KIT FOR DPS SERIES SUSPENDED MONO-GIRDER BRIDGE CRANE

IN IPE-HEA TYPE GIRDERS

- INSTRUCTIONS -

INSTALLATION - USE - MAINTENANCE

KMAN08MG00

FOREWORD

This instruction manual contains the information necessary for the installation, use and maintenance of a suspended mono-girder bridge crane kit.

With the kit, donati also provides the following:

- Bridge end carriages with electric and idle traversing unit.
- Electric control board and relative components.
- Lifting unit.
- Technical indications concerning the type of bridge girder to couple with the relative components.

Declarations / documentation provided with the KIT:

- End carriages: Declaration of incorporation IIB
- Electric control board: wiring diagrams
- Lifting unit: CE Declaration IIA

NOTE:

The manufacturer/final fitter is responsible for issuing the final CE Declaration of the suspended overhead crane.

The suspended mono-girder bridge crane kit must not be commissioned until the complete overhead crane has been declared compliant with the provisions of the 2006/42/CE Directive.

donati does not assume any liability regarding the correct construction and successive installation of the bridge crane realised using our KIT.

INDEX OF CONTENTS	Page

INDEX OF CONTENTS **Page**

1. – PRELIMINARY INFORMATION

1.1 Content and addressees of the manual

This technical publication, distinguished by the code **KMAN08MG00**, refers to the **electrically-driven "Suspended mono-girder bridge crane kit",** manufactured and put onto the market by:

DONATI SOLLEVAMENTI S.r.l.
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It is relative to the "use", technical, operational and performance features and relative installation, use and maintenance instructions. It is for the crane manufacturer and can be included in the use and maintenance manual of the complete crane.

The manual must be kept by a person responsible for the same, in a suitable place, so that it is always available for consultation and in good condition.
In the event of loss or deterioration, a replacement document must be requested directly from donati stating the code of this manual.

donati reserves the material and intellectual property rights of this publication and prohibits its disclosure and duplication, even partial, without previous written authorisation.

1.2 Symbols: meaning and use

Several symbols are used in this manual to call the reader's attention and underline some particularly important aspects.
The table below gives a list and meaning of the symbols used in the manual.

SYMBOL	MEANING	EXPLANATION, RECOMMENDATIONS, USE
	**Hazard**	• Indicates a hazard with risk of injury, even death. • Failure to respect the instructions marked with this symbol can lead to a situation of great danger for the operator and/or exposed persons! • **Scrupulously follow all that indicated!**
	**Attention**	• Represents a note of caution regarding possible deterioration of the flag or another of the operator's personal items. • **Important warning to which maximum attention must be given.**
	**Warning Note**	• Indicates a warning or note regarding key functions or useful information.
	• **Visual observation** • **Action to perform**	• A stylised eye can inform the reader that: **a)** he must proceed with a visual observation. **b)** he must proceed with the operational sequence. **c)** a measurement value must be read, a signal must be checked, etc.

1.3 Regulatory compliance

The suspended mono-girder bridge crane into which the Terex/Donati kit for suspended bridges is to be incorporated, must be designed and manufactured in compliance with the **"Essential Safety Requirements"** of **Attachment I of European Community Directive 2006/42/CE** and **must be** put onto the market **with CE marking** and **CE Declaration of Conformity,** as stated **in Attachment IIA** of the Directive itself.

CE EC DECLARATION OF CONFORMITY

as defined by machinery directive 2006/42/EC - Annex 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 Directive:

- 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 Control principle for design

EN 12077-2/2008 Limiting and indication device

EN 60204 – 32/2009 – Safety of machinery, electrical equipment of machines

EN 60529/97 – Degrees of protection provided by enclosures (IP code)

ISO 4301-1/88 – Lifting equipment classification

ISO 4308 – 1/2003 – Selection of wire ropes (for wire rope hoists DRH series)

UNI 9466/94 – Lifting appliances: shaft drums. 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 retaining components

FEM 9.671/88 – Chain qualities, utilization criteria and requirements (for chain hoists DHC series)

FEM 9.741/93 – Lifting force limiters for controlling the loading of motorized series hoists mechanisms

FEM 9.683/93 – Selection of lifting and hoist motors

FEM 9.755/93 – Measures for obtaining safe working periods for serial hoists units (UNIFEM)

FEM 9.941/95 – Graphical symbols for control stations

Person authorized to compile the technical file

Name and surname: Alberto Tagliabue

Address: Via Quasimodo, 17 - 20025 Legnano (MI) - Italy

Date: 02.10.2017

Facsimile of the CE Declaration of Conformity Attachment IIA
Attachment II A

Furthermore, the suspended mono-girder bridge cranes must be compliant with the following Directives:

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

1.4 Manufacturer's liability

With reference to that stated in this manual, the manufacturer declines all **liability** in the following cases:

- Use of the crane into which the kit is incorporated contrary to national laws regarding safety and accident-prevention.
- Incorrect choice or preparation of the structures onto which the crane will be installed.
- Incorrect mains voltage and power supply.
- No or incorrect compliance with the instructions provided in this manual.
- Unauthorised modifications to the machine.
- Use by untrained or unsuitable staff.
- Incorrect choice/execution of the bridge girder
- Incorrect assembly

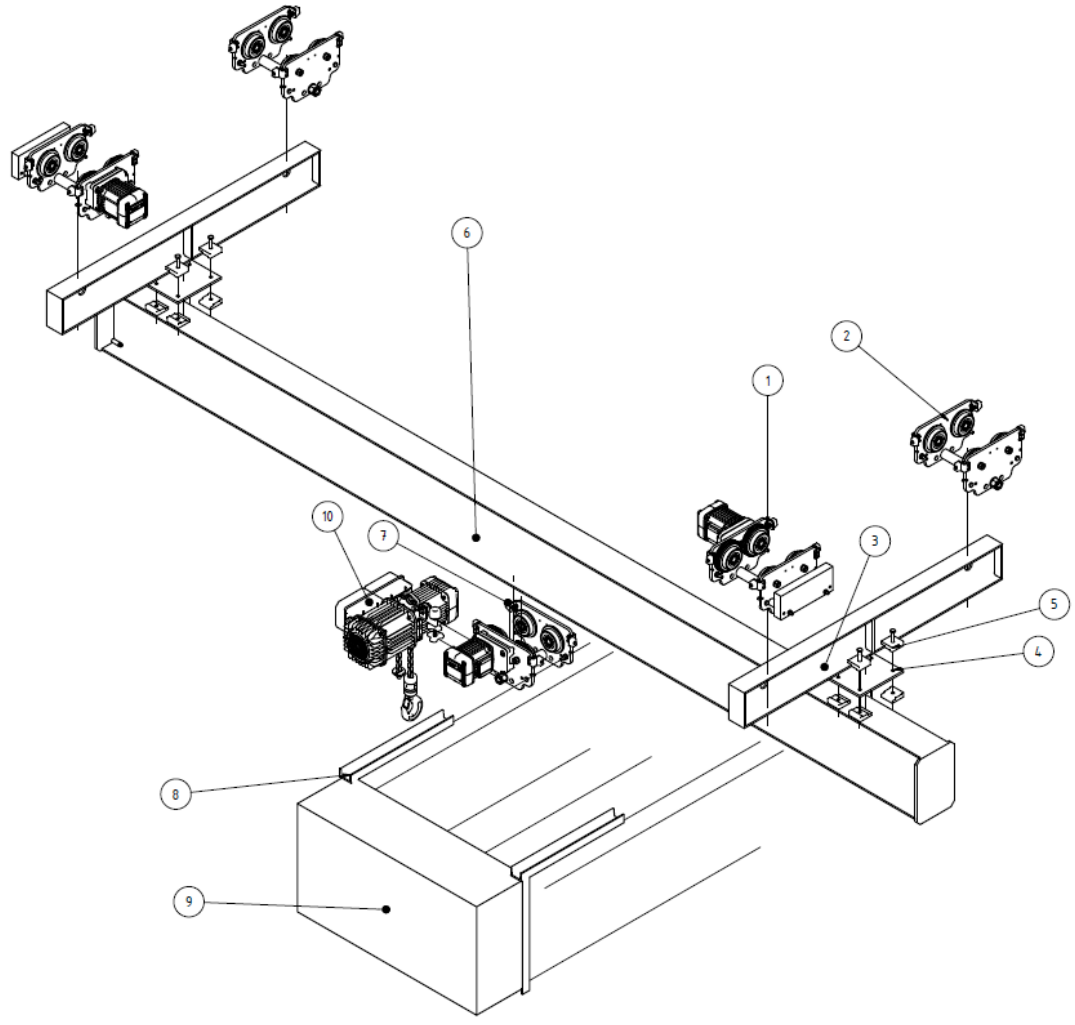
⚠	• **The envisioned intended use and configuration of the bridge crane are the only ones accepted. Do not attempt to use it disregarding the indications supplied.** • **The instructions given in this manual do not replace, but summarise, the respect of current legislation regarding accident-prevention regulations.**

2. – DESCRIPTION AND TECHNICAL INFORMATION

2.1 The suspended mono-girder bridge cranes into which the donati kit is to be incorporated

2.1.1 Usage – Declared use – Intended use

The suspended mono-girder bridge cranes onto which the donati kit can be incorporated, must be manufactured to handle goods inside an establishment or on a work site. The cranes lift the load vertically via the lifting unit hook (electric hoist) and via accessories suitable for this operation.
The load can be traversed along the transversal and longitudinal axes of the bridge, via hoist-support trolleys and bridge-supports running on a runway.
The bridge cranes run electrically suspended on runways, which are also realised on girders positioned at a height with respect to the ground, meaning this remains completely free and available for production activities.



Key:

1. driven traversing unit
2. idle traversing unit
3. end carriage
4. joint plate
5. clamps
6. bridge girder (not supplied by Terex/Donati))
7. hoist traversing unit
8. control board support
9. electric control board
10. hoist

fig.1

2.1.2 Installation restrictions

The suspended mono-girder bridge cranes with donati kit are envisioned to run on runways installed on an existing structure (pillars, ceilings, support girders, trusses, etc.).

⚠	**It is mandatory for the crane manufacturer and the customer to verify, directly or using professionally skilled specialised staff on the subject, the suitability and adequacy of the support structures. They must guarantee the stability and safety of the crane in all operating conditions, supporting the stress and dynamic effects thus deriving.**

2.1.3 The composition of the suspended mono-girder cranes

The donati kits have been designed to be incorporated into suspended mono-girder bridge cranes used to handle loads up to 4000 kg, using a chain or rope electric hoist as the lifting unit. The hoist is suspended on the hoist-holder trolley, which runs on the bridge girder.
Due to the limited number of elements with which the donati kit is realised, and owing to its simplicity, the components allow the crane manufacturer to realise and install it easily.
These elements, constitute the basis of an easily modular and rapid assembly handling system.
The installation operations and the transfer of the plants installed are realised by following the indications contained in this manual.
The composition of the suspended mono-girder bridge crane is extremely simple; it is possible to identify the structure made up from the support girder (not in the donati supply), the lifting unit (electric hoist), the traversing and running units formed by hoist-support trolleys and bridge-support running end carriage, electric plant.
The manufacture of the suspended mono-girder bridge crane makes use of highly developed technologies, which are based on highly industrialised production processes and, which through economies of scale, allow the manufacture of fully reliable and technically innovative machines. The high level of quality is guaranteed and controlled by the company quality system certified in compliance with ISO 9001-ISO 14001-OHSAS 18001.

The structure and the components: - ref. from -1- to -10- (fig.1)

- The structure of the suspended mono-girder bridge crane is made up from a main support girder (not provided by donati) **-6-** and two running end carriages **-3-2-1**.
- In relation to the capacity and gauge of the crane to be realised, different construction sizes are envisioned.
- The technical-dimensional features of the various construction elements are given in paragraph 2.2 "Technical specifications".
- The traversing unit, made up from the hoist-support trolley **-7-,** runs on the lower wing of the main girder.
- The main girder is suspended at the end carriages realised with girders **-3-** trolleys **-1-2-** and fixed using high-resistance joint plates and clamps **-4-5-.**
- When several suspended bridge cranes can operate on the same runway, the installation of an anti-collision system between one crane and another is recommended. During running, this will prevent the cranes themselves or the load transported from colliding and generating hazardous situations for exposed persons. The length of the reciprocal anti-collision devices must be set-up considering the bulkiness of the masses transported and by the distance that must be set at the bridges' end carriages. This, in relation to the capacity of the runway and due to the concentration of the reactions on the wheels of the end carriage wheels acting on the runways themselves.

Traversing and running unit:-1-2-7

- The traversing and running units are made up from electric and thrust trolleys from the DMT series. Each trolley has four steel wheels that turn on permanently lubricated ball bearings. The trolleys run on the runway girders. The support structure is in pantographed steel sheet.

Lifting unit: -10-

- The suspended mono-girder bridge cranes are generally equipped with an electric hoist with rope or chain.

Description of the electric plant components: -9-

The wiring diagrams are supplied inside the command board (fig.2).

- The wiring diagrams include:
- topographic diagrams
- command and power operational diagrams
- terminal board diagrams
- the facsimile below indicates the criterion with which the electric utilities and the pathways of the cables/wires are identified.
- all of the utilities and cables are indicated and numbered on the components. The indications refer to the wiring diagrams and the topographic diagram of the crane electric plant.

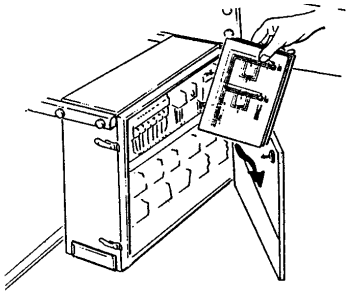


fig.2

- 48 V low voltage electric control board consisting of a sealed box with IP 55 protection, complete with lock and key for safe opening, line isolating switch with door block safety device, siren commanded via the push-button panel “start-alarm” button.
The transformer for the low voltage power supply of the command circuits, the line master switch, the contactors-inverters for command of the hoist motor, trolley and bridge, the terminal board for connections of the auxiliary and power circuits and the protection fuses for the motors and transformer are housed inside the control board;
As an optional, the electric control board can be supplied with quick coupling connectors.
To drive bridge running, on request, the electric control board can have “Inverters”.

-Festoons electric line for the power supply to the hoist and trolley comprising flat, flexible multicore cables, suspended on running trolleys inside a C-shaped steel sheet profile, fixed along the bridge crane girder via brackets and clamps. On request, the electric line can be realised with quick coupling connectors for connection to the hoist and electric control board.

-Electric lines connecting the bridge motors to the control board. They are made up from round multicore cables, fixed using relative devices along the end carriages and the support girders of the bridge crane.

-Supported command push-button panel and relative festoons cable. It has a shock-proof thermoplastic casing and buttons to activate all operational functions as well as the “start-alarm” button and red, mushroom-shaped emergency stop button.
The push-button panel is envisioned to run along the bridge crane support girder, via festoon suspended on trolleys inside a C-shaped steel sheet profile.
The “Radiocontrol” can be supplied on request.

-Electric limit switches for the bridge running movements. Operating on the auxiliary low voltage circuits are the cross-type and then can have single or double click for the two running speeds. The first click generates pre-slowing, the second stopping, depending on plant configuration.
On request and when envisioned, i.e. whenever two or more bridge cranes should operate in the same span, anti-collision systems are available.

2.2 Technical information and service conditions

The suspended mono-girder bridge crane kits are designed and manufactured in compliance with the following legislative/regulatory framework:

European Community Directives:

Machinery Directive 2006/42/CE
Low Voltage Directive 2014/35/UE
Electromagnetic Compatibility Directive 2004/30/UE

Main technical standards and regulations considered:

BS EN ISO 12100/2010 “Basic concepts general principles for design”
BS EN ISO 13849-1/2008 “Safety-related parts of control systems”
BS EN 1993-6/2007 “Design of steel structures for lifting devices - Part 6”
BS EN 12077-2/2008 “Limiting and indicating devices”
BS EN 14492-2/2009 “Cranes - Part 2: Power-driven hoists”
BS EN 60204-32/2009 “Safety of electrical equipment of hoisting machines”
EN 60529/1997 “Degree of protection provided by enclosures (IP Code)”
ISO 4301-1/1988 “Cranes and lifting appliances. Classification. General”
FEM 1.001/98 “Calculation of lifting equipment”
FEM 9.511/86 “Classification of the mechanisms”
FEM 9.683/95 “Choice of lifting and traversing motors”
FEM 9.755/93 “Periods of safe work”
FEM 9.761/93 “Load limiters”
FEM 9.941/95 “Command symbols”

Conditions for use:

Operating temperature: minimum -10° C; maximum +40°C
Maximum relative humidity: 80% - Maximum altitude 1000 m – a.s.l.

Protection and isolation of electrical parts:

Lifting motors: IP55 Protection; Isolation class "F"
Traversing motors: IP55 Protection (motors) - IP23 (brakes); Isolation class "F"
Running motors: IP55 Protection (motors) - IP23 (brakes); Isolation class "F"
Electric control board: IP54 Minimum Protection – Max. isolation voltage 1500 V
Push-button panel: IP65 Protection - Max. isolation voltage 500 V
Connector: IP65 Protection - Max. isolation voltage 600 V
Limit switch: IP65 Protection - Max. isolation voltage 500 V
Cables: CEI 20/22 - Max. isolation voltage 450/750 V

Electric power supply:

The kits for suspended bridge cranes are envisioned to be powered with three-phase alternating electric current: 400 V - 50Hz in compliance with IEC 38-1

Noise - Vibrations:

The sound pressure level, emitted from the suspended bridge crane kit during running, both when empty and with full load, is always below 85 dB (A), measured at 1 m and at 1.6 m from the ground.
The incidence of environmental characteristics such as the transmission of sound through metallic structures, reflection caused by combined machinery and walls, is not included in the value indicated.
The vibrations produced during running are not hazardous for the health of the staff that operates with the hoist realised within the design.

Tolerances accepted for running:

According to ISO 12488-1 class 2

Service classification:

The structural elements and mechanisms of all components and parts making up the kit for the suspended bridge cranes, envisioned within the ambit of the project, are classified in various service groups, in compliance with that envisioned by ISO 4301-1/1988.

- **It is prohibited to use the kit in explosive or potentially explosive atmospheres, i.e. where the use of explosion-proof components is prescribed**
- **Work spaces must be envisioned that are sufficient to guarantee the safety of the operator and the staff assigned to maintenance.**

2.2.1 Criteria for use and operating conditions

Criteria for use:

One of the conditions necessary, to completely meet the functionality requirements of the mono-girder suspended crane in which the kit is incorporated and to whose service it is intended, as well as the best functional duration for the same, consists in the correct choice of machine model. This selection must be made depending on the real service performance required as well as the environmental conditions in which the crane must operate.

The following parameters must be considered carefully on selecting the crane:

- **Capacity**: it must always be higher with respect to the sum of the weight of the maximum load to be lifted and any lifting accessories (sling bars, grippers, suction devices, magnets, etc.).

- **Operational dimensions**: the height quota off the trolley runner girder that determines the hoist hook travel, the crane gauge, the length of the track and the pitch of its suspensions, must be selected in a way to guarantee operational cover of the space to be served in consideration of the surrounding clearance.

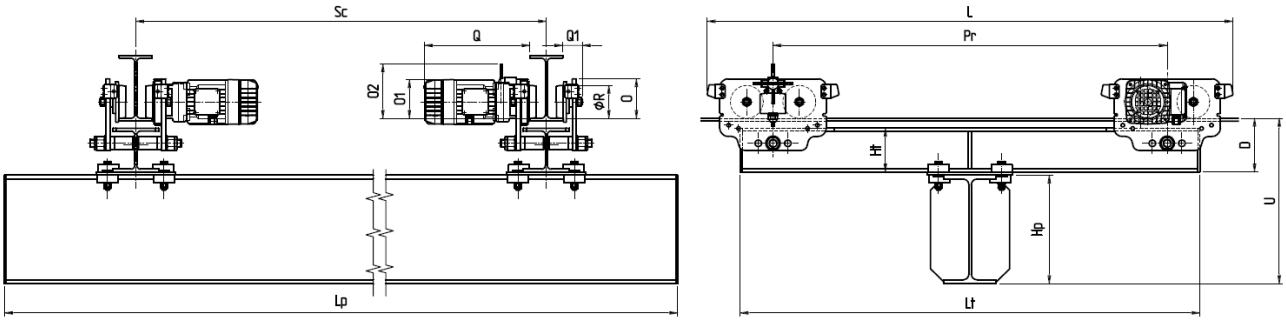
- **The nature of the load**: delicate or not, due to its positioning determines the most suitable choice of lifting speed. In some cases it is essential to use two-speed hoists with slow positioning speed.

- **The environment of use**: suspended mono-girder bridge cranes are envisioned for service indoors and/or in a covered environment, protected from weather and wind-free conditions. Suitable measures must be taken for outdoor operation.

- **The frequency of use**: if use is very high (frequent and/or repeated manoeuvres) with loads nearing maximum capacity or use over long tracks, consequent operator fatigue due to manual handling must be considered.

	**The correct assessment of the parameters indicated above, if they should result near to limit values, can lead to the requirement of a crane with higher performance features which, once downgraded, can guarantee increased rigidity and lower traversing and running effort.**

2.2.2 Features and technical data - Clearance – Weights (single end carriage)

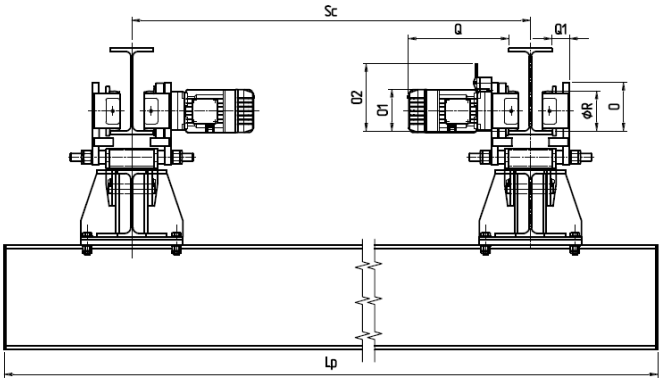


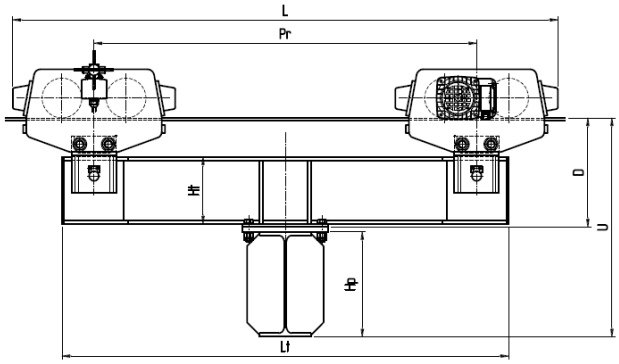
Suspended bridge DPS1 – Capacity 1000 kg – Hoist DMK																	
Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm) Girder			
	Pr	Girder HEA		Lt	L	D	ØR	O	O1	O2	Q	Q1	Weight	End carriage torque code				
m		Type	Ht										kg		Type	Hp	Lp	U
3	1200	100	96	1400	1562	125	80	98	108	165	316	54	73	T112I03	IPE200	200	3600	335
														T112H03	HEA220	210		345
4														T112I04	IPE240	240	4800	375
														T112H04	HEA220	210		345
5														T112I05	IPE240	240	6000	375
														T112H05	HEA220	210		345
6														T112I06	IPE240	240	7000	375
														T112H06	HEA220	210		345
7														T112I07	IPE270	270	8000	405
														T112H07	HEA220	210		345
8	1500	120	114	1700	1862	143	80	98	108	165	316	54	84	T115I08	IPE300	300	9000	453
														T115H08	HEA220	210		363
9														T115I09	IPE330	330	10000	483
														T115H09	HEA240	230		383
10														T115I10	IPE360	360	11000	513
														T115H10	HEA260	250		403
11	1800	140	133	2000	2162	162	80	98	108	165	316	54	100	T118I11	IPE360	360	12000	532
														T118H11	HEA260	250		422
12														T118I12	IPE400	400	13000	572
														T118H12	HEA280	270		442

For VdC with upper wing at 220 mm, increase the quotas D and U by 60 mm with end carriage 1200, by 42 mm with end carriage 1500 and by 23 mm with end carriage 1800

Suspended bridge DPS2 – Capacity 2000 kg – Hoist DMK																	
Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm) Girder			
	Pr	Girder HEA		Lt	L	D	ØR	O	O1	O2	Q	Q1	Weight	End carriage Torque code				
m		Type	Ht										kg		Type	Hp	Lp	U
3	1200	120	114	1400	1602	145	100	120	118	165	322	60	98	T212I03	IPE270	270	3600	425
														T212H03	HEA220	210		365
4														T212I04	IPE330	330	4800	485
														T212H04	HEA220	210		365
5														T212I05	IPE330	330	6000	485
														T212H05	HEA220	210		365
6		140	133			164							105	T212I06	IPE330	330	7000	504
														T212H06	HEA240	230		404
7														T212I07	IPE330	330	8000	504
														T212H07	HEA240	230		404
8	1500	160	152	1700	1902	183	100	120	118	165	322	60	123	T215I08	IPE360	360	9000	553
														T215H08	HEA260	250		443
9														T215I09	IPE400	400	10000	593
														T215H09	HEA280	270		463
10														T215I10	IPE450	450	11000	643
														T215H10	HEA300	290		483
11	1800	160	152	2000	2202	183	100	120	118	165	322	60	132	T218I11	IPE450	450	12000	643
														T218H11	HEA320	310		503
12														T218I12	IPE500	500	13000	693
														T218H12	HEA320	310		503

For VdC with upper wing at 220 mm, increase the quotas D and U by 37 mm with end carriage 1200 and girder HEA120 and by 18 mm with end carriage 1200 and girder HEA140



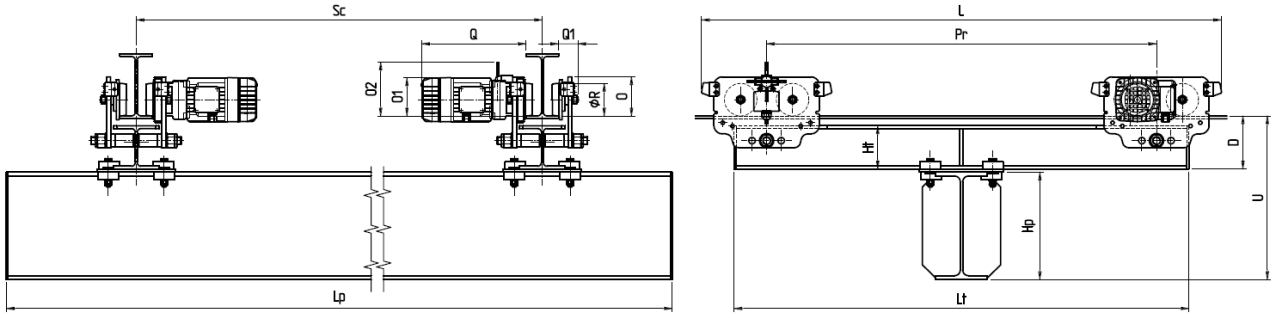


Suspended bridge DPS3 – Capacity 3200 kg – Hoist DMK

Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm)			
	Pr	Girder HEA										Weight	End carriage	Girder			
m		Type	Ht	Lt	L	D	ØR	O	O1	O2	Q	Q1	kg	Torque code	Type	Hp	Lp	U
3	1200	220	210	1400	1710	343	125	155	130	211	316	55	240	T312I03	IPE270	270	3500	628
														T312H03	HEA240	230		588
4														T312I04	IPE330	330	4700	688
														T312H04	HEA240	230		588
5														T312I05	IPE330	330	5800	688
														T312H05	HEA240	230		588
6														T312I06	IPE360	360	7000	718
														T312H06	HEA260	250		608
7														T312I07	IPE400	400	8000	758
														T312H07	HEA280	270		628
8	1500	240	230	1700	2010	363	125	155	130	211	316	55	272	T315I08	IPE450	450	9000	828
														T315H08	HEA300	290		668
9														T315I09	IPE450	450	10000	828
														T315H09	HEA320	310		688
10														T315I10	IPE500	500	11000	878
														T315H10	HEA340	330		708
11	1800	240	230	2000	2310	363	125	155	130	211	316	55	292	T318I11	IPE550	550	12000	928
														T318H11	HEA360	350		728
12														T318I12	IPE600	500	13000	978
														T318H12	HEA400	390		768

Suspended bridge DPS4 – Capacity 4000 kg – Hoist DMK

Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm)			
	Pr	Girder HEA										Weight	End carriage	Girder			
m		Type	Ht	Lt	L	D	ØR	O	O1	O2	Q	Q1	kg	Torque code	Type	Hp	Lp	U
3	1200	220	210	1400	1710	343	125	155	130	211	316	55	240	T412I03	IPE330	330	3500	688
														T412H03	HEA240	230		588
4														T412I04	IPE330	330	4700	688
														T412H04	HEA240	230		588
5														T412I05	IPE360	360	5800	718
														T412H05	HEA260	250		608
6		240	230			363							255	T412I06	IPE360	360	7000	738
														T412H06	HEA280	270		648
7														T412I07	IPE400	400	8000	778
														T412H07	HEA300	290		668
8	1500	260	250	1700	2010	383	125	155	130	211	316	55	288	T415I08	IPE450	450	9000	848
														T415H08	HEA320	310		708
9														T415I09	IPE500	500	10000	898
														T415H09	HEA340	330		728
10														T415I10	IPE550	550	11000	948
														T215H10	HEA360	350		748
11	1800	260	250	2000	2310	383	125	155	130	211	316	55	310	T418I11	IPE600	600	12000	998
														T418H11	HEA400	390		788
12														T418I12	IPE600	600	13000	998
														T418H12	HEA400	390		788

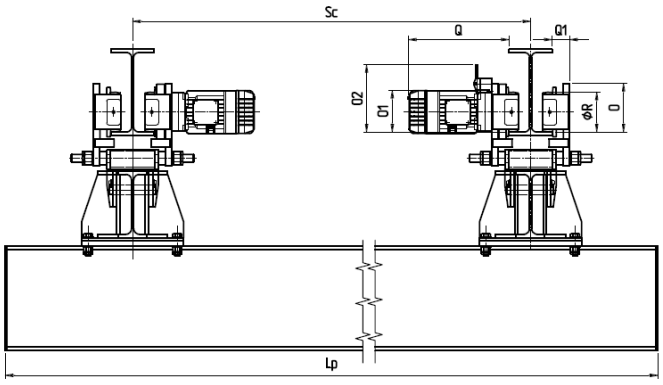


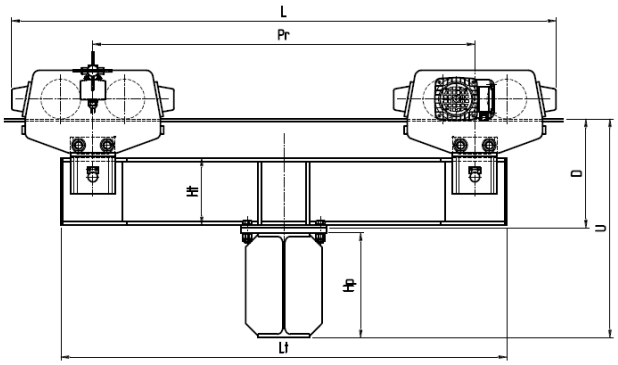
Suspended bridge DPS1 – Capacity 1000 kg – Hoist DRH1																	
Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm)			
	Pr	Girder HEA		Lt	L	D	ØR	O	O1	O2	Q	Q1	Weight	End carriage	Girder			
m		Type	Ht										kg	Torque code	Type	Hp	Lp	U
3	1800	100	96	2000	2162	125	80	98	108	165	316	54	83	T118J03	IPE240	240	3600	375
														T118K03	HEA240	230		365
4														T118J04	IPE240	240	4800	375
														T118K04	HEA240	230		365
5														T118J05	IPE240	240	6000	375
														T118K05	HEA240	240		365
6		120	114			143							90	T118J06	IPE240	240	7000	393
														T118K06	HEA240	230		383
7														T118J07	IPE270	270	8000	423
														T118K07	HEA240	230		383
8														T118J08	IPE330	330	9000	483
														T118K08	HEA240	230		383
9														T118J09	IPE330	330	10000	483
														T118K09	HEA240	230		383
10														T118J10	IPE360	360	11000	513
														T118K10	HEA260	250		403
11		140	133			162							100	T118J11	IPE400	400	12000	572
														T118K11	HEA280	270		442
12														T118J12	IPE400	400	13000	572
														T118K12	HEA300	290		462

For VdC with upper wing at 220 mm, increase the quotas D and U by 60 mm with end carriage HEA100, by 42 mm with end carriage HEA120 and by 23 mm with end carriage HEA140

Suspended bridge DPS2 – Capacity 2000 kg – Hoist DRH1																	
Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm)			
	Pr	Girder HEA		Lt	L	D	ØR	O	O1	O2	Q	Q1	Weight	End carriage	Girder			
m		Type	Ht										kg	Torque code	Type	Hp	Lp	U
3	1800	120	114	2000	2202	145	100	120	118	165	322	60	110	T218J03	IPE300	300	3600	455
														T218K03	HEA240	230		385
4														T218J04	IPE330	330	4800	485
														T218K04	HEA240	230		385
5		140	133			164							120	T218J05	IPE330	330	6000	504
														T218K05	HEA240	230		404
6														T218J06	IPE330	330	7000	504
														T218K06	HEA240	230		404
7														T218J07	IPE330	330	8000	504
														T218K07	HEA260	250		424
8		160	152			183							132	T218J08	IPE360	360	9000	553
														T218K08	HEA280	270		463
9														T218J09	IPE400	400	10000	593
														T218K09	HEA300	290		483
10														T218J10	IPE450	450	11000	643
														T218K10	HEA300	290		483
11														T218J11	IPE500	500	12000	693
														T218K11	HEA320	310		503
12														T218J12	IPE500	500	13000	693
														T218K12	HEA340	330		523

For VdC with upper wing at 220 mm, increase the quotas D and U by 37 mm with end carriage HEA120 and by 18 mm with end carriage HEA140





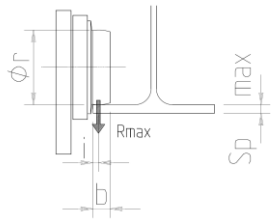
Suspended bridge DPS3 – Capacity 3200 kg – Hoist DRH1																	
Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm)			
	Pr	Girder HEA											Weight	End carriage	Girder			
m		Type	Ht	Lt	L	D	ØR	O	O1	O2	Q	Q1	kg	Torque code	Type	Hp	Lp	U
3	1800	220	210	2000	2310	343	125	155	130	211	316	55	270	T318J03	IPE360	360	3500	718
														T318K03	HEA300	290		648
4														T318J04	IPE360	360	4700	718
														T318K04	HEA300	290		648
5														T318J05	IPE360	360	5800	718
														T318K05	HEA300	290		648
6														T318J06	IPE360	330	7000	718
														T318K06	HEA300	290		648
7														T318J07	IPE400	400	8000	758
														T318K07	HEA300	290		648
8		240	230			363							293	T318J08	IPE450	450	9000	828
														T318K08	HEA300	290		668
9														T318J09	IPE450	450	10000	828
														T318K09	HEA320	310		688
10														T318J10	IPE500	500	11000	878
														T318K10	HEA340	330		708
11														T318J11	IPE550	550	12000	928
														T318K11	HEA360	350		728
12														T318J12	IPE600	600	13000	978
														T318K12	HEA400	390		768

For bridge guages from 3 to 10 m possibility of end carriages with Wheel Pitch 1500, but only with hoist trolley DST1 Normal (end carriage torque code T315...)

Suspended bridge DPS4 – Capacity 4000 kg – Hoist DRH1																	
Sc	End carriage (Dimensions mm)													Bridge (Dimensions mm)			
	Pr	Girder HEA											Weight	End carriage	Girder			
m		Type	Ht	Lt	L	D	ØR	O	O1	O2	Q	Q1	kg	Torque code	Type	Hp	Lp	U
3	1800	220	210	2000	2310	343	125	155	130	211	316	55	270	T418J03	IPE500	500	3500	858
														T418K03	HEA320	310		668
4														T418J04	IPE500	500	4700	858
														T418K04	HEA320	310		668
5														T418J05	IPE500	500	5800	858
														T418K05	HEA320	310		668
6		240	230			363							293	T418J06	IPE500	500	7000	878
														T418K06	HEA320	310		688
7														T418J07	IPE500	500	8000	878
														T418K07	HEA320	310		688
8		260	250			383							310	T418J08	IPE500	500	9000	898
														T418K08	HEA320	310		708
9														T418J09	IPE500	500	10000	898
														T418K09	HEA340	330		728
10														T418J10	IPE550	450	11000	948
														T218K10	HEA360	350		748
11														T418J11	IPE600	500	12000	998
														T418K11	HEA400	390		788
12		280	270			403							320	T418J12	IPE600	600	13000	1018
														T418K12	HEA450	440		858

For bridge guages from 3 to 10 m possibility of end carriages with Wheel Pitch 1500, but only with hoist trolley DST1 Normal (end carriage torque code T415...)

Trolley wheels maximum reaction on the track girder wing

Size DPS	Max capacity (kg)	Trolley type DMT	Clearance (mm) ør	i	b	*R max (kg)	Sp max	
1	1000	EM3	80	7	16	250	22	
2	2000	EM4	100	9	19	500	24	
3	3200	EM5	125	14	29	1000	20	
4	4000	EM5	125	14	29	1000	20	

Technical and electrical features of our bridge traversing motors

End carriage type	Motor type	Poles	Power kW	Speed m/min	Cos φ	50Hz-(In) 50Hz 400V A
DPS1-2-3-4	80C8ST2/1	8	0.17	11	0.5	2.6(1.6)
DPS1-2-3-4	80C6ST2/1	6	0.25	14	0.5	3.8(1.2)
DPS1-2-3-4	80C4ST2/1	4	0.37	22	0.7	4.4(1.7
DPS1-2-3-4	80C5ST2/1	4/12	0.25/0.08	7/22	0.54/0.7	4.5/1.8(1.4/1.2)
DPS1-2-3-4	80C4ST2/1	4 Inverter	0.37	22	0.7	4.4(1.7)
DPS1-2-3-4	80C9ST2/1	12	0.12	7	0.5	3.5(1.1)

3. – SAFETY AND ACCIDENT-PREVENTION

Suspended mono-girder bridge cranes manufactured using donati kits must be designed and built on the basis of the most modern technical know-how and can be used safely.
Hazards for staff can be totally eliminated and/or greatly reduced if the crane is used in compliance with the instructions given in this documentation and by authorised ad appropriately trained staff, with sufficient preparation.

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

- Installation and completion of the bridge crane regarding any missing parts (e.g. hoist, electric commands, fixing accessories, etc.);
- Commissioning the crane and management of operation;
- Inspections and controls of the crane and its components, before start-up, during operation or however after shutdown.
- Maintenance of the crane, repair and/or replacement of its components.
- The staff must be informed regarding the potential hazards that can be met when performing their tasks and regarding operation and correct use of the safety devices available on the machine.
- The staff must also comply with the safety regulations contained in this chapter in order to prevent hazardous situations occurring.

3.1 Qualifications of authorised operators

To better define the field of intervention and the consequent assumption of liability of each individual OPERATOR, given by the specific training and qualification attained, the following table of professional profiles with relative pictogram has been drawn-up, necessary in all types of intervention.

PICTOGRAM	OPERATOR PROFILE
 OPERATOR	**Operator assigned to use of the suspended bridge crane:** Staff enabled to perform simple tasks, i.e. running the crane using the commands and load/unload operations of the material being handled.
 MAINTENANCE MECHANIC	**Maintenance mechanic:** Qualified staff able to intervene on the crane in normal conditions, to perform normal adjustments on mechanisms, routine maintenance interventions and mechanical repairs.
 MAINTENANCE ELECTRICIAN	**Maintenance electrician:** Qualified staff able to intervene on the crane in normal conditions and responsible for normal interventions of an electrical nature, adjustments, maintenance and repairs. He can operate with the presence of voltage inside the control boards.
 MECHANICAL TECHNICIAN	**Mechanical technician:** Qualified technician and authorised to perform operations of a complex and extraordinary mechanical nature.
 ELECTRICAL TECHNICIAN	**Electrical technician:** Qualified technician and authorised to perform operations of a complex and extraordinary electrical nature.

3.2 General safety regulations

Before putting the suspended mono-girder bridge crane into service, it is necessary to:

- Carefully read the technical documentation;
- Obtain information regarding operation and positioning of the emergency stop devices;
- Know which safety devices are installed on the crane and their location;

Some activities to be performed on components operating (e.g. replacement of the hoist chain) expose the operators to serious danger; the following rules must therefore be complied with scrupulously:

- The staff must be authorised and appropriately trained regarding the operational procedures to be followed, the hazardous situations that could occur and the correct methods for preventing them.
- If, exceptionally, to allow the execution of a particular specialist technical maintenance intervention, inspection or repair, the staff responsible must completely or partially open or remove the protective guards, it will be his duty to immediately restore the guard involved at the end of the operations. The staff assigned must also make sure that no foreign objects are left on the crane at the end of the intervention, in particular mechanical pieces, tools or devices used, which could cause damage or malfunctioning.
- Before starting their activity and within the limits of possibility, in order to safeguard their own safety, the staff assigned to maintenance, inspection and repair operations must implement all of the preventive safety measures, and in particular check that:
- The crane has been deactivated and all preventive measures have been taken (warning signs, blocking devices etc.) to prevent accidental start-up. To allow a technical intervention to be performed on an electrical device, great care and caution must be given in the presence of voltage.

3.3 Safety signs

Signs and pictograms are used in the manual and in the hazardous areas to highlight or recall any hazardous situations due to residual risks or actions that must be performed according to the safety procedures indicated in this manual.

SIGNS USED TO INDICATE HAZARDS	
SIGN	MEANING
 DANGER LIVE PARTS	**Voltage presence sign** found affixed to electrical equipment and on any structure enclosing electric voltage.
 GENERAL HAZARD	**Attention general hazard** (completed by caption that indicates the type)
 CRUSHING HAZARD	**Attention crushing hazard** for moving mechanical parts
 ENTANGLEMENT HAZARD	**Attention entanglement and dragging hazard** for moving parts (chains, wheels, etc.)
 SUSPENDED LOADS HAZARD	**Attention suspended loads hazard** which are handled by crane

SIGNS USED TO INDICATE PROHIBITIONS	
SIGN	MEANING
 DO NOT REMOVE GUARDS	**It is prohibited to remove safety devices when the machine is running.**
 DO NOT MANOEUVRE	**It is prohibited to perform manoeuvres during maintenance of mobile parts.**

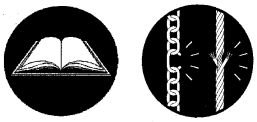
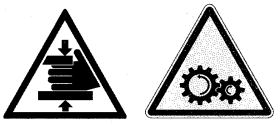
SIGNS USED TO INDICATE OBLIGATIONS	
SIGN	MEANING
 CONSULT THE MANUAL	**Consult the manual when this sign appears,** preceding or within an indication (instructions, registrations, maintenance, etc.).
 HAND PROTECTION MUST BE WORN	**Protective gloves must be worn.**
 HELMET MUST BE WORN	**A protective helmet must be worn.**
 PROTECTIVE FOOTWEAR MUST BE WORN	**Accident-prevention and slip-proof footwear must be worn.**
 SAFETY HARNESS MUST BE WORN	**The use of safety harnesses in operations at a height with fall risk is mandatory.**
 CHECK LIFTING COMPONENTS	**The prior check of chains, ropes, hooks, harnesses and accessories used for lifting and handling is mandatory.**

SIGNS USED FOR SAFETY INDICATIONS	
SIGN	MEANING
 AUXILIARY LIGHTING	**The use of auxiliary lighting is recommended for the interventions indicated.**

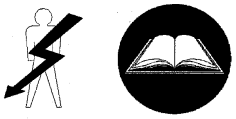
3.4 Warnings regarding residual risks

After careful consideration of the hazards present in all operational phases of the bridge crane, where possible, necessary measures have been taken to eliminate the risks for the operators and/or to limit or reduce the risks deriving from hazards that cannot be totally eliminated at the source. However, in spite of all of the precautions taken, the following **residual risks** remain on the machine, which can be eliminated or reduced through the relative prevention activities:

RISKS DURING USE

HAZARD/RISK	PROHIBITION/WARNING	OBLIGATION/PREVENTION
 **Crushing hazard** during handling of loads in the case of exposure of the operator or other staff in zones/areas affected by the trajectory of the load.	 • **It is prohibited** to lift loads while persons transit in the relative manoeuvre area. • **It is prohibited** to transit, stop, operate and manoeuvre under the suspended load.	 • The operator must follow the indications in order to obtain the best safety by complying with the prescriptions contained in this manual. • Periodic checks of the rope and hook are mandatory.
 **Entanglement and/or crushing hazard** following contact with the running bridge and/or with the mobile elements of the trolley/hoist.	 • **Attention!** Exposure to moving parts can create hazardous situations. • **It is prohibited** to touch the crane girder/s and the moving trolley/hoist or expose oneself to the trajectory of the same.	 • Use of gloves mandatory during harnessing and handling the load by pushing.

RISKS DURING MAINTENANCE

HAZARD/RISK	PROHIBITION/WARNING	OBLIGATION/PREVENTION
 **Electrocution – electric shock hazard** in the case of maintenance of the electrical equipment without having disconnected the electric power supply.	 • **It is prohibited** to intervene on the electric equipment before having disconnected the bridge crane from the electric line.	 • Entrust the electrical maintenance operations to qualified staff. • Perform the checks of the electrical equipment prescribed in the manual.
 **Crushing hazard** in the event of contact with moving parts, pushed and not braked, of the bridge crane.	 • **Attention!** Exposure to moving parts can create hazardous situations.	 • Entrust the maintenance operations of the bridge crane to qualified staff. • Use protective gloves and, if necessary, safety harnesses.

3.5 Safety devices and indications

3.5.1 Command devices

The standard bridge crane command functions have three main movements:

- **vertical**; lifting the load via the electric hoist with chain or rope.
- **transversal**; traversing of the load via movement of the hoist-support trolley.
- **longitudinal**; running of the bridge crane along the tracks via the end carriages.

These movements are activated by the push-button panel buttons and precisely (fig.4):

- UP and DOWN buttons for the LIFTING movement of the hoist.
- RIGHT and LEFT buttons to command the TRAVERSING movement of the trolley.
- FORWARD and BACKWARD buttons to command the RUNNING movement of the crane
- ➢ The buttons activate the function if they are pressed and held; when two speeds are envisioned, they are activated with "shift" type buttons with two clicks: the first to command the "slow" speed and the second to command the “fast” speed.
- ➢ The EMERGENCY STOP button present on the push-button panel is red and has a mushroom-shape and activates the STOP function when it is pressed (fig.5). For the crane to function again, the STOP/EMERGENCY button must be turned until it is to allow running (fig.6) and the green START – ALARM button must then be pressed.

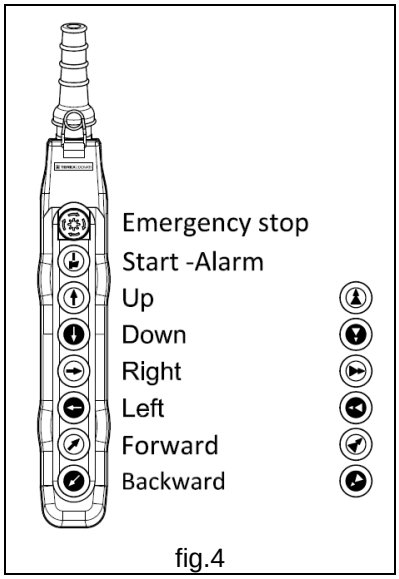


fig.4

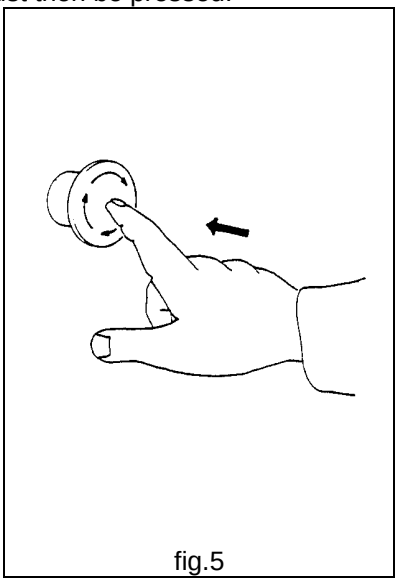


fig.5

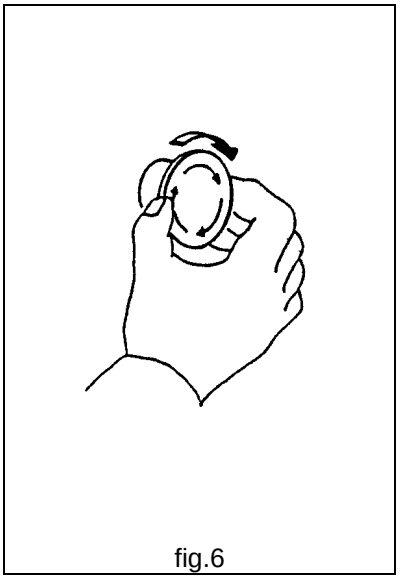


fig.6

3.5.2 Safety and emergency devices

The kits for the suspended mono-girder bridge cranes are supplied with the following safety and emergency devices:

1. **Trolley end run**, mechanical stops that delimit the maximum transversal travel of the trolley along the bridge girders/s (fig.7)
2. **End carriage end run**, mechanical stops delimit the maximum longitudinal travel of the bridge along the runways.(fig.8)

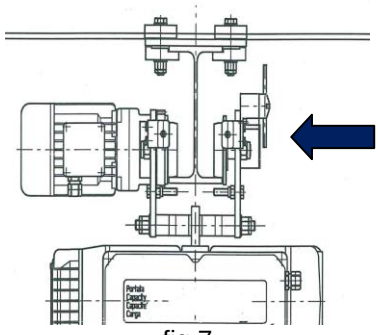


fig.7

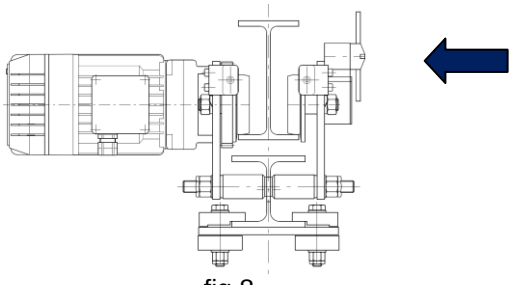


fig.8

⚠	• **When part of the supply, the electric limit switches are not connected!** • **Before commissioning the “DPS” suspended bridge crane, it is mandatory to install and connect the electric limit switches, checking that they intervene correctly as described in paragraph 4.4 “Commissioning”.**

3.5.3 Warning and signalling devices – Plate summary

The kit for the suspended mono-girder bridge cranes is supplied with the following warning and signalling devices (fig.9):

Plates present on the machine:

-hoist and trolley plates
-end carriage data plate (fig.9a)
-electric equipment plate (fig.9b)

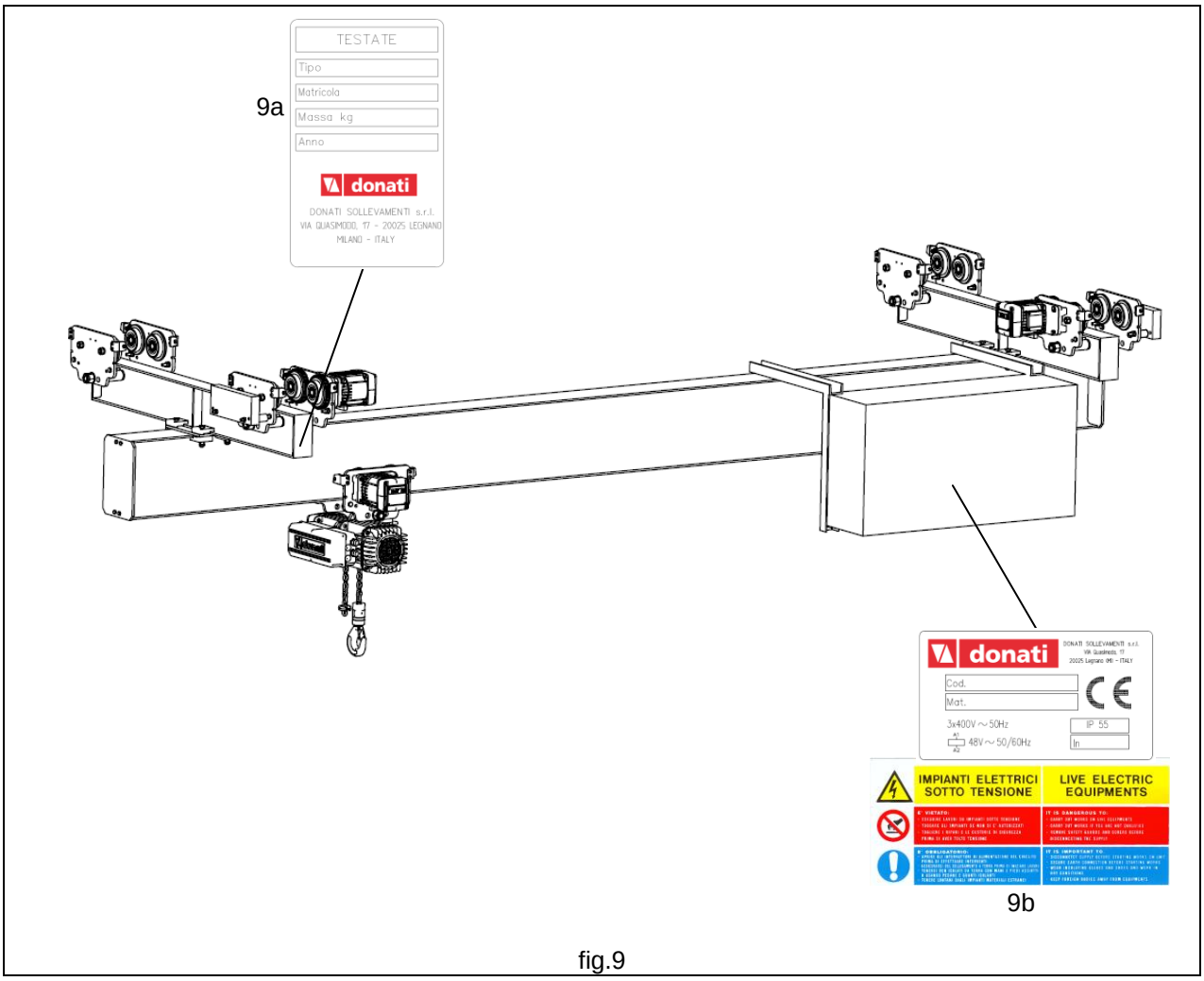


fig.9

Legibility and preservation of the plates
The data on the plates must always be legible; they must be cleaned periodically.
Whenever a plate deteriorates and/or even just one of the pieces of information given on the plate is no longer legible, a new plate must be requested from the manufacturer, stating the data contained in this manual or on the original plate, and the plate must be replaced.

!	**The plates must never be removed and it is prohibited to affix other plates onto the crane without previous authorisation from the manufacturer.**

4. - HANDLING - INSTALLATION - COMMISSIONING

4.1 – General notes on delivery

- **The DPS series suspended mono-girder bridge crane kits are delivered with their main parts not assembled.**
- **The manufacturer must therefore proceed with the installation of the bridge crane kit, following the instructions contained in this chapter and entrusting assembly to specialised fitters.**

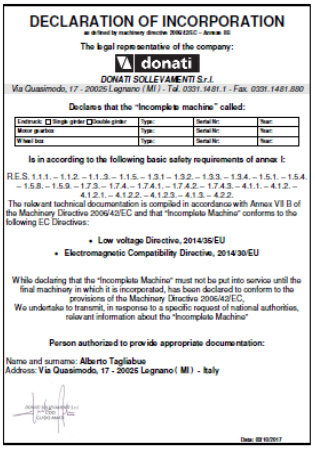
- **Due to the delicacy and importance of the operations described in this chapter, if performed badly, they can lead to serious risks for the safety and wellbeing of persons exposed during the installation phases and use of the crane.**
- **Therefore, they must be performed by professionally qualified staff with specialisation in assembly of industrial plants, with skills in electro-mechanics, supplied with work and personal protection equipment in compliance with current legislative provisions on the subject of accident-prevention and safety in the workplace, after having carefully read this publication.**

On receipt of the supply, check and ascertain that:

- The delivery data (recipient's address, n° packs, etc.) corresponds to that contained in the accompanying documentation (transport document and/or any packing-list).
- The documentation includes (fig.10):

- The "User Instruction" manual.
- The Declarations of incorporation IIB.
- The hoist and trolley control register is part of the supply.
- The instructions for use of the hoist and/or trolley to install on the crane, if part of the supply.
- The packaging, if part of the supply, is in a good state, integral and damage-free.

In the event of damage and missing parts, inform the carrier of the anomaly, writing "with reserve" on the accompanying document and inform donati within eight days from receipt of the goods.


DECLARATION OF INCORPORATION

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 that the "Incomplete machine" called:

Endtrucks: ☐ Single girder ☐ Double girder	Type:	Serial Nr:	Year:
Motor gearbox	Type:	Serial Nr:	Year:
Wheel box	Type:	Serial Nr:	Year:

Is in according to the following basic safety requirements of annex I:

R.E.S. 1.1.1. – 1.1.2. – 1.1.3. – 1.1.5. – 1.3.1 – 1.3.2. – 1.3.3. – 1.3.4. – 1.5.1. – 1.5.4. – 1.5.8. – 1.5.9. – 1.7.3. – 1.7.4. – 1.7.4.1. – 1.7.4.2. – 1.7.4.3. – 4.1.1. – 4.1.2. – 4.1.2.1. – 4.1.2.2. – 4.1.2.3. – 4.1.3. – 4.2.2.

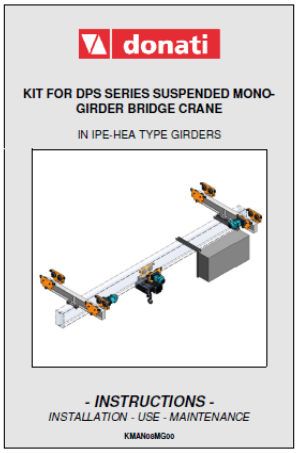
The relevant technical documentation is compiled in accordance with Annex VII B of the Machinery Directive 2006/42/EC and that "Incomplete Machine" conforms to the following EC Directives:

- Low voltage Directive, 2014/35/EU
- Electromagnetic Compatibility Directive, 2014/30/EU

While declaring that the "Incomplete Machine" must not be put into service until the final machinery in which it is incorporated, has been declared to conform to the provisions of the Machinery Directive 2006/42/EC.
We undertake to transmit, in response to a specific request of national authorities, relevant information about the "Incomplete Machine"

Person authorized to provide appropriate documentation:

Name and surname: Alberto Tagliabue
Address: Via Quasimodo, 17 - 20025 Legnano (MI) - Italy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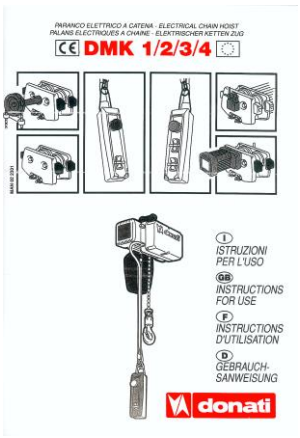
KIT FOR DPS SERIES SUSPENDED MONO-GIRDER BRIDGE CRANE

IN IPE-HEA TYPE GIRDERS

- INSTRUCTIONS -
INSTALLATION - USE - MAINTENANCE

KMAN08MG00


PARANCO ELETTRICO A CATENA - ELECTRICAL CHAIN HOIST
PALANS ELECTRIQUES A CHAINE - ELEKTRISCHER KETTEN ZUG

CE DMK 1/2/3/4

I ISTRUZIONI PER L'USO
GB INSTRUCTIONS FOR USE
F INSTRUCTIONS D'UTILISATION
D GEBRAUCH-SANWEISUNG

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fig.10

4.2 Packaging, transport and handling

☞	**Before moving the bridge crane and relative accessories, it is good practice to know that:**

4.2.1 Standard packaging

- The framework parts are generally supplied without packaging. When necessary, the lifting points are identified on the packs to ease handling during transport and installation operations.
- To facilitate handling and assembly operations of the lifting unit, if part of the supply, it can be delivered in a cardboard box (with or without pallet) or, when envisioned, in a wooden crate or cage or just simply on a pallet.
- When the lifting unit is delivered on a pallet, it is generally covered with a polyethylene film protection against dust.
- Any other accessories that are part of the supply (e.g. electric plant components), can be delivered inside cardboard boxes which, in relation to the mass to handle, can be with or without pallet.
- The standard packaging is not waterproof against rain and is envisioned for destinations reached by road and not by sea, for covered and non-humid environments. Therefore, particular packaging or protections are excluded from the supply, unless they have been envisioned in the contract.
- When necessary, the packaging can have signs and pictograms, which provide important information regarding handling and transport (mass, pick-up points, storage information, etc.) - (fig.11).
- The appropriately preserved packs can be stored for a period of approx. two years in covered environments with a temperature between - 20°C and + 60°C and relative humidity of 80%. Specific packaging is required for different environmental conditions.

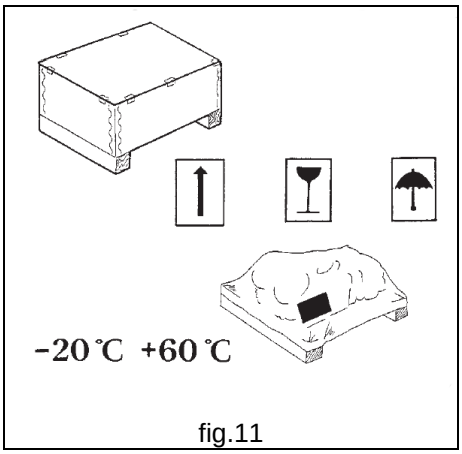


fig.11

4.2.2 Transport

- Transport must be performed by qualified carriers that can guarantee that the material transported is handled correctly.
  - During transport, avoid placing packs onto parts of the crane or other packaged parts, which could cause damage.
  - During the transport phases, it is recommended that the pallets, i.e. the crates/cages are not tilted or overturned to prevent dangerous variations of their barycentre and therefore constantly guarantee the best stability.

☞	**donati does not assume any liability in the case of transport under the customer's responsibility or by carriers chosen by the same.**

4.2.3 Handling

	**To handle, proceed as follows:**	

- Prepare a delimited and suitable area, with flat floor or base, for the unloading and assembly operations of all components on the ground.
- Depending on the type of part/component or packaging envisioned, prepare the equipment necessary for unloading and handling of the parts of the crane in which the kit is incorporated and its accessories, taking into account their weight, clearance and the pick-up and/or suspension elements.
- Prepare suitable wooden cross-members with suitable dimensions to be positioned below the packs of framework to be handled.
- Unloading and handling can be performed by crane (e.g. mobile cranes, bridge cranes, etc.) or lifting trucks with suitable capacity and features; the use of special equipment is not required
- The packs of accessories weighing less than 30 kg (differently to those weighing more than 30 kg), do not indicate any weight and can be handled manually.
- Heavy packs must be harnessed using suitable equipment so as not to damage the painted surfaces.
- Pick-up the parts of the crane and its accessories using suitable harnessing and handle with care in the area set-up for unloading, avoiding dangerous oscillations, swinging and unbalancing.
- After handling, check that the parts and packs are integral and undamaged.

	• **Parts of the crane and relative accessories must be handled with great care and using adequate lifting and transport devices, in a way not to generate hazards due to the risk of loss of stability.** • **All parts or components must be positioned or fixed well in all handling, transport and storage phases and must not be overturned or placed in a vertical position.**

4.2.4 Removal from the packaging and/or control of the components

- In the case of packaged products, open the package and extract the various parts using suitable equipment selected in relation to their mass and pick-up points.
- Check the integrity of all materials making up the supply and that there are no missing parts and/or accessories. Inform the manufacturer of any damaged or missing items immediately.
- If the material is to be stored, follow the instructions in paragraph 4.5.1 “Storage and preservation of the parts".

	• **Check the integrity of all parts and in particular, control that:**
	  • **there is no crushing, deformations, cracking or broken parts.**
	  • **there is no damage to the components of an eventual electric plant.**
	• **Envision the disposal of al packaging according to that prescribed by the regional laws on the subject in relation to their nature (wood, plastic, cardboard), following separate selection.**

4.3 – Installation of the suspended mono-girder bridge crane into which the kit is incorporated

4.3.1 Tasks and responsibilities of the fitter

- **Due to the importance of the operations, if the installation of the bridge crane is not performed correctly, it can lead to <u>serious risks for the safety of the persons</u> exposed both in the assembly phase and in successive use of the crane. Therefore, where not performed by the manufacturer, it must be entrusted to fitters specialised in assembly of industrial plants.**
- **The lifting operations and positioning at a height of the parts of the crane must be performed by fitters equipped with:**
  - **suitable and adequate P.P.E.** (e.g. helmet, gloves, harnessing, etc.)**.**
  - **equipment** (e.g. lifting truck, scaffolding, etc.) **suitable for the purpose.**
  - **And following careful assessment of the following parameters:**
  - **environmental features of the work place** (e.g. walkway, etc.).
  - **height of the work surface with respect to the loading surface.**
  - **dimensions and weight of the parts to install.**
  - **spaces available for handling the parts to install.**

Before assembling the parts and commissioning the bridge crane, the fitter must ensure that the crane features are compliant with that required and the intended use and, in particular:

1. The capacity of the crane ≥ with respect to the loads to be lifted.
2. The fixing structures (pillars, walls, ceilings, girders, trusses, machine bodies, etc.) have been **"Declared suitable"** by the customer or by the expert technicians, engaged by the customer itself.
3. The features of the lifting unit (trolley/hoist), when not part of the supply, are compatible with those of the suspended mono-girder crane in relation to: (fig.12)
   - **Hoist capacity:** must be ≤ with respect to the capacity of the bridge crane.
   - **Weight of the trolley/hoist:** must be ≤ with respect to the maximum values envisioned.
   - **Lifting speed:** must be ≤ with respect to the maximum values accepted.
   - **Trolley/hoist clearance:** must be ≤ with respect to the maximum values accepted.
   - **Trolley wheels reactions:** must be ≤ with respect to the maximum values accepted.

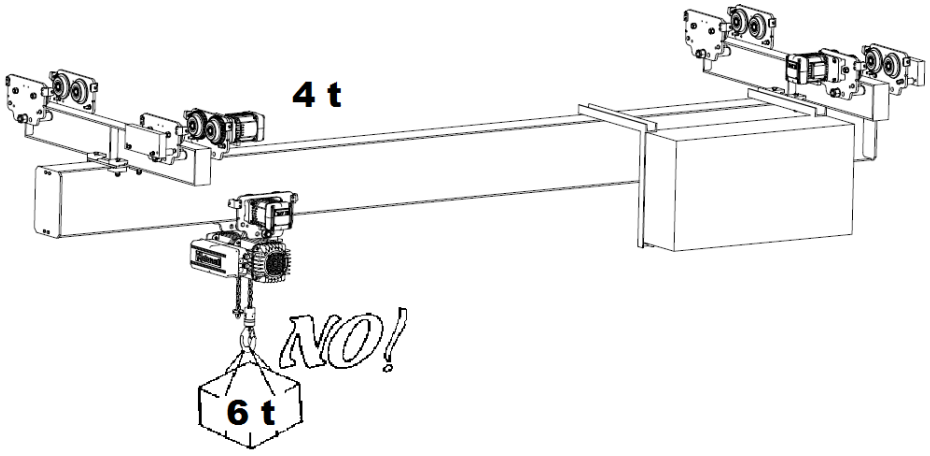


fig.12

Following installation of the suspended bridge crane, the fitter must:

1. Perform **"Commissioning"**, as described in paragraph 4.4.
2. Draw-up the **"Inspection" report** and approve the **"Suitability for use"** of the bridge crane.

4.3.2 Preparation of the place of installation

	To allow installation of the suspended bridge crane, first perform the following operations:	

- Ascertain the presence of the declaration of suitability of the support/fixing structures.
- Ascertain the absence of obvious defects in the support/fixing structures.
- Check the suitability of the spaces available for manoeuvres of the bridge crane, especially if operating in areas where other cranes or machinery are present.
- Check the gauges, which must be measured in at least three points of the shed (two near to the ends and one in a central position).
- Check the suitability and correct operation of the mains power supply electric plant: (fig.13)

1) correspondence of the power supply line voltage with the voltage envisioned for the motors;
2) presence and suitability of the electric line switch/isolating switch;
3) adequacy of the power supply electric line cable section;
4) presence and suitability of the earth plant;

- Prepare the masses for the **dynamic tests** equal to: **rated capacity x 1.1**
- Prepare the masses for the **static tests** equal to: **rated capacity x 1.25**
- Prepare the equipment for harnessing and lifting the masses for the load tests
- Check the presence of signs that inform of the risks due to handling via crane.

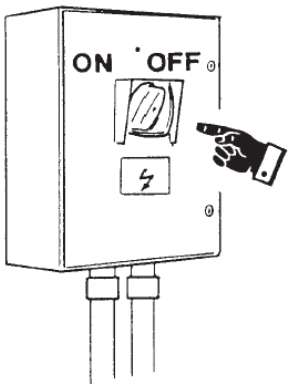


fig.13

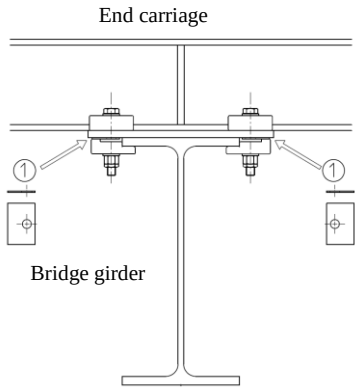
4.3.3 Assembly of the suspended mono-girder crane

	-The installation, assembly, commissioning and inspection activities are entrusted to specialised and highly trained staff and/or staff trained by the manufacturer. **-In this section, the manual contains just the instructions relative to the operations under the fitter's responsibility.**	

4.3.4 Connection of the bridge girder (indicated but not supplied) and end carriages

The connection between the end carriages and the bridge girder (not supplied in the TEREX | DONATI kit**) is envisioned using bolts.**

- **For capacities up to 2000 kg, the connection is made via clamps supplied as per standard with the donati kit (fig.14).**
- **For capacities from 2000 to 4000 kg the connection is made via plates and counterplates supplied as per standard with the donati kit (fig.15)**

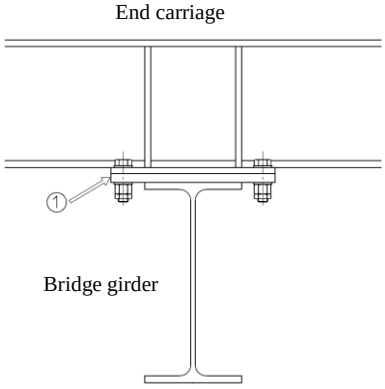


The clamp works by resting the edge on the girder wing (end carriage/bridge).
When the thickness of the girder wing is over 12 mm position a spacer plate (1) between the end carriage girder counter plate and the clamp that supports the bridge girder as indicated below depending on the thickness of the wing:

N°1 from 10 to 11.5
N°2 from 12 to 13.5
N°3 from 14 to 15.5
N°4 from 16

Screws coupling torque M12 = 84 Nm

fig.14



The counter plate (1), supplied as per standard, must be welded onto the bridge girder.
The crane manufacturer must perform suitable welding to support the loads to which the crane is subjected.

Screws coupling torque M16 = 205 Nm

fig.15

4.3.5 Assembly of the traversing trolleys on the end carriages

4.3.5.1 KIT with capacity up to 2000 kg and wing up to 220 mm (fig.16)

1. **Insert the tie rods into the lateral holes of the end carriage.**
2. **Insert the internal spacers (see spacers table) and the two plates of the trolley with at least one external spacer acting as a flat washer under the closing nut.**
3. **Insert the palmutter-type self-locking nuts.**

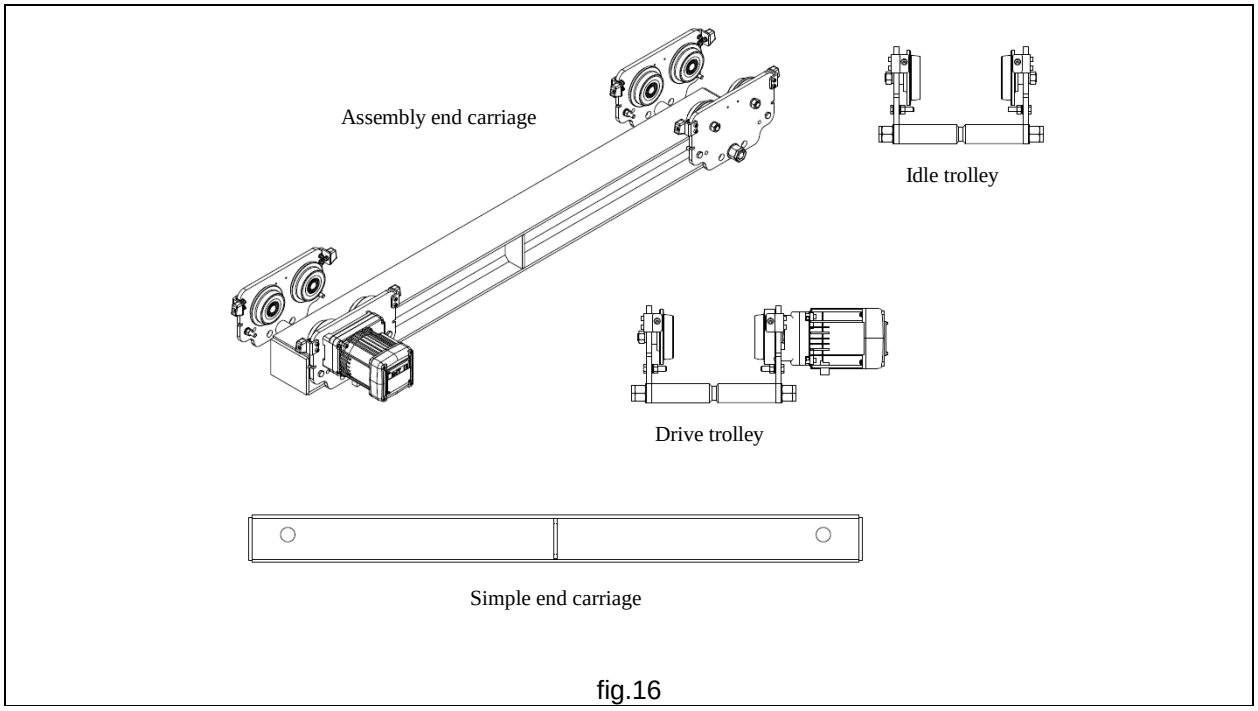


fig.16

4.3.5.2 KIT with capacity up to 2000 kg and wing over 220 mm with standard bracket (fig.17)

1. **Position the brackets at the ends of the end carriage and insert the special pins provided.**
2. **Block the pins using the plates and M6 screws supplied as per standard.**
3. **Mount the trolley plates on the brackets by inserting the two tie rods into the lateral holes of the brackets with at least one external spacer acting as a flat washer under the closing nut (see the table for internal spacers).**
4. **Insert the palmutter-type self-locking nuts.**

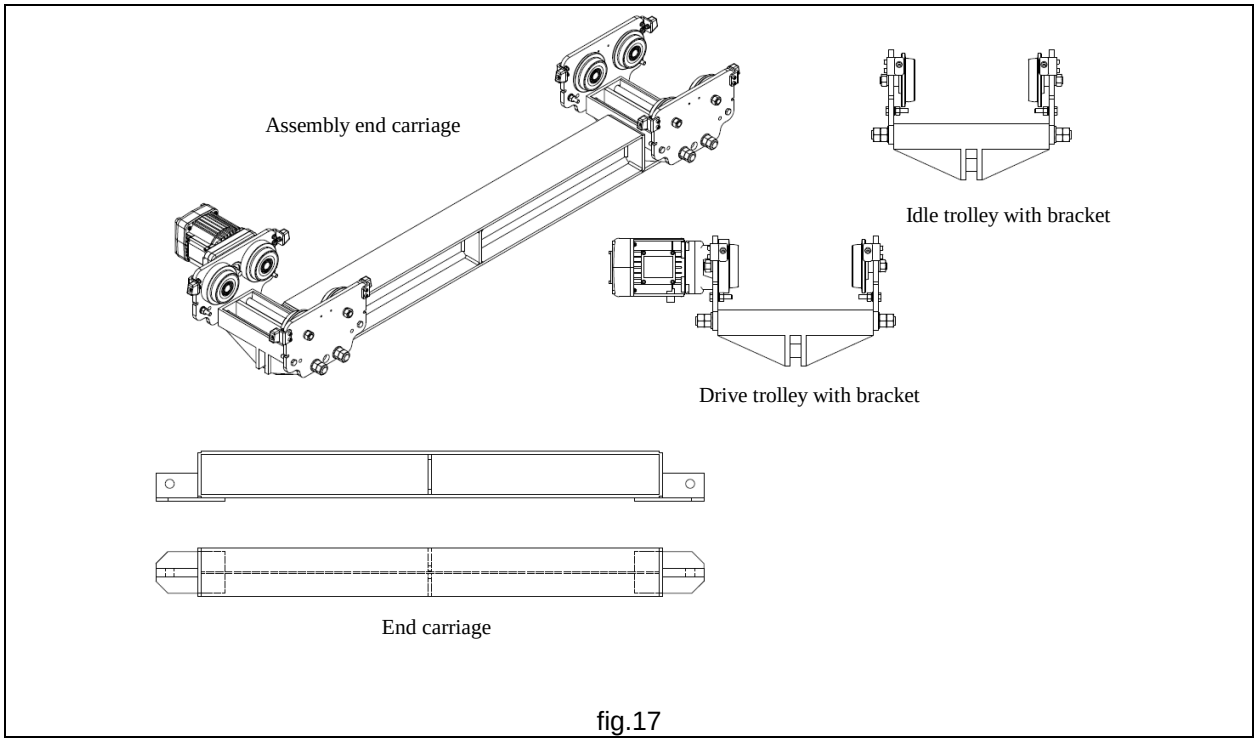


fig.17

4.3.5.3 KIT with capacity from 3200 to 4000 kg with standard bracket (fig.18)

1. **Position the brackets at the ends of the end carriage and insert the special pins provided**
2. **Block the pins using the plates and M6 screws supplied as per standard.**
3. **Mount the trolley plates on the brackets by inserting the two tie rods into the lateral holes of the brackets with at least one external spacer acting as a flat washer under the closing nut (see the table for internal spacers).**
4. **Insert the palmutter-type self-locking nuts.**

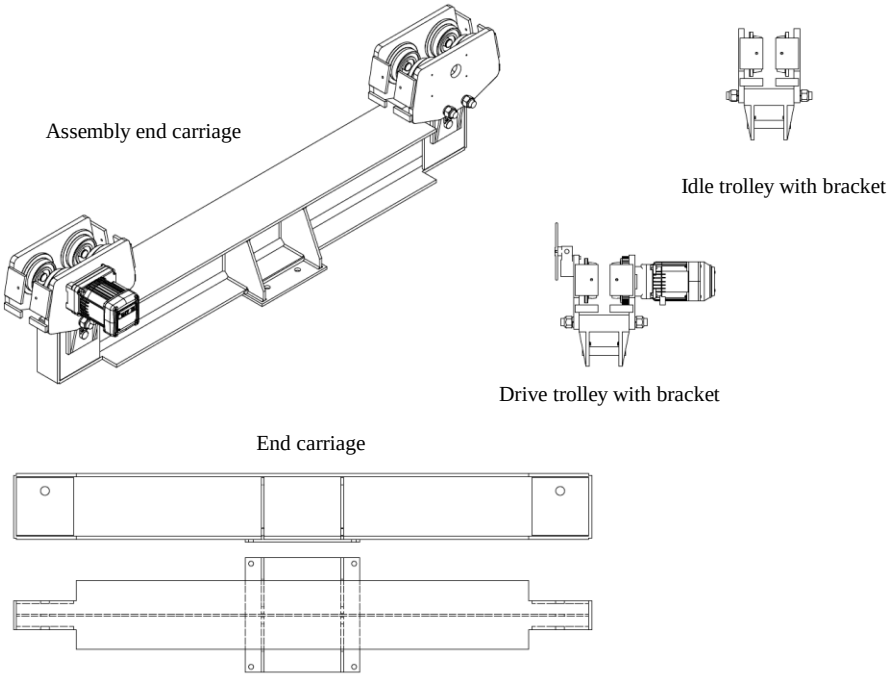


fig.18

4.3.5.4 Table of the spacers and tie rod units of the DPS end carriage trolleys

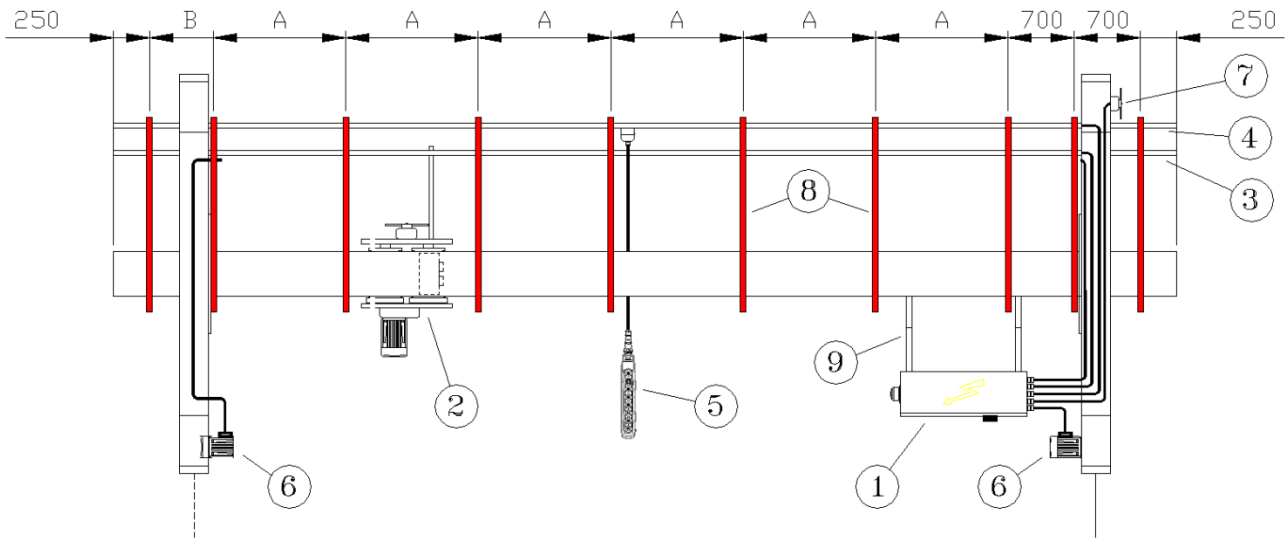
Type of track girder				DPS1 End carriage Trolley				
INP	**IPE**	**HEA**	**Girder wing (mm)**	**Inner wheel (mm)**	**Play (mm)**	**Internal spacers**	**Tie rods unit**	**Tie rods Diameter and Coupling torque**
160	-	-	74	78	4	0	1	Tie rods M16 = 128 Nm
180	-	-	82	86	4	4		
200	-	-	90	94	4	4+4		
-	180	-	91	94	3	4+4		
220	-	-	98	102	4	12		
-	200	-	100	102	2	12		
240	-	-	106	110	4	12+4		
-	220	-	110	114	4	12+4+2		
260	-	-	113	116	3	0	2	
280	-	-	119	124	5	4		
-	240	-	120	124	4	4		
300	-	-	125	128	3	4+2		
320	-	-	131	136	5	10		
-	270	-	135	136	1	10		
340	-	-	137	140	3	10+2		
-	-	140	140	144	4	10+4		
360	-	-	143	148	5	12+4		
380	-	-	149	152	3	12+4+2		
-	300	-	150	152	2	12+4+2		
400	-	-	155	160	5	16+4+2		
-	330	-	160	164	4	16+4+4		
450	360	-	170	172	2	16+12		
-	400	180	180	184	4	0	3	
500	-	-	185	188	3	2		
-	450	-	190	192	2	4		
550	500	200	200	204	4	10		
-	550	-	210	212	2	10+4		
600	-	-	215	220	5	16+2		
-	600	220	220	224	4	16+4		
-	-	-	230	234	4	2	4	Tie rods M14 = 85 Nm
-	-	240	240	242	2	4+2		
-	-	-	250	254	4	12		
-	-	260	260	262	2	12+4		
-	-	-	270	274	4	2	5	
-	-	280	280	282	2	4+2		
-	-	300	300	302	2	16		

Type of track girder				DPS2 End carriage Trolley				
INP	**IPE**	**HEA**	**Girder wing (mm)**	**Inner wheel (mm)**	**Play (mm)**	**Internal spacers**	**Tie rods unit**	**Tie rods Diameter and Coupling Torque**
160	-	-	74	78	4	0	1	Tie rods M24 = 432 Nm
180	-	-	82	86	4	4		
200	-	-	90	94	4	4+4		
-	180	-	91	94	3	4+4		
220	-	-	98	102	4	12		
-	200	-	100	102	2	12		
240	-	-	106	110	4	12+4		
-	220	-	110	114	4	12+4+2		
260	-	-	113	118	5	16+4		
280	-	-	119	122	3	16+4+2		
-	240	-	120	122	2	16+4+2		
300	-	-	125	129	4	0	2	
320	-	-	131	133	2	2		
-	270	-	135	137	2	4		
340	-	-	137	141	4	4+2		
-	-	-	140	145	5	4+4		
360	-	-	143	145	2	4+4		
380	-	-	149	153	4	12		
-	300	-	150	153	3	12		
400	-	-	155	157	2	12+2		
-	330	-	160	165	5	16+2		
450	360	-	170	173	3	16+4+2		
-	400	180	180	183	3	25+2		
500	-	-	185	186	1	0	3	
-	450	-	190	194	4	4		
550	500	200	200	202	2	4+4		
-	550	-	210	214	4	12+2		
600	-	-	215	218	3	16		
-	600	220	220	222	2	16+2		
-	-	-	230	234	4	2	4	Tie rods M20 = 250 Nm
-	-	240	240	242	2	4+2		
-	-	-	250	254	4	12		
-	-	260	260	262	2	12+4		
-	-	-	270	274	4	2	5	
-	-	280	280	282	2	4+2		
-	-	300	300	302	2	16		

Type of track girder				DPS3-4 End carriage Trolley				
INP	**IPE**	**HEA**	**Girder wing (mm)**	**Inner wheel (mm)**	**Play (mm)**	**Internal spacers**	**Tie rods unit**	**Tie rods diameter and Coupling torques**
200	-	-	90	94	4	0	1	Tie rods M24 = 432 Nm
-	180	-	91	94	3	0		
220	-	-	98	102	4	4		
-	200	-	100	102	2	4		
240	-	-	106	110	4	4+4		
-	220	-	110	114	4	4+4+2		
260	-	-	113	118	5	12		
280	-	-	119	122	3	12+2		
-	240	-	120	122	2	12+2		
300	-	-	125	130	5	12+4+2		
320	-	-	131	134	3	16+4	2	
-	270	-	135	138	3	16+4+2		
340	-	-	137	142	5	16+4+4		
-	-	-	140	144	4	25		
360	-	-	143	148	5	25+2		
380	-	-	149	152	3	25+4		
-	300	-	150	152	2	25+4		
400	-	-	155	160	5	25+4+4		
-	330	-	160	164	4	25+4+4+2		
450	360	-	170	174	4	40		
-	400	180	180	182	2	40+4		
500	-	-	185	190	5	40+4+4		
-	450	-	190	193	3	2	3	
550	500	200	200	205	5	4+4		
-	550	-	210	213	3	12		
600	-	-	215	217	2	12+2		
-	600	220	220	225	5	16+2		
-	-	-	230	233	3	16+4+2		
-	-	240	240	243	3	25+2		
-	-	-	250	255	5	0	4	
-	-	260	260	263	3	4		
-	-	-	270	275	5	4+4+2		
-	-	280	280	283	3	12+2		
-	-	300	300	303	3	16+4+4		

4.3.6 Assembly of the electric plant:

Topographic diagram of the electric plant (fig.19)



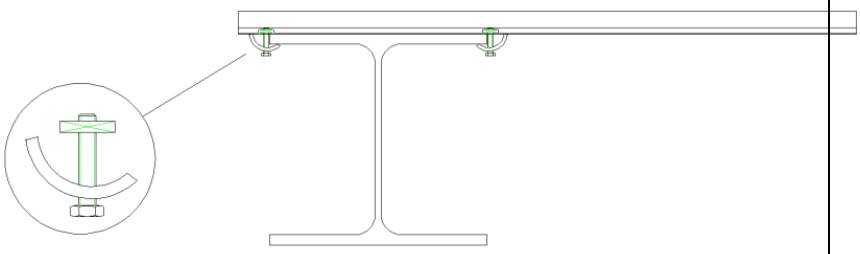
1.	**Electric control board**	**2.**	**Hoist – connection equipment**
3.	**Power supply line**	**4.**	**Push-button panel line**
5.	**Push-button panel (optional radiocommand)**	**6.**	**Bridge running motors**
7.	**Bridge end run**	**8.**	**Plant suspension brackets**
9.	**Electric control board support (if envisioned**		

Distance "**A"** between the brackets 1100/1300 mm max.
Distance "**B**" depending on line length.
For bridge gauge up to 6 m the additional bracket does not have to be mounted (700 mm) for festoon accumulation.

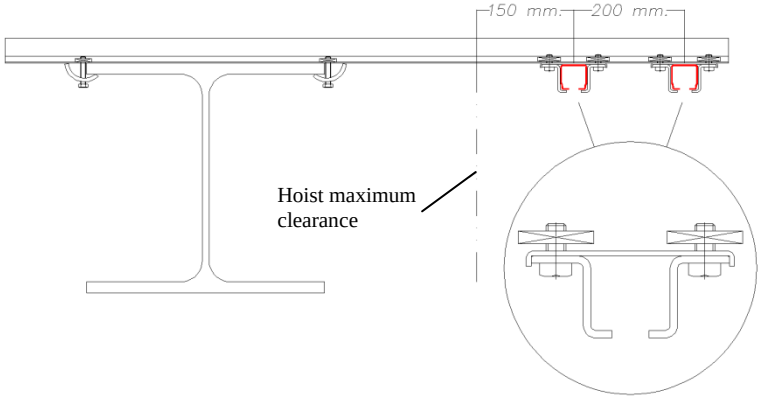
fig 19

Fix the electric control board (1) using the relative support (9) (if envisioned).

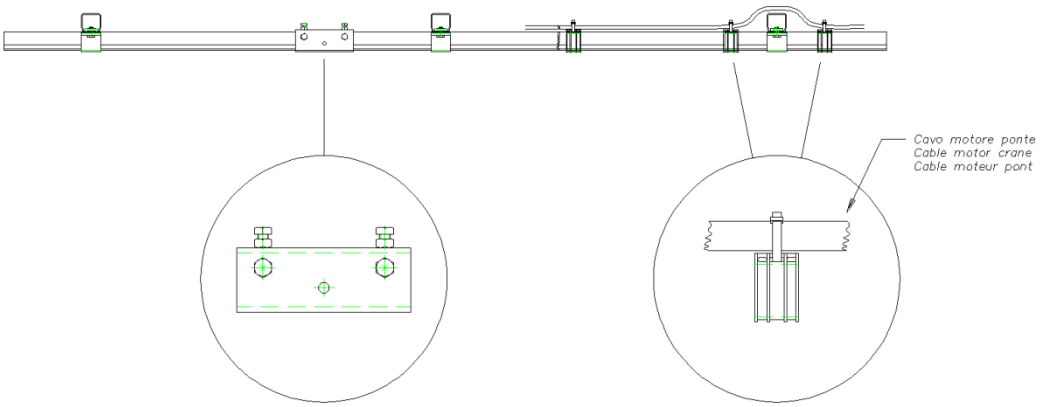
Fix the bracket (8) to the girder using the clamps.
Follow the diagram (fig.19) for the distances between the brackets. Particular set-ups or special electric equipment can reduce the distance between the supports (std bracket length 1300 mm).



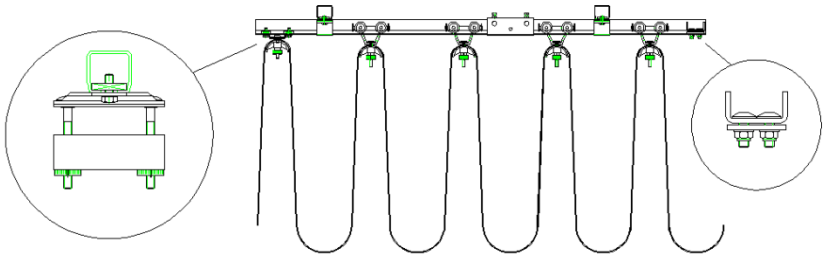
Suspend the line cable ducts (3) on the brackets.
The distance between the girder and the power supply line varies according to the type of hoist mounted.
In general, the festoon must run at approx. 150 mm from the maximum machine clearance.
Consequently position the most external push-button panel line (4).

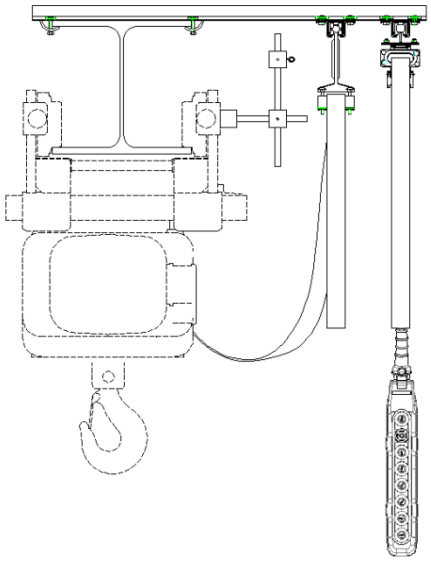


Complete the line with all of the pieces of cable duct using the joints (the cable ducts measure between 2000 and 3000 mm), mount the supports for the running motors connection cable.

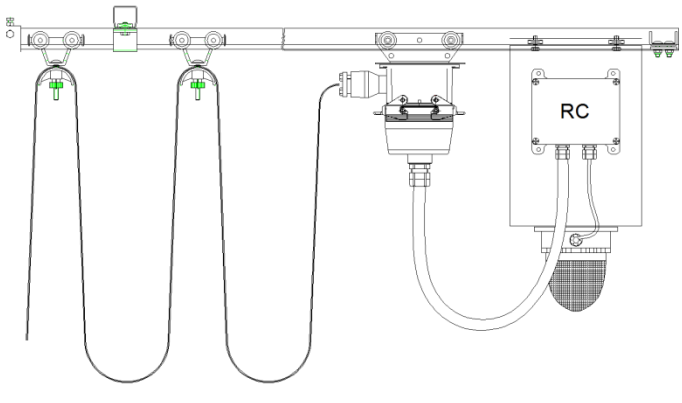


Insert the festoons into the cable ducts; fix the retainers and the terminal for the cable. Check that the trolleys run correctly in the profiles and, if required, check the alignment of the cable ducts in correspondence with the joints.

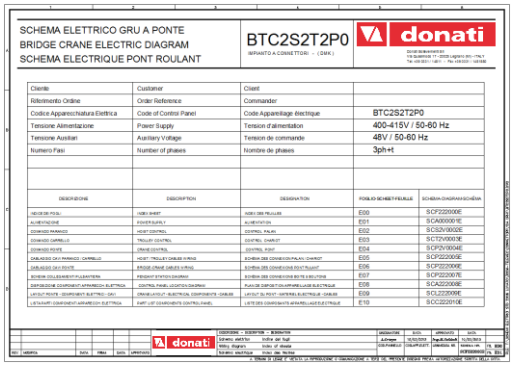




All of the plants are set-up as per standard for connection of the radio control (supplied on request). The connection can be made on the push-button panel holder trolley or directly to the electric control board.



Make the electric connections according to that indicated in the diagram contained in the control board.


SCHEMA ELETTRICO GRU A PONTE
BRIDGE CRANE ELECTRIC DIAGRAM
SCHEMA ELECTRIQUE PONT ROULANT

BTC2S2T2P0

donati

Cliente	Customer	Client	
Riferimento Ordine	Order Reference	Commander	
Codice Apparecchiatura Elettrica	Code of Control Panel	Code Appareillage électrique	BTC2S2T2P0
Tensione Alimentazione	Power Supply	Tension d'alimentation	400-415V / 50-60 Hz
Tensione Ausiliari	Auxiliary Voltage	Tension de commande	48V / 50-60 Hz
Numero Fasi	Number of phases	Nombre de phases	3ph+t

During periodic maintenance, check the torque of the various power supply line components. Control the electric connections inside the equipment, checking the tightness of the terminal screws and of the contactors.

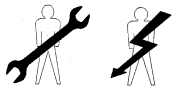
Disconnect the electric power supply before performing any check or maintenance operation.

4.3.7 Trolley/hoist assembly

☞	**See hoist “User instructions”, attached to this publication**

4.4 - Commissioning

4.4.1 Preliminary checks – Adjustments and operating tests

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

- **Checking suitability of the electric plant:**
  - Check that the line voltage and frequency, given on the respective motor plates, correspond with those envisioned for operation.
  - Check that the voltage value to the motors is within the limits of +/- 10% of the rated value.
  - Check the presence and correct connection of the earth sockets.
- **Checking correct installation of the crane:**
  - Ascertain the absence of obvious defects following installation of the crane.
  - Check that all bolted joints are correctly coupled.
  - Control the integrity of the trolley and bridge wheel tracks, which must be free from obstacles, roughness, indentations and foreign bodies.
  - Check the uniform sliding sensitivity of the entire breadth of the bridge.
  - Check for the absence of obstacles in all of the area covered by the crane service and ascertain any interference.
  - Check that the trolley and bridge end stop devices are present.
  - Check that there are no lubricant leaks.
  - Ensure that during the tests, no abnormal noises and/or vibrations and/or incorrect movements (spontaneous movements of the trolley and/or bridge, etc.) are detected.

	**Adjustment of the "DPS" suspended bridge crane electric limit switches** (if supplied)**:**	

- Check the correct positioning of the **"DPS" bridge crane** end run actuators.
- Make sure that **crane** travel is that desired and, if necessary, adjust the limit switch:
  - The limit switch test is performed by taking the **crane** to the extreme limit of its travel. Perform the test several times, the **crane** must stop in the pre-established position and guarantee a suitable "over-run" before reaching the end mechanical stop devices, to avoid collision.
  - Check the correct positioning of the mechanical end stop devices of the bridge, which must be able to support collision with the rubber buffers of the **suspended bridge crane**, if the electric limit switches should not operate.
    - Check the suitable positioning of any pre-slowing devices in the case of two-speed drives, in order to prevent the end run stop devices being reached at maximum speed.

	**The automatic limit switches are emergency devices with safety functions and not work functions and MUST NOT BE subjected to routine and/or continuous operation. If this necessity exists, additional operational limit switches must be installed, positioned in a way to operate before those installed as an emergency device.**

	• **Makes sure that no abnormal noise and/or vibrations are detected during movements and no incorrect movements of the machine or its parts are noted.** • **After the first lifting operations, check the tightness of all bolted joints.**

	• **If the direction of rotation of the motors does not agree with the push-button panel command, the electric limit switches will not stop movement; malfunctioning may then occur.** • **If the direction of the movements does not correspond with the push-button panel indications, stop the movements and check the connections.**

4.4.2 Inspection of the suspended mono-girder bridge crane – Suitability for use

- **The suspended mono-girder bridge crane must be introduced onto the market in consideration of the inspections performed at the manufacturer's establishment on similar prototypes subjected to suitability control of the structural parts.**
- ***DONATI SOLLEVAMENTI S.r.l.*** **checks the manufacture of the suspended bridge kits within the ambit of the company "Quality System", certified by DNV in compliance with ISO 9001:2008.**
- **The inspection procedure, described successively refers to the ascertainment of the functional and performance correspondence of the bridge crane installed in the place of use, complete in all parts** (fixing, structure, lifting unit, lifting accessories, etc.).
- **The inspection of the crane installed is performed and under the responsibility of the user and must be carried out by the same specialised member of staff (fitter) that performed assembly, while scrupulously following the instructions given in this manual.**
- **The fitter must perform the inspection and fill-in the "Inspection report" completely and draw-up the "Suitability for use" certificate, contained in the "Control register" attached (when envisioned) to this publication.**

After having performed the "no-load" functional tests, perform the dynamic tests; these tests must be performed with masses of value corresponding to the plate capacity of the crane increased by the overload coefficient 1.1 (load equal to 110% of the rated load). The static tests must be performed with overload coefficient 1.25 (load equal to 125% of the rated load).

All tests must be performed in wind-free conditions.

Inspect the suspended bridge crane as follows:

No-load test:

- enable crane functions.
- activate the line master switch.
- place the push-button panel emergency stop button in "start" position.
- press the "start/alarm" button, if available on the hoist push-button panel.
- check the lifting function by pressing the push-button panel "up and down" buttons (In the case of two-speed movements, check the functionality).
- check the traversing functions by pressing the push-button panel "right-left" buttons (In the case of two-speed movements, check the functionality).
- check the running functions by pressing the push-button panel "forward-backward" buttons (In the case of two-speed movements, check the functionality).
- check operation of the limit switches of all movements and the clutch device, when available.

Dynamic test:

- prepare suitable masses for the load tests equal to: **rated capacity x 1.1** and suitable equipment for harnessing and lifting.
- harness the load, positioning the hook on the vertical of the load to prevent oblique pull.
- slowly tension the harnessing so as not to generate jerking.
- if available, perform the load tests using the “slow” speed.
- lift the load slowly and check that this takes place without any difficulty, no abnormal noise, obvious permanent deformations or support structure failure and/or anchorage device failure are detected.
- repeat the maximum speed test, performing the previous controls.
- check functionality of the "up and down" limit switches, when installed, and/or of any clutch device.
- check brake functionality, controlling that the mass is stopped in a suitable time and that the load does not slide, after the button has been released.
- check functionality of the "right-left" and "forward-backward" mechanical end runs moving the mass without taking it to maximum height (lift to 50 cm from the ground).
- first operate at slow speed, if available, and then at maximum speed.
- check that the trolleys run correctly on the girders and make sure no abnormal noise, obvious permanent deformations or support structure failure and/or anchorage device failure are detected.
- check operation of the load limiter, if installed.
- check the braking and stop spaces during lifting and traversing movements, verifying the stability of the mass after having suspended the relative handling actions.

!	**The dynamic tests must be performed in the most unfavourable load conditions, i.e. combining bridge lifting, traversing and running movements.**

Static test:

- prepare suitable masses for the load test equal to: **rated capacity x 1.25** and suitable equipment for harnessing and lifting the load.
- harness the load **used for the dynamic tests** (rated capacity x 1.1) making sure the hook is positioned on the vertical to prevent oblique pull.
- slowly tension the harnessing so as not to generate jerking; if available, perform the load tests using the “slow” speed.
- lift the load and stop it in a suspended position at a height of 10 cm.
- gradually apply masses to it up to an overload equal to 25% of the rated capacity
- leave the mass suspended for a minimum of 10 minutes.
- check that the suspended mass (load + overload) does not give way (the lifting brake and the clutch device/load limiter, if installed, must not slip).
- release the load and check that obvious deformations and/or crane and support structure failure and/or anchorage device failure are detected.

!	• **No crane movement must be activated during the static test.** • **Bridge crane inspection must be repeated on occasion of the yearly checks** (see paragraph 6.3.2). • **The results of the yearly inspections must be noted in the control register, when envisioned.**

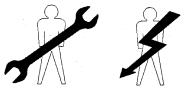
4.5 Decommissioning.

4.5.1 Storage and preservation of the parts.

	**If the suspended single-bean bridge crane kit and its components, must be stored and preserved (storage), proceed as follows to prevent damage or deterioration:**	

- Check that there is no damage in the mechanisms, in any electric plants, in the lifting, traversing and running units, in the support girder and prevent scratching to the surfaces of the structure.
- The materials, whether envisioned for installation indoors or outdoors can be stored up to a maximum period of two years in an environment with the following features:
  - protected from atmospheric agents.
  - relative humidity not exceeding 80%.
  - minimum temperature - 20°C.
  - maximum temperature + 60°C.
- For storage periods exceeding two years, request the preservation procedures from the manufacturer.
- If these values should change during storage, preliminary checks are required before commissioning the crane (see "Restore after storage").
- If the temperature exceeds or drops below the values indicated and the relative humidity is over 80% in the place of storage, protect the packages with protective bags and hygroscopic salts.
- For storage in open areas envision:
  - bases for lifting from the floor for all packs without a pallet.
  - protect all packs with protection bags and hygroscopic salts.
  - if the machine has been manufactured to operate outdoors, the framework does not require particular protection; on the contrary, parts processed on machine tool (machined surfaces, wheels, pins, etc.) must be protected using antioxidants (transparent paints, grease, etc.).
- Delimit the material storage area.

4.5.2 Restore after storage

	**Before putting the bridge cranes, which have been stored for long periods, back into service, the following operations must be performed:**	

- **Structure:**
  - eliminate traces of paint or lubricant from the structure and tracks.
  - clean the matching surfaces intended for assembly.
  - repair any structural damage (scratched surfaces, peeling paint, etc.).
- **Mechanisms:**
  - check for any leaks and, if necessary, restore lubricant levels.
  - check that the mechanisms are fixed to the structure correctly.
  - check integrity of the chain (clean and lubricate it), of the deflection wheels and the idler sprockets, the clutch device or load limiter.
  - eliminate traces of oxidation from the accessory running parts of the commands.
  - lubricate the bearings and non-painted mechanical parts (shafts, pins, joints, etc.).
  - eliminate any water residues present in concave parts.
- **Electric equipment:**
  - eliminate any condensate from the motors and the terminal boards; dry using jets of air.
  - check the integrity and functionality of the lifting brakes.
  - thoroughly clean the surfaces of the hoist brake, eliminating traces of humidity and lubricants.
  - control the integrity and functionality of the limit switches.
  - check the integrity of the electric parts and components.
  - dry the contacts of the contactors.
  - check the smoothness of the festoon electric lines.
  - thoroughly check the functionality of the control push-button panel.

5. – OPERATION AND USE

5.1 – The functions of the suspended mono-girder bridge crane

5.1.1 Usage – Declared use – Intended use

The donati kit is manufactured to be incorporated in a suspended mono-girder type bridge crane to handle goods inside an establishment or on a work site. The cranes lift the load vertically via the lifting unit hook (electric hoist) and via accessories suitable for this operation.

The load can be traversed along the transversal and longitudinal axes of the bridge, via hoist-support trolleys and bridge-support running on a girder.

The bridge cranes run suspended on runways, which are also realised on girders positioned at a height with respect to the ground, which remains completely free and available for production activities.

The standard bridge crane command functions have three main movements:

- **vertical:** lifting the load via electric hoist.
- **transversal**; electric traversing of the load via movement of the hoist-support trolley.
- **longitudinal**; electric running via crane trolleys along the runways.

These movements are activated by:

Push-button panel: by pressing the **up** or **down** command buttons for **lifting** movements,
to the **right** or **left** for **traversing** movements**, forward** or **backward** for **running** movements.

- The push-button panel command buttons activate the function when they are pressed and held down and can be the "shift" type with two clicks: the first for the “slow” speed command, the second to command the "fast" speed.
- The **emergency stop** button present on the push-button panel is red and has a mushroom-shape and activates the **stop** function when it is pressed.
- For the crane to function again, the **emergency stop** button must be turned clockwise and "released" to allow running and, when available, the green **start** button must be pressed.
- The push-button panel is suspended from the hoist and can be manoeuvred by the operator on the ground, following the movement of the trolley (right/left) and/or running of the crane (forward/backward).

- **The operator must always pay great attention during manoeuvres, without ever losing the work area and load handled from sight so as not to compromise his own safety and/or that of any exposed persons.**
- **It is prohibited to control suspended bridge crane movements while on board the same.**

5.1.2 Loads allowed, loads not allowed

The loads must:

- have shape, dimensions, mass, balance and temperature suitable for the features of the place in which they must be handled and must be compatible with the performance of the suspended bridge crane.
- have suitable pick-up points and/or harnessing with relevant accessories that prevent accidental falls.
- be stable and not subject to changing their static or physical configuration during handling.

The following loads cannot be handled:

- **whose weight, including any accessory, exceeds the capacity of the crane** (fig.20)**.**
- **with unbalanced masses with respect to the centre of gravity.**
- **with surfaces not sufficiently resistant to the pressure exerted by the grip**
- **which, due to their chemical-physical features, are classified as hazardous, e.g. inflammable, explosive, radioactive materials, melted metals, etc.**
- **toxic, noxious materials or products if not handled in relevant safety containers, e.g. corrosive chemical products, products with biological risk, etc.**
- **bulk products or food-stuff substances, which can come into direct contact with parts of the hoist or with its lubricants.**
- **which can change their static and/or chemical-physical configuration or their barycentre during handling.**
- **which are not supplied with accessories as per following point.**

5.1.3 Lifting accessories

The following are generally accepted:

- Harnessing made up from ropes and/or chains and/or textile fibre straps.
- Lifting accessories that are placed between the load and lifting hook, such as: sling bars, grips, suction devices, magnets and electromagnets, etc.
- The use of these accessories must comply with the prescriptions provided by the manufacturer of the same.

The following accessories are not generally accepted:

- **those whose functional features can cause undue dynamic stress to the crane exceeding those accepted or accidental overloads.**
- **those which may collide with parts of the suspended crane.**
- **those which limit free handling of the load.**
- **those which are connected to independent electric lines.**

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

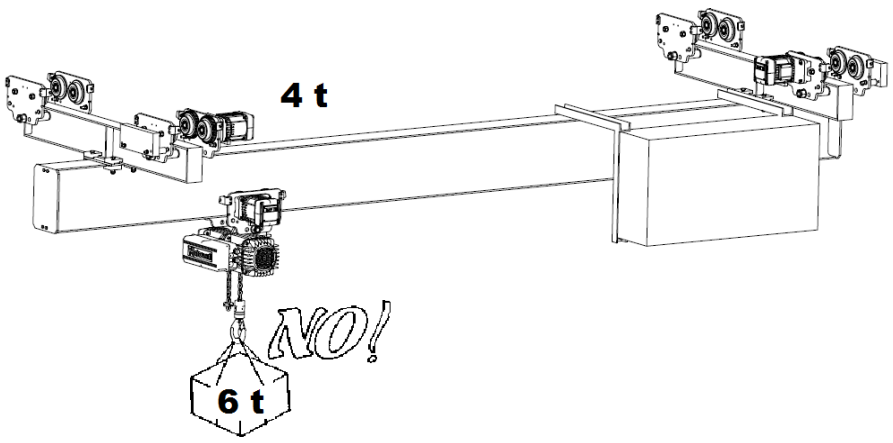


fig.20

5.2 – Operating conditions

5.2.1 Operating environment

- **The operating environment must have the following characteristics:**
  - **temperature:** min.: - 10°C; max.: + 40°C : max. relative humidity 80%.
  - **Use in covered environment:** in this case, as the suspended mono-girder bridge crane is not exposed to atmospheric agents, it does not require particular precautions.
  - **Use outdoors:** the suspended bridge crane can be exposed to atmospheric agents during and after use. The electric parts must be supplied with IP55 protection, and it is also advised to protect motorised parts.
    To prevent oxidation, protect the structure with suitable treatments and lubricate the mechanisms.
    The bridge crane can be used outdoors when there are no exceptional atmospheric events, which can modify the values of the loads envisioned, for example: heavy rain, heavy snowfall, gail force winds, etc.

	**During standard jobs, the crane must not be used in environments and areas:** • **with vapours, fumes or highly corrosive and/or abrasive dusts (when this cannot be prevented, intensify maintenance cycles).** • **in the presence of flames and/or heat higher than temperatures accepted.** • **with risk of fire and explosion and where the use of explosion-proof and anti-spark components is prescribed.** • **in areas where there are strong electromagnetic fields, which can generate accumulations of electrostatic charges.** • **in direct contact with bulk foodstuff substances.**

5.2.2 Hazardous areas and exposed persons

The hazardous areas are all those where, the exposed persons can be subjected to the risk that a dangerous event for their safety, health or psychophysical wellbeing occurs in any operational phase. In particular, the **potentially exposed persons** must be informed that the operator assigned to use of the crane, in the handling trajectories in the **hazardous areas**, does not always operate in conditions of sufficient visibility in order to completely or quickly prevent all potential risks of crushing, collision or dragging regarding persons, which therefore must themselves prevent their exposure to risk during the manoeuvres in these areas (fig.21).

	**It is mandatory for the customer to provide suitable signs for the hazardous areas to prevent or limit access to unauthorised and/or non-assigned staff to the areas where the suspended bridge crane operates, as envisioned by current legislative provisions.**

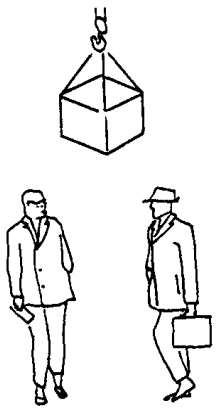


fig.21

5.2.3 Work area lighting

The DPS series suspended mono-girder bridge crane kit does not have its own lighting system. Consequently, the work position of the operator using the crane, must have suitable lighting and must guarantee maximum visibility.

☞	• **The level of environmental lighting must be such to guarantee crane operations with maximum safety possible.** • **For operations in areas without sufficient lighting, additional lighting systems are mandatory, avoiding shadow cones, which prevent or reduce visibility in operational and/or surrounding areas.**	

5.2.4 Operator

The operators are all those persons which, in turn, perform the following activities on the crane:

- transport, handling, assembly, installation, adjustments and the audit.
- commissioning, use, cleaning, maintenance and repairs.
- disassembly, dismantling and demolition.
  - **The operators** must be persons suitable for the job and psychophysically able to attend to the requirements connected with the activities consistent with the bridge crane during all operating phases and, in particular, during the harnessing and handling phases.
  - **The operator assigned to use** of the crane must position himself in a way that is not hazardous for his own safety, envisioning and/or preventing, and therefore avoiding, possible falls or dangerous movements of the load transported. He must follow the indications provided in order to obtain the highest safety for himself and others when using the machine. In particular, he must scrupulously comply with the indications contained in this manual.

⚠	• **The operator must not allow anyone to approach during use of the bridge crane in "cable duct" mode and prevent use by unauthorised staff, especially those under 18 years of age.** • **Use of the crane by unauthorised and untrained persons is prohibited.** • **The operator must always use suitable personal protection devices (P.P.E. = gloves, protective footwear)**	

5.2.5 Capacity of the suspended mono-girder bridge crane

The capacity of the bridge crane in the operational configuration envisioned, must be indicated by the plate affixed to the same and be visible from the manoeuvre position (not supplied).

!	• **The capacity limit of the crane and its accessories must never be exceeded, by applying overloads** (fig.22)**.**
	  • **The crane must never be equipped with a lifting appliance (hoist) with higher rated capacity than the same.**
	  • **lifting speed limit of 24 m/min must never be exceeded, unless the crane capacity is suitably reduced.**

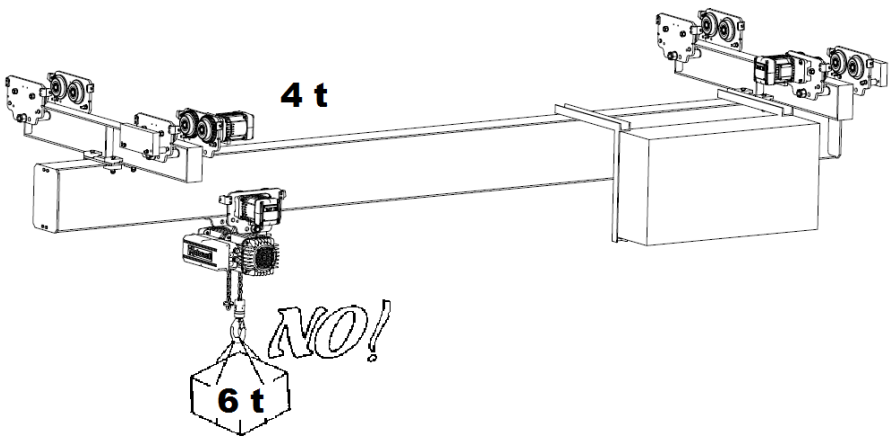


fig.22

5.2.6 Manoeuvres: trolley lifting, traversing and bridge running

It is good practice to perform one manoeuvre at a time, as only in this way can a manoeuvre be started, stopped and constantly followed by the operator, who must also avoid continuous, repeated connections and disconnections also in the case of small movements.

- The load must be picked-up with the hoist hook and with the lifting accessories with great caution, delicately and without jerking.
- Start the lifting operation by slowly tensioning the chain or rope until the load has been lifted by a few centimetres, stop the manoeuvre and check the hold and stability of the load.
- On completion of handling, position the load carefully and release the hoist hook.
- **During lifting manoeuvres** the operator must not place the hook on the ground or on the loads to be lifted, so as not to cause slackening of the chain or rope. The operator must not perform oblique pulls with the chain, which are always dangerous and difficult to control (fig.23).
- **During the trolley traversing and/or bridge running manoeuvres** it is mandatory to prevent violent collisions between the trolley/hoist and the end bumpers, in order not to cause serious repercussions on the mechanical parts and on the framework. The operator must never handle the load towards himself, to prevent the risk of crushing (fig.24).

⚠	• **Operate with caution and diligence, constantly following the manoeuvres and visually checking the equilibrium of the mass handled.** • **Avoid sudden and "jerky" manoeuvres, which are very dangerous for the stability of the load due to the dynamic effects that are generated** • **Never lift load with lifting points that are not barycentric and not balanced or omit attaching and fastening all harnessing accessories envisioned or fix the load with improvised or makeshift harnessing.** • **Never leave the load suspended once the handling operation has started. It must be completed as quickly as possible and the load must be positioned without crushing the lifting accessories.**

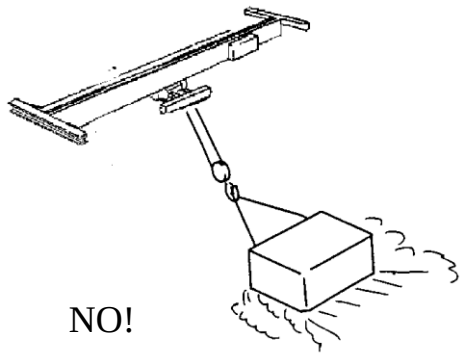


fig.23

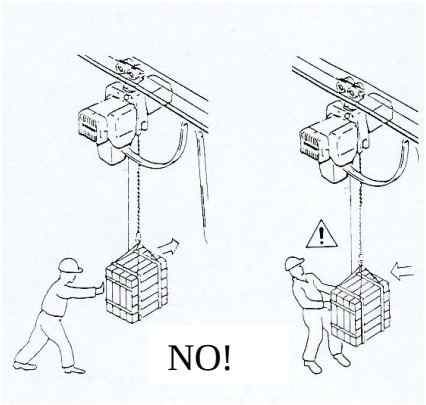


fig.24

5.2.7 Safety devices

The exclusion of the crane power supply must take place by disconnecting the line switch/isolating switch (not supplied) and/or by pressing the "emergency stop" button on the push-button panel.

- The lack of voltage causes the motors to block immediately, which have a self-braking motor.
- The safety carabiner is mounted on the lifting hook against accidental release of the harnessing and/or the load.
- The lifting, traversing and running limit switches delimit vertical and horizontal travel of the load. They are emergency devices and are not suitable to stop normal service.

☞	• **When excluded from the donati supply, the safety devices must be installed by the customer.**	CE

5.3 – Enabling of the suspended mono-girder bridge crane with DPS kit

	**Respect the following provisions to start operations with the crane:**	

1. Visually check the integrity of the crane and the structures, where it is installed.
2. Perform all controls as described in paragraph 5.5 "Criteria and precautions for use".
3. Connect the power supply line using the master switch.
4. Control that there are no exposed persons in the operating areas.
5. Place the red **"emergency stop"** button in start consent position.
6. Activate all functions by pressing the **"start"** button, if available.
7. Check the functionality of the safety devices by controlling the movements as described in paragraph 5.1 "The functions of the suspended mono-girder bridge crane".

5.4 Disabling at the end of the job

	**To deactivate the crane manufactured with DPS kit at the end of the job, the following provisions must be respected:**	

1. Place the bridge in recovery position, making sure it is stable and it does not generate a collision hazard or interference with surrounding structures and/or machines.
2. Release the lifting hook from the harness used to handle the load.
3. Where possible, raise the hook to a height of at least 250 cm., i.e. so that it does not create disturbance and hazards to persons or objects moving below the crane.
4. Stop all crane movements by pressing the "stop" button on the push-button panel.
5. Put the push-button panel in the "do not disturb" position.
6. Disconnect the power supply by operating on the master switch.

5.5 - Criteria and precautions for use

	• **Correct use of the bridge crane, allows to take full advantage of the performance it can supply in complete safety.** • **This potential is only guaranteed by scrupulously following only the indications given below:**	

ALWAYS follow the indications and instructions given in the installation and user manuals, which must be supplied by the crane manufacturer and check the integrity of the components and parts of the crane.

ALWAYS respect the instructions and the warnings highlighted on the machine; the warning plates shown on the crane and in the manoeuvre area are accident-prevention signs and must always be perfectly legible (not supplied).

ALWAYS make sure that the crane operates in an environment protected from atmospheric agents (rain, wind, snow, etc.), or, if outdoors, it has suitable guards or protections.

ALWAYS check the correspondence of performance of the crane built with the DPS kit in relation to the service for which it is intended (work cycles - intermittence – time of use – load to handle).

ALWAYS check the strength of the structures that support the suspended bridge crane and suitability of the runway.

ALWAYS ascertain the adequacy of crane maintenance (cleaning, lubrication) and that of its main components (hook, chains, push-button panel, end run, wheels, brakes, etc.).

ALWAYS check the correspondence of hoist movements.

ALWAYS test the functionality of the emergency stop button.

ALWAYS constantly control the efficiency of the brake, the end runs and the electric plant.

ALWAYS ascertain the integrity and the efficiency of the chain or rope, block, hook and push-button panel.

ALWAYS make sure that the hook is not consumed, damaged or without carabiner.

ALWAYS check the suitability and efficiency of the harnessing (ropes, chains, straps, etc.).

ALWAYS check that the trolley track is at a height that does not allow the operator to interfere with the profile of the hoist/trolley and/or the moving parts. If this is not possible, provide appropriate guards or signs in the area at risk.

ALWAYS act on the load avoiding traversing it towards yourself, during trolley traversing and crane running movements.

ALWAYS make sure the lifting unit has been centred (hoist and hook) on the perpendicular of the load before harnessing and handling the load itself.

ALWAYS correctly fasten the load harnesses to the lifting hook and tighten the harnesses with slow and safe movements.

ALWAYS operate in the best lighting conditions and visibility of the load.

ALWAYS ensure, before the manoeuvre, that the traversing and running actions do not meet any obstacles during lifting.

ALWAYS operate outside the radius of manoeuvre of the lifted load.

ALWAYS activate movements avoiding pulse commands in rapid succession.

ALWAYS avoid combining movements, simultaneously activating the lifting buttons and traversing buttons and paying attention not to cause the load to swing.

ALWAYS use “slow” speed for approach and positioning operations.

ALWAYS position the crane, the load hook and the push-button panel at the end of the job in a way that they do not constitute dangerous collision elements.

ALWAYS, press the red emergency stop button on the push-button panel and disconnect the crane master switch before leaving the manoeuvre position.

ALWAYS disconnect the machine power supply voltage in the case of inspections, repairs and routine maintenance interventions.

ALWAYS, for all operations, use suitable P.P.E. (gloves, etc.).

ALWAYS signal any operating anomalies (malfunction, suspected breakage, incorrect movements and abnormal noise) to the Dept. Manager and put the machine out of service.

ALWAYS respect the maintenance schedule and, at each control, record any observations relative to the hook, chains, brake and end runs.

5.6 – Contraindications regarding use

	• **Use of the suspended bridge crane for manoeuvres that are not allowed, its improper use and lack of maintenance can lead to serious risks for the health and wellbeing of the operator and exposed persons, as well as jeopardising the functionality and safety of the machine.** • **The actions described below, which obviously cannot cover the entire range of possibilities of "bad use" of the crane, however constituting those "reasonably" most foreseeable, are prohibited and therefore:**	

5.6.1 Use not envisioned and not allowed – Foreseeable and non-foreseeable improper use

NEVER use the suspended bridge crane to lift and transport persons.

NEVER lift loads exceeding the rated capacity or equip the crane with hoists having rated capacity higher than that of the crane itself.

NEVER lift loads while persons transit in the manoeuvre area below.

NEVER transit, stop, operate and manoeuvre under the suspended load.

NEVER allow use of the crane by unqualified staff or under the age of 18.

NEVER use a crane if you are not psychophysically suitable.

NEVER use the crane if you are not provided with suitable P.P.E. (gloves, etc.).

NEVER operate without due attention during lifting, traversing and running movements of the bridge crane.

NEVER put the hands on the harnessing in the "tensioning" phases in the areas of contact with the load and between the hook and the harnessing.

NEVER leave the suspended load unattended.

NEVER use the crane for services different to those for which it is intended, avoid use for other operations e.g. painting ceilings, replacing light bulbs, support for scaffolding etc.

NEVER lift unbalanced loads.

NEVER make the hook or load oscillate during traversing and/or running.

NEVER place the chain/rope in the diagonal pull position.

NEVER use the crane or its lifting device for towing or dragging operations.

NEVER use harnessing without having first checked its suitability.

NEVER use the hoist chain as earth for the welding device.

NEVER lift loads with the point of the hook.

NEVER use the crane to maintain elements taught to extract elements fastened to the ground.

NEVER lift "guided" loads without having taken suitable safety measures.

NEVER continue hook travel after having positioned the load causing the chain or rope to slacken.

NEVER strike the structures of the shed, machines or plants with the load or bridge.

NEVER use two cranes simultaneously to lift the same load.

NEVER use the crane with two simultaneous movements; wait for the movement in progress to be completed before starting another one.

NEVER use the crane in non-envisioned environmental conditions or, if installed outdoors, in hostile, unfavourable and/or hazardous environmental conditions (strong wind, heavy rain, etc.).

NEVER use or intervene on the crane with conditions of insufficient visibility and/or lighting.

NEVER use the crane in areas where the use of explosion-proof components is prescribed.

NEVER make the end run devices or load limiters intervene continuously.

NEVER reach the "travel end" at full speed during traversing or running.

NEVER use the crane in the presence of a high voltage drop with one of the phases missing.

NEVER perform sudden changes in direction in the lifting, traversing and running manoeuvres.

NEVER repeatedly activate the push-button panel command buttons.

NEVER modify the functional and performance features of the cranes and/or its components.

NEVER tamper with the adjustments of the safety devices (limit switch, clutch device).

NEVER perform temporary repairs or restore interventions that do not comply with the instructions.

NEVER use non-original spare parts or not prescribed by the manufacturer.

NEVER entrust extraordinary maintenance and repairs to staff not trained by the manufacturer.

NEVER abandon the crane at the end of the job without having implemented the safety procedures.

NEVER perform maintenance, inspections or repairs without having put the crane out of service.

NEVER during maintenance phases:
-use unsuitable work equipment
-rest ladders on the column, hoist, trolley or on the girder/s of the bridge crane
-operate without P.P.E.
-intervene without having removed the load lifted

NEVER use the crane if its operational functions are not all fully compliant.

6. - MAINTENANCE

6.1 Safety precautions

The accident-prevention precautions contained in this paragraph must always be closely complied with during maintenance, in order to prevent injury/damage to the staff and machine.

- **The staff assigned to the maintenance of the bridge crane with suspended DPS kit must:**
  - **be well trained.**
  - **have read this document.**
  - **have in-depth knowledge regarding accident-prevention regulations.**

  Unauthorised staff must remain outside the work area during operations.

These precautions are recalled and further detailed in this chapter every time a procedure is required, which can lead to a risk of damage or injury, via **WARNING** and **HAZARD** notes:

The WARNING notes precede an operation which, if not performed correctly, can cause damage to the crane or its components.

The HAZARD notes precede an operation which, if not performed correctly, can cause injury to the operator.

Pay attention to the following WARNING NOTES during the maintenance phases:

Before re-starting the crane after a breakdown, it must be thoroughly inspected and checked to highlight any damage and the procedure described in paragraph 5.3 must be repeated

Unless expressly requested for the elimination of a fault, never intervene on adjustments and on the positioning of safety devices. Tampering with them can cause serious damage to the crane or its components.

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

⚠	**If not necessary, disconnect the power supply to the electric components before performing maintenance operations. Affix a sign with the following wording: MACHINE UNDERGOING MAINTENANCE – DO NOT CONNECT POWER SUPPLY**	
⚠	**Never exclude the safety and protection devices installed on the suspended bridge crane. If this should become necessary, affix appropriate warning signs and operate with great caution.**	
⚠	**Always check the presence and suitability of the earth connections and their compliance with regulations. Lack of earth connection of the electric equipment can cause serious injury to persons.**	
⚠	**Avoid the use of inflammable or toxic solvents (petrol, ethers, alcohol, etc.). Avoid prolonged contact with solvents and inhalation of their vapours. Particularly avoid use near to naked flames.**	
⚠	**Before re-starting the crane, always make sure that the staff assigned to maintenance is at a safe distance (no longer at a height) and that the tools or materials have not been left on the crane.**	
⚠	**Always wear protective gloves during maintenance operations.**	
⚠	**All accessible moving parts, excluding the chain and the hook block/block, are as protected as possible from accidental contact. Re-position the envisioned protections before commissioning.**	
⚠	**Never use jets of water in the event of a fire; isolate all power supplies and use suitable fire extinguishers.**	
⚠	**Make sure that the tools to be used are in perfect condition and have an isolating grip, where required.**	
⚠	**Pay maximum attention to all RESIDUAL RISKS highlighted on the suspended bridge crane and in this publication.**	

6.2 Qualification of staff assigned to maintenance.

In order to be able to perform maintenance of the mono-girder bridge crane with DPS kit suitably, the staff assigned to maintenance must:

- know the laws in force relative to accident-preventions during the jobs performed on motor-driven machines 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 machine operation
- determine operating irregularities and take the necessary measures when appropriate

The professional figures assigned and authorised to perform maintenance on the crane are:

	**Operator assigned to use of the DPS suspended bridge crane.**	

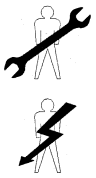
- **Typical maintenance activity:**
  - verification of correct operation of the crane. Collaboration with the staff in charge of periodic and/or extraordinary maintenance activity, following timely notification of the same if anomalies are detected.
  - cleaning and lubrication of the crane parts (hoist) with which he is normally in contact (push-button panel and hook) and performing simple maintenance activities that do not require interventions at a height (e.g. lubrication of the hook thrust bearing).
- **Technical know-how required:**
  - knowledge of the functions and use of the suspended bridge crane
  - knowledge of the lubricants used in the crane and hoist and the hazards connected with their use
- **Qualification required:**
  - suitability for the job in relation to the specific operational and environmental features

	**Maintenance mechanic**	

- **Typical maintenance activity:**
  - mechanical adjustment of play of the brakes and mechanisms
  - verification of the execution of the movements and mechanical adjustments of the safety devices
  - control of mechanical play and wear of the components (chain or rope, hook, etc.)
  - replacement of high wear components (chain or rope , hook, chain guide or rope guide) through the use of this publication and/or attached publications
  - routine maintenance of mechanical units following replacement with original spare parts
- **Technical know-how required:**
  - good knowledge of manual and motor-driven mechanical lifting and handling systems
  - good knowledge of the safety devices used in the hoist (end run, brakes, load limiter, clutch, etc.)
  - basic knowledge of the techniques of control and electrical adjustment of low difficulty (limit switch adjustment, fuse replacement, motor connection, etc.)
  - knowledge of the measurement and test methods to determine the effective status of the crane and hoist conditions (checks of: brakes, chain and hook wear, wheels wear, abnormal noise, etc.)
  - logical search methods for non-complex faults and assessment of the results
  - capacity to organise the measures used to take the hoist back to its correct function and performance
  - capacity to draw-up a maintenance intervention statement
- **Qualification required:**
  - Complete training as industrial mechanic with specialisation and experience in maintenance of industrial lifting or handling systems

	Maintenance electrician	

- **Typical maintenance activity:**
  - intervention on the electric equipment starting from the functional diagrams
  - verification of the execution of the movements and electric adjustment of the safety devices
  - controlling wear of the electric components (contacts of the electric equipment)
  - repair of electric units after replacement of parts with original spare parts
- **Technical know-how required:**
  - good knowledge of electrical plants and installations
  - good knowledge of the electric components and safety devices used in the hoist (limit switches, brakes, etc.)
  - knowledge of the techniques of control and electric adjustment of average difficulty (replacement according to the original layout of: motors, limit switch, push-button panels, command boards, cables, etc.)
  - basic knowledge of the techniques of control and mechanical adjustment of low difficulty (checking wear, adjustment of mechanical retainers, etc.)
  - knowledge of the measurement and test methods to determine the effective status of the hoist conditions (check efficiency and reliability of the electric equipment)
  - knowledge regarding methods of troubleshooting and search for electrical failure and experience regarding electric command and control systems of lifting and handling equipment
  - capacity to organise the measures used to take the hoist back to its correct function and performance
  - capacity to draw-up a maintenance intervention statement
- **Qualification required:**
  - Complete training as industrial electrician with specialisation and experience in maintenance of industrial lifting or handling systems

	Electromechanical maintenance technician: **An operator whose professional profile gathers and summarises the skills and technical capacities of the typical electrical technician and also those of the mechanical technician.**	

	Mechanical technician	

- **Typical maintenance activity:**
  - mechanical adjustments of the safety devices, calibrations and inspections (annual load tests)
  - routine maintenance operations following replacement of complex electric components and/or critical for safety reasons (components of the suspensions, reducers, motors, etc.)
  - repair of mechanical units following extraordinary maintenance operations (repair of the structural parts with overlay welding, mechanical machining on the crane, etc.)
- **Technical know-how required:**
  - knowledge of industrial mechanical lifting and handling 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 electric control and adjustment techniques (check motors)
  - specific skills regarding the measurement and test methods to determine the effective status of the crane and hoist conditions (checking: brakes, push-button panel, control board, limit switch, etc.)
  - specific skill regarding the methods of logical search of the faults and assessment of results
  - capacity to direct the measures used to take the bridge crane back to its correct function and performance
  - capacity to draw-up a maintenance intervention statement
- **Qualification required:**
  - Complete training as industrial mechanical technician with specialisation and specific skills in maintenance of industrial lifting or handling systems

	Electrical technician.	

- **Typical maintenance activity:**
  - electric adjustments of the safety devices, calibrations and inspections (annual load tests)
  - routine maintenance operations following replacement of complex electric components and/or critical for safety reasons (lifting limit switch, hoist motor, L.V. control board)
  - repair of electric units following extraordinary maintenance operations (repair of electric motors with partial replacements, limit switch replacement with set-up variations, etc.)
- **Technical know-how required:**
  - excellent knowledge of the plants and electric installations on industrial lifting and handling equipment
  - specific knowledge of the electrical components and safety devices used in the hoist (limit switch, brakes, load limiter, etc.)
  - experience in electric control and adjustment techniques (capacity to intervene in the original layout for improvements on: limit switch, push-button panels, command boards, cables, etc.)
  - knowledge of the control and mechanical adjustment techniques (check wear, check performance of mechanical components, adjustment of mechanical retainers, check noise, etc.)
  - specific expertise regarding the measurement and test methods to determine the effective status of the hoist conditions (check efficiency and reliability of the electric equipment)
  - specific skill regarding the logical search methods for all faults and assessment of the results on the electric command and control devices on lifting equipment
  - capacity to direct the measures used to take the crane and hoist back to their correct function and performance
  - capacity to draw-up a maintenance intervention statement
- **Qualification required:**
  - Complete training as industrial electrical technician with specialisation and specific skills in the electrical equipment of lifting or handling systems

	Electromechanical technician: **It is a highly specialised and specifically trained operator, whose professional profile gathers and summarises the skills and knowledge of the typical electrical technician and also those of the mechanical technician.**	

	Particular recommendations regarding maintenance:

1. If performed correctly, the maintenance interventions guarantee the safety of the operators assigned to using the suspended bridge crane and reduce down times after a fault to a minimum.
2. Timely repairs prevent further deterioration of the crane or its components.
3. Where possible, use original spare parts or products.
4. The following provisions must be complied with when maintenance must be performed:
   - The staff performing the routine and extraordinary maintenance interventions must have read and fully understood all of the indications contained in this chapter and in chapter 3.
   - Extraordinary maintenance operations must be performed only by authorised staff, qualified and trained for the purpose.

	When possible, the maintenance interventions must be performed with the crane unpowered and in conditions of safety, using suitable equipment and personal protection equipment, according to that prescribed by the regulations in force, affixing the a warning sign stating: " MACHINE UNDERGOING MAINTENANCE".

	For problems that may occur or to order spare parts, refer to the donati After-sales Technical Service

6.3 Maintenance plan

The maintenance plan concerns the DPS suspended bridge crane kit and must be assessed/integrated by the crane manufacturer. The plan includes routine interventions, which envision inspections, controls and checks performed by the operator assigned to use of the crane and/or qualified staff assigned to normal company maintenance, and also periodic maintenance that includes replacement, adjustment and lubrication operations performed by technical staff trained for this purpose through specific courses and publications.

- **Since maintenance operations may be performed at a dangerous height, with respect to the ground, the staff assigned must have suitable means (scaffolding, platform, ladders, etc.), which allow the activity to be performed in safe conditions.**
- **The staff must also be provided with suitable Personal Protection Equipment (P.P.E.) envisioned by current legal provisions.**

6.3.1 Daily and periodic maintenance.

Includes the maintenance operations that can be performed directly by the operator assigned to using the crane with DPS kit or by qualified staff, as prescribed in this publication and/or in any attached documentation, which does not require the use of special tools and equipment.

The maintenance interventions are divided into:

Daily interventions, by the operator assigned to using the crane:

- general visual checks
- functional checks with following tests: motors, limit switch, clutch device, no-load brakes, "stop" buttons and other push-button panel functions
- checking the conditions of the rope/chain and hook
- checking correct running of the trolley and bridge

Monthly interventions, by qualified staff:

- visual check of every mechanism and any lubricant leaks
- functional check of the brakes at full load
- checking that there are no abnormal noises and/or vibrations
- greasing the mechanisms, end runs, to guarantee regular operation and limit wear
- checking the functionality and integrity of the push-button panel and relative cable.

Three-monthly interventions, by qualified staff:

- checking efficiency and wear of: hook, rope, chain and chain guide
- checking wear of the sprocket and block/hook block
- checking wear of the traversing trolleys and bridge wheels
- checking efficiency and functionality of the load limiter.
- visual check inside the control boards to ascertain the presence of dust
- checking and cleaning oxidised contacts and any plugs/sockets
- checking greasing of the mobile trolleys and the eventual festoon line and control of cables
- checking efficiency and integrity of the power supply line and its components
- load check of motors and brakes with control of wear
- checking efficiency and preservation of the structure (paintwork, oxidation, etc.)

6.3.2 Frequency and deadline of the maintenance interventions

The frequency of the following operations refers to a DPS mono-girder bridge crane in normal operating conditions and is valid up to the M5 service unit (ISO 4301/88) i.e. 2m (FEM 9.511).
If use of the suspended bridge crane is normal and correct for an 8 hour shift, it can be overhauled after a period of use of approx. 10 years (FEM 9.755 - S.W.P.).
If used over several shifts the maintenance periods must be adapted accordingly.

Periodic control and maintenance interventions table

Subject of the check ⇓	Periodic checks				Useful notes
	Daily	Monthly	Every three months	Yearly	
Controls Inspections - Audits	General visual checks. Good working order checks	General visual inspections	Check wear	Annual inspection	page 37-38
Signs and pictograms, Signs and plates	Legibility of signals and pictograms, signs and plates	Visual inspections of integrity and cleaning plates and signals	Check suitability		page 18-22
Structural elements Welding – Pins Bolted joints				Check wear and efficiency Check bolted/welded joints	page 57
Rope/Chain Fixing elements	Visual inspection		Check wear and efficiency		Hoist manual
Lifting hook	Visual inspection and check carabiner		Check wear and efficiency		Hoist manual
Load sprocket Chain guide Block idler			Check wear and efficiency		Hoist manual
Lifting reducer Traversing reducer Running reducer		Check noise			Hoist manual
Lifting motor Traversing motor Running motors	Check correct operation		Load tests		Hoist manual
Lifting brake Traversing brake Running brakes	Check correct operation	Load tests of the braking spaces	Load tests Check wear		Hoist manual and page 59
Trolley wheels Rotation bearings			Check noise of bearings	Check wheels	page 57
Buffers/anti-collision devices of the bridge and trolley	Visual inspection			Check wear and efficiency	page 58
Electric plant Push-button panel and cable	Check correct operation	Visual inspection external breakage push-button panel/cable	Wear and efficiency check		Hoist manual and page 58
Load limiter Clutch device			Load tests	Check calibration	Hoist manual
Lifting end run Traversing end run Running end run	Check correct operation		Load tests wear and efficiency check		Hoist manual and page 58
Cleaning and lubrication	Check correct status of cleanliness and lubrication	Inspection of general lubrication	Check leaks Lubrication of chains, hook, mechanisms		Hoist manual and page 59

6.3.3 Checking efficiency of the parts and components.

	**For the individual parts of the suspended bridge crane with DPS kit, the following instructions must be followed scrupulously:**

	**Annual efficiency check of the structural elements, welding, pins and bolted joints:**	
• In addition to normal alterations due to environmental factors and the wear of moving parts, the metal structure of the suspended bridge crane can be subjected, also unintentionally or during the handling operational phases, to blows, contacts or scraping against other equipment or also to abnormal stress, which can cause damage to the framework sheets, the welding and suspension clamps. Therefore, following thorough cleaning, the structures must be periodically subjected to scrupulous controls to ascertain suitability and to remedy any damage. • Check the tightness of all suspension and joint fixing bolts.		
!	**Repair the structures and components or replace them where the following occur:** • **deformations:** lengthening, crushing, dents, bending • **wear:** consumed parts, section reductions, incisions, abrasions, corrosion, oxidation, scratches, peeling paint • **breakage:** cracks in welding, cracks, cuts or incisions, broken parts • **section variations ≥ 10%, or diameter or thickness ≥ 5 % with respect to initial values**	DONATI TECHNICIAN  DONATI SERVICE

	**Annual efficiency check of the wheels of the hoist-support and bridge-support:**	
• Check the status of wear of the strips where the wheels roll. • Every three-months check the ball bearings, which must be replaced when there is excessive noise or excessive friction, "jerky", difficult and/or irregular rotation		
!	**Replace the trolley wheels when:** • **The rolling diameter of the wheel has excessive wear** • **Whenever it is necessary to replace just one wheel. To obtain the best operations and duration, it is recommended to replace all trolley wheels**	

	**Annual efficiency check of the trolley and bridge buffers:**	
• Control that the end stops are not deformed and there is no sign of failure in their fixing to the structures and the buffer is integral and fixed well to its support.		
!	**Replace the buffers when they have:** • **Signs of breakage or permanent deformation, cuts, abrasions, incisions**	

	**Three-monthly check of the mechanical end runs and anti-collision devices:**	

- Check the status of preservation and correct intervention of the mechanical end runs
- Check the mechanical integrity of the anti-collision device mobile elements and check the tightness of the fixing screws.

	**Replace the end run buffers or anti-collision devices if they show:** • **Signs of breakage or permanent deformation, cuts, abrasions, incisions**	

	**Three-monthly efficiency check of the electric power supply plant:**	

- Check the efficiency of the festoons power supply cable, check there is no peeling, cuts, lacerations or alterations in the protective sheath.
- Check the tightness of the wires and power supply cable in their terminals (in the junction box) and, if necessary, tighten them correctly.
- Check the efficiency of the wires and the earth connections, performing a control, and, if necessary, fixing all of the earth screws.
- Check all sealing gaskets of the lids and cable glands.
- Check the presence and efficiency of the plates.

	• **Do not hesitate to replace the electric component, whenever it is no longer able to sufficiently guarantee operational liability** • **Never perform improvised or makeshift repairs** • **Use original spare parts**	

	**For information regarding the checks of all structural, mechanical and electro-mechanical components of the lifting unit incorporated into the suspended bridge crane with DPS kit, see the relative documentation attached to this technical publication.**

	• **Do not hesitate to replace the part and/or component in question, whenever it is not able to offer a sufficient guarantee of safety and/or operational reliability** • **Never perform improvised or makeshift repairs!**

6.3.4 Cleaning and lubrication of the DPS suspended mono-girder bridge crane

	**The bridge crane can be cleaned by staff that does not have to be highly specialised. This is periodically necessary in order to parts from the accumulation of dust, dirt and sludge due to excess lubricants.**

- Cleaning can be performed simply with the use of means, equipment and detersives or solvents commonly used in the general cleaning operations of industrial equipment, as particular contraindications do not exist in relation to the use of products or materials.

	**The accurate management of lubrication of the crane mechanisms is the condition necessary to guarantee the effective compliance to the service to which it is intended, as well as its duration.**

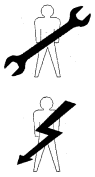
- The crane is very easy to lubricate and can be performed by non-highly specialised staff, following the instructions provided scrupulously.

	**Regarding the lubrication of all mechanical components of the following units:** • **"DRH" series electric hoist with rope and relative traversing trolleys** • **"DMK" series electric hoist with chain and relative traversing trolleys** **consult the "Instruction manuals" attached to this technical publication.**

	• **lubricants, solvents and detergents are products that are toxic/noxious to health:** • **if they come into direct contact with the skin they can cause irritations** • **if inhaled they can cause serious intoxication** • **if ingested they can cause death** • **handle them with care using suitable P.P.E. Do not dispose of them in the environment; dispose of them in compliance with the current legislative provisions on the subject of toxic/noxious waste.**

6.3.5 Adjustment of the DPS suspended bridge crane end carriages motor brake

	• **The "DPS" end carriages motor is the self-braking type with axial displacement of the rotor.** • **Braking is mechanical and is ensured by a conical brake shoe, supplied with brake lining, joined to the rotor which, without power supply, is pushed by a spring in contact with the braking surface of the brake cover.** • **The asbestos-free brake linings are subject to more or less accentuated consumption depending on the intensity of the service.** • **The consumption of the brake lining increases play between the lining itself and the brake shoe. This leads to progressive loss of the braking torque with consequent slipping of the brake and lengthening of the braking spaces; brake adjustment is necessary for this reason.** • **The braking torque can be adjusted as follows:** **internal recovery of brake play for great wear of the brake lining with increase of the axial travel of the drive shaft > 1 mm**

 	**Adjustment of the "DPS" end carriages brake via internal recovery of brake play.** **ATTENTION! When these operations are carried out at a height, the use of safety harnesses is mandatory.**		

- To adjust the brake of the **"DPS" running end carriages**, the following **PRELIMINARY OPERATIONS** must be performed:
  1. Disconnect the power supply voltage;
  2. Reach the work area at a height in safety;
  3. Operating at a height, remove the plastic grid (aerator) by completely loosening the four screws (fig. 25).
  4. Completely loosen the three screws from the brake shoe locknut (fig. 26);
  5. Remove the locknut from the shoe, releasing it. If necessary, use a screwdriver in the slot (fig. 27);
  6. Turn the locknut anti-clockwise by 360° (1 complete turn) considering that a complete turn of the locknut generates axial displacement of di 1 mm of the brake shoe.

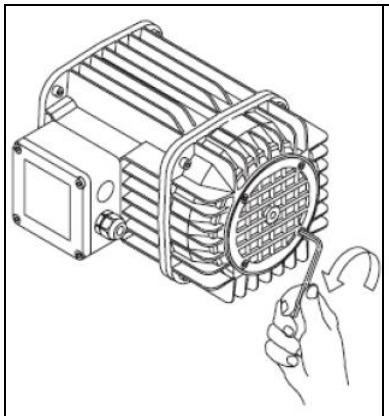


fig.25

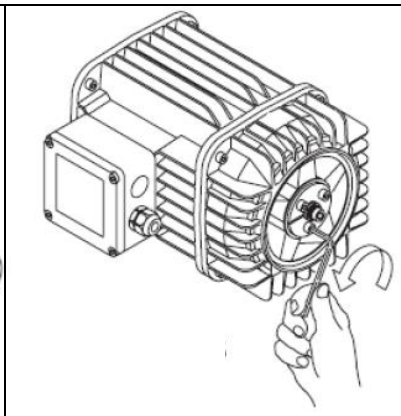


fig.26

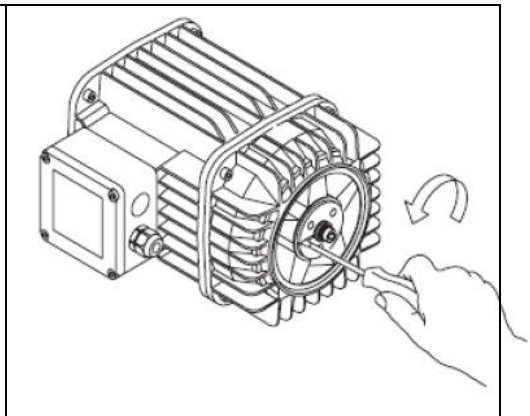


fig.27

7. Approach the shoe to the locknut, making the relative holes correspond.
8. Re-position the three screws in the original seat on the locknut and tighten them onto the shoe (fig. 28)
9. Re-mount the grid (aerator) by tightening the four screws fully home (fig. 29).

When the operation has been completed, check that the brake adjustment, with recovery of play, has taken place correctly, checking (first with no load and then with rated load) that:

- Motor rotation is free, without abnormal noise, friction of the brake or overheating of the brake cover.
- The brake intervenes silently and the "DPS" end carriages are made to brake without evidence of slipping.

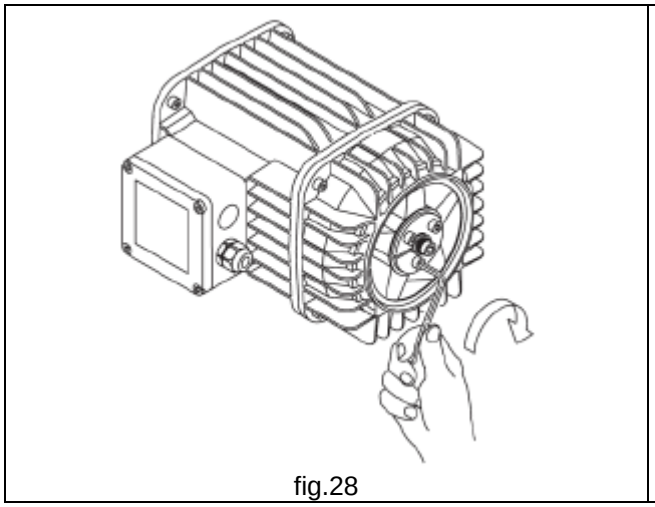


fig.28

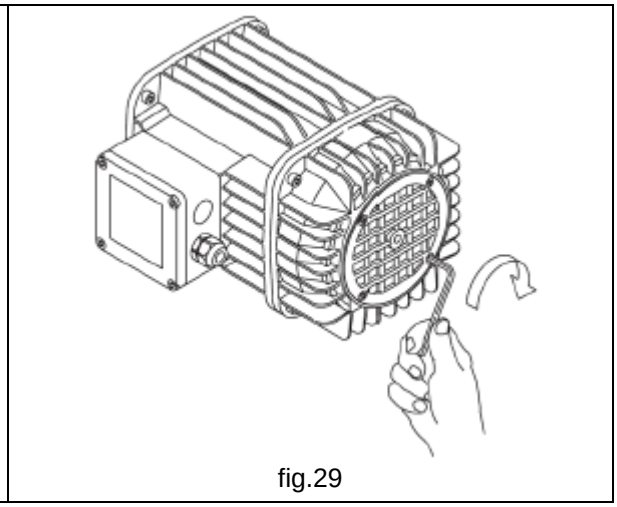


fig.29

☞	**If adjustment has been carried out several and desired braking can no longer be obtained, the motor cover must be replaced by ordering EXCLUSIVELY the original spare part.**

6.4 Troubleshooting

6.4.1 Main malfunctions or faults and possible solutions

The columns in the table below show the main reasonably foreseeable malfunctions and the type of problem, the potential cause of the fault and the possible solutions.

FUNCTION ⇒ FAULTS ⇓	Hoist lifting	Trolley traversing	Bridge crane running	CAUSE
it does not start	■			- up/down contactors - up/down buttons - hoist motors - fuses
it does not start		■		- right/left end run - right/left contactor - right/left button - trolley motors - fuses
it does not start			■	- forward/backward end run - forward/backward contactor - forward/backward button - bridge motors - fuses
it does not start	■	■		- check power supply festoon - check hoist/trolley
it does not start	■	■	■	- power supply line - low voltage transformer - line switch - fuses
it starts partially (in just one direction)	■	■	■	- end run, contactor or button of the function inhibited
the movement does not stop at end run or does not stop in the correct place	■	■	■	- function end run - function brake (in this case check "wheel spin")
the movement continues even when the button has been released	■	■	■	- function button - function contactor - "false contact"
excessive reducer noise	■	■	■	- no lubrication - reduce failure
squealing noise in the braking phases	■	■	■	- presence of dust - excessive play - braking gasket worn
squealing noise of wheels (operation in fits and starts)		■	■	- no lubrication - out of service cycle
wheels that spin on the tracks		■	■	- wheels too lubricated or presence of paint
crane not linear (“transversal” handling")			■	- gear-reducer or bridge motor failure - track wear or misalignment
The crane jumps in the vicinity of the runway joints			■	- misalignment of the runways in correspondence with the joint
all crane functions move slowly and/or the hoists lift the load with difficulty	■	■	■	- voltage drop on the line - insufficient power supply cable section - line phase missing (single-phase operation)
current is detected at the hooks	■			- electric plant - earth plant

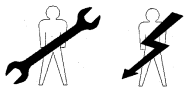
6.4.2 Staff authorised to intervene in the case of breakdown

The staff authorised to intervene in most breakdown cases, or where not differently signalled, is an expert or qualified maintenance technician with specific preparation regarding mechanical and electrical parts. Where highlighted, the intervention of specialised or especially trained staff is necessary or intervention by the manufacturer's technical staff.

6.4.3 Decommissioning

If the suspended bridge crane cannot be repaired, proceed with its decommissioning, signalling the breakdown with the relative sign; request the assistance of the after-sales service.

6.5 Dismantling, disposal and scrapping

	**Whenever the suspended bridge crane or its components, which are broken, worn or at the end of their envisioned life span, can no longer be used or repaired, they must be demolished.**	

- The bridge crane must be demolished using suitable equipment selected in relation to the nature of the material on which intervention is to be performed (e.g. shears, blowtorch, hacksaw, etc.)
- All components must be dismantled and scrapped after they have been reduced to small pieces so that they cannot be re-used.
- When the bridge crane is scrapped, its parts must be disposed of separately, taking the different nature of the same into account (metals, oils and lubricants, plastic, rubber, etc.), if possible engaging specialised authorised companies to do this and in all cases in compliance with that prescribed by the law on the subject of the disposal of industrial solid waste.

	**Do not attempt to re-use parts or components of the bridge crane that apparently can seem to be still integral once that they have been declared no longer suitable, following controls and checks and/or replacements by specialised staff or the manufacturer itself.**

7. – SPARE PARTS

	• **The DPS suspended mono-girder bridge crane kits are designed and manufactured in a way not to normally require spare parts DUE TO FAULTS OR BREAKAGE, if used correctly and following suitable maintenance, as described in this manual.** • **The parts or components subjected to normal wear or deterioration following use can be found at the manufacturer for a minimum period of 10 years.**

	• **Do not hesitate to replace the part and/or component in question, whenever it cannot offer sufficient guarantees of safety and/or operational reliability.** • **Never perform improvised or makeshift repairs!**

Where it is necessary to replace faulty parts, it is mandatory only to use original spare parts, requesting them directly from:

		***Via Quasimodo, 17 20025 – Legnano (MI)*** ***Tel. +39 0331 14811 Fax. +39 0331 1481880*** ***E-mail: dvo.info@donaticranes.com*** ***www.donaticranes.com***

	**In addition to making the warranty null and void, the use of non-original spare parts can compromise the good operation of the bridge crane and/or its components.**

www.donaticranes.com
DONATI SOLLEVAMENTI S.r.l.
Via Quasimodo, 17 - 20025 Legnano (Milano) - Italia
Tel. +39 0331 14811 - Fax. +39 0331 1481880
e-mail: dvo.info@donaticranes.com

Factory:
Via Archimede, 52 - 20864 Agrate Brianza (MB) – Italia