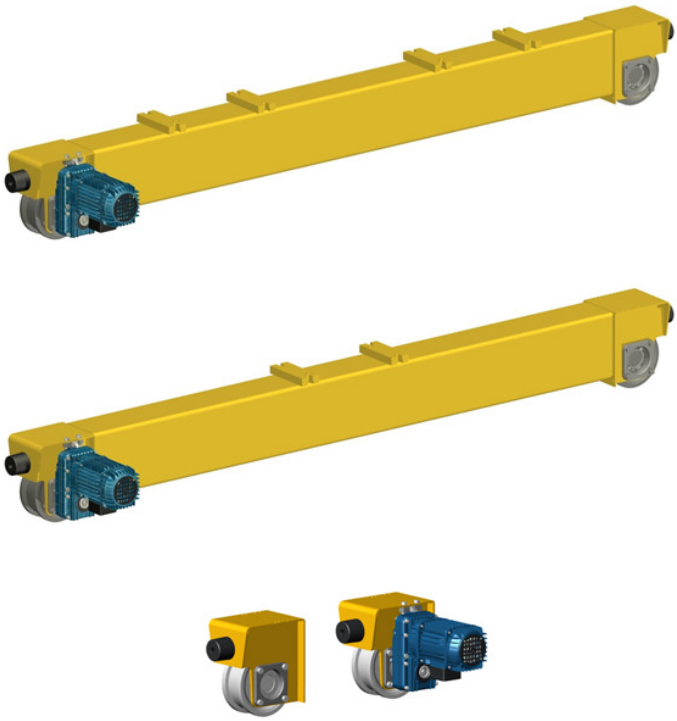
Drive UNITS FOR CRANES

"DGT" Wheel Groups + "DGP" Offset Geared Motors

Endcarriages

for Single girder and Double girder Bridge Cranes



donati

OPERATING MANUAL

INSTALLATION - USE - MAINTENANCE

KMAN19MG00

CONTENTS

CONTENTS **page**

1. – PRELIMINARY INFORMATION

1.1 Contents and recipients of the operating manual

- This technical publication, identified with the code **KMAN19MG00**, refers to the following products, hereinafter also referred to as **"components"**:
  - **Drive units**, comprising the **"DGT" series Wheel Groups**, in combination with the **"DGP" series Offset Geared motors**;
  - **"DGT" series endcarriages for single girder and double girder bridge cranes**;

  designed, manufactured and introduced on the market by:

DONATI SOLLEVAMENTI S.r.l.
Via Quasimodo, 17 - 20025 Legnano (MI) - Italy
tel. +39 0331 14811 - fax +39 0331 1481880
e-mail: dvo.info@donaticranes.com - www.donaticranes.com

- In relation to its "intended use," technical and functional specifications, performance characteristics and installation, use and maintenance instructions, the manufacturer directs its attention at:
  - the production plant or work site coordinator
  - operators in charge of transport, handling and installation
  - personnel charged with maintenance operations
- This operating manual must be kept under the care of a person responsible for the machinery's operation, in an appropriate location, so that it is always available for consultation in the best possible state of conservation.
- If this operating should go missing or become damaged, a replacement copy must be ordered directly from the manufacturer, citing the code of this present operating manual.

1.2 Symbols: meaning and usage

- This operating manual makes use of various symbols to call the reader's attention to and emphasize the importance of certain safety considerations.
  The table below provides a list of symbols used in the manual, and their related meaning.

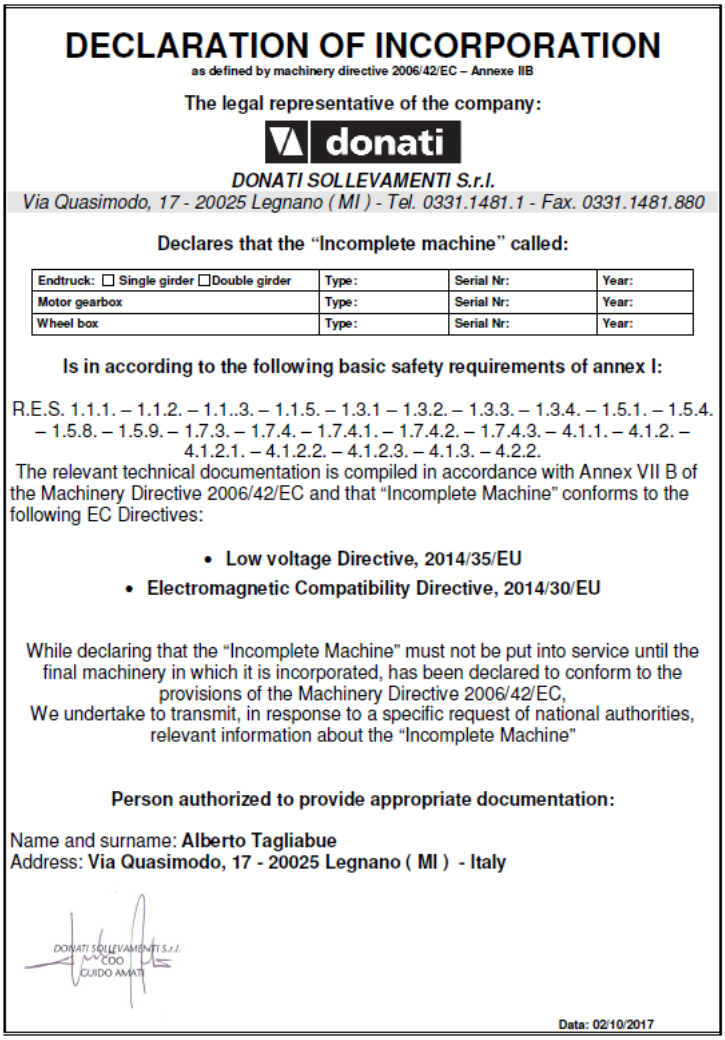
SYMBOL	MEANING	EXPLANATION, RECOMMENDATIONS, NOTES
	**Danger**	• Indicates danger with the risk of an accident, even death related. • Failure to respect the safety instructions related to this symbol can lead to extremely dangerous situations placing the unit's operator and/or persons exposed at risk! • **Abide strictly to all safety precautions indicated!**
	Warning	• Represents a warning notice for the possible deterioration of components or the operator's personal belongings. • **Important warning - pay maximum attention.**
	**Caution** **Note**	• Provides information or useful information on key functions.
	• **Visual control** • **Take action**	• An eye-shaped symbol tells the reader to: **a)** proceed with a visual control check. **b)** proceed with the operating sequence. **c)** read or take note of a setting or measurement, check an indication, etc.

1.3 Collaborating with users

- This operating manual represents the state-of-the-art in technology at the time of the introduction to the market of the components illustrated herein.
- Any integrations to this operating manual the manufacturer deems appropriate to send to users must be duly conserved together with the original manual.
- The manufacturer is available to its customers to provide further information and to consider proposals for improvements, so as to render this manual more responsive to the needs of users.

1.4 Conformity to norms and regulations

- The components illustrated in this publication have been designed and produced in conformity with current legislation in Italy, adopting the following **European Community Directives:**
  - **Machinery Directive 2006/42/CE.**
- Specifically, in relation to the obligations outlined in **Machinery Directive 2006/42/CE**, the **"DGT" series Drive Units and Endcarriages** are:
  - conceived and manufactured as per the **"Essential Safety Requisites"** cited in **Attachment I**;
  - introduced onto the market, equipped with a **Declaration of incorporation** – **Annexe IIB.**



DECLARATION OF INCORPORATION

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

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:

Endtruck: ☐ 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**

DONATI SOLLEVAMENTI S.r.l. COO GUIDO AMATI

Data: 02/10/2017

Facsimile of the **Declaration of incorporation** – **Annexe IIB**

1.5 Manufacturer's liability and warranty

- In relation to the components illustrated herein and in reference to the indications outlined in this operating manual, the manufacturer ***DONATI SOLLEVAMENTI S.r.l.*** declines any **responsibility** in the case of:
  - usage contrary to Italian legislation on safety and accident prevention measures;
  - wrongful preparation and setup of components in the worksite, and/or on structures and machinery the components are set to operate on;
  - faulty electrical line voltage specifications;
  - failure to observe the instructions provided in this operating manual;
  - non-authorized modifications or interventions on the product;
  - installation on the part of non-qualified or ill-trained personnel.
- So as to avail itself of the **warranty**, as outlined in the certificate below, the buyer must meticulously observe the prescriptions indicated in this operating manual, specifically:
  - always operate within the product's usage and performance limitations;
  - always carry out constant and diligent maintenance, as outlined in this operating manual;
  - entrust the use and operation of lifting equipment and machinery fitted with the **"DGT" series drive units and endcarriages** to operators with proven experience and skills, and appropriately trained in their usage;
  - make use of the manufacturer's original spare parts exclusively.

- **The usage designations and configurations foreseen for the "DGT" series sliding units and beams are the ones admissible. Do not attempt to use these components disregarding the indications provided.**
- **The instructions provided in this manual do not substitute, but summarize the obligations stipulated under current legislation on accident prevention regulations.**

2. – DESCRIPTION OF COMPONENTS AND TECHNICAL SPECIFICATIONS

2.1 “DGT” series endcarriages for cranes

2.1.1 Intended and proper usage

- The **drive units for cranes comprise “DGT” series wheel groups in combination with “DGP” series offset geared motors**, are built specifically for handling lifting systems on rails, such as, for example, travelling cranes, trolley cranes, wall-mounted cranes, etc. and/or related running trolleys, guaranteeing the precise alignment for moving structures, control over high shifting speeds, while facilitating installation and maintenance.
- **“DGT” series wheel groups and “DGP” series offset geared motors** are modular components specifically designed for **drive units for cranes** by manufacturers of machinery and industrial lifting and handling installations.
- Running movements (forward and reverse) **must be enabled electrically**.

2.1.2 The range of Drive Units

- These **drive units for cranes** are designed and engineered based on the principle of modular components which, in addition to the more common versions commercially available, when assembled to one other in relation to the user’s requirements, allow for the fast and economical realization of multiple standard and special configurations.
- **DONATI drive units** are configured in **6 production sizes**, for which the basic components are:
  - 6 sizes of **“DGT” series wheel groups** (Ø 125, Ø 160, Ø 200, Ø 250, Ø 315 and Ø 400/400R)
  - 4 sizes of **“DGP” series offset geared motors** (DGP 0, DGP 1, DGP 2 and DGP 3)
  - 4 sizes of **self-braking motors** (motor 71, motor 80, motor 100 and motor 112)

Wheel Group configurations based on combinations between “DGT” Wheels and “DGP” Motoreducers

<table>
<tr><th colspan="2">“DGT” WHEELS</th><th colspan="4">“DGP” SERIES OFFSET GEARED MOTORS</th></tr>
<tr><th>SIZE</th><th>0 (mm)</th><th>“DGP” REDUCERS SIZE 0</th><th>“DGP” REDUCERS SIZE 1</th><th>“DGP” REDUCERS SIZE 2</th><th>“DGP” REDUCERS SIZE 3</th></tr>
<tr><td>1</td><td>125</td><td rowspan="2">Motors size 71</td><td rowspan="3">Motors size 71</td><td rowspan="2">Motors size 80</td><td>=</td><td>=</td></tr>
<tr><td>2</td><td>160</td><td>=</td><td>=</td></tr>
<tr><td>3</td><td>200</td><td>=</td><td rowspan="3">Motors size 80</td><td rowspan="4">Motors size 100</td><td>=</td></tr>
<tr><td>4</td><td>250</td><td>=</td><td rowspan="2">=</td><td>=</td></tr>
<tr><td>5</td><td>315</td><td>=</td><td rowspan="3">Motors size 112</td></tr>
<tr><td rowspan="2">6</td><td>400</td><td>=</td><td>=</td><td rowspan="2">=</td></tr>
<tr><td>400R</td><td>=</td><td>=</td></tr>
</table>

- The **6 production sizes for “DGT” series Wheel Groups** cover the following operating limitations:
  - **Capacity** of the lifting and/or traversing equipment:
    - from **1000 to 40,000 kg**
  - Running **speed**:
    - single speed, from **3.2** to **25 m/min**;
    - two-speed, from **12.5/3.2** to **80/20 m/min**.

- The modular design of the basic components (wheels, reducers and motor) allows for two configurations of **“DGT” series drive units**:
  - **Idle drive units** (fig. 1a)
  - **Motor driven units** (fig. 1b)

- The flexibility of the numerous fastening solutions adopted allow for assembly on a variety of mechanical frame types, as well as easy integration with a number of accessories available on the market, such as, for example, guide systems, or collision proof systems, whether mechanical, electrical or electronic, or speed control and crane and trolley stop position systems.

2.1.3 Components on Drive Units

- **"DGT" series wheel groups:**

The drive wheels Ø 125, Ø 160, Ø 200, Ø 250 and Ø 315 are carbon steel moulded. The wheels Ø 400 and Ø 400 R are cast-iron.

- All wheels revolve on radial bearings, permanently lubricated, with the exception of the larger capacity Ø 400 R wheel, which is fitted with roller bearings.
- They are available in either neutral (idle) operation or ready to be set up as drive units in combination with a offset geared motors.
- In drive operation, the direct coaxial connection between the oscillating reducer's exit shaft and the slotted hub on the drive wheel ensures high safety standards and operating reliability.
- Wheels are available in a standard version with a double flange, and can be supplied, on request, in various sliding band widths in relation to the type of traversing rail they are intended to slide on.
- Whether in idle or drive operation, the wheels are supported and contained within an electro-welded plated frame which acts as a support box for the entire group, and as an joining element between the operating head frame or trolley with which the wheel group is to be assembled.

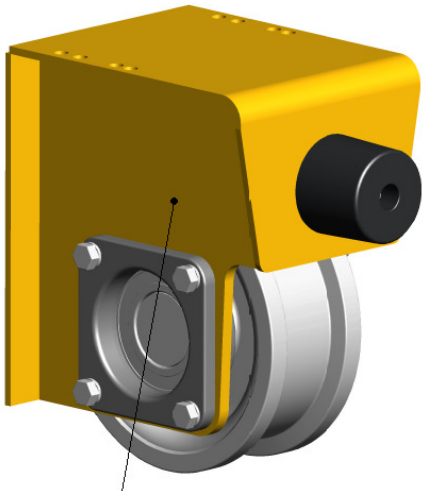
- **"DGP" series offset geared motors:**

Reducers are designed as a "offset" type with a concave shaft, featuring parallel axes with two or three stages of reduction, and permanent oil-bath lubrication.

- Engineered with cylindrical high resistance steel gears, featuring spiral toothing, thermically treated, entirely supported on ball bearings.
- Sized to resist a lifetime of stress and wear, in accordance to the pertinent ISO service group.
- The connection between the reducer and sliding wheel is guaranteed by a slotted shaft connecting the holes on both parts, while the reducer fastened to the wheel group makes use of a system comprising a reaction arm fastened to the wheel group, and an elastic counter bearing with rubber buffers and a setscrew. The entire reducer-wheel connection system guarantees both high quality sliding operation and maximum duration over time with low maintenance, thanks to the elimination of rigid connections.

The electric motors are asynchronous, featuring a progressive start-up, with standard ventilation, self-braking with axial shifting of the rotor guaranteeing a fast, reliable mechanical braking over time.

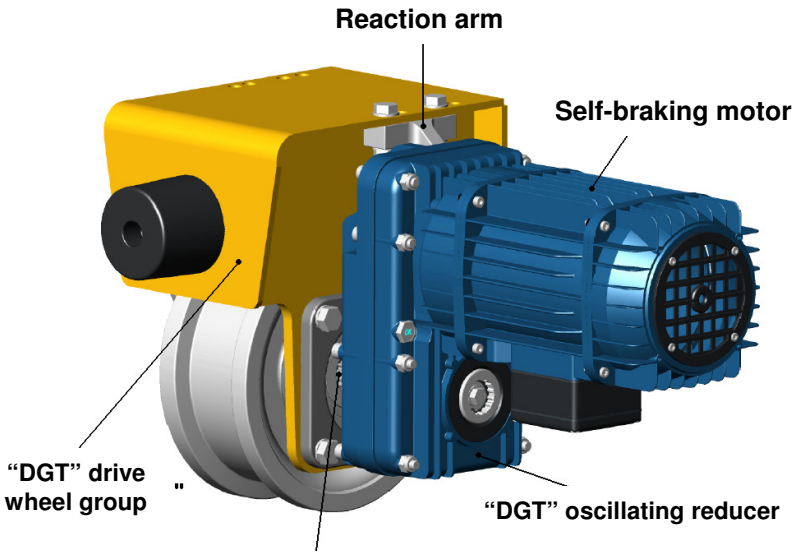
- Conical brakes are fitted with asbestos-free braking gaskets, featuring an extended braking surface.
- The brake block comprises a fan which ensures proper cooling for the brake and motor, shifting axially with the motor shaft; the brake function is activated automatically in the case of a power outage.
- The connection between the motor and swinging reducer features a slotted joint contained within a coupling housing, which also comprises, where required, a flywheel transferring progressive start-up and braking drive motion.



"DGT" idle wheel group

Idle Drive Unit

fig. 1a



Powered Drive Unit

fig. 1b

2.2 “DGT” series Endcarriages for bridge cranes

2.2.1 Intended and proper usage

- The **endcarriages** are designed for handling operations on rails on **bridge cranes**:
  - **at a running speed of from 3.2 to 25 m/min;**
  - **at two running speeds, from 12.5/3.2 to 80/20 m/min;**

  operating on:
  - **single girder, with a capacity of up to 20,000 kg and gauge of up to 25 m**;
  - **double girder, with a capacity of up to 40,000 kg and gauge of up to 27 m**.
- The **endcarraiges** are equipped with **drive units** comprising **“DGT” series wheel groups**, which, in combination with **“DGP” series offset geared motors**, guarantee:
  - accurate alignments;
  - control over high running speeds;
  - easy installation and maintenance.

2.2.2 The range of endcarraiges

- The range of **endcarriages for bridge cranes** are designed in **6 production sizes** corresponding to the dimensions of the respective wheels, in **17 configurations** based on **7 different wheel pitch lengths** calibrated in relation to the gauges and type of bridge crane they are combined with, i.e.:
  - **6 “DGT” series drive wheel group sizes:**

  (Ø 125, Ø 160, Ø 200, Ø 250, Ø 315 and Ø 400/400 R)
  - **17 configurations based on the wheel pitch:**

  (1800 mm; 2100 mm; 2400 mm; 2700 mm; 3300 mm; 3600 mm; 3900 mm)

Operating limitations for endcarriages on SINGLE GIRDER or DOUBLE GIRDER bridge cranes, in relation to span

END-CARRIAGES TYPE SIZE “DGT”	WHEEL Ø R (mm)	WHEEL BASIS PR (mm)	SPAN (m) SINGLE GIRDER M OR DOUBLE GIRDER B BRIDGE CRANE. 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	125	1800				M																		
		2400				B					M		B											
		3300														M		B						
2	160	1800				M																		
		2400				B					M		B											
		3300														M		B						
3	200	2100					M																	
		2700					B						M		B									
		3600																M		B				
4	250	2100					M																	
		2700		M	B				B				M		B									
		3600																M		B				
		3600 R																	M					
5	315	2400						M																
		3900													B									
6	400	3900													B									
	400R	3900 R														B								

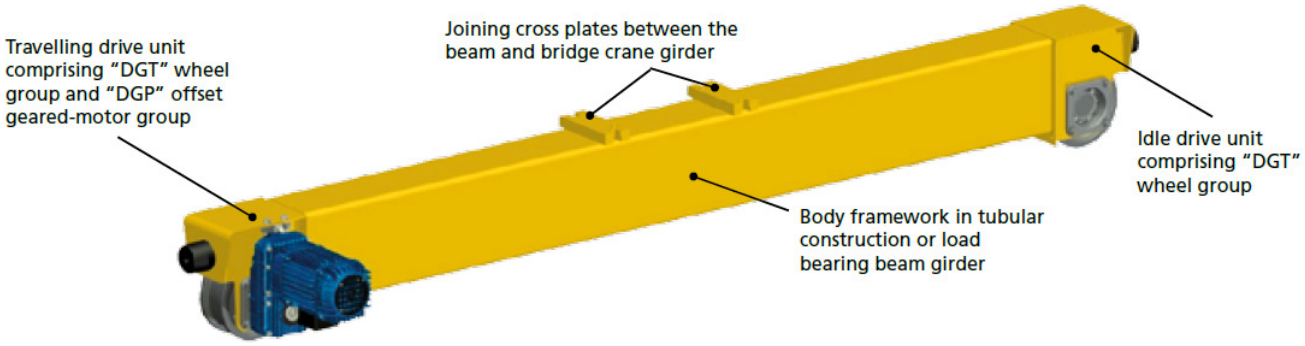
Endcarriages are equipped with **Drive Units**, comprising **“DGT” series Wheel Groups** in combination with **“DGP” series Offset Geared Motors**, as outlined in section 2.1.

2.2.3 Components on travelling beams

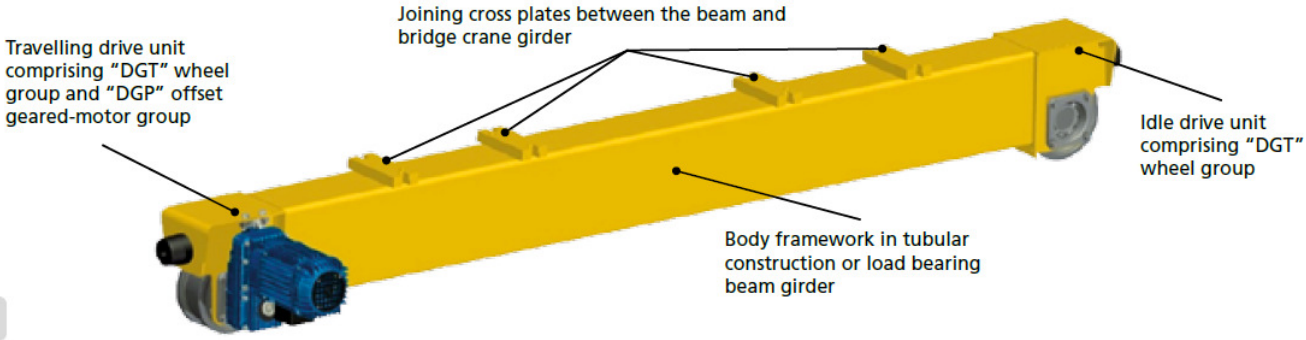
END-CARRIAGE FRAMEWORK:

- The load-bearing structure is made from a rectangular tubular section.
- The bridge crane girders are fixed to the end-carriage structure using a system of high-resistance bolts and a pin centring system.

END-CARRIAGE FOR SINGLE GIRDER BRIDGE CRANE



END-CARRIAGE FOR DOUBLE GIRDER BRIDGE CRANE



2.3 Technical specifications and operating conditions

2.3.1 Applicable norms and regulations

- The following norms and technical principles have also been taken into consideration in the design and manufacturing of **"DGT" series endcarriges for bridge cranes**:
  - EN ISO 12100/2010 "Fundamental concepts on general engineering principles"
  - EN 60529/97 "Degrees of protection for casings (IP Codes)"
  - ISO 4301-1/88 "Classifications for lifting equipment"
  - ISO 8306/85 "Tolerances for travelling girders"
  - FEM 1.001/98 "Calculations for lifting equipment"
  - FEM 9.511/86 "Classifications for mechanisms"
  - FEM 9.683/95 "Options for lifting and traversing motors"
  - FEM 9.755/93 "Safety work periods"

2.3.2 Electrical power – Protection and insulation of electrical parts

- The motors on the **Drive Units** are designed to be powered through three-phase alternating current: 400 V - 50Hz. in accordance with IEC 38-1.
- **Drive Unit** motors: Protection IP55 (motor) - IP23 (brake); class "F" insulation.
- Limit switch: minimum protection IP65; max. Insulation voltage 500 V

2.3.3 Surface finish

- Finishing on the bodywork on the **"DGT" series Drive units and Endcarriages** and protection from atmospheric and environmental agents (dust, gas, etc.) is guaranteed by a special paintwork finish which applies a chrome and lead free primer coat of 40 microns in thickness of yellow enamel RAL 1002; surfaces are previously prepared with SA 2 degree metallic sanding in accordance with SVENSK STANDARD SIS 055900. The finish is oven dried for 40 min. at a temperature of 60-80°C.
- The special waterproof paintwork finish adopted for electro-mechanical parts (swinging reducer and self-braking drive motor), obtained using an electrostatic process and the complete sealing of parts, guarantees their inalterability over time and constant high performance characteristics, even in particularly hostile environments.

2.3.4 Environmental conditions for standard usage

- Operating temperature: minimum - 10° C; maximum + 40°C
- Maximum relative humidity: 80% - Maximum altitude 1000 m above sea level.
- Standard **Drive units and Endcarriages for bridge cranes** must be installed in a well aerated working environment, free of corrosive vapours (acidic vapours, saline mists, etc.), and are designed to operate in a covered environment, protected from atmospheric elements.

It is forbidden to operate the "DGT" series Drive units and Endcarriages in a potentially explosive environment, i.e. in which the use of anti-explosive components is mandatory.

2.3.5 Noise emissions - Vibrations

- Noise emission levels emanating from the **Drive units and Endcarriages** during traversing operations, whether empty or fully loaded, are in all cases inferior to a value of 80 dB (A), as measured at a distance of 1 m and 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 surrounding walls, are not taken into consideration in the value indicated.
- Vibrations produced by the **Drive units and Endcarriages** during traversing operations are not considered dangerous for the health and wellbeing of personnel operating the lifting equipment on which the units are installed.
- Excessive vibrations can be caused by a malfunction, which must be immediately pointed out and eliminated so as to safeguard the reliability of components.

3. – SAFETY AND ACCIDENT PREVENTION MEASURES

- **"DGT" series drive units and endcarriages** are engineered and manufactured based on the most advanced technical know-how, and are designed to be operated safely.
- Dangers for personnel operating the equipment can be totally eliminated and/or notably reduced only if the components are used in accordance with the instructions outlined in this operating manual, by authorized and specially trained and prepared personnel.

	**In relation to installation, use and maintenance tasks to be carried out on "DGT" series drive units and endcarriages, operating personnel are responsible for the following operations:**

- Incorporating components in assembling lifting equipment (crane, trolley, etc.).
- Completion of component and missing parts (electrical controls) in conformity with directives stipulated by current legal norms and regulations in force
- Setup and assembly of components, and managing its operation;
- Performing operations of a different nature on components, specifically in relation to maintenance, controls and repairs, of any and all parts, before the machine's start-up, during its operation or even after its shutdown.
- Personnel must be absolutely informed regarding potential dangers inherent in conducting work operations, both in relation to operating the equipment and the correct use of safety devices on the machine.
- Personnel must also carefully observe all safety norms and regulations contained in this section of the operating manual, in order to prevent potentially dangerous situations.

3.1 Operator qualifications

- The table below outlines professional operator profiles with related pictograms, so as to better define the field of intervention and consequent responsibilities for each OPERATOR, provided by specific training and qualifications, as required for every type of intervention.

PICTOGRAM	OPERATOR PROFILE
 GENERIC OPERATOR	**Generic operator:** Personnel qualified to perform only tasks which do not imply technical interventions on the **"DGT" drive units and/or endcarriages**, such as, for example: transport, reception of goods, storage, usage, etc.
 MECHANICAL MAINTENANCE PERSONNEL	**Mechanical maintenance personnel:** Personnel qualified to intervene on components under normal conditions, as well as carry out normal adjustment on machine parts, ordinary maintenance interventions and simple mechanical repairs.
 ELECTRICAL MAINTENANCE PERSONNEL	**Electrical maintenance personnel:** Personnel qualified to intervene on components under normal conditions, and responsible for normal interventions on electrical parts, settings, including simple electrical maintenance and repairs.
 MECHANIC	**Mechanic:** Technician specialized in carrying out complex and extraordinary operations of a mechanical nature, such as, for example, assembling **"DGT" drive units and/or endcarriages** onto lifting equipment.
 ELECTRICIAN	**Electrician:** Technician specialized in carrying out complex and extraordinary operations of an electrical nature, such as, for example, incorporating **"DGT" drive units and/or endcarriages** onto lifting equipment.

3.2 General safety norms and regulations

- Before installing and operating the **"DGT" drive units** and/or **endcarriages**:
  - Carefully read and understand this operating manual;
  - Know what safety devices are available and know their location (e.g. endstrokes);
- Some tasks which need to be carried out on components in operation (e.g. setting the limit switches) expose operators to potentially dangerous situations; operators must therefore carefully observe the following:
  - Personnel must be authorized and specifically trained on operating procedures, dangerous situations which may arise, and on correct procedures to prevent and avoid such dangers.
  - If operating personnel is required to remove the cover on the motor drive terminals, due to specific technical maintenance, inspections or repairs, they must immediately replace the safety guards at the end of such operations.
  - Personnel must ascertain that, at the end of any intervention on machine components, no tools, foreign objects or mechanical parts are forgotten inside.
  - For their own personal safety and whenever possible before work operations, personnel conducting maintenance, inspections and repairs must enact all required preventive safety measures, specifically checking that the **"DGT" drive units** and/or **endcarriages** have been:
    - set in stop mode (no power or movement) and in a stationary position;
    - disabled (power cut off);
    - subjected to preventive measures (warning signs, blocking devices, etc.) so as to avoid accidental or unforeseen start-ups.
  - Electrical maintenance personnel intervening on live electrical components must proceed with extreme caution.

3.3 Safety symbols and warning labels

- This operating manual uses signals and pictograms to highlight or call the reader's attention to dangerous situations resulting from residual risks or actions which must necessarily be conducted according to safety procedures indicated in this manual.

DANGER AND WARNING SYMBOLS USED	
SYMBOL	**MEANING**
 DANGER: LIVE ELECTRICAL PARTS	**Warning label indicating live electrical parts** affixed to electrical equipment (e.g. covers on motor terminals) and any live structure or component.
 GENERIC DANGER	**Warning: generic danger** (completed with a caption indicating the type of danger)
 DANGER: WATCH YOUR HANDS!	**Warning: danger to upper limbs** from mechanical parts in motion (e.g. wheels, beam girder, etc.)
 DANGER: WATCH YOUR FEET!	**Warning: danger to lower limbs** from mechanical parts in motion (e.g. wheels, beam girder, etc.)
 DANGER OF GETTING CAUGHT UP IN MOVING PARTS	**Warning: danger of getting caught up and being dragged** by moving parts (e.g. wheels, beam girder, etc.)
 DANGER: OVERHEAD LOADS	**Warning: danger from overhead loads** in motion during installation and maintenance phases.

WARNING SYMBOLS USED TO INDICATE ACTIONS WHICH ARE FORBIDDEN	
SYMBOL	**MEANING**
 DO NOT REMOVE THE PROTECTIONS	**It is forbidden to remove protective devices on the machine in motion or when it is powered on.**
 DO NOT CONDUCT MANOEUVRES	**It is forbidden to conduct manoeuvres during maintenance operations on moving parts.**
 DO NOT TOUCH	**It is forbidden to touch, mishandle, disable or extract devices and/or components.**
 NO ACCESS	**During technical interventions, access to non-authorized personnel is forbidden.**

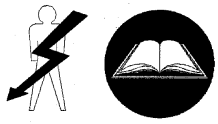
WARNING SYMBOLS USED TO INDICATE OBLIGATIONS	
SYMBOL	**MEANING**
 CONSULT THE MANUAL	**Consult the manual when this symbol appears** preceding or within an indication (instructions, adjustments, maintenance, etc.),
 OPERATORS MUST WEAR GLOVES	**Operating personnel must wear safety gloves.**
 OPERATORS MUST WEAR A HELMET	**Operating personnel must wear safety protective helmets.**
 OPERATORS MUST WEAR SAFETY FOOTWEAR	**Operating personnel must wear safety non-slip footwear.**
 OPERATORS MUST WEAR A SAFETY HARNESS	**Operating personnel must wear safety harnesses when working at altitudes with a risk of falling.**

SYMBOLS USED FOR SAFETY INDICATIONS	
SYMBOL	**MEANING**
 SUPPLEMENTAL LIGHTING	**Supplemental lighting is recommended for interventions in which this label appears.**

3.4 Warnings inherent to residual risks

- After having carefully considered the dangers present in all operating phases for **"DGT" drive** and/or **endcarriages**, the following measures have been adopted so as to eliminate, as far as possible, risks for operators and/or limit or reduce risks deriving from dangers which cannot totally be eliminated at their source. However, in spite of all the precautions adopted on the machine, the following **residual risks** remain; these risks can be eliminated or reduced through the following preventive measures:

RISKS DURING OPERATION		
DANGER / RISK	**CAUTION / WARNING**	**OBLIGATION / PREVENTION**
 **Risks from the danger of becoming ensnared and/or crushed**, following contact with the **beams and/or wheels** in motion, where such components are accessible to operators.	 • **Warning!** Exposure to moving parts can create dangerous situations. • **Caution!** Do not touch moving **Beams and/or Wheels**.	 • **Ascertain** that the rail/wheel contact area is **> 2.7 m** above the walking area. • For quotas < **2.7 m**, enact **special technical measures**.

RISKS DURING MAINTENANCE		
DANGER / RISK	**CAUTION / WARNING**	**OBLIGATION / PREVENTION**
 **Risk of electrocution** when performing maintenance on electrical motors without cutting off electrical power first.	 • **Caution!** Do not intervene on electrical motors without cutting off electrical power first. • **Caution!** Do not restart the motors without replacing the covers on the terminals.	 • Entrust electrical maintenance operations to qualified personnel only. • Perform controls on electrical equipment as required by norms. • After controls, replace the covers on the terminals.
 **Risks from the danger of becoming ensnared, crushed and/or exposed to falling loads** during inspections, adjustments and maintenance on **Beams and/or Wheels.**	 • **Warning! Exposure to moving parts can create dangerous situations**. • **Caution!** Do not intervene on moving parts • **Caution!** Access to non-authorized personnel is forbidden.	 • Entrust maintenance operations to qualified personnel only. • Make use of suitable personal safety devices and equipment when carrying out adjustments on parts and components.

3.5 Safety devices and indications

3.5.1 Control devices

- **"DGT" drive units and endcarriages are supplied without command and control devices, which must be provided by the buyer incorporating these components onto an industrial lifting or handling system.**
- **"DGT" drive units and endcarriges must not be operated before they have been incorporated, in conformity with indications outlined in Machinery Directive 2006/42/CE, and a "CE Marking" has been affixed, as shown here, on the whole of the lifting or handling system they are assembled onto.**

3.5.2 Safety and emergency devices

"DGT" drive units and endcarriages are equipped with the following devices:

1. **Brakes** (fig. 3): mechanical, negative type, incorporated in the drive motors (self/braking) for forward / reverse manoeuvres.
   The brakes intervene automatically in case of a electrical power failure, and are sized to stop the maximum load the **"DGT" drive units and endcarriages** can move in total safety and in the shortest time possible, at the maximum travelling speed.

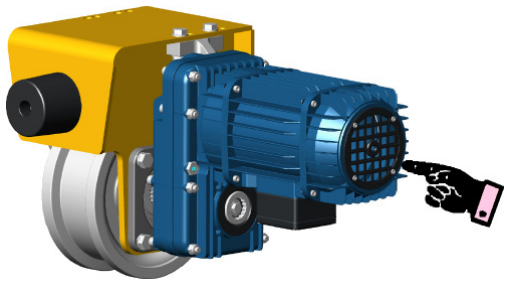
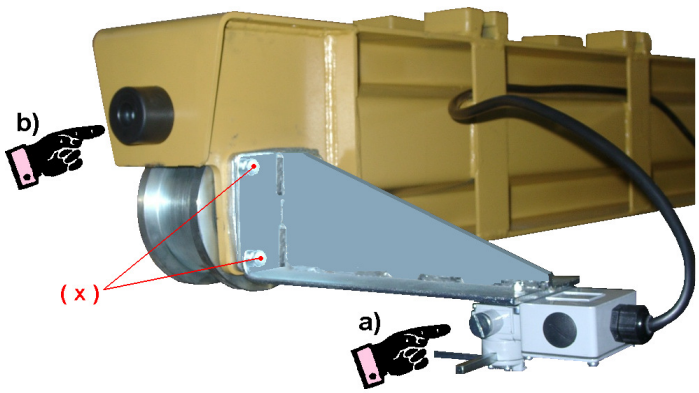
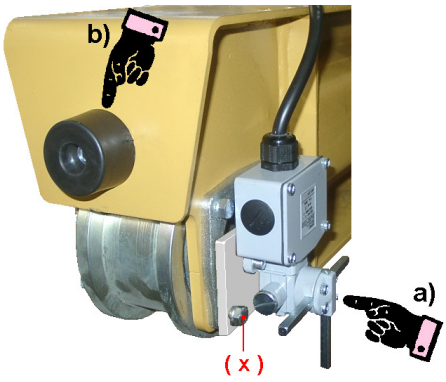


fig. 3

2. **Limit switches** (fig. 4)
   a) **Electrical**: rotating, shaft-cross type, when included; equipped with sensitive micro-switches which, by activating the auxiliary circuit, limit the lengthwise stroke of the running beams in forward/reverse manoeuvres. For **"DGT" drive units and endcarriages** with two operating speeds, in addition to the stop function in both directions, electrical limit strokes also ensure a pre-slowdown function, switching from "high" speed to "low" speed;
   b) **Mechanical**: provided as standard equipment, comprising shock absorbing buffers in hard rubber, sized to absorb forces from kinetic energy generates by the travelling of the bridge crane, in an eventual accidental strike, i.e. in case the electrical limit strokes fail to work.



Positioning of "DGT" limit strokes 1, 2 and 3:
limit stroke arm fastened by 4 screws **(x)** on the wheel support



Positioning of "DGT" limit strokes 4, 5 and 6:
limit stroke fastened by 2 lower screws **(x)** on the wheel support

fig. 4

- **The electrical limit switches, when included, are not connected!**
- **It is obligatory to install and connect the electrical limit switch before setting up and operating the "DGT" drive units and endcarriages, checking to make certain they intervene correctly, as outlined at section 4.4 "Setup and Preparation".**

3.5.3 Identification nameplate and markings

- **"DGT" drive units and endcarriages** are equipped with the following identification nameplates (fig. 5):
  - nameplate on **"DGT" drive unit** (fig.5a) or **endcarriage** (fig.5b), containing:
    - manufacturer's logo, name and address;
    - specific weight of the wheel group or beam girder;
    - type, serial number and code of the wheel group or beam girder;
    - year of manufacture.
  - identification nameplate on the **"DGP" offset geared motors**, containing (fig.5c):
    - manufacturer's logo, name and address;
    - specific weight of the motoreducer;
    - type, serial number and code of the motoreducer;
    - year of manufacture.
  - identification nameplate on the **self-braking motor**, containing (fig.5d):
    - manufacturer's logo, name and address;
    - specific weight of the motoreducer;
    - type, serial number and code of the motor;
    - year of manufacture.
    - typical electrical specifications for the motor (power, absorption, etc.);
    - CE marking for the following European Community Directives:
      - Low Voltage Directive 2014/35/UE;
      - Electromagnetic Compatibility Directive 2014/30/UE.

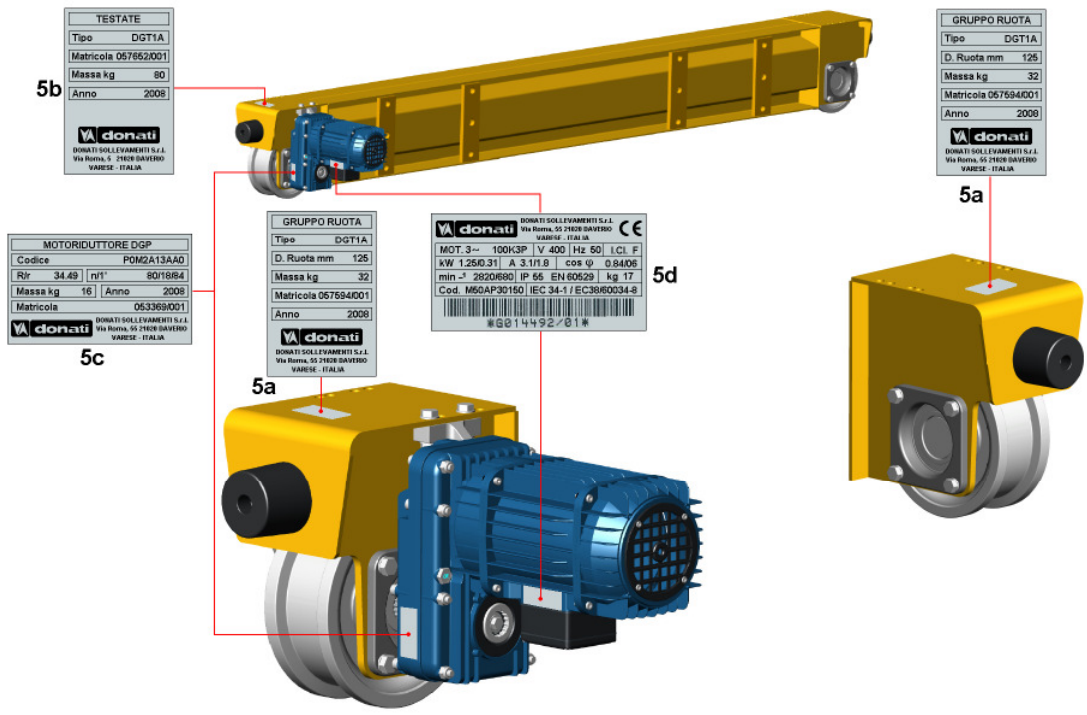


fig. 5

- **Readability and conservation of identification nameplates:**
  - Identification nameplates must be cleaned periodically so that they are legible at all times and properly display information for all personnel.
  - If a nameplate becomes deteriorated and/or is no longer legible, even if only partially, a replacement should be requested from the manufacturer, citing the information contained in this operating manual or on the original nameplate.

☞	**Since "DGT" drive units and endcarriages are considered incomplete machinery, i.e. designed to be assembled onto other machinery, they bear no "CE Marking," in accordance with mandatory requirements outlined in Machinery Directive 2006/42/CE.**

4. - HANDLING - INSTALLATION – SETUP

4.1 – General notes on the shipment

- **"DGT" drive units and endcarriages are, as far as is possible, shipped pre-assembled in their main parts.**
- **The Buyer can proceed with installation phases (incorporating the units onto industrial lifting or handling equipment) by following the instructions contained in this section of the operating manual, entrusting such tasks to qualified personnel.**

- **Due to the delicate and important nature of the operations described in this section, serious risks for the health and safety of personnel can be incurred if such operations are carried out inappropriately during the installation and use of the industrial lifting or handling equipment on which the components are assembled.**
- **As such, these operations must be performed by professionally trained and qualified personnel specialized in the construction and/or assembly of lifting systems, with special expertise in electromechanics, and equipped with personal safety and accident prevention working equipment conforming to current legislative ordinances on matters related to safety and accident prevention in the workplace, after having carefully read this operating manual.**

On reception of the shipment, check to make certain that:

- The documentation provided with the components, attached to this operating manual, comprises the Manufacturer's Declaration – Annexe IIB.
- The packaging, if part of the shipment, is in good condition, and does not present damages.

In case of damage or missing parts, notify the shipping company of the irregularity, annexing a written statement to the accompanying document and notifying *DONATI SOLLEVAMENTI S.r.l.* of the mishap within eight days of receiving the goods.

4.2 Packaging, transport and handling

Before carrying handling operations on the "DGT" drive units and endcarriages, read the following:

4.2.1 Standard packaging

- To facilitate handling and assembly operations, components are generally shipped separately or in carton boxes, on appropriately bound pallets. Special protections or packagings are therefore excluded from the shipment.
- In some cases, components can be packed in a crate or wooden case.
- When materials are shipped on pallets, they are generally covered and protected against dust with a plastic film wrapping.
- Swinging gearmotors and related accessories are generally shipped inside carton boxes, which, depending on the mass being handled, may or may not be equipped with pallets.
- Standard packagings are not provided with protection against rain, and are foreseen for destinations via ground and not sea shipments, for covered and non humid environments.
- Packages, suitably conserved, can be stored for a period of around two years in a covered environment in which the temperature is comprised between - 20°C and + 60°C with a relative humidity of 80%.

Any special packaging, waterproofed and/or for destinations shipped by sea, can be appropriately prepared at the Buyer's request.

4.2.2 Transport

- Entrust all transport operations to qualified personnel, capable of guaranteeing a correct handling of materials;
- During transport operations, the manufacturer recommends avoiding the following:
  - do not place onto the components other packages which may cause damage;
  - do not place the beam girders on the wheels, placing them onto wooden blocks instead (fig. 6);
  - do not tilt or overturn pallets, crates/cases or boxes containing the materials, so as to prevent dangerous oscillations and ensure constant stability.

☞	***DONATI SOLLEVAMENTI S.r.l.*** **declines all responsibility for transport operations performed by the Buyer or shipping companies appointed by the Buyer.**

4.2.3 Lifting points and handling equipment

- To ensure safe handing operations, in relation to the configuration foreseen, the **"DGT" drive units** or **endcarriages** and related accessories are fitted with the following lifting points:

A. **"DGT" drive units**, comprising the **wheel groups** and related **"DGP" offset geared motors:**

1. **"DGT" wheel groups** are fitted with special holes for handling purposes, situated in the upper section of the wheel bearing flanges, which enable lifting using a transverse bar of suitable diameter, and a lifting accessory (slinging the group using two chains or straps) - (fig. 7).

The wheel groups weight less than 30 kg and as such can be handled manually.

2. **"DGP" offset geared motors**, which are always provided separately from wheel groups or running beams, when their weight exceeds 30 kg and cannot be handled manually must be lifted using suitable straps fitted like a "noose" in the gearmotor connection area (fig. 8).
3. The handling operations outlined at points 1 and 2 must be performed using lifting machinery (a bridge or jib crane, etc.), adopted in relation to the weight of the mass indicated on the packaging being handled.
4. If the packagings are placed onto pallets, the pallet must be handled using a fork lift or transpallet, adopted in relation to the weight being handled, whereas individual packagings (if they cannot be handled manually) must be lifted using lifting equipment and related accessories, as outlined below.

B. **"DGT" drive units**, comprising the **beam girder** cover and **"DGP" offset geared motors:**

1. The **beam girders** can be handled using a fork lift or lifting machinery (a bridge or jib crane, etc.) equipped with suitable straps fitted like a "noose". Lifting equipment adopted must be selected in relation to the mass indicated on the packaging and employed so as to ensure proper balancing. (fig. 9).
2. For handling **"DGP" offset geared motors**, proceed as outlined at points A2 and A3.

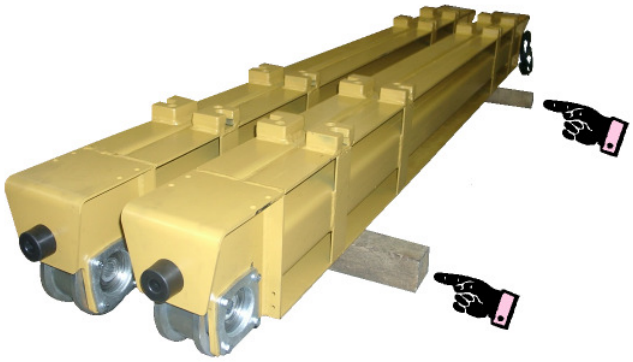


fig. 6

fig. 7

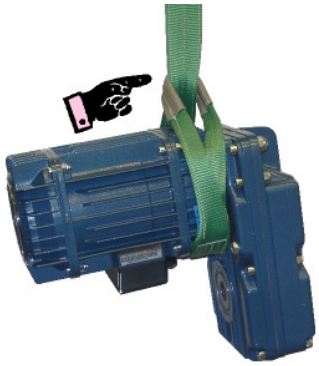


fig. 8

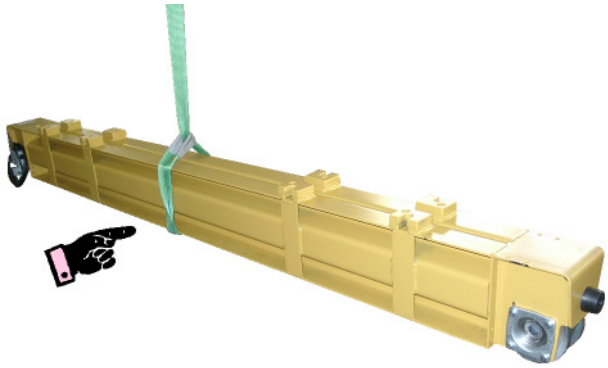


fig. 9

4.2.4 Handling

	**For handling operations on "DGT" drive units** or **endcarriages, proceed as follows:**	

- Prepared a suitable demarcated area, with a flat level flooring, for unloading and storing the materials.
- Depending on the type of shipping packaging and indications illustrated at point 4.2.3, prepare the necessary equipment for unloading and handling the various packagings, taking into consideration their weight, dimensions and lifting elements.
- No special tools are required.
- Any packages with accessories weighing less than 30 kg can be handled manually.
- Secure and lift all components with care in the unloading area, avoiding dangerous oscillations and unbalancing of the loads being moved.
- Once the handling operations have been completed, check the packages to make certain they have not been damaged.

	**All materials must be handled with care, using suitable transport and lifting equipment, so as to avoid generating dangerous risks due to a loss of stability.**

4.2.5 Removing the packaging

- Open the packagings and remove the various parts using suitable equipment in relation to their weight and lifting points (see point 4.2.3).
- Check to make certain all materials in the shipment are whole and that no parts and/or accessories are missing. Promptly notify the manufacturer of any damage or missing parts.
- To store the materials, follow the instructions outlined at section 4.5.1 "Storing the units and parts".

	**Dispose of all packaging materials following the indications prescribed by local ordinances in relation to their nature (wood, plastic, carton) and differentiating the materials for recycling purposes.**

4.3 – Installing "DGT" drive units and endcarriages

	• **The installation of "DGT" drive units and endcarriages, in their various configurations, refers to the process of "incorporating" the components into a more complex assembly.** • **Specifically, two types of "incorporating" processes can be adopted:** 1. **Incorporating the "DGT" drive units onto a crane beam** (sect. 4.3.1) 2. **Incorporating the "DGT" drive units onto a bridge crane** (sect. 4.3.2)

	**Before proceeding with "incorporating" the "DGT" drive units and beams, carry out the following controls:**	

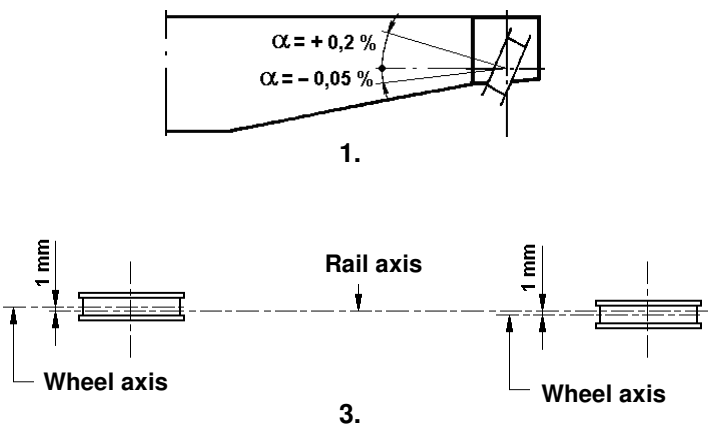
- check that the performance specifications of the components are suitable for the type of service required (capacity, speed, ISO/FEM classification, dimensions of sliding rail, available space, etc.).
- check that no damage has resulted to component during transport operations.
- if the component has been stored in a humid or tropical location for en extended period of time, check the brakes, and if necessary, remove the gluing on the brake surfaces.
- use grease to lubricate the drive shaft that will be joined to the offset geared motor and wheel.

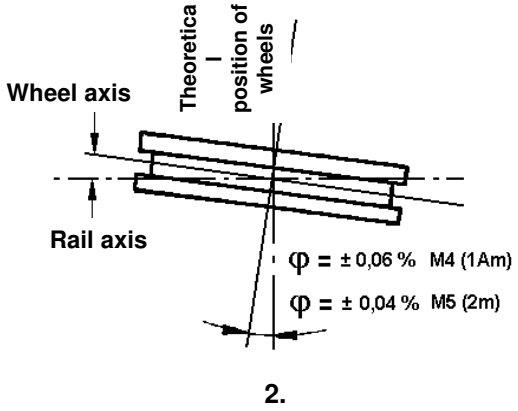
4.3.1 Setting up "DGT" sliding units onto a crane beam

- **"DGT" drive units are designed to be incorporated using an electric welding process on the beam girders;**
- **The structural element (beam frame) to which the "DGT" drive units can be welded can comprise a beam or tubular section** (fig. 10)**, whose dimensions (height and width) are compatible with the connecting plate on the drive units.**
- **The joining welding between the "DGT" drive units and beam frame must be sized and performed by the Buyer, taking into consideration the loads, geometric shape, material S235JR-EN 10027, and applicable regulations..**

To assemble the beams incorporating the "DGT" drive units using an electric welding process, be sure to respect the tolerances prescribed by ISO regulation 8306/88 and FEM regulation 1.001/98 – book 8, i.e.

1. The angle (α) of the wheel axis with respect to a horizontal plane must be comprised between + 0.2 % and – 0.05 %
2. The angular deviation (φ) of the wheels with respect to a theoretical horizontal plane must be:
   - ± 0.06 % for beam girders classified up to service group M4 (1Am)
   - ± 0.04 % for beam girders classified from service group M5 (2m) up to M8 (5m)
3. The wheel centres (wheel axis) must not deviate more than ± 1 mm from the rail axis (track)





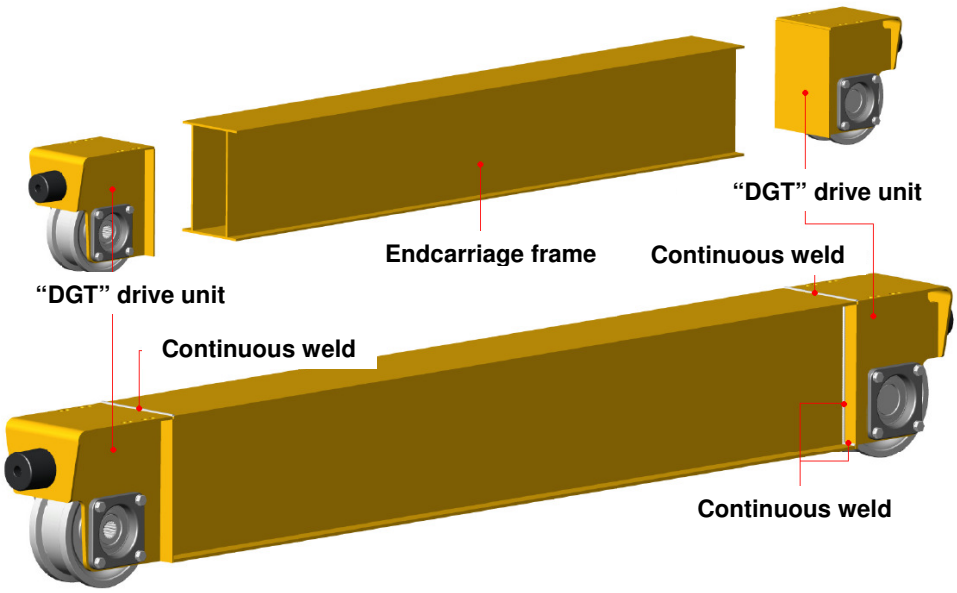


fig. 10

Assembling the “DGP” offset gearmotor (fig. 11):

1. Follow the indications in the diagrams (fig. 11a and 11b) to assemble the reaction arm (1) onto the wheel group (2), using the screws and nuts (3). This operation is not necessary for “DGT” drive units sizes 5 and 6, since their reaction arms are welded to their respective wheel groups.
2. Clean and lubricate, then assemble the drive shaft (4) onto the grooved shaft on the motoreducer (5), fastening it with the screws (6);
3. Clean and lubricate, then insert the drive shaft (4), jutting out from the motoreducer (5), into the grooved borehole on the wheel (7);
4. Fasten the motoreducer (5) to the reaction arm (1) using the screw and nut (8) and inserting the rings (9), according to the correct sequence illustrated in the diagrams (fig. 11a and 11b), and the rubber shock absorbing buffers, compressing them by about 1 mm (10).

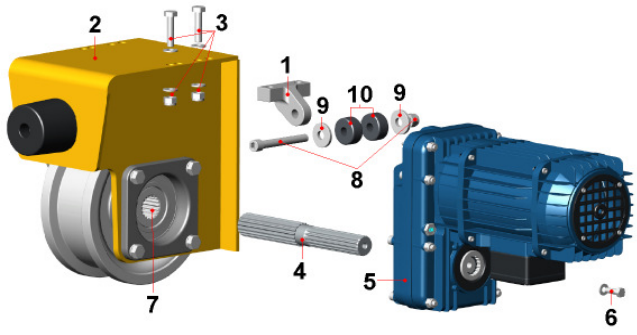
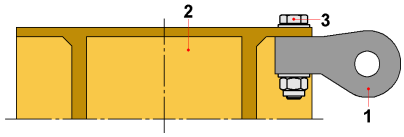
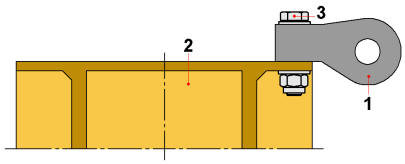
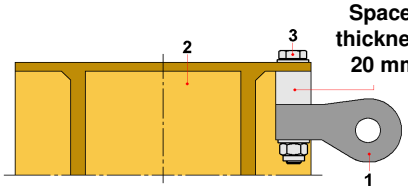
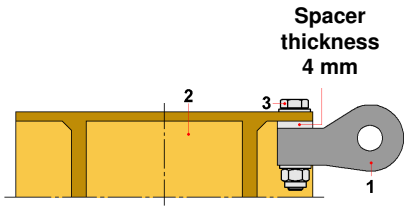


fig. 11

Assembly diagram for reaction arms on “DGT” drive units 1 and 2

“DGT” wheel group Size	Ø (mm)	Combination of “DGT” wheel groups with “DGP” offset geared motors (valid for both “left” and “right” operation)	
		“DGP” offset gearmotors Size 0	“DGP” offset gearmotors Size 1
1	125		
2	160		

Assembly diagram for rubber shock absorbing buffers on “DGT” drive units 1 and 2

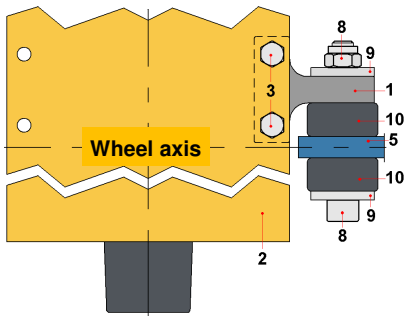
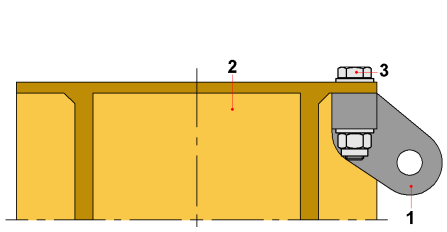
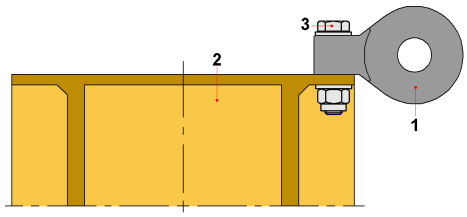
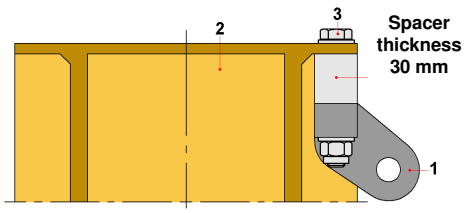
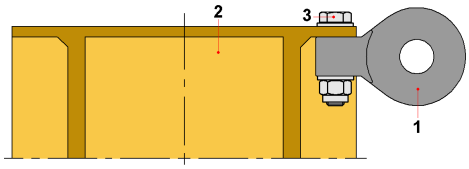
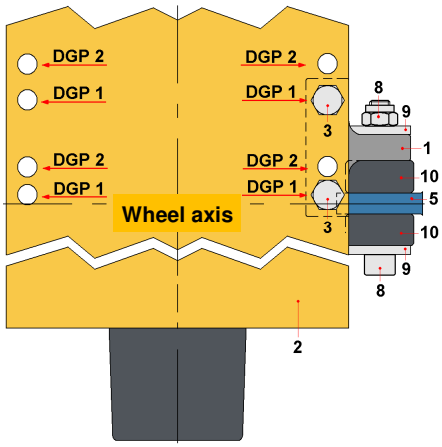
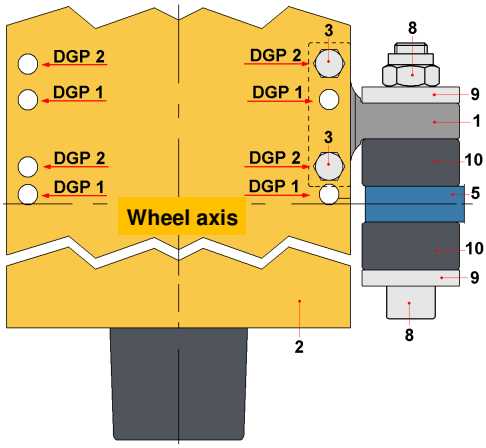
“DGT” wheel group Size	Ø (mm)	Combination of “DGT” wheel groups with “DGP” offset gear motors (valid for both “left” and “right” operation)	
		“DGP” offset gearmotors Size 0	“DGP” offset gearmotors Size 1
1	125		
2	160		

fig. 11a

Assembly diagram for reaction arms on “DGT” drive units “DGT” 3 and 4

“DGT” wheel group Size	Ø (mm)	Combination of “DGT” wheel groups with “DGP” offset gearmotors (valid for both “left” and “right” operation)	
		“DGP” offset gearmotors Size 1	“DGP” offset gearmotors Size 2
3	200		
4	250		

Assembly diagram for rubber shock absorbing buffers on “DGT” drive units “DGT” 3 and 4

“DGT” wheel group Size	Ø (mm)	Combination of “DGT” wheel groups with “DGP” offset gearmotors (valid for both “left” and “right” operation)	
		“DGP” offset gearmotors Size 1	“DGP” offset gearmotors Size 2
3	200		
4	250		

Assembly diagram for rubber shock absorbing buffers on “DGT” drive units “DGT” 5 and 6

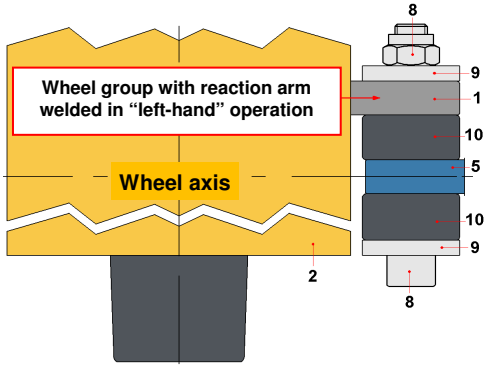
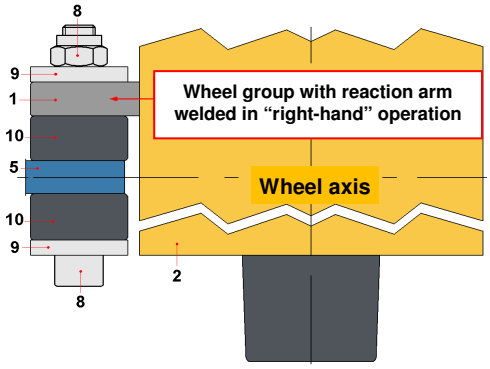
“DGT” wheel group Size	Ø (mm)	Combination of “DGT” wheel groups with “DGP” swinging gearmotors, in “left” and “right” operation	
		“DGP” offset gearmotors Size 2	“DGP” offset gearmotors Size 3
5	315		
400			
6			
400 R			

fig. 11b

4.3.2 Setting up "DGT" drive units onto a bridge crane

- **"DGT" endcarriages are designed standard to be assembled to the beam girder(s) on a bridge crane, using bolted joints;**
- **Connecting elements between the "DGT" endcarriages and the girder(s) on the crane are standard joining "beam-girder" cross-plates.**
- **The joining cross-plates must be welded onto the girder(s) on the crane by the Buyer, taking into consideration the material S235JR-EN 10027 and applicable standards;**
- **The joint between the "DGT" endcarriages and "beam-girder" cross-plates must be bolted using the screws only, in class 8.8, included in the shipment, respecting applicable fastening and tightening torques** (fig. 14)**.**

Assemble the "DGT" endcarriages to the beam girder(s) on the bridge crane following the structural configuration foreseen, which, relative to the "beam-girder connection," whether in MONORAIL or DUALRAIL version, can be either:

- **L = Beam connection in "lateral" connection** (fig. 12)
  1. Set the girder alongside the beam, allowing the holes on the cross-plate (1) to match those on the beam (2);
  2. Insert the screws (3), taking care to maintain the nuts and rings (4) on the outside, i.e. on the plate (1);
  3. Screw on and set the nuts (4) without tightening them, to allow the insertion of the centring pins (5);
  4. Insert the pins (5) to the endstroke, then tighten the nuts (4), applying tightening torque as required (fig. 14).
- **A = Beam connection in "supported" connection**(fig. 13)
  1. Set the girder alongside the beam, allowing the slots on the cross-plate (1) to match those on the blocks (2);
  2. Insert the screws (3) into the support blocks (2);
  3. Screw on and set the nuts (4) without tightening them, to allow the insertion of the centring pins (5);
  4. Insert the pins (5) to the endstroke, then tighten the nuts (4), applying tightening torque as required (fig. 14).
- **L + A = Beam connection in "lateral + supported" connection**
  1. Proceed as outlined at previous points **L + S**, inserting the centring pins (5) for operation A.

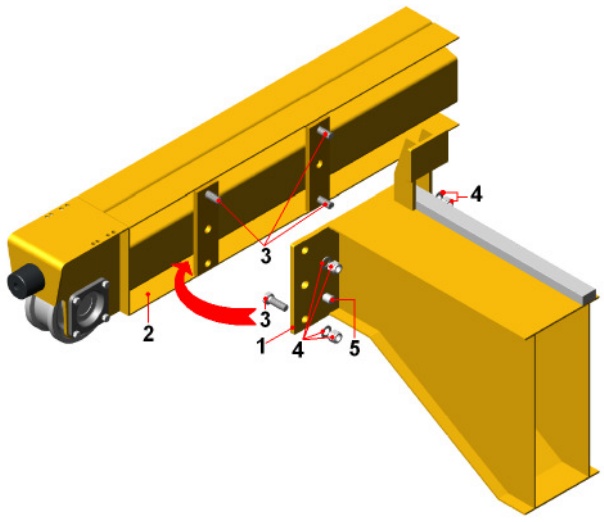


fig. 12

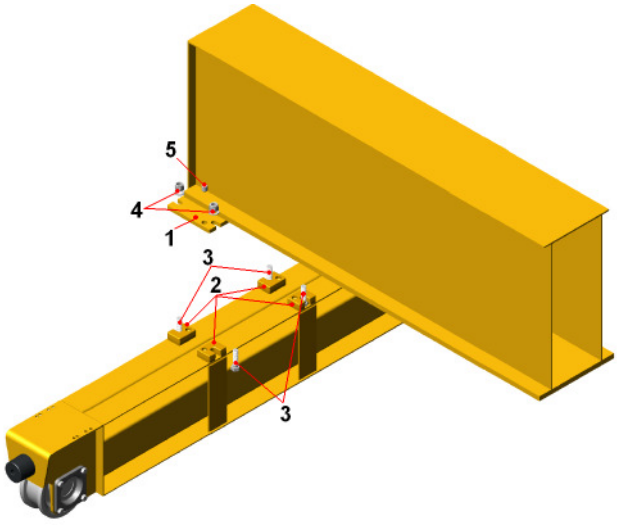


fig. 13

"DGT" beams Size	Ø wheels (mm)	Beam connection in "Lateral" operation Ø (mm)	Screw class 8.8 length (mm)	tightening torque (Nm)	Ø centring pin (mm)	Beam connection in "Supported" operation Ø (mm)	Screw class 8.8 length (mm)	tightening torque (Nm)	Ø centring pin (mm)
1	125	M 16 x 2.0	55	205	20	M 18 x 2.5	65	283	20
2	160	M 18 x 2.5	55	283					
3	200	M 20 x 2.5	60	400	25				
4	250	M 24 x 2.0	70	731					
5	315	M 27 x 2.0	80	1070	32				
6	400 / 400 R	M 33 x 2.0	90	1890					

fig. 14

4.3.3 Connections and electrical diagrams

- **"DGT" drive units are equipped with self/braking electric motors, designed to be electrically powered by a three-phase alternating current, at the voltage specifications indicated on the motor's nameplate.**
- **The electrical connection diagram is indicated on the nameplate inside the terminal cover on each motor.**

Set the electrical connections on the motors as follows:

1. Check to make certain the voltage indicated on the nameplates on the motors for the sliding units corresponds to the power voltage available.
2. Verify the suitability and correct operation of the electrical system and **grounding**.
3. Perform the electrical connections on the motor terminals, in relation to their type, as indicated in the electrical diagram (fig. 15), i.e. connect the suitably sectioned four-pole cable to the respective terminals, connecting the yellow/green conductor to the ground terminal and tightening the terminals to avoid bad contacts.

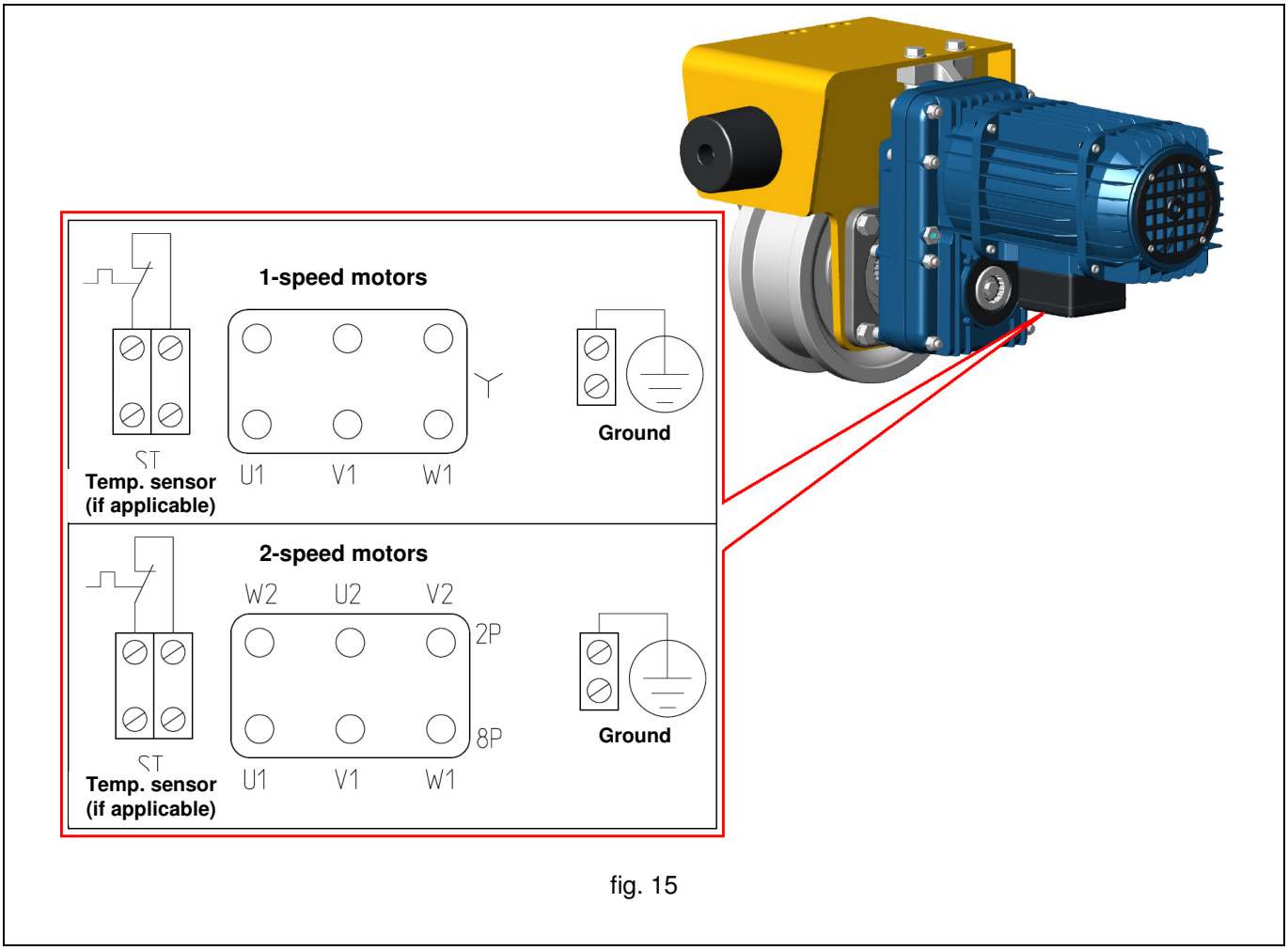


fig. 15

- **Never carry out electrical connections with the power on**
- **Never carry out provisional or hasty connections**
- **Tighten all cable clamps**
- **Replace the covers on the terminals, after having completed the electrical connections**

4.4 – Setup and preparation

4.4.1 Preliminary operations

	Before operating the "DGT" drive units and endcarriages, perform the following control checks:	

- **Check the lubrication on the mechanisms:** (see also point 6.3.4 "Cleaning and lubrication")
  - Make certain there are no lubricant leaks.
- **Check the suitability of the electrical system:**
  - Make certain the limit strokes are installed, correctly positioned and locked in place.
  - Control the line voltage and frequency, as indicated on the identification nameplates on the motors, correspond to operating specifications.
  - Make certain the voltage on the motors falls within a +/- 10% limit of the nominal value.
- **Check the efficiency and suitability of the installation structures for the components:**
  - Control the strength and suitability of the structures on which the components will operate, specifically ascertaining that:
    - the dimensions of the rails are compatible with the wheel's sheave width (see table at page 14);
    - the tolerances for the rails conform to specifications as per norm ISO 8306/88 or regulation FEM 1.001/98.
    - the sliding runs on the wheels are exempt from obstacles, unevenness, depressions, and foreign objects.
  - Make certain operating and manoeuvring spaces are sufficient and ascertain there are no interferences.
  - Verify the presence of the mechanical end-stops and the alignment of the shock absorbing buffers.
- **Verify the correct direction of rotation of the drive motors:**
  - By activating the "forward/reverse" movements, make certain the movements of the **"DGT" drive units** or **endcarriages** occur in the corresponding directions.

If the direction of the movements does not correspond to the required function, immediately stop the manoeuvre and invert the connection of two of the phase connections for the motors in question.

	If the direction of rotation of the motors does not correspond to the controls, the limit strokes will not stop the movement.

4.4.2 Settings and operating tests

	As per their design, "DGT" endcarriages are equipped with electrical limit microswitches limiting the stroke along the travelling run.

	Setting the electrical limit devices on the "DGT" endcarriages (if part of the shipment)**:**	

1. Check the correct positioning of the limit stroke actuators on the **"DGT" endcarriages**.
2. Make certain the stroke of the **beams** complies to that which is required, and if necessary, adjust accordingly:
   - Tests on the limit strokes are conducted bringing the **beams** to the extreme limit of their run. Perform the test several times; the **beams** must stop in the preset position and ensure an adequate "overstroke" before reaching the mechanical end-stops, and avoid a collision.
   - Check the correct positioning of the mechanical end-stops on the girder, which must be capable of supporting an eventual bumping into the rubber shock absorbers on the **drive units on the beams**, in case the electrical limit switch fail to operate correctly.
   - Check the correct positioning of any pre-slowdown devices, in the case of two-speed operation, so as to avoid reaching the limit stroke end-stops at maximum speed..

	The automatic limit stroke switches are emergency devices with safety functions, rather than working devices, and MUST NOT be subjected to regular and/or continuous operation. **If this need arises, supplementary operable limit stroke switches must be installed, set so that they are activated in advance with respect to the emergency switches.**

4.4.3 Testing the "DGT" drive units and beams – getting ready for operation

	• **"DGT" drive units and beams are thoroughly tested at the Manufacturer's production facilities to ascertain their performance and operating response. However, these tests must be repeated once the installation is complete, in order to guarantee optimal and safe operating performance for the components in their installation.** • **The test phases comprise a precise sequence of operations, which, as described below, must be accurately respected by technicians conducting the tests.**

- After having conducted operating tests "on empty," proceed with the dynamic test; these tests are carried out with weight masses corresponding to the equipment's nominal lifting capacity, increased by the overload coefficient 1.1 (load equal to 110% of the nominal load). Static tests are conducted with an overload coefficient of 1.25 (load equal to 125% of the nominal load).

	**All tests must be conducted in the absence of wind.**

	**Proceed with testing the "DGT" drive units or beams as follows:**	

- **Empty performance tests:**
  - switch on the power switch
  - set the emergency stop button to the "enable operation" position
  - press the "operation/alarm" button (if available)
  - verify the "forward/reverse" sliding function
  - in the case of movements at two speeds, verify their operability
  - check the operation of the motor brakes in their "forward/reverse" movements
  - check the operation of the electrical limit strokes in their "forward/reverse" movements

- **Dynamic test:**
  - prepare suitable masses for loading tests equal to: **nominal capacity x 1.1**
  - lift the load and check for proper "forward/reverse" sliding operation, making certain there are no irregular noises, obvious deformations or yielding of the structure
  - in the case of movements at two speeds, verify their operability
  - verify the system's operation in "emergency stopping" conditions. Sliding functions must stop in the shortest time and space possible, without irregularities, swerving, dangerous oscillations, etc., or loss of stability.
  - check braking and stopping spaces during sliding phases. For a mass moving at a typical speed of 40 m/min, the amplitude of these spaces can indicatively be estimated at between 1.5 and 2 m, without the insurgence of consistent load oscillations.

- **Static test:**
  - lift the load used for the dynamic tests, stopping it in a suspended position at a height of 50 cm, then gradually apply masses onto it until reaching an overload value equal to 25% of the maximum nominal capacity.
  - leave the load suspended for a test time of no less than 10 minutes.
  - following the test, check for the absence of obvious deformations or structural yielding.

4.5 Disabling the units

4.5.1 Storing the units and parts

	**If the "DGT" drive units and endcarriages must be stored for an extended period, proceed as follows to avoid damage or deterioration:**	

- Protect all mechanisms and work surfaces with rust-proofing products.
- The materials are designed for indoor installation and can be stored up to a maximum period of two years in a protected environment presenting the following specifications:
  - protected from atmospheric agents
  - relative humidity not exceeding 80%
  - temperature: minimum - 20°C; maximum + 60°C
- If these conditions should become altered during storage, preliminary control checks must be conducted before setting up and operating the equipment (see sect. 4.5.2 "Resetting up the units after storage")
- If the temperature in the storage area exceeds or falls below the values indicated, and the relative humidity exceeds 80% set up protections using barriers and hygroscopic salts.
- For outdoor storage:
  - set blocks under all materials not placed onto pallets
  - protect all materials using barriers and hygroscopic salts
- Demarcate and cordon off the material storage areas.

4.5.2 Resetting up the units after storage

	**Before operating the "DGT" drive units and endcarriages after an extended storage period, proceed as follows:**	

- **Structure:**
  - eliminate traces of lubricant or products adopted to preserve the structure
  - clean boreholes of any grease residue
  - clean all surfaces around joint areas
  - repair any structural damage (scratched surfaces, scarred paintwork, etc.)

- **Mechanisms:**
  - check for lubricant leaks; if any are found, contact the technical servicing department at Donati Sollevamenti S.r.l.
  - make certain all mechanisms are properly set and fixed onto the structures.
  - eliminate residues of water from grooved sections on the mechanisms or structure.
  - use grease to moderately lubricate toothed joints and couplings on wheels and reducers.

- **Electrical equipment:**
  - eliminate any condensation from the motors and terminals; dry using jets of air
  - check the operation of the brakes for damage and wear
  - carefully clean surfaces on braking seals, eliminating traces of humidity
  - check the operation of the limit switches
  - conduct electrical rigidity and insulation tests for storage periods exceeding 6 months
  - carefully check the operation an efficiency of all electrical conductors

5. - OPERATION

5.1 – Functions on "DGT" endcarriages and beams

5.1.1 Intended and proper usage

- The **drive Units**, comprising **"DGT" series Wheel Groups** in combination with **"DGP" series Offset Gearmotors** and **"DGT" endcarriages** equipped with drive units, are designed for handling operations on rails set onto lifting equipment, such as, for example, bridge cranes, trolley and wall mounted cranes, etc. and/or related travelling trolleys, guaranteeing accurate alignments for handling structures, control over high operating speeds, and easy installation and maintenance.
- **"DGT" series Wheel Groups** and **"DGP" series Offset Gearmotors**, comprising the **drive units** are modular components specifically designed for **endcarriages** on industrially designed **bridge cranes**.
- Forward and reverse running movements **must be activated electrically**.

5.1.2 Admissible and inadmissible loads

- **Loads must be** compatible with performance specifications for **"DGT" drive units and endcarriages:** in terms of shape, dimensions, weight, balance and temperature.

⚠	**The handling of the following types of loads is not admissible:** • **weight exceeding the capacities of "DGT" drive units and endcarriages** • **chemical-physical specifications classifies loads as dangerous (e.g. inflammable, explosive, radioactive materials, etc.)** • **loosely packed food products or substances, which can come into direct contact with parts on the "DGT" drive units and endcarriages or their lubricants** • **loads whose static and/or chemical-physical configuration or balance can be altered during handling operations**

5.2 – Operating conditions

5.2.1 Operating environment

- **The operating environment must present the following specifications:**
  - **temperature:** min. -10°C; max. +40°C; **relative humidity:** max. 80%; **maximum altitude:** 1000 m a.s.l.
  - **indoor environment: "DGT" drive units and endcarriages** not exposed to atmospheric agents do not require particular precautionary measures.
  - **outdoor environment: "DGT" drive units and endcarriages** can be exposed to atmospheric agents during and after operation. Electrical parts are classified as minimum protection IP55; however, it is advisable to protect the motors with a roof covering or protective guard.
    To avoid the formation of rust, protect the frames with suitable rust-proofing treatments and keep all mechanisms well lubricated.

⚠	**Standard series "DGT" drive units and endcarriages must not be operated in environments and areas presenting the following characteristics:** • **Vapours, fumes or highly corrosive and/or abrasive dust particles** (when such conditions cannot be avoided, intensify maintenance care)**.** • **Flames and/or heat exceeding admissible temperatures.** • **Fire or explosion hazards, and where the use of anti-explosive and/or spark-proof components is required.** • **Areas presenting strong electromagnetic fields, which can generate accumulations of electrostatic loads.** • **Direct contact with loosely packed food substances.**

5.2.2 Danger areas and exposed personnel

- Danger areas are all areas where, in relation to the installation height (< 2700 mm), i.e. accessibility of the **"DGT" drive units** or **endcarriages**, during any operating phase, exposed personnel are placed at risk of a situation which is dangerous for their safety, health or psychophysical integrity. **Personnel potentially exposed** must be informed that the operator using the **"DGT" drive units** or **endcarriages** does not always operate in conditions of sufficient visibility in **dangerous areas** or with respect to handling trajectories, in order to completely or immediately prevent all risks of potential accidentally falling loads, collisions and entangling for exposed personnel.

The user must set up suitable signs and demarcations to prevent or limit access to outside and/or non-operating personnel in the operating areas relative to the "DGT" drive units or **endcarriages, where the latter are accessible or set at a height of less than 2700 mm.**

5.2.3 Lighting in the work area

- **"DGT" drive units** and **endcarriages** are not equipped with their own lighting system. Consequently, the operator's work area must be suitably lit and must guarantee maximum visibility.

- **Ambient lighting must always be such as to guarantee the operability of the "DGT" drive units** and **endcarriages in maximum safety conditions.**
- **For operations in areas not sufficiently lit, operators must be equipped with a supplementary lighting system, illuminating shadowy areas that can prevent or reduce visibility in operating and/or bordering areas.**

5.2.4 Operators

- **Operators** are all personnel who, in relation to the **"DGT" drive units** or **endcarriages**, perform the following tasks:
  - the transport, handling, assembly, installation, adjustment and testing of components and parts
  - set-up, use, cleaning, maintenance and repairs on components and parts
  - disassembly, disposal and demolition of components and parts
  - **operators** must be persons suited to the type of work required and psychophysically capable of complying to tasks related to **"DGT" drive units** or **endcarriages** during all operating phases and particularly during handling operations.
  - **the operator charged with the operation** of the **"DGT" drive units** or **endcarriages** must be stationed in a non-dangerous position, so as to be able to foresee and/or prevent possible dangerous movements from handled loads. The operator must follow the safety indications provided, so as to obtain conditions which respect maximum safety for himself and for other personnel, in particular carefully observing all indications contained in this operating manual.

- **The operator must not allow anyone to approach the "DGT" drive units or endcarriages during their operation, preventing outside persons from operating the units, especially children under 18 years of age.**
- **It is strictly forbidden to allow non-authorized and non-informed persons to operate the "DGT" drive units or endcarriages.**

5.2.5 Load bearing capacities on "DGT" drive units and beams

- **The maximum load bearing capacity** on **"DGT" drive units and endcarriages**, in the operation configuration foreseen, is defined by the values for **maximum reaction R max**. (kg) and **Average Reaction R ave**. (kg), admissible for the wheels.

!	**Never exceed the maximum load bearing capacity on "DGT" drive units and endcarriages.**

5.2.6 Drive operations

- As a rule, perform one movement at a time, since this is the only way a manoeuvre can be started, stopped and kept constantly under watch by the operator, who must avoid continuous and repeated jog type movements, even in the case of small shiftings.
- Limit switches are set so as to operate in proximity to the extremities of runs. Avoid travelling manoeuvres with short and repeated jog type movements or sudden inversions of course, which, in addition to casuing damage to mechanical parts, can also generate dangerous load oscillations, with risks of collisions or violent impacts between the **"DGT" drive units** or **endcarriages** and the endstroke mechanical stops.

⚠	• **Operate with attention and diligence, keeping a constant watch on manoeuvres, and visually controlling the balancing of loads being handled.** • **Avoid sudden manoeuvres and "jolts," which are damaging to the reliability of the drive motors, as well as to the load's stability, due to dynamic effects generated by such movements**

5.2.7 Safety devices

- A power failure will cause the driving movement to stop in the shortest possible time and space, since the electrical motors are equipped with automatic braking devices. However, the adjustment of the braking torque on the motors must be such as to prevent generating sudden braking, which can result in the dangerous tilting of handled loads.
- The limit switch demarcate the maximum horizontal travel of the **"DGT" drive units** or **endcarriages**. They are emergency devices and are not suitable as operating stops or acknowledgement devices for subsequent operations.

☞	**When excluded from the *DONATI SOLLEVAMENTI S.r.l.*, shipment, the electrical limit switch devices must mandatorily be installed by the Buyer.**

5.3 - Safety measures and precautions

!	• **Correct usage of the "DGT" drive units** and **endcarriages allows users to take fully advantage of their performance specifications in complete safety.** • **Performance specifications are guaranteed only if the indications listed hereunder are followed attentively:**	

- **ALWAYS** follow the instructions outlined in the operating and maintenance manual, and make certain all components and parts on the "DGT" drive units and endcarriages function properly.
- **ALWAYS** make certain the "DGT" drive units and endcarriages operate in a working environment that is protected from atmospheric agents (rain, wind, snow, etc.), or, if operated outdoors, that they are equipped with suitable guards or protections.
- **ALWAYS** make certain the "DGT" drive units and endcarriages handle loads that are compatible with their capacity specifications, in shape, dimensions, weight, balancing and temperature.
- **ALWAYS** verify that performance specifications on the "DGT" drive units and endcarriages correspond to the service they are used for (work cycles – operating time – loads handled).
- **ALWAYS** make certain the travelling runs on the "DGT" drive units and endcarriages are positioned at a height of > 2.7 m from the flooring, i.e. such as to ensure that the operator will not interfere with moving elements (wheels, girders). If this is not possible, set up appropriate guards or warning signs in danger areas.
- **ALWAYS** ascertain the proper maintenance status of the "DGT" drive units and endcarriages (wear, cleaning and lubrication) and their main components (wheels, reducers and motors, etc.).
- **ALWAYS** check the correct operation (spaces, efficiency times) of the self-braking motors and brakes.
- **ALWAYS** check the correct responses of all movements on the "DGT" drive units and endcarriages.
- **ALWAYS** check the efficiency of the limit switches, verifying their operation on a constant basis.
- **ALWAYS** activate forward reverse movements avoiding jolts and impulses in rapid succession.
- **ALWAYS** cut off power to the motors when carrying out inspections, repairs, or maintenance interventions.
- **ALWAYS** point out operating irregularities (faulty operation, malfunctions, suspected breakages, incorrect movements and abnormal noises) to the department coordinator, placing the "DGT" drive units and endcarriages out of service.
- **ALWAYS** respect the maintenance schedule, and at every control record any observations, especially related to: wear on the wheels, conditions of brakes and limit switches.
- **ALWAYS** replace the covers on the terminals following inspections or maintenance interventions on the motors.

5.4 – Counterindications

⚠	• **Using the "DGT" drive units** and **endcarriages for inadmissible manoeuvres, their improper usage, and a failure to respect maintenance interventions can entail serious and dangerous risks for the health and wellbeing of the operator and other persons exposed.** • **The actions outlined hereunder, which obviously cannot cover the entire gamut of possibilities for "bad usage" of the components, nevertheless constitute those actions which are "reasonably" more predictable, and are absolutely forbidden:**	

5.4.1 Improper and unintended usage – Foreseeable and unforeseeable improper usage

- **NEVER** handle loads whose specifications exceed the nominal capacity of the "DGT" drive units and endcarriages.
- **NEVER** allow the use of the "DGT" drive units and endcarriages to non-qualified personnel or children under 18 years of age.
- **NEVER** operate the "DGT" drive units and endcarriages unless physically and psychologically fit.
- **NEVER** stand in the way of the "DGT" drive units and endcarriages when they are in movement, or touch the wheel-rail contact areas during handling operations.
- **NEVER** operate the units without proper attention during handling manoeuvres.
- **NEVER** abandon the "DGT" drive units and endcarriages with an unattended load on them.
- **NEVER** use the the "DGT" drive units and endcarriages for operations other than those for which they are designed (e.g. pulling or dragging objects)
- **NEVER** collide or impact load bearing structures, machinery or installations with the "DGT" drive units and endcarriages.
- **NEVER** leave the "DGT" drive units and endcarriages exposed to atmospheric agents at the end of work operations.
- **NEVER** allow the automatic limit switches to intervene continuously.
- **NEVER** operate the "DGT" drive units and endcarriages under a voltage shortage or lack of one of the phases.
- **NEVER** carry out sudden inversions of course during handling operations.
- **NEVER** operate the "DGT" drive units and endcarriages with impulses in rapid succession.
- **NEVER** modify the functions and performance specifications of the "DGT" drive units and endcarriages and/or their components.
- **NEVER** carry out hasty or temporary repairs and/or non conforming to the instructions.
- **NEVER** intervene on the "DGT" drive units and endcarriages in conditions of insufficient visibility.
- **NEVER** operate the "DGT" drive units and endcarriages in areas classified as "work areas with potentially explosive environments" or where the use of anti-explosive components is mandatory.
- **NEVER** mishandle the adjustments and settings on the safety devices (limit strokes, brakes).
- **NEVER** use non-original spare parts or parts not authorized by the manufacturer.
- **NEVER** entrust extraordinary maintenance and repairs to personnel not trained by the manufacturer.
- **NEVER** carry out maintenance or repairs without having firstly placed the "DGT" drive units and endcarriages out of service.
- **NEVER** during maintenance phases:
  - place or lean ladders or other equipment on the "DGT" drive units and endcarriages
  - intervene without having firstly removed the last load being handled

6. - MAINTENANCE

6.1 Safety precautions

- The accident prevention precautions contained in this section must be diligently observed during maintenance, so as to avoid damages to personnel and/or the “DGT” drive units and endcarriages.

⚠	• **Personnel carrying out maintenance on the “DGT” drive units and endcarriages must:**
	  • **be well trained;**
	  • **have read this operating manual;**
	  • **have an in-depth knowledge of accident prevention norms;**
	• **Non-authorized personnel must remain outside the work area during maintenance operations.**
		

- The following precautions are reiterated in further detail in this section with a note of **WARNING** and **DANGER** every time a procedure is requested which can entail a risk of damage or injury**:**

!	**WARNING notes precede operations which, unless correctly performed, can cause damage to the “DGT” drive units and endcarriages**

⚠	**DANGER notes precede operations which, unless correctly performed, can cause injury to the operator.**

☞	**Pay attention to the following WARNING NOTES during maintenance interventions:**

!	**Before restoring operation on the “DGT” drive units and endcarriages, following a malfunction, the units must be carefully inspected and controlled for any damage, repeating the procedure outlined at section 4.4 “Setup and preparation”**	

!	**Never, unless expressly requested in order to eliminate a malfunction, intervene on the settings and positioning of safety devices (brakes, limit switches and related end stroke stops). Mishandling these devices can lead to serious damage to the “DGT” drive units and endcarriages**	

	Pay attention to the following DANGER NOTES during maintenance interventions:

	Cut off power to the "DGT" drive units and endcarriages, whenever it is not required, before carrying out maintenance operations. Affix a sign with the following indication: MACHINE IN MAINTENANCE STATUS – DO NOT POWER ON	

	Never exclude the safety devices (brakes, limit switches and related end stroke stops) installed on the "DGT" drives units and endcarriages. If this becomes necessary, affix appropriate warning signs and operate with maximum care.	

	Always make certain that a suitable ground connection exists and that it responds to ordinances in force. Failure to provide a ground connection for electrical equipment can cause serious damage to personnel.	

	Before restoring operation to the "DGT" drives units and endcarriages, always make certain that personnel charged with maintenance is at a safe distance (no longer at the units' operating height) and that no tools or materials have been left behind on the components.	

	Always make use of safety gloves during maintenance operations.	

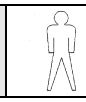
	All accessible moving parts and transmission components (wheels and drive shafts), as well as electrical parts, must be exempt from risks due to accidental contacts. Replace protective covers on terminals before restoring operation.	

	Pay maximum attention to al RESIDUAL RISKS highlighted in this operating manual.	

6.2 Qualifications for maintenance personnel

- In order to capably and diligently perform maintenance operations on the **"DGT" drive units** or **endcarriages**, maintenance personnel must:
  - possess knowledge and expertise as required regarding current legislation in force on the prevention of injuries during work operations on machinery with motor drives, and be capable of applying such expertise;
  - have read and fully understood section 3 "Safety and Accident Prevention Measures";
  - know how to use and consult this operating manual;
  - be knowledgeable of the operation of the machine on which the **"DGT" drive units** or **endcarriages** are installed;
  - recognize any operating irregularities and act accordingly is necessary.

- **The following professionally trained personnel are authorized to carry out maintenance operations on the "DGT" drive units and endcarriages:**

	**Operator entrusted with the use of the machine on which the "DGT" drive units and endcarriages are installed:**	

- **Typical maintenance tasks:**
  - check the correct operation of the **"DGT" drive units** or **endcarriages**;
  - collaborate with personnel carrying out periodic and/or extraordinary maintenance, providing information in the case of irregularities.
  - **Knowledge and expertise requested:**
  - knowledge of functions and use of the **"DGT" drive units** or **endcarriages**.
- **Qualifications requested:**
  - qualified for work operations in relation to specific operative and environmental conditions.

	**Mechanical maintenance personnel:**	

- **Typical maintenance tasks:**
  - mechanical adjustments on braking torque and slack;
  - verification of operating movements and mechanical adjustment of safety devices;
  - control of mechanical play and wear on components (wheels, shafts, etc.);
  - replace worn out components (wheels, brakes, etc.) as outlined in this operating manual;
  - ordinary maintenance on mechanical groups, replacing worn out parts with original spare parts.
- **Technical knowledge and expertise requested:**
  - proper knowledge of motor driven mechanical lifting and handling systems;
  - proper knowledge of safety devices employed on **"DGT" drive units** or **endcarriages** (limit strokes, brakes, etc.);
  - elementary knowledge of electrical adjustment and control techniques of modest difficulty (adjustment of limit strokes, motor connections, etc.);
  - knowledge of measurement and testing methods so as to determine the effective status of the **"DGT" drive units** or **endcarriages** (verifications on: brake wear, wheel wear, abnormal noises, etc.);
  - logical search methods for non-complex malfunctions and evaluations of results;
  - capacity to organize measures capable of restoring proper performance to the **"DGT" drive units** or **endcarriages**;
  - capacity to draw up a summary of maintenance interventions.
- **Qualifications requested:**
  - complete training as an industrial mechanic, with specialization and experience in maintenance on industrial lifting and handling systems.

Electrical maintenance personnel:

- **Typical maintenance tasks:**
  - interventions on electrical equipment, consulting electrical diagrams;
  - verification of operating movements and electrical adjustment of safety devices (limit strokes);
  - control of wear on electrical components (limit strokes, etc.);
  - repairs on electrical components, replacing worn out parts with original spare parts.
- **Technical knowledge and expertise requested:**
  - proper knowledge of electrical systems and installations;
  - proper knowledge of electrical components and safety devices employed on **"DGT" drive units** or **endcarriages** (motors, limit switches, etc.);
  - knowledge of control techniques and electrical adjustments of average difficulty (replace parts according to original diagram for: motors, limit switches, cables, etc.);
  - elementary knowledge of control techniques and mechanical adjustments of modest difficulty (verify wear, adjust mechanical stops, etc.);
  - knowledge of measurement and testing methods so as to determine the effective status of electrical components on **"DGT" drive units** or **endcarriages** (motors, limit strokes, etc.);
  - knowledge of search methods for electrical malfunctions and experience on electrical command and control systems on lifting and handling equipment;
  - capacity to organize measures capable of restoring proper performance to the **"DGT" drive units** or **endcarriages**;
  - capacity to draw up a summary of maintenance interventions;
- **Qualifications requested:**
  - complete training as an industrial electrician, with specialization and experience in maintenance on industrial lifting and handling systems.

Electromechanical maintenance personnel:

- **Operators who possess specifications typical of electrical maintenance personnel, as well as the expertise and technical skills requested on mechanical maintenance personnel.**

Mechanical technicians:

- **Typical maintenance tasks:**
  - mechanical adjustments on safety devices, calibrations and tests (load tests);
  - ordinary maintenance operations, replacing complex mechanical and/or critical components for safety purposes (wheels, reducers, motors, etc.);
  - repairs on mechanical groups, through extraordinary maintenance operations (repairs of structural parts and welding on **"DGT" drive units** or **endcarriages** (etc.);
- **Technical knowledge and expertise requested:**
  - proven knowledge and experience in the field of mechanical systems for industrial lifting and handling equipment, certified by specific training;
  - specific knowledge of safety devices as applied to **"DGT" drive units** or **endcarriages** (limit strokes, brakes, etc.);
  - fundamental knowledge of control techniques and electrical adjustments (verify motors);
  - specific expertise on measurement and testing methods so as to determine the effective status of **"DGT" drive units** or **endcarriages** (verify: brakes, limit strokes, etc.);
  - specific knowledge of logical search methods for malfunctions and evaluations of results;
  - capacity to organize measures capable of restoring proper performance to the **"DGT" drive units** or**endcarriages**;
  - capacity to draw up a summary of maintenance interventions.
- **Qualifications requested:**
  - complete training as an industrial mechanical technician, with specialization and experience in maintenance on industrial lifting and handling systems.

Electrical technicians:

- **Typical maintenance tasks:**
  - electrical adjustments on safety devices, calibrations and tests (load tests);
  - ordinary maintenance operations, replacing complex electrical and/or critical components for safety purposes (motors, limit switches, brakes, etc.);
  - repairs on electrical groups, through extraordinary maintenance operations (repairs on electrical motors with partial part replacements, replacing limit strokes with setting variations, etc.).
- **Technical knowledge and expertise requested:**
  - excellent knowledge of electrical systems and installations as related to industrial lifting and handling equipment;
  - specific knowledge of electrical components and safety devices employed on **"DGT" drive units** or **endcarriages** (motors, limit switches, brakes, etc.);
  - expertise in control techniques and electrical adjustments (capacity to intervene on the original layout for improvements on: limit strokes, control panels, cables, etc.);
  - knowledge of control techniques and mechanical adjustments (verify wear, verify performance of mechanical components, adjust and set mechanical stops, verify noise emissions, etc.);
  - specific expertise on measurement and testing methods so as to determine the effective status of **"DGT" drive units** or **endcarriages** (verify efficiency and reliability of electrical equipment);
  - specific knowledge of logical search methods for all malfunctions and evaluations of results on electrical command and control systems as related to lifting equipment;
  - capacity to organize measures capable of restoring proper performance to the **"DGT" drive units** or **endcarriages**;
  - capacity to draw up a summary of maintenance interventions.
- **Qualifications requested:**
  - complete training as an industrial electrical technician, with specialization and specific expertise in electrical equipment for industrial lifting and handling systems.

Electromechanical technicians:
- **Highly specialized operators who possess skills and expertise related to electrical and mechanical maintenance technicians.**

Special recommendations regarding maintenance:

1. When correctly performed, maintenance interventions guarantee the safety of operators working on the **"DGT" drive units** or **endcarriages** and reduce machine downtime to a minimum following a malfunction.
2. Repairs carried out ahead of time avoid further deterioration on the **"DGT" drive units** or **endcarriages.**
3. Use original products and spare parts as far as possible.
4. Observe the following guidelines when placing the system in maintenance status:
   - personnel carrying out ordinary and extraordinary maintenance interventions must read and fully understand all indications contained in this section and in section 3 of the operating manual.
   - extraordinary maintenance interventions must be carried out by authorized and specialized personnel only.

Whenever possible, maintenance interventions on the "DGT" drive units or endcarriages must be carried out with the power cut off and in safety conditions, using suitable tools and personal protection equipment, in accordance with current regulations in force, affixing a sign with the warning: "MACHINE IN MAINTENANCE STATUS".

For any other problems which may arise, and to order spare parts, please contact the Technical Service Department at *DONATI SOLLEVAMENTI S.r.l.*

6.3 Maintenance program

- The maintenance program comprises interventions of an ordinary nature, which foresee inspections, controls and verifications conducted by the machine's operator and/or by qualified personnel overseeing normal and periodic maintenance operations, which include replacing parts, adjustments and settings, and lubrication performed by specially trained technicians.

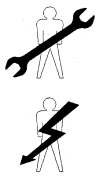
⚠	• **Considering maintenance work can be carried out at a dangerous height, personnel must have appropriate means of support (scaffolding, platform, ladders etc.) which allows the work to be performed in safe conditions.** • **Personnel must also have suitable personal protection devices (PPD) in accordance with current legislation in force.**	

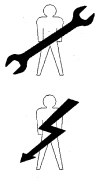
6.3.1 Daily and periodic maintenance

- Comprises maintenance operations that can be performed directly by the operator making use of the machine on which the **"DGT" drive units** or **endcarriages** are assembled, or by specially qualified personnel, as outlined in this operating manual, and/or in the attached documentation, which do not require the use of special tools and equipment.

- **Maintenance operations are divided into:**

👁	**Daily interventions performed by the operator making use of the machine on which the "DGT" drive units or endcarriages are assembled:** • general visual checks • functional checks on: motors, brakes and limit switches..	

👁	**Monthly interventions to be performed by qualified personnel:** • visual checks on mechanisms and lubricant leaks • functional checks on brakes at full load • checking for abnormal or irregular noises and/or vibrations.	

👁	**Quarterly interventions to be performed by qualified personnel:** • check for wear on wheels • functional checks on motors and limit strokes at full load • functional checks on brakes at full load and inspection of wear • verify efficiency and integrity of electrical cables powering the motors.	

6.3.2 Maintenance frequency and deadlines

- The frequency with which the following operations are carried out refers to **"DGT" drive units or endcarriages** used under normal operating conditions, and are valid up to service group M6 (ISO norm 4301/88); i.e. 3m (FEM ordinance 9.511).

- If the use of the **"DGT" drive units or endcarriages** is normal and correct for daily 8 hour shifts, their overhaul can be performed after a period of use of approximately 10 years (FEM ordinance 9.755 - S.W.P.). For usage over repeated and consecutive work shifts, intensify the frequency of maintenance periods proportionately.

Table of periodic checks and maintenance

Object of verification ⇓	Periodic maintenance checks				Page
	Daily	Monthly	Quarterly ✍	Annualy ✍	
• **Controls** • **Inspections** • **Tests**	 General visual checks. Verify proper operation	 General visual checks	  Verify wear	  Annual tests	55
Drive motors			 Load tests		69
Brakes	 Verify correct operation		 Load tests Check braking spaces and wear		69
Reducers		 Check noise emissions			69
Wheels		 Visually verify wear	 Verify instrumental wear		70
• **Structural elements** • **Pins and hinges** • **Bolted joints**				 Verify efficiency of pins and hinges Check bolted/ welded joints	70
Rubber elastomer: • **Buffers** • **Shock absorbers**				 Verify wear and efficiency	70
Limit switches	 Verify correct operation		 Load tests Verify wear and efficiency		71
Cables and electrical conductors			 Check for broken parts and efficiency		71
Cleaning and lubrication		 Check for lubricant leaks	 General cleaning to allow verifications		71

NOTE ✍: All operations must be fully recorded in the control registry for the lifting equipment on which the "DGT" drive units and endcarriages are assembled (see sect. 8).

6.3.3 Checking the operating efficiency of parts and components

The Manufacturer recommends strictly observing the following instructions for individual parts on the "DGT" drive units or endcarriages:

Quarterly efficiency control on the self-braking travelling motors:

- Clean the drive motor on the swinging gearmotor, eliminating any dust from the frame, which can otherwise hinder its regular cooling function; check to make certain the vent openings are not clogged.
- With a nominal load, check for abnormal noises (chaffing, rasping sounds).
- Check to make certain the temperature of the frame does not exceed 110°C. If it does, look for causes and verify the type of operation the gearmotor is subjected to (see point 6.7 "Troubleshooting Guide").
- Verify the voltage and power absorption, comparing them with the nominal values reported on the motor's identification nameplate (see also motor specifications at point 2.3.7 - page 19 of this manual).

IN CASE OF A MALFUNCTION:

- **It is forbidden to intervene with corrective maintenance inside the motors;**
- **Any extraordinary maintenance operation on the self-braking travelling motors must be conducted by the *DONATI SOLLEVAMENTI S.r.l.* technical servicing department or by its authorized technicians.**

Check the efficiency of the self-braking travelling motors every three months:

- Check to make certain the brake unlocks correctly with each intervention, and the rotor does not remain braked and/or chaffing is detected.
- With a nominal load, control braking spaces, times and effectiveness and make certain they are the desired settings, i.e. those set during the setup phase. If this is not the case, cut off the power supply and check for wear on the surface of the brake lining and brake block, ascertaining any irregularities.
- Where necessary, make adjustments to the brakes and/or replace them, as outlined in sections 6.4 "Settings" and 6.6 "Replacements"

- **Replace the brake if braking spaces, times and effectiveness are inadequate, even after having made adjustments.**

IN CASE OF IRREGULARITIES:

- **It is forbidden to intervene with corrective maintenance on the brakes;**
- **Any extraordinary maintenance operation on the brakes must be conducted by the *DONATI SOLLEVAMENTI S.r.l.* technical servicing department or by its authorized technicians.**

Check the efficiency of the swinging reducers on a monthly basis:

- Check noise levels on the drive swinging reducers to make certain there are no variations in intensity. Vibrations or excessive noise can reveal wear on the teeth or a malfunctioning bearing.
- Check for lubricant leakage.

CAUTION:

- **The swinging reducers are lubricated for life and do not require any maintenance nor lubricant refilling.**

IN CASE OF IRREGULARITIES:

- **It is forbidden to intervene with corrective maintenance on the reducers;**
- **Any extraordinary maintenance operation on the reducers must be conducted by the *DONATI SOLLEVAMENTI S.r.l.* technical servicing department or by its authorized technicians.**

Visually check the efficiency of the drive wheels on a monthly basis:
Check the components on the drive wheels every three months:

- Visually check the wear and status of the edgings and rolling bands on the sliding wheels every month, and take measurements every three months.
- Control the pads to make certain there are no irregularities. Pads must be replaced if excessive noise or chaffing is present, or rotation in "jolts," and any difficult and/or irregular rotation.
- Check for the absence of play in the fittings between the wheel and grooved shaft, as well as between the shaft and reducer; the presence of play reveals the need to replace the grooved shaft and/or wheels.

Replace the drive wheels if:

- **The thickness of the edging/s on the wheel has diminished by ≥ 50%**
- **The wheel's rolling diameter shows wear ≥ 5 mm**
- **Should the drive wheels require replacing, to obtain the best guarantee in terms of operation and duration the Manufacturer recommends replacing both drive wheels**
- **For the correct replacement procedure for the wheels, refer to section 6.6 "Replacing parts and components"**

On an annual basis, check the efficiency of the:

- **structural elements**
- **pins and hinges**
- **bolted joints**

- Metal frames on the **"DGT" drive units** or **endcarriages** can be subject to alterations due to environmental factors (corrosion, rust, etc.), which can cause damage to the framework and welding. As such, all frames require cleaning and annual controls to ascertain they are in perfect condition, repairing any damage found is required;
- The reaction arms on the swinging reducers, and hinged brackets and pins, are subject to wear, as moving and oscillating elements under ongoing friction in the contact area. Control these parts regularly and replace them in the case of excessive wear;
- On an annual basis, the screw pins on the reaction arms and their housings must be disassembled and carefully controlled;
- At least once a year, check to make certain all bolted joints are properly tightened.

Repair frames or replace hinged elements under the following conditions:

- **deformations:** lengthening, flattening, dents, folds;
- **wear:** worn out parts, reductions in section, incisions, abrasion, corrosion, rust, scars, scratched paintwork;
- **breakage:** weld cracks, fissures, cuts or incisions, broken parts;
- **variations in section ≥ 10%, or in diameter or thickness ≥ 5 % with respect to initial values.**

On an annual basis, check the efficiency of the rubber elastomer

- **buffers on the wheel group end stops**
- **shock absorbers on the offset gearmotors.**

- Control the **buffers** to make certain they are not deformed or broken, that they do not present symptoms of aging (cracks, fissures, loss of elasticity) and are well fastened to the structures;
- Control the **shock absorbers on the offset gearmotors** to make certain they are not flattened, do not present symptoms of aging (cracks, fissures, loss of elasticity) and are well fastened to the gearmotor reaction arm.

Replace the rubber elastomer parts under the following conditions:

- **permanent deformations:** flattening;
- **breakage:** splits, cuts or incisions, broken parts;
- **signs of aging:** cracks, fissures, loss of elasticity.

In all cases, replace the rubber elastomer parts every 5 years, even if they appear apparently in good condition.

	Check the efficiency of the sliding limit strokes every three months:	

- Check their conservation status and operation (allow the limit switches to intervene several times) and specifically, check their operation during a normal manoeuvre with a full load, testing at low speed first (where this speed option is available);
- Control to make certain all cable runs, covers and seals are properly fitted;
- Check all moving mechanical elements (levers/springs) and tighten all screws.

	• **The limit switches are safety devices – as such their malfunctioning can compromise the safety of persons exposed!** • **Do not hesitate to replace limit strokes being tested if they do not appear to sufficiently satisfy operating reliability.** • **Never carry out hasty repairs on the limit strokes!** • **Use original spare parts.**	

	Check the efficiency of all cables and electric conductors every three months:	

- Check all flexible cables for cuts, abrasion, peeling and uncovered conductors;
- Check the efficiency of all conductors and ground connections on the electric motors, controlling and tightening all screws and terminals.
- Check all seals on the covers and cable runs.
- Check to make certain the identification nameplates are present on the motors, and in good condition.

	• **Replace any cables and/or conductors that appear broken, cut, peeled or eroded.** • **Never carry out hasty repairs.**	

6.3.4 Cleaning and lubrication

	• **"DGT" drive units or endcarriages must be thoroughly cleaned every three months, in order to allow for periodic control checks;** • **<u>Cleaning operations above ground level</u> must be carried out by qualified personnel making use of suitable equipped with individual safety and protection devices.**	

- Cleaning operations can be performed simply using tools, detergents or solvents commonly employed in general cleaning operations on industrial equipment.
- Remove smudges, stains and other foreign substances with an aspirator, absorbent cloths, etc.

	• **Sliding reducers on the "DGT" drive units and endcarriages are lubricated for life and do not require lubricant replacement.** • **However, since the proper lubrication of mechanisms on the reducers is an essential condition in guaranteeing their effective operating response and duration, on a monthly basis visually control that there are no lubricant leaks on the reducers.** • **If <u>significant leaks</u> are detected, immediately contact the servicing department at *DONATI SOLLEVAMENTI S.r.l.***	

	• **Lubricants, solvents and detergents are toxic/harmful products for our health which can:**
	  • **produce irritations in direct contact with skin;**
	  • **provoke serious intoxication if inhaled;**
	  • **cause death if swallowed.**
	• **Handle with care using suitable individual protection and safety equipment;**
	• **Do not disperse in the environment, dispose of in conformity with current legislative ordinances in force regarding toxic/harmful substances.**

6.4 Setting the brake on the motors on “DGT” drive units and endcarriages

- **The motor on the “DGT” drive units and endcarriages is a self-braking type with axial shifting of the rotor.**
- **Braking is mechanic and is provided by a conical brake block, equipped with a brake lining that is integral with the rotor, and which, in the absence of power, is thrust by a spring in contact with the braking surface on the brake cover.**
- **The brake linings do not contain asbestos, and are subject to wear depending on the intensity of work operations.**
- **Wear on the brake linings increases the amount of play between the lining and brake block; this leads to a progressive loss of brake torque and consequent brake skidding and lengthening of brake spaces; proper maintenance on the brake is consequently essential.**
- **Adjust the brake torque as follows:**
  - **A) On the outside, adjust the brake torque in the case of modest wear or to modify preset torque settings.**
  - **B) On the inside, restore the brake play in the case of heavy wear on the brake lining, increasing the motor shaft axial stroke > 1 mm.**

Adjustments on the brake on “DGT” drive units or endcarriages:
A) Externally set the brake torque
B) Internally restoring the brake play

WARNING! The use of a safety harness is mandatory when these operations are conducted above ground level.

- To make adjustments on the brake on **“DGT” drive units** or **endcarriages**, whether externally adjusting the brake torque **A)**, or internally restoring the brake play **B)**, the following **PRELIMINARY OPERATIONS** are required**:**
  1. Cut off power to the **“DGT” drive units** or **endcarriages**;
  2. Get to the work area above ground level in safety;
  3. Operating above ground level, remove the plastic grid (aerator), unscrewing the four screws completely, as shown in fig. 16.

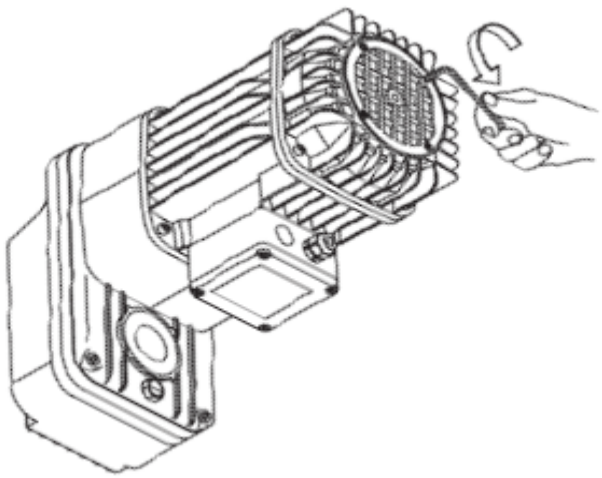


fig. 16

A) Externally setting the brake torque:

- **To increase or decrease the desired brake torque**, proceed as follows:
  1. Loosen the “hexagonal concave head” centre screw (fig. 17);
     - **to increase the brake torque:** remove one or more washers until obtaining the desired brake torque (fig. 18);
     - **to decrease the brake torque:** with all washers inserted under the “hexagonal concave head” screw, the spring thrust is at its minimum setting, and consequently the brake torque is also at a minimum.
  2. Reset the “hexagonal concave head” centre screw (with the desired washers) and tighten securely (fig. 19);
  3. Perform driving and braking tests, and if necessary repeat the above steps until obtaining the desired brake torque, after having reassembled the aerator and securely tightened the “hexagonal concave head” screws (fig. 20).

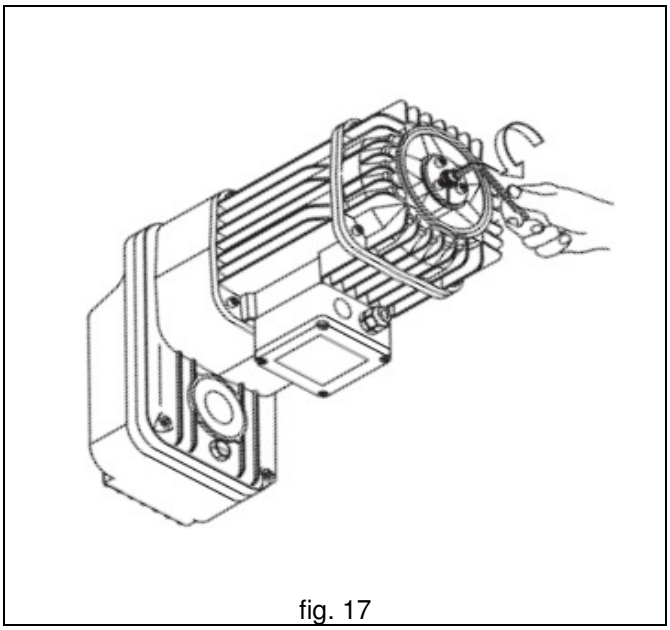


fig. 17

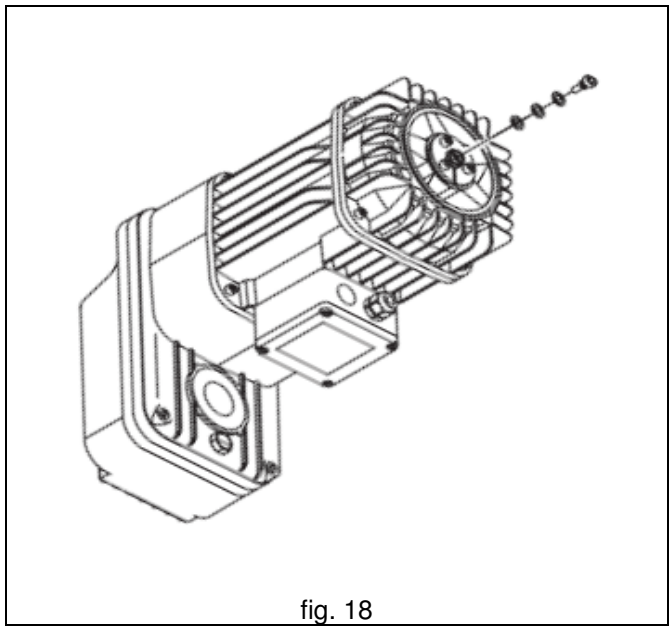


fig. 18

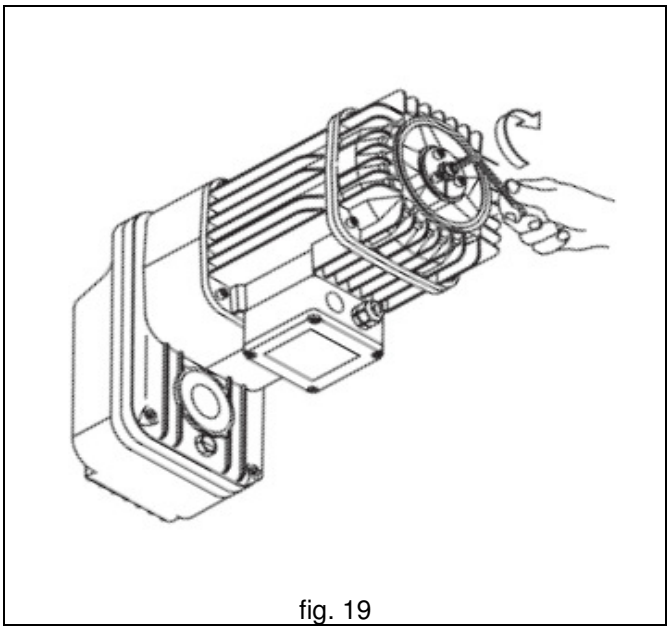


fig. 19

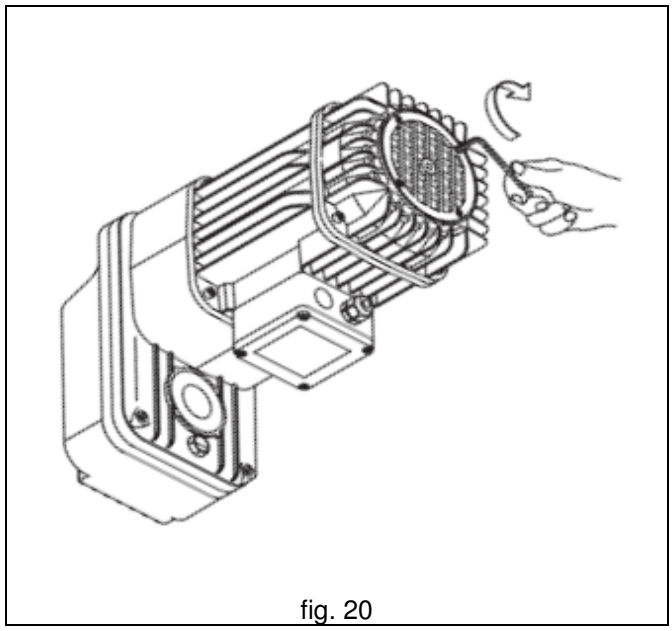


fig. 20

If the brake torque adjustment has been performed several times and the desired braking space is not achieved, proceed as outlined under the following point B) “Internally restoring the brake play.”

B) - Internally restoring the brake play:

- **To reset the correct axial stroke on the motor shaft** (≅ 1mm), proceed as follows**:**
  1. Operating above ground level, remove the plastic grid (aerator), unscrewing the four screws completely, as shown in (fig. 16);
  2. Completely unscrew the three screws form the locking ring nut on the brake block (fig. 21);
  3. Remove the ring nut from the brake block, if necessary using a screwdriver in the slot (fig. 22);
  4. Turn the ring nut counter-clockwise 360° (1 complete turn), considering that a complete turn of the ring nut generates an axial shifting of the brake block of 1 mm;
  5. Draw the brake block in towards the ring nut, matching up the boreholes;
  6. Reset the three screws into their original housings on the ring nut, fastening them onto the block (fig. 23);
  7. Reassemble the grid (aerator), fastening the four screws back on completely (fig. 24).

When these steps have been completed, control the brake setting and play, to make certain they are correct, verifying (firstly on empty and subsequently with a nominal load) that:

- the motor rotates freely, without irregular noises, brake chaffing or the brake cover overheating.
- the brake operates silently, and the **"DGT" drive units** and **endcarriages** brake without any obvious slipping.

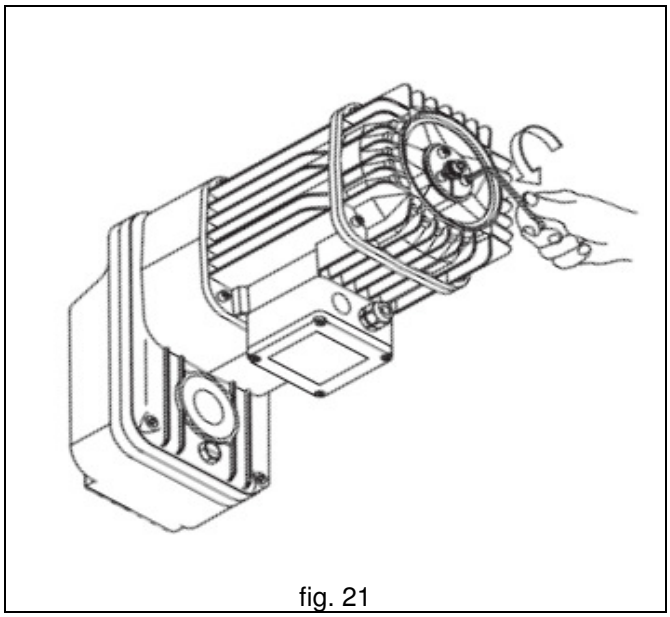


fig. 21

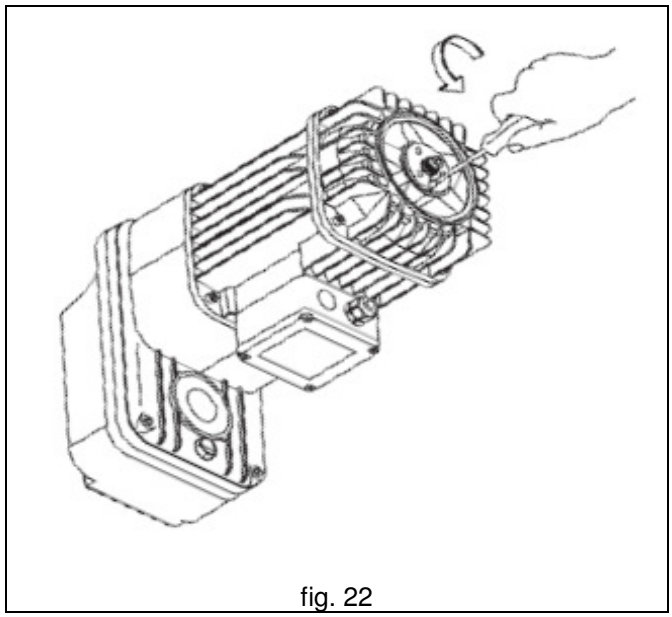


fig. 22

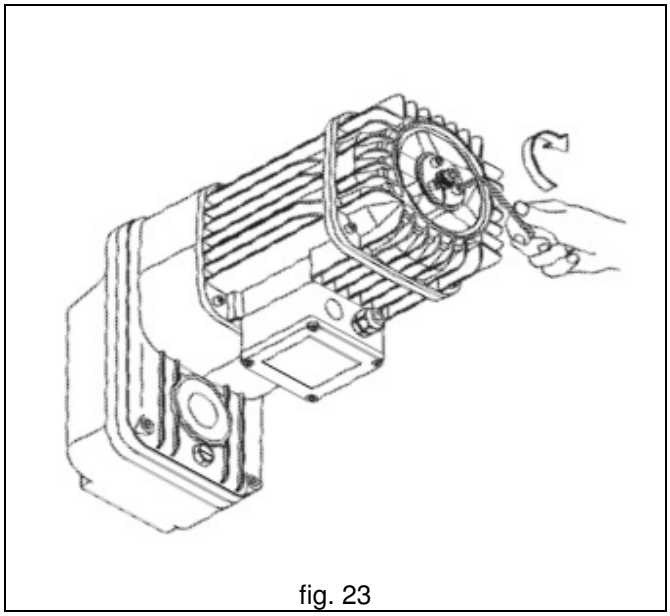


fig. 23

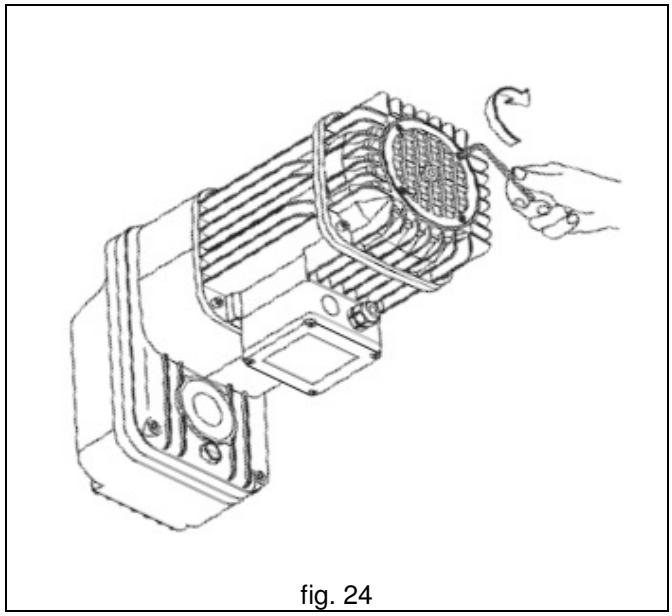


fig. 24

If the brake adjustment has been performed several times and the desired braking is not achieved, replace the motor cover as outlined at sect. 6.6.1, ordering original spare parts EXCLUSIVELY.

6.5 Disassembling the "DGP" offset gearmotor

Disassembly operations must be carried out by qualified and trained personnel, and when working above ground level, equipped with:

- **suitable individual protection devices (e.g. safety harnesses, etc.);**
- **appropriate working tools (e.g. fork lift, crane, scaffolding, etc.).**

after carefully evaluating the following parameters:

- **type of working environment, ambient specifications and type of flooring**
- **height of the installation with respect to the flooring and available spaces**
- **dimensions and weight of the "DGP" offset gearmotor to disassemble**

The "DGP" offset gearmotor being disassembled must be moved SOLELY using LIFTING EQUIPMENT (crane, hoist, etc.) **and a suitable harness** (textile fabric sling) **fastened loop- like onto the connection area between the motor and swinging reducer** (fig. 25)**.**

Disassembling the "DGP" offset gearmotor (fig. 26)**:**

1. Cut off power to the **"DGT" drive units** or **endcarriages**;
2. Sling the offset gearmotor (1), using a textile fabric sling (2), fastened loop-like onto the motor (fig. 25) without, however, tensioning the harness;
3. Unfasten the screw and nut (3), and remove it from the reaction arm (4) on the operating head (5);
4. Remove from the gearmotor (1) the screw and nut (3) and shock absorber group, comprising two buffers (6) and two pressure rings (7);
5. Completely extract the gearmotor (1), integral with the drive shaft (8), from the wheel (9), maintaining it suspended from the lifting equipment with the harness (2);
6. Set the gearmotor (1) on the ground, operating the lifting equipment.

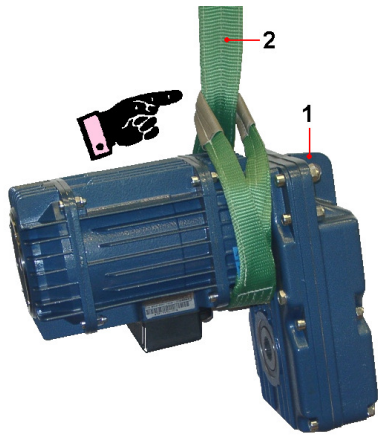


fig. 25

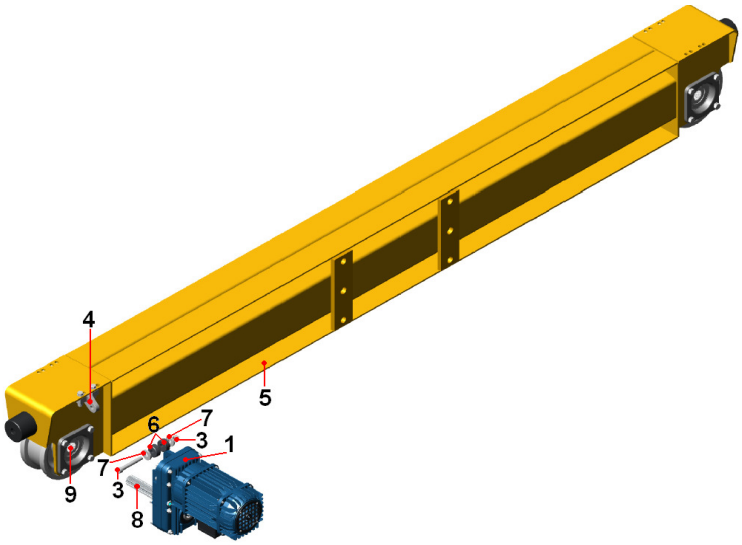


fig. 26

To reassemble the "DGP" offset gearmotor once more onto the operating head, proceed by following the above steps in reverse sequence, i.e. as outlined in the procedure at page 50.

6.6 Replacing parts and components

⚠	**To guarantee the operating safety of the "DGT"endcarriages units and endcarriages, it is mandatory to use original spare parts or parts recommended by *DONATI SOLLEVAMENTI S.r.l.***

⚠	**Operations regarding the replacement of parts and components must be performed by qualified and specially trained personnel, and when working above ground level, equipped with:** • **suitable individual protection devices (e.g. safety harnesses, etc.);** • **appropriate working tools (e.g. fork lift, crane, scaffolding, etc.).** **after carefully evaluating the following parameters:** • **type of working environment, ambient specifications and type of flooring** • **height of the installation with respect to the flooring and available spaces** • **dimensions and weight of the parts to be replaced**	

6.6.1 Replacing the brake on the motors on "DGT" drive units and endcarriages

👁	**To replace the motor brake proceed as follows:**	

1. Cut off power to the **"DGT" drive units** or **endcarriages**;
2. Access the work area safely;
3. Operating above ground level, remove the motor's brake cover, unfastening the four screws (fig. 27);
4. Completely unscrew the three screws form the locking ring nut on the brake block (fig. 28);
5. Unfasten the ring nut and remove the brake block and its worn out material;
6. Reassemble the new brake block (with the new brake lining) and screw the ring nut back on to the end of its stroke;
7. Fasten the ring nut to the brake block using the three screws (fig. 29);
8. Reassemble the motor cover, tightening it with the screws and nuts (fig. 30).
9. Proceed with the operating tests and adjustment of the braking torque as outlined at sect. 6.4.

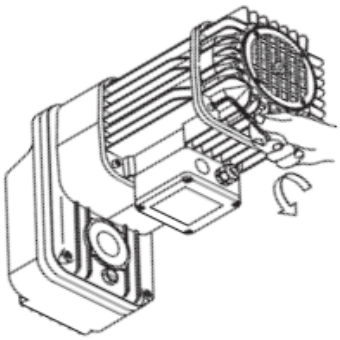


fig. 27

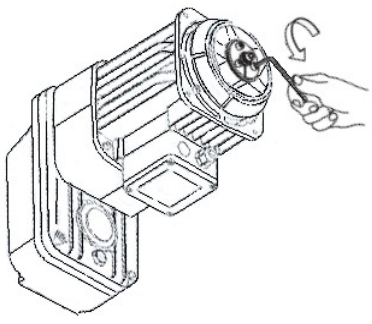


fig. 28

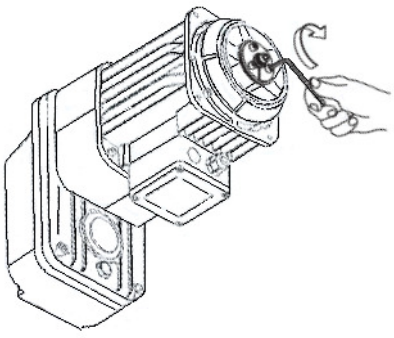


fig. 29

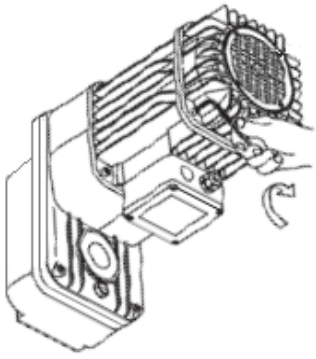


fig. 30

6.6.2 Replacing the wheels on “DGT” drive units

Operations regarding the replacement of the wheels must be performed by qualified and specially trained personnel, and when working above ground level, equipped with:

- **suitable individual protection devices (e.g. safety harnesses, etc.);**
- **appropriate working tools (e.g. fork lift, crane, scaffolding, etc.).**

after carefully evaluating the following parameters:

- **type of working environment, ambient specifications and type of flooring**
- **height of the installation with respect to the flooring and available spaces**
- **dimensions and weight of the wheels to be replaced**

The wheels must be moved <u>SOLELY</u> using LIFTING EQUIPMENT (crane, hoist, etc.) **and a suitable harness** (textile fabric sling) **fastened loop- like onto the perimeter of the wheel’s sliding harness** (Fig. 31)**.**

It is advisable to replace all the wheels, even if some of them appear in good condition.

To replace the wheels proceed as follows (Fig. 32)**:**

1. For a power wheel, disassemble the offset gearmotor (1), removing the wheel (2), then proceed as outlined at section 6.5 on page 75;
2. Using appropriate tools (jack, steeve, etc.), lift the operating head by a few centimeters (3) from the side of the wheel (2) to be replaced;
3. Sling the wheel to be disassembled (2), with a fabric harness (4) fastened loop-like onto the perimeter of the sliding harness (fig. 31), without tensioning it, however;
4. Remove the wheel supports (6) on both sides, unfastening the four screws (7), using a screwdriver if necessary;
5. Extract the wheel (2) from the operating head lifting unit housing (3), maintaining it suspended with the harness (4) and lifting equipment (5);
6. Set down the wheel (2) to be replaced, using the lifting equipment;
7. Set the wheel supports on the ground as well (6), if the bearings must be replaced as well (8).

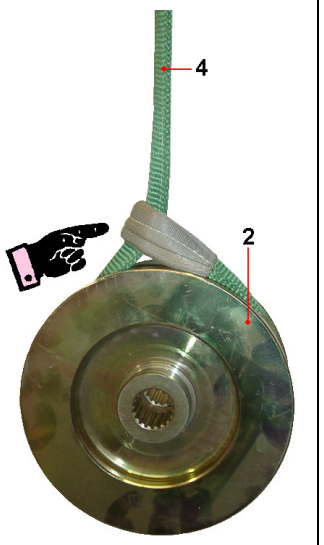


fig. 31

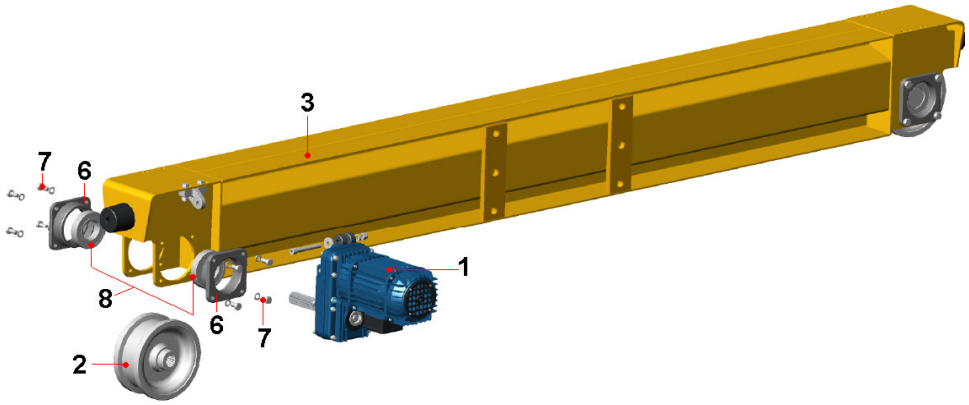


fig. 32

To reassemble the wheels on the operating head, proceed in reverse sequence.

6.7 Troubleshooting guide

6.7.1 Malfunctions and irregularities

- The following are the primary, reasonably foreseeable malfunctioning conditions related to operating functions on the **"DGT" drive units** or **endcarriages**.

PROBLEM	POSSIBLE CAUSES
A single "DGT" Unit or Beam won't start	• motor power cable • motor malfunction • blocked brake • reducer jammed • blocked wheel
The pair of "DGT" "DGT" Units or Beams won't start	• motor power cable • motor fuses • temperature sensors tripped (if available) • forward/reverse limit switch • forward/reverse contactor • forward/reverse command button
The driving operation won't stop in the required space	• worn out brake
The driving operation won't stop at the end of the stroke	• worn out brake • limit stroke operation
The reducer is excessively noisy	• lack of lubricant • incorrect/overly intense operation • unsuitable rail tolerances (planarity/parallelism)
Grating brake sound during braking	• check for dust • excessive play • worn out brake lining
Strident noise from the wheels (advancing in jolts)	• incorrect play between wheel and rail way • unsuitable rail tolerances (planarity/parallelism) • incorrect/overly intense operation
The "DGT" Units or Beams start up too slowly or uneasily and do not transfer the maximum load	• voltage malfunction • overload, incorrect/overly intense operation • a reducer is beginning to jam • incorrect contact between rail and wheel • unsuitable rail tolerances (planarity/parallelism)
The "DGT" Units or Beams skid on the rails	• obstacles on the rail way • oil, grease or paint on the rail way • unsuitable rail tolerances (planarity)

6.7.2 Malfunctions on components and possible solutions

- Primary causes of malfunctions on individual parts, and possible solutions.

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Brake skidding	* brake lining wear * presence of oil/grease	* set the play or replace the lining * clean the lining
Brake overheating	* incorrect operation * unsuitable environmental conditions * incorrect setting	* reset normal operating conditions * adjust the brake
Brake not releasing	* incorrect power supply * incorrect setting	* reset voltage values * adjust the brake
Brake tends to jam up	* unsuitable environmental conditions * inappropriate operation	* reset normal operating conditions
Limit switch is blocked on opening, does not reset	* activation head clogged * incorrect confirmation * interrupted connections	* clean and reset correct operating conditions
Motor too hot	* variation in voltage > 10% * poor cooling * ambient temperature > foreseen * use does not conform to service operation foreseen	* ensure correct line voltage * reset correct air circulation * adapt motor specifications * adapt service conditions to normal
Motor won't start	* burnt fuse * power malfunction * overload, burnt out due to high start-up frequencies, insufficient protection	* replace the fuse * check contactor/power cable * rewind the motor and ensure better protection * check the control device
Motor doesn't start up easily	* on start-up the tension or frequency decrease with respect to the nominal value	* improve line or power supply conditions
Motor buzzes and absorbs too much current	* defective winding * one power phase missing * reducer blocked * brake blocked * short circuit on power supply * short circuit on motor	* proceed with repairs * check power cable and/or contactor * request a specialized technician * check and if necessary set the brake * eliminate the short circuit * request a specialized technician
Motor short circuiting	* malfunction in winding	* re-wind up the motor

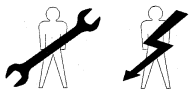
6.7.3 Personnel authorized to intervene in case of malfunctions

- Personnel authorized to intervene in cases of malfunctions, where not notified otherwise, are expert maintenance staff with specific training on mechanical and electrical parts.
- Where specifically indicated otherwise, on the other hand, the intervention of specialized servicing personnel for ***DONATI SOLLEVAMENTI S.r.l.*** or its authorized personnel is required.

6.7.4 Disabling the units

- Should the **"DGT" drive units** or **endcarriages** no longer be repairable, proceed with disabling them, requesting the intervention of specialized servicing personnel for ***DONATI SOLLEVAMENTI S.r.l.***, notifying the type of malfunction.

6.8 Dismantling and disposing of the units

	Should the "DGT" drive units and endcarriages, or their components, due to breaking, wear or at the end of their expected lifetime, no longer be usable or repairable. Proceed with their demolition:	

* The demolition of the **"DGT" drive units** or **endcarriages** must be carried out using appropriate tools and equipment depending on the nature of the materials (e.g. saw cutters, oxyhydrogen flame, hacksaw, etc.);
* All components must be dismantled and disposed of after having been reduced to small pieces so that none of these pieces can reasonably be re-used;
* When the **"DGT" drive units** or **endcarriages** are disposed of, their various parts must be scrapped taking into account their different nature (metal, oil and lubricants, plastic, rubber, etc.), possibly entrusting this task to authorized and specialized companies, and in all cases observing the regulations and ordinances stipulated by current legislation regarding the disposal of solid industrial waste materials.

	Do not attempt to re-use parts or components on the "DGT" drive units or **endcarriages which can appear still whole once they have been declared as no longer suitable through controls and/or part replacements conducted by specialized personnel.**

7.SPARE PARTS

!	* **The "DGT" drive units and endcarriages are designed and built to not normally require spare parts DUE TO MALFUNCTIONS OR BREAKING, if used correctly and accompanied by suitable maintenance, as outlined in this operating manual.** * **Parts or components subject to normal wear or deterioration are available for a minimum period of 10 years.**

	* **Do not hesitate to replace a part and/or component being examined should it no longer be capable of providing satisfactory results or sufficient guarantees of safety and/or reliability.** * **Never carry out hasty repairs on parts and components!**

- Where malfunctioning parts must be replaced, it is compulsory to make use of original spare parts exclusively, requesting them directly from:

	donati	**DONATI SOLLEVAMENTI S.r.l.** Via Quasimodo, 17 - 20025 Legnano (MI) - Italy tel. +39 0331 14811 - fax +39 0331 1481880 e-mail: dvo.info@donaticranes.com - www.donaticranes.com

!	**In addition to rendering the warranty void, the use of non-original spare parts can compromise the proper operation of the "DGT" drive units and endcarriages.**

8. – CONTROL REGISTRY

- As proof of the proper management of all maintenance and control activities for the **"DGT" units** or **endcarriages**, as well as to provide a history of responsibilities for such interventions, as outlined in this operating manual, **the Manufacturer recommends diligently compiling and keeping for the entire expected lifetime of the components** (10 years) a suitable control registry, which, as prescribed under Res. 4.4.2b Attachment I of Machinery Directive 2006/42/CE, must mandatorily accompany lifting equipment for which **"DGT" units** or **sliding beams** have been incorporated.

- In addition to all activities regarding the working life and usage of the **"DGT" units** or **endcarriages** (parts replacements, revisions, malfunctions of a certain scope, etc.), the control registry must take note of and indicate all maintenance operations foreseen at three-month and annual intervals as indicated in the **"Table of periodic control and maintenance interventions"**, at point 6.3.2 of this operating manual.

- The control registry must be compiled in all its parts by the buyer's maintenance personnel, indicating all test results and pertinent annotations.

- The name(s) of maintenance personnel must also be clearly indicated, as well as the date(s) of all interventions.