual
Cleaning and lubrication	Check correct cleaning and lubrication conditions	General lubrication inspection	Check for chain, hook and mechanism lubrication leaks		Hoist manual and pag. 55

N.B.: The following operations must be noted in the specific control booklet (See chapter 8)

6.3.3 Test of part and component efficiency

	The following instructions should be scrupulously complied with for the single parts of the jib crane:

	Annual test of the efficiency of the structural elements, welding, pins and bolted joints (fig. 69):	
• The metallic structure of the jib crane, in addition to normal alterations due to environmental factors and wear of moving parts, may be subject, including unexpectedly or during handling operating phases, to collisions, contacts or scraping with other equipment or abnormal stress that can damage the metalwork frames, welding and pins. Therefore, the structures, after perfect cleaning, must periodically undergo scrupulous tests to check their suitability and repair any damage if necessary. • The brackets composed of plates and pin, that form the hinged parts are subject to wear since they are mobile and swinging parts subject to radiating friction in the contact area. Replace them if any excessive wear is found when they are checked. • All of the grub screws, high resistance pins and pins must be disassembled and carefully checked along with their seats on an annual basis. • Make sure the locking torque of the bolts fixing the column or shelf is in accordance with the required torques.		
!	**Repair the hinged structures and parts or replace them if the following occurs:** • **deformations:** lengthening, crushing, dents, bends • **wear:** worn parts, reduction in cross section, incisions, abrasions, corrosion, oxidation, scratches, peeling paint • **breakages:** cracks in the welding, bending, cuts or incisions, broken parts • **changes in cross section ≥ of 10%, or diameter or thickness ≥ of 5% compared to the initial values**	

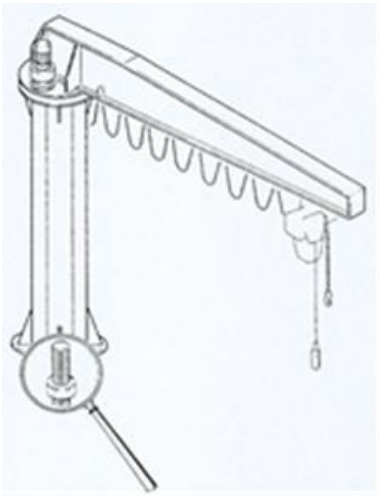


fig. 69

	Quarterly check of the efficiency of the wheels (paragrafo 6.3.2):	
• Check the wear of the rolling band of the wheels • Check the ball bearings. They need to be replaced if there is excessive noise or if they have excessive friction, “tugging”, difficult and/or irregular rotation		
	Replace the wheels if: • **The rolling diameter of the wheel has wear ≥ of 5 mm** • **The rolling diameter of the guide roller has wear ≥ of 2 mm** • **If even just one wheel needs to be replaced, to obtain the best operating guarantee and duration it is advisable to replace all of the trolley wheels**	

	Annual check of the efficiency of the trolley buffers: paragrafo 6.3.2)	
• Check that the end stops are not deformed and that there are no signs of their anchoring to the structures giving way and that the buffer is intact and correctly fixed in its mounting.		
	Replace the buffers if they have: • **Signs of breakage or permanent deformation, cuts, abrasions or incisions**	

	Quarterly test of the efficiency of the power electrical system:	
• Check the efficiency of the power cable, make sure there are no worn patches, cuts, abrasions or other alterations of the protection sheathing. • Check the tightening of the conductors, power cable, and their terminals (in the connector block) and, if necessary, tighten them correctly. • Check the efficiency of the conductors and earth connections, checking them and fixing all of the earthing screws if necessary. • Check all of the seals of the covers and grommets. • Check for the presence and efficiency of the warning plates located on the cover		
	• **Do not hesitate to replace the electrical component in question, if it is no longer able to offer sufficient guarantees on its functional reliability** • **Do not ever make temporary or makeshift repairs.** • **Use original spare parts only**	

	For information on the tests of all the structural, mechanical and electromechanical components of the living and traverse units incorporated in the jib crane, see the relative documentation attached to this technical publication.
	• **Do not hesitate to replace the part and/or component in question, if it is not able to offer sufficient guarantees on its safety and/or functional reliability.** • **Do not ever make temporary or makeshift repairs!**

6.3.4 Cleaning and lubricating the jib crane

	• **Cleaning can be performed by personnel who is not highly specialised.** • **It is periodically necessary to keep the following parts clean:** ◦ **jib crane structure** (column, arm, etc.) ◦ **jib crane mechanisms** (thrust bearing, pins, etc.) ◦ **jib crane electrical parts** (festoon cable, etc.) ◦ **components of the lifting and traverse unit** (wheels, chain, hook, block, pushbutton panel, etc.). • **<u>Overhead cleaning above ground</u> must be performed by qualified personnel equipped with suitable means and personal protection equipment.** • **These operations are necessary on a quarterly basis to permit activation of periodic tests.**	

- Cleaning can be implemented simply with the use of means, equipment and cleansers or solvents normally used in general cleaning operations for industrial equipment since no particular contraindications exist in relation to the use of products or materials.
- Clean by removing any foreign and dirty substances with vacuums, absorbent cloths, etc.
- Dry any excess grease and/or oil on the parts.

	**Accurate management of the jib crane mechanism lubrication is a necessary condition for guaranteeing the effective compliance to its intended service as well as its duration.**	

- The lubricating power decreases over time due to stress, so it is necessary to restore or renew the lubricants.
- Lubrication of the jib crane is simple and limited to application of a thin layer of oil or grease, between the bearings and pins, in the arm rotation points.
- Instead, the lubrication of the lifting and traverse mechanisms is very important, their lubrication cycles are contained in the relative technical publications attached hereto.

	• **Lubricants, solvents and detergents are toxic/harmful products for health:** ◦ **they can cause irritation if they come into direct contact with the skin** ◦ **they can cause serious intoxications if inhaled** ◦ **they may be fatal if ingested** • **Handle with care using adequate personal protection equipment (PPE). Dispose of correctly in compliance with current laws on toxic/harmful waste.**

6.4 Troubleshooting

6.4.1 Main causes of malfunctions or faults and possible solutions

The columns of the table below show the main malfunction conditions that can be reasonably predicted and the type of problem, potential cause of the fault and possible solutions.

Fault type	Possible fault causes	Possible solution
Rotation is blocked	• **introduction of a foreign object** • **in the rotation system** • **thrust bearing seized** • **gear motor fault**	• **remove the foreign object** • **replace the thrust bearing** • **contact technical assistance**
Difficult rotation Excessive force	• **drain lubrication from thrust bearing** • **gear motor fault**	• **lubricate** • **contact technical assistance**
Arm positioning instability	• **excessive inclination of rotation axis**	• **check the verticalness of the crane and tightening of fixing system**

6.4.2 Personnel authorised to intervene in the event of a failure

The personnel authorised to work in most of the cases of fault, or unless otherwise reported, is an expert maintenance person or one who is authorised based on specific preparation on the mechanical and electrical parts When highlighted the intervention of specialised or specifically trained personnel or the manufacturer's technical personnel is necessary.

6.4.3 Decommissioning

If it is not possible to repair the jib crane, decommission it, indicating the fault with a specific sign; ask for intervention from the assistance service.

6.5 Disassembly, disposal and scrapping

If the jib crane and its components, because broken, worn or at the end of their expected life cycle, can no longer be used or repaired, they need to be demolished.

- Demolition of the jib crane must be performed using suitable equipment selected in relation to the material on which to intervene (e.g. shears, blow torch, hacksaw, etc.)
- All of the components must be dismantled and scrapped after having reduced them to small pieces so that none of them can be reasonably reused.
- When the jib crane is scrapped, its parts must be recycled taking into account their various natures (metals, oil and lubricants, plastic, rubber, etc.) possibly hiring specialised companies authorised for this purpose and complying with the laws regarding the disposal of solid industrial waste.

Do not attempt to reuse the parts or components of the jib crane that apparently may seem still intact once that they, following check and tests and/or replacements conducted by specialised personnel or the manufacturer, have been declared no longer suitable.

7 SPARE PARTS

!	• **The jib cranes have been designed so they do not normally need spare parts due to FAULTS OR BREAKAGE, if they are used correctly and following adequate maintenance as described in this manual.** • **If necessary, consult the "Jib crane components and spare parts" manual.** • **Parts or components subject to normal wear and tear following use can be obtained from the manufacturer for a minimum period of 10 years.**

⚠	• **Do not hesitate to replace the part and/or component in question, if it is not able to offer sufficient guarantees on its safety and/or functional reliability.** • **Do not ever make temporary or makeshift repairs!**

When it is necessary to replace faulty parts, it is mandatory to only use original spare parts, by contacting the manufacturer directly.

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!	**The use of non-original spare parts, in addition to cancelling the warranty, may compromise the correct operation of the jig crane and/or its components.**

8 CONTROL BOOKLET

To demonstrate the correct performance of all of the test and maintenance activities of the jib crane, as well as to keep a record of all responsibilities in terms of the performed activities, as described in this publication, **it is advisable to diligently fill in and maintain for the expected life of the hoist** (10 years) the specific control booklet as prescribed by RES 4.4.2 of Annex I to the Machinery Directive 2006/42/EC supplied, when required, as an attachment to this publication.

In addition to the activities regarding the life and the use of the jib crane (replacement of parts, overhauls, faults of a certain entity, etc.) all operations included in the maintenance plan with quarterly and annual frequency indicated in the **"Table of periodic checking and maintenance operations",** paragraph 6.3.2. must be noted in the control booklet.

The maintenance personnel assigned by the customer are responsible for filling in all parts of this logbook reporting the results and any notes in the specific spaces.
The name of the maintenance personnel and the date of the intervention must be clearly identified.

KMAN60MG00

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