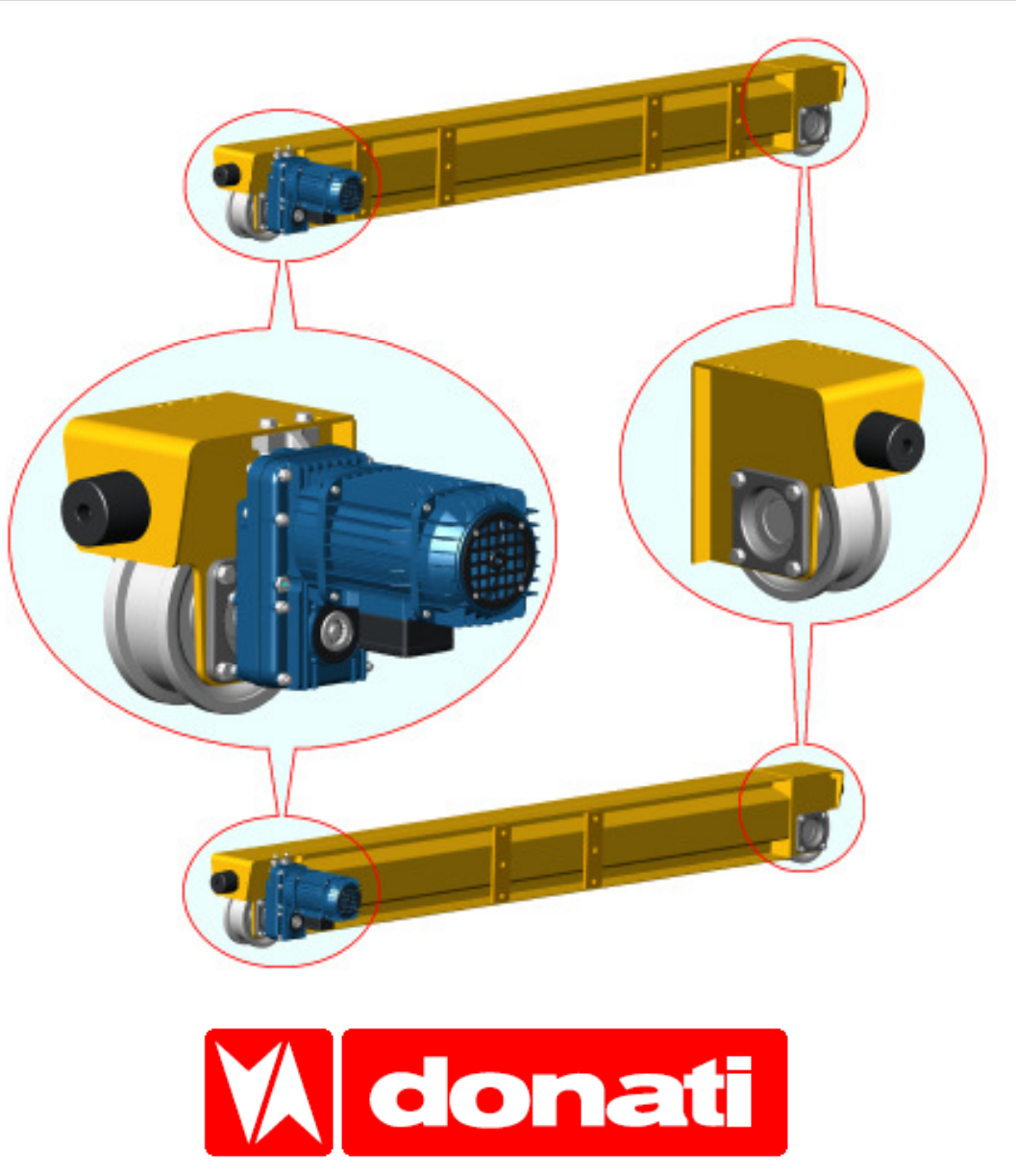


Drive UNITS FOR CRANES

“DGT” Wheel Groups + “DGP” Offset Geared Motors

Endcarriages

for Single girder and Double girder Bridge Cranes



OPERATING MANUAL

INSTALLATION - USE - MAINTENANCE



MAN-DGT.01

CONTENTS

page

1. PRELIMINARY INFORMATION	5
1.1 Contents and recipients of the operating manual	5
1.2 Symbols: meaning and usage	5
1.3 Collaborating with users	6
1.4 Conformity to norms and regulations	6
1.5 Manufacturer's liability and warranty	7
2. DESCRIPTION OF COMPONENTS AND TECHNICAL SPECIFICATIONS	8
2.1 "DGT" series drive units for cranes	8
2.1.1 Intended and proper usage	8
2.1.2 The range of drive units	8
2.1.3 Components on drive units	9
2.2 "DGT" series endcarriages for bridge cranes	10
2.2.1 Intended and proper usage	10
2.2.2 The range of endcarriages	10
2.2.3 Components on endcarriages	11
2.3 Technical specifications and operating conditions	12
2.3.1 Regulatory framework	12
2.3.2 Electrical power – Protection and insulation of electrical parts	12
2.3.3 Surface finish	12
2.3.4 Environmental conditions for standard usage	12
2.3.5 Noise emissions - Vibrations	12
2.3.6 Classification of "DGT" series drive units	13
2.3.7 Operating limitations and technical specifications for "DGT" series drive units	14
2.3.8 Operating limitations and technical specifications for "DGT" series endcarriages	27
2.3.9 Sample guidelines for selecting endcarriages and related drive units	38
3. SAFETY AND ACCIDENT PREVENTION MEASURES	40
3.1 Operator qualifications	40
3.2 General safety norms and regulations	41
3.3 Safety symbols and warning labels	41
3.4 Warnings inherent to residual risks	43
3.5 Safety devices and indications	44
3.5.1 Control devices	44
3.5.2 Safety and emergency devices	44
3.5.3 Identification nameplate and markings	45
4. HANDLING - INSTALLATION – SET-UP	46
4.1 General notes on the shipment	46
4.2 Packaging, transport and handling	46
4.2.1 Standard packaging	46
4.2.2 Transport	47
4.2.3 Lifting points and handling equipment	47
4.2.4 Handling	48
4.2.5 Removing the packaging	48
4.3 Installing "DGT" drive units and endcarriages	48
4.3.1 Setting up "DGT" drive units onto a crane beam	49
4.3.2 Setting up "DGT" endcarriages onto a bridge crane	52
4.3.3 Connections and electrical diagrams	53
4.4 Setup and preparation	54
4.4.1 Preliminary operations	54
4.4.2 Settings and operating tests	54
4.4.3 Testing the "DGT" drive units and endcarriages – getting ready for operation	54
4.5 Disabling the units	56
4.5.1 Storing the units and parts	56
4.5.2 Resetting up the units after storage	56

CONTENTS	page
5. OPERATION	57
5.1 Functions on "DGT" drive units and endcarriages	57
5.1.1 Intended and proper usage	57
5.1.2 Admissible and inadmissible loads	57
5.2 Operating conditions	57
5.2.1 Operating environment	57
5.2.2 Danger areas and exposed personnel	58
5.2.3 Lighting conditions in the work area	58
5.2.4 Operators	58
5.2.5 Load bearing capacities on "DGT" drive units and endcarriages	59
5.2.6 Driving operations	59
5.2.7 Safety devices	59
5.3 Safety measures and precautions	60
5.4 Counterindications	61
5.4.1 Improper and unintended usage – Foreseeable and unforeseeable improper usage	61
6. MAINTENANCE	62
6.1 Safety precautions	62
6.2 Qualifications for maintenance personnel	64
6.3 Maintenance program	67
6.3.1 Daily and periodic maintenance	67
6.3.2 Maintenance frequency and deadlines	68
6.3.3 Checking the operating efficiency of parts and components	69
6.3.4 Cleaning and lubrication	71
6.4 Setting the brake on the motors on "DGT" drive units and endcarriages	72
6.5 Disassembling the "DGP" drive motoreducer	75
6.6 Replacing parts and components	76
6.6.1 Replacing the brake on the motors on "DGT" drive units and endcarriages	76
6.6.2 Replacing the wheels on "DGT" drive units	77
6.7 Troubleshooting guide	78
6.7.1 Malfunctions and irregularities	78
6.7.2 Malfunctions on components and possible solutions	79
6.7.3 Personnel authorized to intervene in case of malfunctions	79
6.7.4 Disabling the units	79
6.8 Dismantling and disposing of the units	80
7. SPARE PARTS	80
8. CONTROL REGISTRY	81

MANUFACTURER'S INTRODUCTORY NOTE

Dear customer,

- Congratulations on having chosen a **DONATI** product! Please make use of this operating manual to get the most out of your lifting equipment, for maximum productivity in the safest possible operating conditions.
- **DONATI SOLLEVAMENTI S.r.l.** engineers and designs technically innovative, thoroughly reliable lifting machinery and components, making use of advanced industrialized production processes which ensure low costs for end-users. Continuous attention to quality allows **DONATI SOLLEVAMENTI S.r.l.** to consistently manufacture highly engineered, meticulously designed products, using quality control measures on materials throughout the production process, right down to the finished product, involving the company's entire organization, through its certified quality assurance system in accordance with **UNI ISO 9001:2000** norms (Certified ICIM N° 0114), regulating and controlling the company's management and production organization since 1993.
- This documentation, whose original text has been written in Italian, is compiled in accordance with the EN ISO 12100 harmonized norms, part 2, chapter 6, and is made available to users in compliance with requirements outlined under sections 1.7.4. and 4.4.2. of Directive 98/37CE, formerly 89/392CEE, and subsequent modifications, also known as "Machinery Directive".
- We urge you to attentively read through the contents of this operating manual, and make it available to operating and lifting equipment installation personnel. **DONATI SOLLEVAMENTI S.r.l.** sincerely wishes that you make the most of this lifting equipment, exploiting its high performance specifications to the utmost.



Facsimile of CISQ-ICIM certificate



Facsimile of IQ Net certificate


1. – PRELIMINARY INFORMATION

1.1 Contents and recipients of the operating manual

- This technical publication, identified with the code **MAN-DGT.01**, 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 Roma, 55 - 21020 Daverio (Varese) - Italy tel. +39 0332 942.611 - fax +39 0332 948.597 e-mail: info@donati-europe.com - www.donati-europe.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.

	<ul style="list-style-type: none"> • The manufacturer maintains the material and intellectual property rights to this publication and forbids its dissemination and/or duplication, even partial, without its prior written consent. • Copyright© 2008 by DONATI SOLLEVAMENTI S.r.l.
---	--

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.


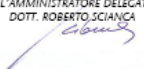
SYMBOL	MEANING	EXPLANATION, RECOMMENDATIONS, NOTES
	Danger	<ul style="list-style-type: none"> • Indicates danger with the risk of an accident, even death related. • Failure to respect the safety instructions related to this symbol can lead to extremely dangerous situations placing the unit's operator and/or persons exposed at risk! • Abide strictly to all safety precautions indicated!
	Warning	<ul style="list-style-type: none"> • Represents a warning notice for the possible deterioration of components or the operator's personal belongings. • Important warning - pay maximum attention.
	Caution Note	<ul style="list-style-type: none"> • Provides information or useful information on key functions.
	<ul style="list-style-type: none"> • Visual control • Take action 	<ul style="list-style-type: none"> • An eye-shaped symbol tells the reader to: <ol style="list-style-type: none"> 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 98/37/CE** (re-codification of Directive 89/392/CEE and subsequent revisions 91/368/CEE, 93/44/CEE and 93/68/CEE);
 - **Low Voltage Directive 2006/95/CE** (replacing Directives 73/23/CEE and 93/68/CEE);
 - **Electromagnetic Compatibility Directive 2004/108/CE** (replacing Directives 89/336/CEE and 92/31/CEE).
- Specifically, in relation to the obligations outlined in **Machinery Directive 98/37/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, as prescribed in **Attachment II**, equipped with a **Manufacturer’s Declaration – Attachment II B**, as **incomplete machinery**, i.e. designed to be incorporated with other machinery, and as such, in accordance with **Article 4 – section 2** of **Directive 98/37/CE**, the components illustrated herein present **no CE marking**.

DICHIARAZIONE DEL FABBRICANTE			
ai sensi dell'Allegato II B della Direttiva Macchine 98/37/CE			
Il legale rappresentante della Società:			
 DONATI SOLLEVAMENTI S.r.l. Via Roma, 55 - 21020 Daverio (VA) - Tel. 0332.942611 - Fax. 0332.948597			
Dichiara sotto la propria responsabilità che la macchina denominata:			
Testate: <input type="checkbox"/> Monotrave <input type="checkbox"/> Bitrave	Tipo:	Matricola:	Anno:
Gruppo ruota: <input type="checkbox"/>	Tipo:	Matricola:	Anno:
Non può essere messa in esercizio prima che la stessa sia stata completata e/o incorporata in altre macchine in totale conformità con le disposizioni della Direttiva Macchine 98/37/CE, ex 89/392/CEE e successivi emendamenti.			
Principali direttive, norme e regole tecniche considerate:			
<ul style="list-style-type: none"> • Direttiva Macchine 98/37/CE (Ricodifica della Direttiva 89/392/CEE e relativi emendamenti: 91/368/CEE - 93/44/CEE - 93/68/CEE) • Direttiva Bassa Tensione, 2006/95/CE (Ricodifica della direttiva 73/23/CEE) • Direttiva Compatibilità Elettromagnetica, 2004/108/CE (Ricodifica della direttiva 89/336/CEE) 			
EN 12100 parti: 1ª - 2ª - Sicurezza del macchinario EN 60529 - Gradi di protezione IP ISO 4301-1 - Classificazione apparecchi di sollevamento UNI ISO 8306 - Apparecchi di sollevamento. Gru a ponte e a cavalletto. Tolleranze delle vie di corsa UNI 7670 - Meccanismi per apparecchi di sollevamento. Istruzioni per il calcolo. FEM 9.511/86 - Classificazione dei meccanismi FEM 9.683/95 - Scelta dei motori di sollevamento e di traslazione FEM 9.755/93 - Periodi di lavoro sicuro FEM 1.001/98 - Calcolo degli apparecchi di sollevamento			
DONATI SOLLEVAMENTI S.r.l. L'AMMINISTRATORE DELEGATO DOTT. ROBERTO SCIANCA 			
DATA: 10/01/2008			

Facsimile of the Manufacturer's Declaration - Attachment II B

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.**

WARRANTY CERTIFICATE

Whereas:

- **DONATI SOLLEVAMENTI S.r.l.** is the **Manufacturer** of the **"DGT" series Wheel Groups and endcarriages** illustrated in this technical manual.
- **DONATI SOLLEVAMENTI S.r.l.** carries out manufacturing controls in accordance with its company instituted **"Quality system,"** certified by **ICIM** as **No. 0114**, in compliance with the **UNI ISO 9001:2000** norm.

"DGT" series Wheel Groups and endcarriages are covered by the following warranty formula:

1. The warranty on these components extends to 36 months from delivery, as indicated by the date of the invoice, taking into consideration the specifications and exclusions cited herein and excepting different explicit agreements between the parties. This warranty is subordinate to the notification by registered mail, within 8 days of discovering faults or defects and recognizing their subsistence on the part of Donati Sollevamenti S.r.l.
2. The warranty covers exclusively parts which prove defective due to causes imputable to Donati Sollevamenti S.r.l., and comprises the replacement or repair of defective parts, with the exclusion of disassembly, assembly and shipping costs. Parts which Donati Sollevamenti S.r.l. recognizes as defective shall be shipped ex-works from the production facilities in Daverio (VA).
3. Regarding components provided by third parties (commercially available electrical and mechanical components) the warranty conditions which can be exercised towards their respective manufacturers and suppliers shall prevail.
4. Parts damaged during transport and handling operations shall remain excluded from the warranty, including parts subject to normal wear (e.g. brake friction seals) and/or deterioration caused by atmospheric and environmental agents. Excluded from this warranty are malfunctions deriving from, insufficient, incorrect or lack of maintenance, the inexperience of operating personnel, improper usage, non-authorized unforeseen usage, non-authorized modifications or repairs, mishandling and interventions on components carried out by non-qualified personnel or in defiance of the manufacturer's specifications.
5. The validity of the warranty is subordinate to correct installation, periodic controls and maintenance, as outlined in this operating "installation, usage and maintenance" manual, including diligent annotations in the "Control Registry" of all periodic maintenance interventions, controls, verifications and tests.
6. The replacement of defective parts does not entail the renewal of the warranty period on the entire machine. Donati Sollevamenti S.r.l. remains in all cases exempt of all liability or obligation of indemnity of any form, and the buyer agrees to forego any requests for expenses or damages, whether direct and/or indirect, even towards third parties, due to machine stoppages.
7. The warranty shall be considered void if non-original Donati spare parts and/or parts not approved by Donati are used.
8. The Court of Varese shall be the sole and exclusive place of jurisdiction for any legal claims and disputes which may arise.

DONATI SOLLEVAMENTI S.r.l.



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)
 - 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							
“DGT” wheels		“DGP” series swinging gear motors					
Size	Ø (mm)	“DGP” reducers size 0	“DGP” reducers size 1		“DGP” reducers size 2		“DGP” reducers size 3
1	125	Motors size 71	Motors size 71	Motors size 80	=		=
2	160				=		=
3	200	=	Motors size 71	Motors size 80	Motors size 80	Motors size 100	=
4	250	=					=
5	315	=	=		Motors size 80	Motors size 100	Motors size 112
6	400	=	=				
	400 R	=	=		=		

- 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.

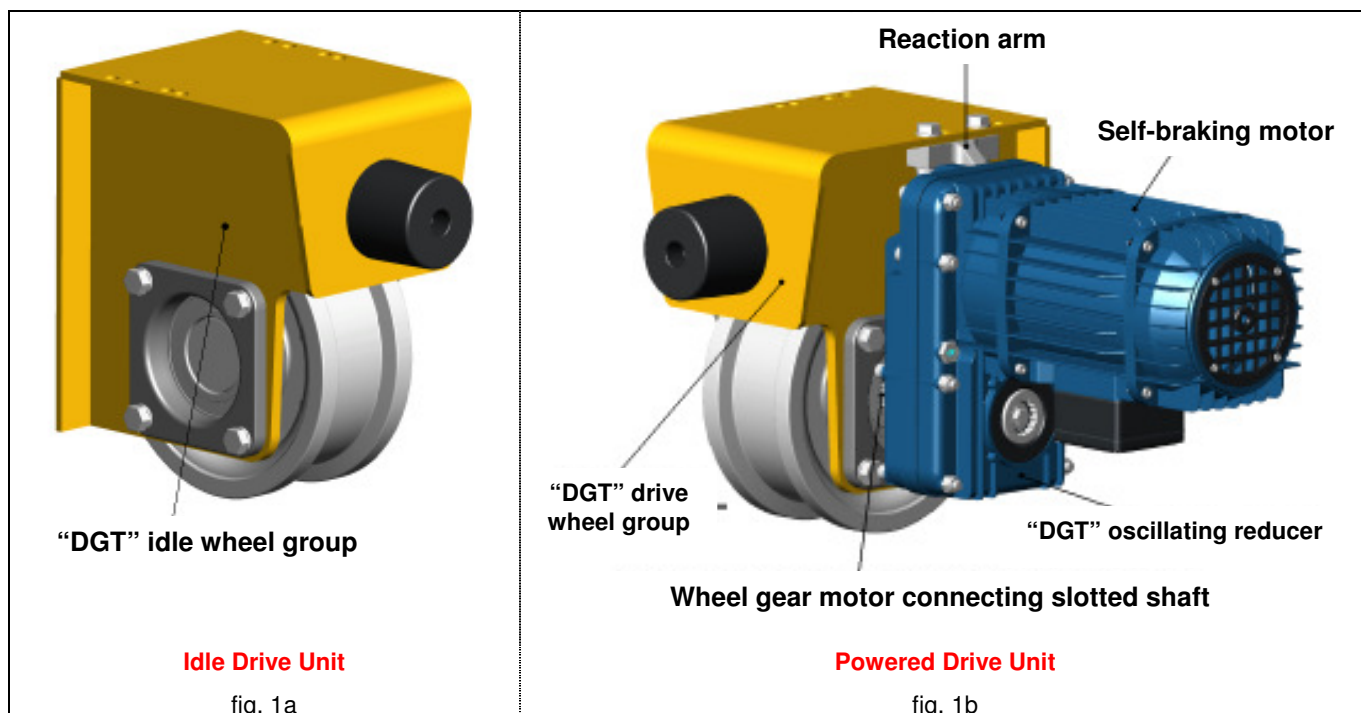
- **“DGP” series offset geared motors:**

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.



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 **endcarriages** 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 endcarriages

- 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																													
Endcarriage type			Span (m) on SINGLE GIRDER <input type="checkbox"/> or DOUBLE GIRDER <input type="checkbox"/> bridge crane.																										
“DGT” Size	Ø R mm	Wheel basis mm	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	D										M	D															
		3300															M	D											
2	160	1800	M																										
		2400	D										M	D															
		3300															M	D											
3	200	2100	M																										
		2700	D										M	D															
		3600																	M	D									
4	250	3600	M																										
		2700	M	D	D								M	D															
		3600																	M	D									
		3600 R																		M									
5	315	2400	M																										
		3900													D														
6	400	3900													D														
		400 R	3900 R																D										



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

- The **endcarriages for bridge cranes** are generally supplied in pairs, each beam girder comprising the following parts and components:
 - **Body framework in tubular construction**, or load bearing beam girder:
 - The load bearing structure, in a tubular construction, comprises two semi-frames built in special sectioned steel, joined together by a continuous seam welding process. The special profiled section of the semi-frames allows for easy assembly and maintenance of the bolted joints between the beam and girders.
 - The special construction design also allows for the passage of electrical cables.
 - Its closed body design avoids problems due to rusting and internal corrosion, thereby reducing costly maintenance and controls on the beam.
 - The bridge crane girders are securely assembled to the sliding beam structures by a system of high resistance traction bolts adopting a stress bearing pin system.
 - **Idle drive units** ("DGT" idle wheel group - fig. 1a);
 - see description at section 2.1
 - **Powered drive units** ("DGT" motor driven wheel group with "DGP" swinging gear motor - fig. 1b);
 - see description at section 2.1
 - **Cross plate connecting the endcarriages to the crane's beam** (on **Single girder** bridge cranes - pic. 2a)
 - **Cross plates connecting the endcarriages to the crane's beams** (on **Double girder** bridge cranes-pic. 2b)
 - Specially designed the plates connect the endcarriages to the girder/s on the bridge crane. Built in steel plating in different sizes, they are welded to the bridge crane girders, whether tubular or HE plated sectioned, with perforations for laterally joining or fastening to the travelling beam structures.
 - **Accessories** (limit strokes, drive arms, etc.)
 - The lengthwise limit switch on the travelling beams, when supplied, is a rotating type with a double cross-rod ensuring for two-speed cranes a dual function of pre-deceleration and stopping in both directions, and is housed on the DGT drive unit.
- The **endcarriages** are also easily integrated and combined with a variety of accessories, such as, for example: mechanical or electrical/electronic anti-collision systems, operating speed and stop position control systems, mechanical type limit stroke or cycle counter (worm screw limit), electrical systems (dynamo speed gauge), electronic systems (encoders), thereby guaranteeing cost efficient operation.

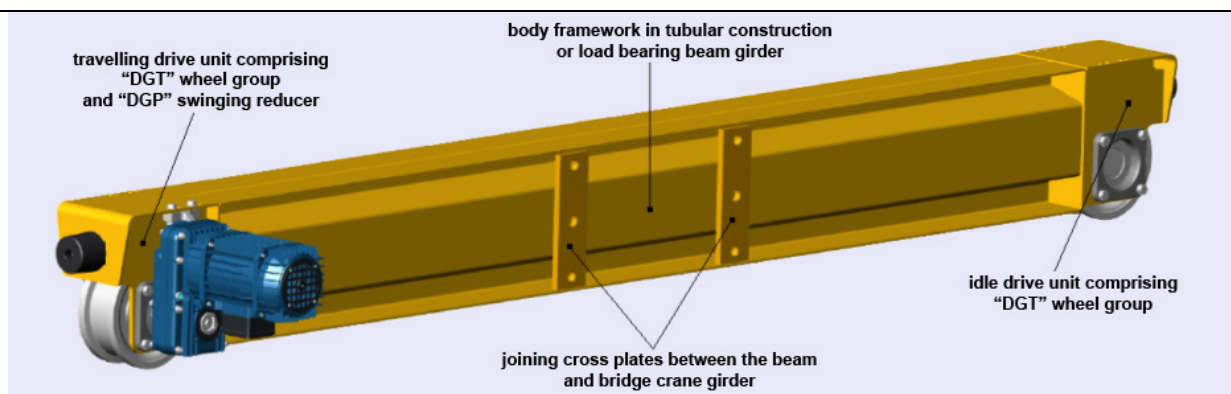


fig. 2a - endcarriage for SINGLE GIRDER bridge crane

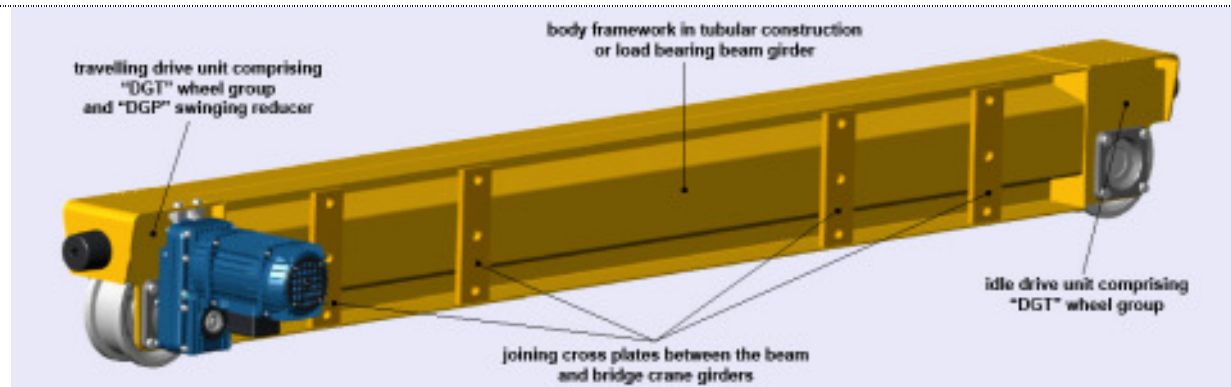


fig. 2b - endcarriage for DOUBLE GIRDER bridge crane

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 endcarriages for bridge cranes**:
 - EN ISO 12100 parts: 1st – 2nd /2005 “Fundamental concepts on general engineering principles”
 - EN 60529/92 “Degrees of protection for casings (IP Codes)”
 - ISO 4301/88 “Classifications for lifting equipment”
 - ISO 8306/88 “Tolerances for travelling girders”
 - UNI 7670/88 “Mechanisms for lifting equipment”
 - 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.

2.3.6 Classification of “DGT” series units

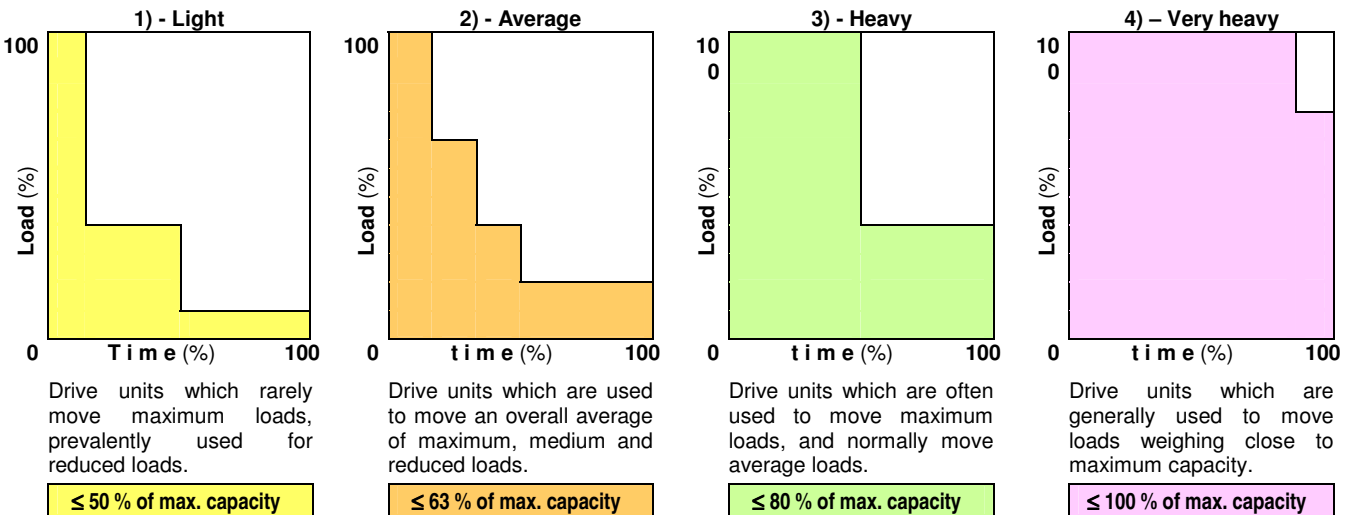
- The ISO 4301/88 and FEM 9.511/86 ordinances allow for the classification of the **service group** for the “DGT” **series Drive units** in relation to operating conditions, so as to guarantee their complete compliance to the working conditions they are subjected to.

- The parameters required for determining the operating limits of “DGT” **series Endcarriages** are:

A) the degree of mechanical stress

B) the average daily operating time

A) The degree of mechanical stress is evaluated taking into consideration the loads effectively being moved, falling into one of the four load capacity categories shown below, which determine the type of service.



B) Average daily running time (T_m = Hrs), determined as follows:

$$T_m \text{ (hrs)} = \frac{P_m \times C/h \times T_i}{30 \times V}$$

where:

- P_m** (m) is the average distance covered = L/2, i.e. the average of the travelling length L for the “DGT” Unit;
 - C/h** (No. of cycles per hour) is the number of complete strokes travelled (forward and reverse manouevres) covered in an hour;
 - T_i** (hours) is the time the sliding is employed during the course of a day;
 - V** (m/min) is the running speed, i.e. the space which can be covered by a “DGT” Unit in one minute.
- After having determined the **degree of mechanical stress** and the **average daily operating time** for the “DGT” **series Drives**, use the table below to classify the **Service Group** for related components.

Degree of mechanical stress			Average daily operating time - Tm (hrs)				
1) – Light load		≤ 50 % of max. capacity	≤ 4	≤ 8	≤ 16	> 16	–
2) – Average load		≤ 63 % of max. capacity	≤ 2	≤ 4	≤ 8	≤ 16	> 16
3) – Heavy load		≤ 80 % of max. capacity	≤ 1	≤ 2	≤ 4	≤ 8	≤ 16
4) – Very heavy load		≤ 100 % of max. capacity	≤ 0.5	≤ 1	≤ 2	≤ 4	≤ 8
Service group for mechanisms on “DGT” sliding units		according to ISO 4301/88	M4	M5	M6	M7	M8
		according to FEM .511/86	1Am	2m	3m	4m	5m
Intermittent use in compliance with regulation FEM 9.683/95	Intermittency ratio RI (%)		25	30	40	50	60
	No. of startups per hour (A/h)		150	180	240	300	> 360
	No. of cycles per hour (C/h)		25	30	40	50	> 60
Dual polarity 2-speed motors	No. of startups per hr (A/h)	Primary speed	1/3 (33.3 % of the total no. of startups per hour)				
		Slow speed	2/3 (66.7 % of the total no. of startups per hour)				
	Daily operating time (Tm)	Primary speed	2/3 (66.7 % of the average daily operating time)				
		Slow speed	1/3 (33.3 % of the average daily operating time)				

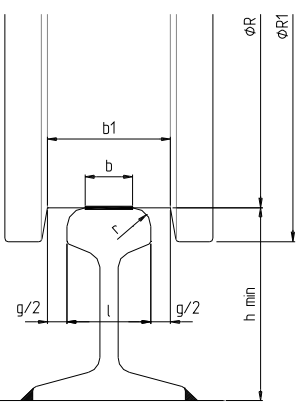
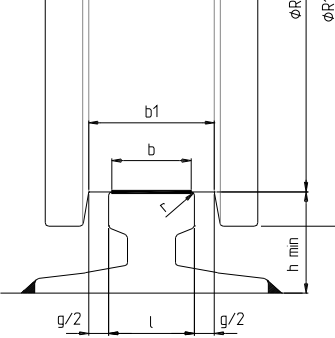
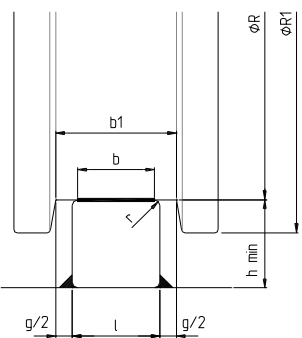






DONATI SOLLEVAMENTI S.r.l. guarantees the safe and long-lasting use of its “DGT” series Drive units only if they are employed in conformity with the parameters corresponding to the service group in which they are classified.

2.3.7 Operating limitations and technical specifications for “DGT” series Drive units

- For complete technical specifications on “DGT” series Drive units for cranes, in relation to their intended operation, check and match the parameters limiting the operation of the **wheel group** in combination with the “DGP” **swinging gear motors** and related **self-braking motors**, in relation to the following user specifications:
 - operating loads on the wheels
 - width and shape of the traversing rail
 - sliding speed
 - number of wheel groups and gear motors employed.

Specifications for sliding rails and maximum contact area

<div></div> <div>Square laminated rail UNI 6013 - DIN 1013 Flat laminated rail UNI 6014 - DIN 1017</div> <div>Burbak type rail - DIN 536</div> <div>Vignole type rail - UNI 3141</div>															
Wheel specifications				Rail (mm)			Type of runways rail and maximum operating contact surface - b (mm)								
Type  ØR (mm)	Max. Rx (kg)	Wheel internal width (mm)		width b (mm)		h (mm)	 Square laminated UNI 6013 - DIN 1013 Flat laminated UNI 6014 - DIN 1017		 Burbak - DIN 536			 Vignole - UNI 3141			
		type	b1	max.	min.		min.	l	b = l - 2r	type	l	b = l - 2r	type	l	b = l - 4/3r
125	3.670 36 kN	standard	50	40	35	30	40	38	=	=	=	=	=	=	
		maximum	60	50	45	30	50	48	A 45	45	37	21 - 27	50	34	
		special	70	60	55	30	60	58	A 55	55	45	36	60	44	
160	4.893 48 kN	standard	55	45	40	30	40	38	A 45	45	37	=	=	=	
		maximum	65	55	50	30	50	48	A 55	55	45	21 - 27	50	34	
		special	80	70	65	30	70	68	A 65	65	53	46 50	65 67	46 49	
200	7.340 72 kN	standard	60	50	45	30	50	48	A 45	45	37	21 - 27	50	34	
		maximum	70	60	55	30	60	58	A 55	55	45	30 36	56 60	40 44	
		special	90	80	75	30	80	78	A 75	75	59	60	72 ⁽¹⁾	55	
250	10.805 106 kN	standard	70	60	55	30	60	58	A 55	55	45	30 36	56 60	40 44	
		maximum	80	70	65	30	70	68	A 65	65	53	46 50	65 67	46 49	
		special	100	90	85	30	90	88	A 75	75 ([*])	59	=	=	=	
315	14.679 144 kN	standard	75	65	60	40	60	58	A 65	65	53	36 46	60 65	44 47	
		maximum	85	75	70	40	70	68	A 75	75	59	50 60	67 ⁽¹⁾ 72	48 55	
		special	110	100	95	40	100	98	A 100	100	80	=	=	=	
400	18.960 186 kN	standard	85	75	70	40	70	68	A 75	75	59	50 60	67 ⁽¹⁾ 72	48 55	
400 R	30.580 ⁽²⁾ 300 kN	maximum	95	85	80	40	80	78	=	=	=	=	=	=	
		special	115	100	95	40	100	98	A 100	100	80	=	=	=	

- The clearance between the internal width of the wheel and the maximum rail width must be contained within: slack ≥ 10 mm and ≤ 15 mm
- ⁽¹⁾ wheel with increased slack = 18 mm
- ⁽²⁾ theØ 400 R wheel is sized identical to the Ø 400 wheel but allows for a greater reaction since its is fitted with roller bearings
- Recommended rails appear in red, together with operating contact area values, verified in relation to maximum static reaction

Operating limits for wheels in relation to the rail's contact surface and the running speed

- The following diagrams (pages 15, 16 and 17) illustrate average **admissible** reactions **R med. [average R]** (expressed in kg) on **Drive unit wheels**, in relation to the speed and to the operating width "b" of the rail, as specified in the table on page 14.
- The correct choice of wheel is based on the average reaction – **R med. [average R]**, exercised on the wheel. This value is derived from the following equation:

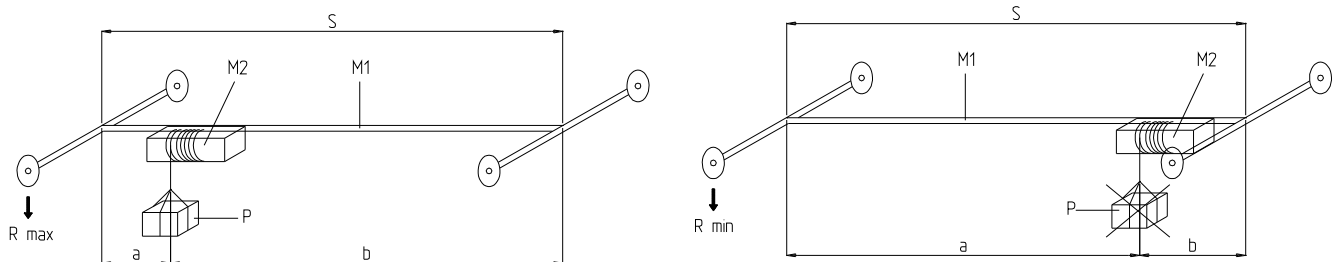
$$R \text{ med.} = \frac{2 \cdot R \text{ max.} + R \text{ min.}}{3}$$

where R max. is the most unfavourable load condition, equal to:

$$R \text{ max.} = \frac{M1}{4} + \left(\frac{M2 + P}{2} \right) \cdot \left(1 - \frac{a}{S} \right)$$

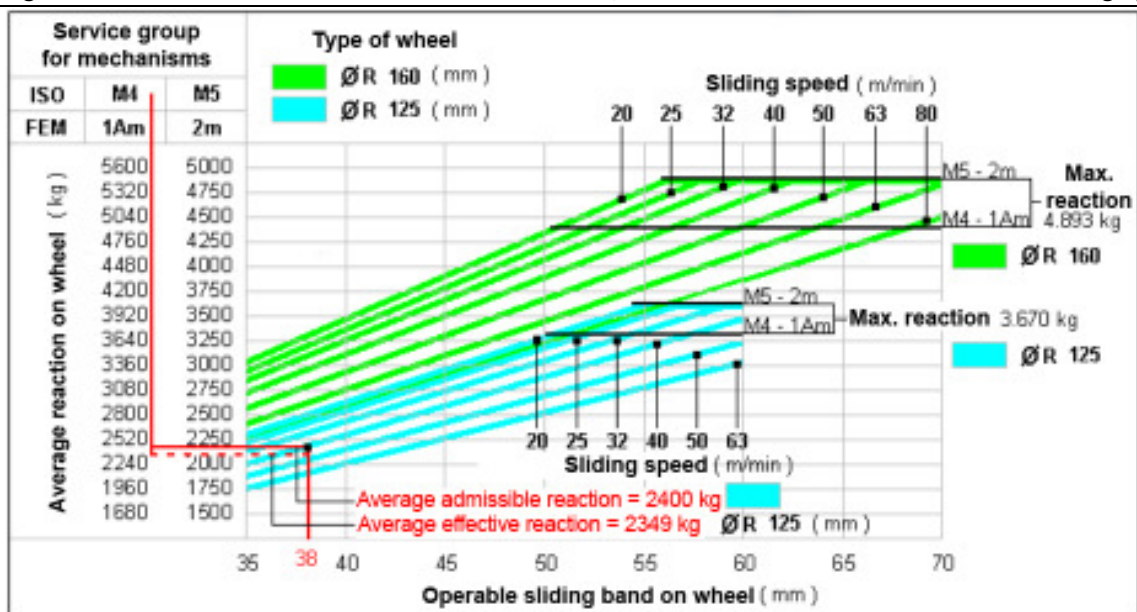
while the minimum reaction R min. is:

$$R \text{ min.} = \frac{M1}{4} + \frac{M2}{2} \cdot \frac{a}{S}$$



where:
M1 = crane mass, i.e. its proper weight, expressed in kg
M2 = hoist/trolley mass, i.e. their proper weight, expressed in kg
P = nominal crane capacity, expressed in kg

Average admissible reactions from wheels Ø 125 and 160, in relation to the rail width and the running speed



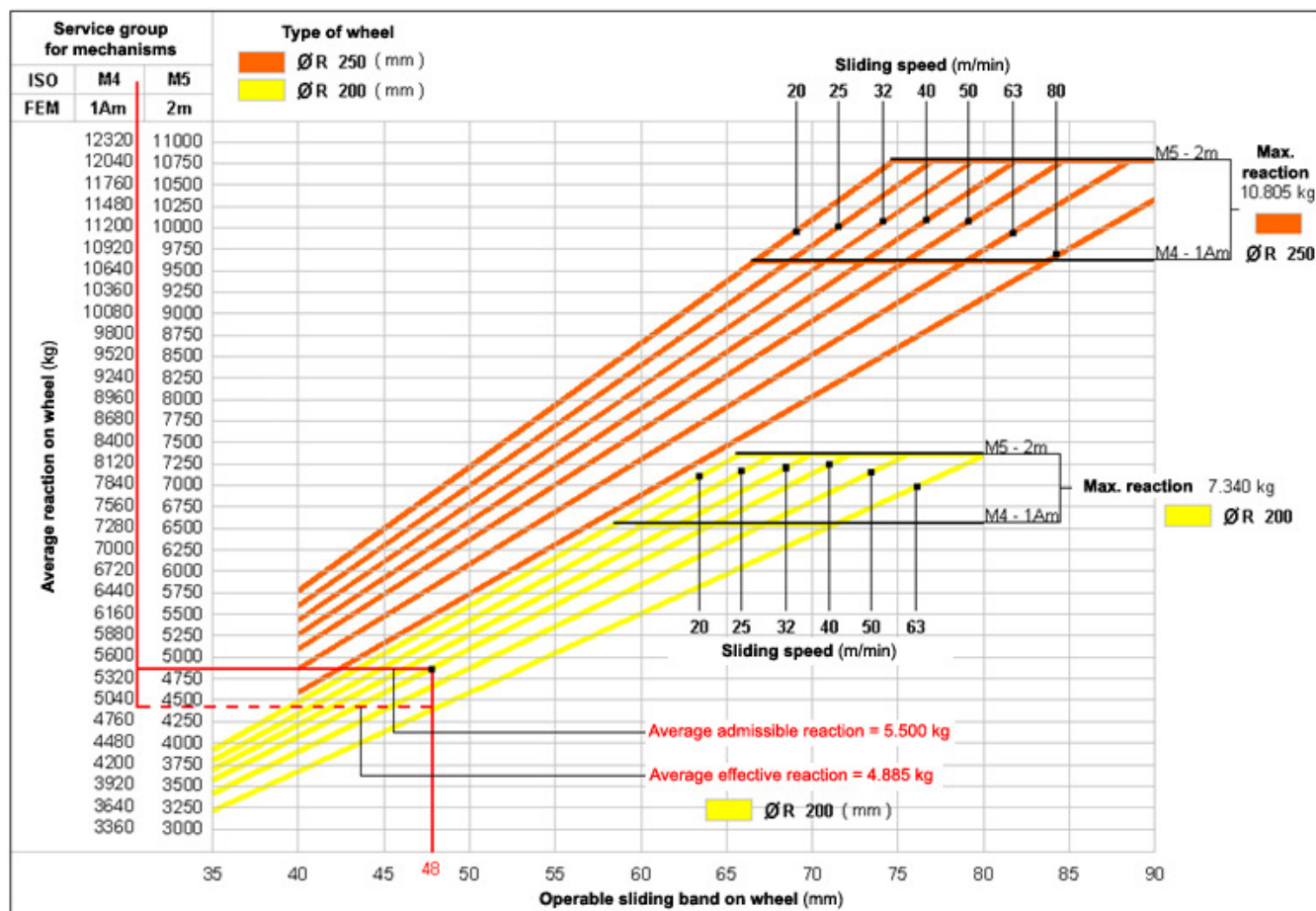
Example of verification of suitability for a Ø 125 wheel (see example 1 at page 38)

Data calculated:

- Rail operating width: $b = 38 \text{ mm}$
- Running speed: $40/10 \text{ m/min}$
- Service group: ISO M4 (FEM 1Am)
- Average effective reaction: $R \text{ ave.} = 2349 \text{ kg}$
- Maximum effective reaction: $R \text{ max. eff.} = 3203 \text{ kg}$

The average admissible reaction is $\approx 2400 \text{ kg}$ > than the average effective reaction of 2349 kg the wheel is subjected to;
 The maximum admissible reaction is $\approx 3670 \text{ kg}$ > than the maximum effective reaction of 3203 kg .

Average admissible reactions from wheels Ø 200 and 250, in relation to the operating width and travelling speed



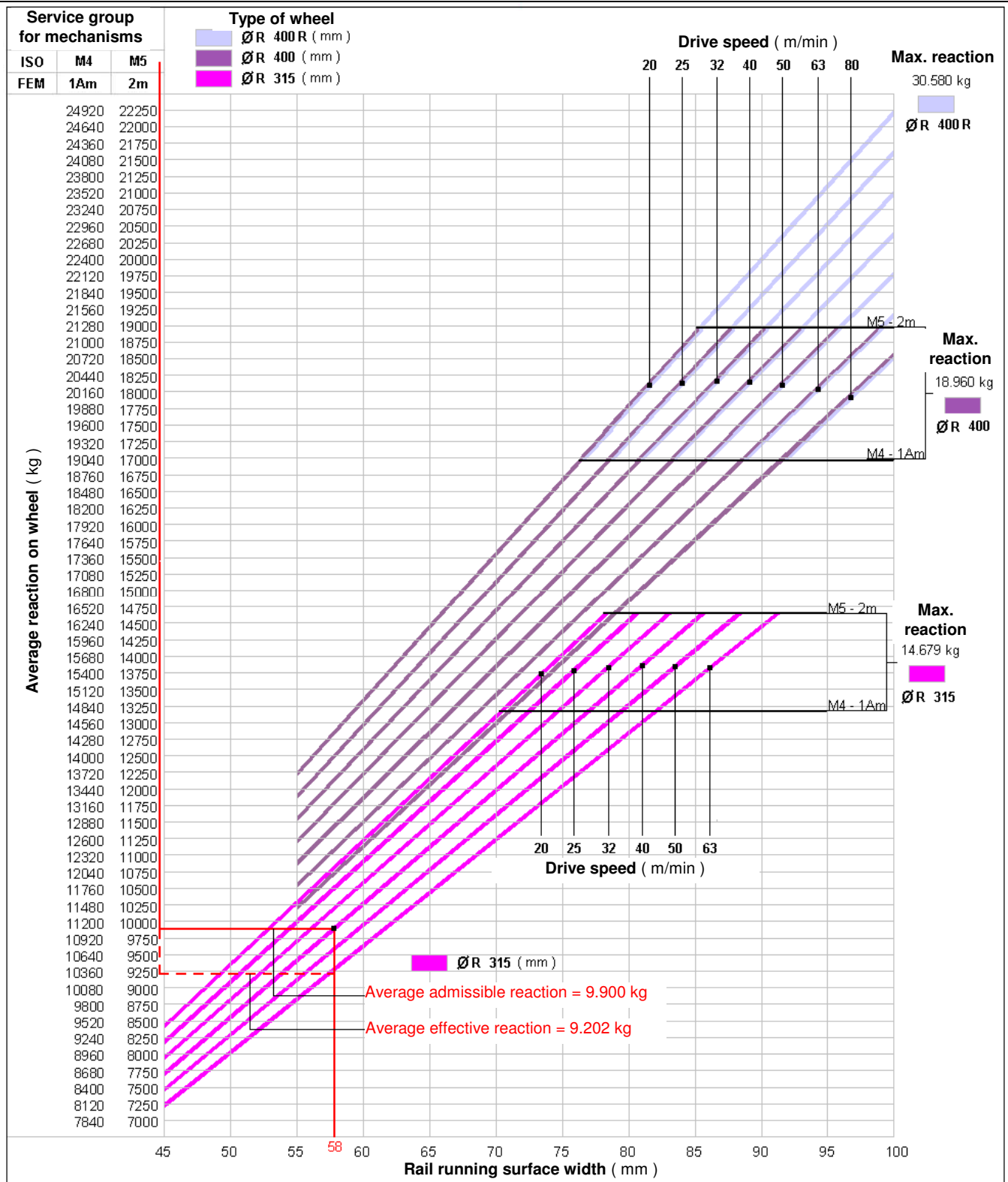
Example of verification of suitability for a Ø 200 wheel (see example 2 at page 39)

Data calculated:

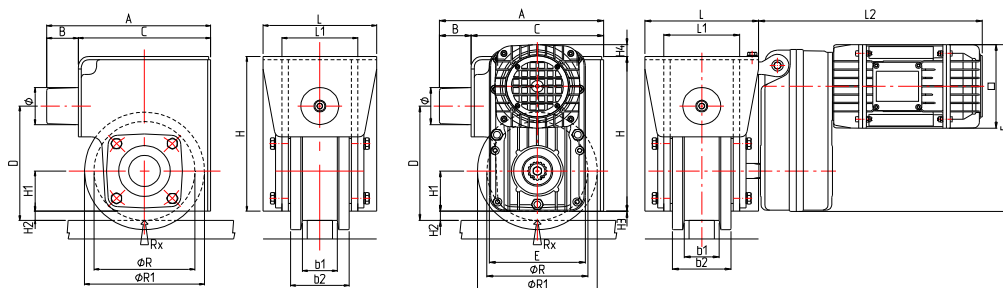
- Rail operating width: $b = 48 \text{ mm}$
- Running speed: $40/10 \text{ m/min}$
- Service group: ISO M4 (FEM 1Am)
- Average effective reaction: $R_{\text{ave.}} = 4885 \text{ kg}$
- Maximum effective reaction: $R_{\text{max. eff.}} = 6581 \text{ kg}$

The average admissible reaction is $\cong 5500 \text{ kg}$ > than the average effective reaction of 4885 kg the wheel is subjected to;
The maximum admissible reaction is $= 7340 \text{ kg}$ > than the maximum effective reaction of 6581 kg

Average admissible reactions from wheels Ø 315 and 400, in relation to the operating width and travelling speed



Dimensions and headroom of wheel drive groups based on combinations with the related motoreducers



Idle drive units

Drive powered units

Wheel specifications			Wheel group dimensions (mm)														Size		Motoreducers dimensions (mm)					
type Ø ØR (mm)	Max. Rx (kg)	Wheel internal width	b1	b2	L1	L	Ø R1	A	B	C	D	Ø	H	H1	H2	Reducer	Motor	L2	□	E	F	H3	H4	
125	3.670 36 kN	standard	50	80	100	160	150	200	30	170	145	50	220	55	7.5	0	71	325	135	138	223	0	3	
		maximum	60	1	71											355	135	152	270	0.5	9.5			
		special	70		90											110	1	80	375	150	152	278	0.5	7.5
160	4.893 48 kN	standard	55	93	120	180	190	260	50	210	185	60	250	65	15	0	71	325	135	138	223	0	17	
		maximum	65	1	71											355	135	152	270	0.5	9.5			
		special	80		105											130	1	80	375	150	152	278	0.5	7.5
200	7.340 72 kN	standard	60	100	135	200	230	325	65	260	230	80	290	75	25	1	71	345	135	152	270	0.5	10.5	
		maximum	70	1	80											365	150	152	278	0.5	2.5			
		special	90		120											145	2	80	390	150	227	357	0.6	41
250	10.805 106 kN	standard	70	110	149	230	280	375	65	310	275	80	335	90	35	1	71	345	135	152	270	4.5	40.5	
		maximum	80	1	80											365	150	152	278	4.5	32.5			
		special	100		135											165	2	80	390	150	227	357	1	11
315	14.679 144 kN	standard	75	120	159	260	350	470	80	390	335	100	385	105	52.5	2	80	360	150	227	357	4	24	
		maximum	85	2	10											405	190	227	376	4	5			
		special	110		150											180	3	11	500	225	265	456	5	56
400	18.960 186 kN	standard	85	135	170	290	440	570	100	470	385	125	440	145	55	2	80	355	150	227	357	14	39	
400 R	maximum	95	3	11	400											190	227	376	14	20				
	special	115		155	190											500	225	265	456	25	41			

- Quotas L2 in red refer to wheels operating with a "standard" and "maximum" sheave:
- For Ø 315 and Ø 400 wheels with a "special" sheave, the quota L2 increases by 10 mm, with respect to the values listed in the table

Types and reduction ratios for "DGP" offset reducers

"DGP" offset reducers		3 reduction stages (torques)				2 reduction stages (torques)			
Size 0	Type	031	032	033	034	021	022	023	024
	Reduction ratio	87.85	70.35	57.61	45.20	34.49	28.10	23.46	18.94
Size 1	Type	131	132	133	134	121	122	123	124
	Reduction ratio	89.45	69.98	56.35	44.35	35.10	28.87	22.77	18.50
Size 2	Type	231	232	233	234	221	222	223	224
	Reduction ratio	140.65	109.45	88.10	72.57	55.42	43.24	35.66	29.50
Size 3	Type	331	332	333	334				
	Reduction ratio	88.67	70.36	56.65	44.33				

- Determining the reducer type:
E.g. reducer 132, where:
 - 1 = reducer size 1
 - 3 = No. of reduction stages (torques)
 - 2 = reduction ratio 69.98

Specifications and codes for self-braking motors combinable with "DGP" offset gearboxes

Motor size	Type	Poles (no.)	Rpm (rpm)	Power (kW)	Torque (Nm)	Ia (A)	In (A)	cos φ	Motor code
71 M 20 series	71K8C	8	645	0.08	1.09	1.20	0.90	0.45	M20AP80050
	71K4CA	4	1370	0.16	1.09	2.20	0.80	0.55	M20AP40050
	71K4CB	4	1370	0.20	1.36	2.70	1.00	0.55	M20AP40051
	71K2CA	2	2740	0.32	1.09	3.60	1.00	0.75	M20AP20050
	71K2CB	2	2700	0.40	1.36	4.50	1.30	0.70	M20AP20051
	71K2L	2	2740	0.50	1.70	5.20	1.30	0.72	M20AP21050
	71K3C	2/8	2760/650	0.32/0.07	1.09	3.60/1.10	1.00/0.80	0.70/0.55	M20AP30050
80 M 30 series	71K3L	2/8	2760/630	0.40/0.09	1.36	4.40/1.20	1.20/0.90	0.75/0.60	M20AP30051
	80K8C	8	660	0.12	1.70	2.00	1.20	0.45	M30AP80050
	80K8L	8	630	0.16	2.18	2.20	1.30	0.48	M30AP80051
	80K4CA	4	1360	0.25	1.70	3.10	0.90	0.65	M30AP40050
	80K4CB	4	1370	0.32	2.18	3.90	1.10	0.65	M30AP40051
	80K2CA	2	2740	0.50	1.70	5.80	1.30	0.80	M30AP20050
	80K2CB	2	2750	0.63	2.18	7.70	1.70	0.75	M30AP20051
	80K2L	2	2770	0.80	2.73	9.70	1.90	0.80	M30AP21050
100 M 50 series	80K3C	2/8	2740/650	0.50/0.12	1.70	5.20/1.60	1.30/1.10	0.85/0.60	M30AP30050
	80K3L	2/8	2760/650	0.63/0.15	2.18	6.70/1.90	1.60/1.30	0.82/0.57	M30AP30051
	100K8C	8	680	0.32	4.36	4.60	1.7	0.50	M50AP80050
	100K8L	8	670	0.40	5.46	5.40	2.50	0.45	M50AP80051
	100K4CA	4	1390	0.63	4.36	8.50	1.70	0.70	M50AP40050
	100K4CB	4	1390	0.80	5.46	8.90	2.00	0.80	M50AP40051
	100K2CA	2	2820	1.25	4.36	16.50	2.90	0.83	M50AP20050
	100K2CB	2	2800	1.60	5.46	21.00	3.70	0.80	M50AP20051
112 M 60 series	100K2L	2	2780	2.00	6.82	23.00	4.30	0.86	M50AP21050
	100K3C	2/8	2820/680	1.25/0.31	4.36	15.70/3.60	3.10/1.80	0.84/0.60	M50AP30050
	100K3L	2/8	2790/660	1.60/0.39	5.46	21.00/4.00	3.50/2.30	0.86/0.60	M50AP30051
	112K8L	8	690	0.63	8.72	8.60	3.40	0.50	M60AP80050
	112K4C	4	1430	1.25	8.72	20.50	3.60	0.65	M60AP40050
	112K2L	2	2800	3.20	10.92	39.00	6.50	0.88	M60AP21050
	112K3L	2/8	2850/690	2.50/0.62	8.72	33.00/7.30	5.60/3.40	0.85/0.50	M60AP30050

Specifications for self-braking motors are related to the M4 service group (1 Am) – RI 40% – Power voltage 400 V

Codes for "DGT" drive wheel groups ready for matching with "DGP" offset gearboxes

"DGP" offset reducers	Gruppo ruota motrice "DGT" Ø (mm)						
	125	160	200	250	315	400	400 R
size 0	DGT1A0M10	DGT2A0M10	=	=	=	=	=
size 1	DGT1A0M30	DGT2A0M30	DGT3A0M10	DGT4A0M10	=	=	=
size 2	=	=	DGT3A0M30	DGT4A0M30	DGT5A0M10 (r) DGT5A0M20 (l)	DGT6A0M10 (r) DGT6A0M20 (l)	DGT6A0M60 (r) DGT6A0M70 (l)
size 3	=	=	=	=	DGT5A0M30 (r) DGT5A0M40 (l)	DGT6A0M30 (r) DGT6A0M40 (l)	DGT6A0M80 (r) DGT6A0M90 (l)

- The configuration (r) = right and (l) = left, for wheel groups Ø 315 and Ø 400 refers to the positioning of the welded reaction arm
- The codes refer to drive wheels with a standard sheave width. In the case of wheels with different sheave widths, replace the letter **M** in the code with the letter **P** for wheels with a maximum sheave width, or **S** for wheels with a special sheave width

Max. weights for "DGT" drive wheel groups coupled with "DGP" offset gearboxes

"DGT" drive wheel group Ø (mm)		125	160	200	250	315	400	400 R
"DGP" offset gearmotors	"DGP" reducers size 0	max. 32 kg	max. 40 kg	=	=	=	=	=
	"DGP" motors size 71	max. 36 kg	max. 44 kg	max. 54 kg	max. 73 kg	=	=	=
	"DGP" motors size 80	max. 38 kg	max. 48 kg	max. 58 kg	max. 75 kg	=	=	=
	"DGP" reducers size 2	=	=	max. 75 kg	max. 94 kg	max. 125 kg	max. 197 kg	max. 197 kg
	"DGP" motors size 100	=	=	max. 83 kg	max. 102 kg	max. 133 kg	max. 205 kg	max. 205 kg
	"DGP" reducers size 3	=	=	=	=	max. 172 kg	max. 236 kg	max. 236 kg

Partnumbers and weights for "DGT" idle wheel groups

"DGT" idle wheel group Ø (mm)	125	160	200	250	315	400	400 R
Partnumber	DGT1A0M00	DGT2A0M00	DGT3A0M00	DGT4A0M00	DGT5A0M00	DGT6A0M00	DGT6A0M50
Weight (kg)	15.5	23.5	37.5	57.0	88.0	152.0	152.0

The partnumbers refer to idle wheels with a standard sheave width. In the case of wheels with different sheave widths, replace the letter **M** in the partnumber with the letter **P** for wheels with a maximum sheave width, or **S** for wheels with a special sheave width

Travelling masses at 1 speed, based on the combination of components

Nominal speed (m/min)	Travelling mass (kg)		“DGT” wheel		“DGP” motoreducer		Self-braking motor specifications		Partnumbers for components	
	ISO service group (FEM)		group Ø (mm)	Reducer Type	Motor Type	Poles (N°)	Power (kW)	“DGT” drive wheel group	“DGP” motoreducer	
	M4 (1Am)	M5 (2m)								
3.2	7.400	7.400	125	031	71K8C	8	0.08	DGT1A0M10	P0M2B18AA0	
	14.700	14.700	200	231	80K8C	8	0.12	DGT3A0M30	P2M3B18AA0	
4	7.400	7.400	125	032	71K8C	8	0.08	DGT1A0M10	P0M2B28AA0	
	9.800	8.000	160	031	71K8C	8	0.08	DGT2A0M10	P0M2B18AA0	
	14.700	14.700	200	232	80K8C	8	0.12	DGT3A0M30	P2M3B28AA0	
	20.800	16.600	80K8C		8	0.12	DGT4A0M30	P2M3B18KA0		
	21.600	21.600	250	80K8L	8	0.16				
5	6.700	5.360	125	033	71K8C	8	0.08	DGT1A0M10	P0M2B38AA0	
	7.400	7.400		133	80K8C	8	0.12	DGT1A0M30	P1M3B38AA0	
	8.000	6.400	160	032	71K8C	8	0.08	DGT2A0M10	P0M2B28AA0	
	9.800	9.800		132	80K8C	8	0.12	DGT2A0M30	P1M3B28AA0	
	9.600	7.600	200	131	71K8C	8	0.08	DGT3A0M10	P1M2B18AA0	
	14.400	11.500			80K8C	8	0.12		P1M3B18AA0	
	14.700	14.700			80K8L	8	0.16		P1M3B18KA0	
	16.800	13.400			80K8C	8	0.12		P2M3B28AA0	
	21.600	18.000	250	232	80K8L	8	0.16	DGT4A0M30	P2M3B28KA0	
	21.600	21.600			100K8C	8	0.32		P2M5B28AA0	
	18.400	14.700	315	231	80K8C	8	0.12	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B18AA0	
	23.300	18.600			80K8L	8	0.16		P2M3B18KA0	
	29.400	29.400			100K8C	8	0.32		P2M5B18AA0	
	6.3	7.400	7.400	125	031	71K4CA	4	0.16	DGT1A0M10	P0M2B14AA0
6.400		5.100	160	033	71K8C	8	0.08	DGT2A0M10	P0M2B38AA0	
9.800		8.000		133	80K8C	8	0.12	DGT2A0M30	P1M3B18AA0	
14.700		14.700	200	231	80K4CA	4	0.25	DGT3A0M30	P2M3B14AA0	
9.000		7.200	250	131	71K8C	8	0.08	DGT4A0M10	P1M2B18AA0	
13.500		10.800			80K8C	8	0.12		P1M3B18AA0	
18.000		14.400			80K8L	8	0.16		P1M3B18KA0	
21.600		21.600			100K8C	8	0.32		P2M5B38AA0	
14.600		11.700	315	232	80K8C	8	0.12	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B28AA0	
18.600		14.900			80K8L	8	0.16		P2M3B28KA0	
29.400		29.400			100K8C	8	0.32		P2M5B28AA0	
20.800		16.600			400	231	80K8L		8	0.16
41.400		33.100	100K8C	8			0.32	DGT6A0M20 (l)	P2M5B18AA0	
41.400		33.100	400 R	231	100K8C	8	0.32	DGT6A0M60 (r)	P2M5B18AA0	
51.700		41.400			100k8L	8	0.40	DGT6A0M70 (l)	P2M5B18KA0	
8	7.400	6.658	125	032	71K4CA	4	0.16	DGT1A0M10	P0M2B24AA0	
	9.800	8.000	160	031	71K4CA	4	0.16	DGT2A0M10	P0M2B14AA0	
	9.800	9.800		131	71K4CB	4	0.20	DGT2A0M30	P1M2B14KA0	
	6.000	4.800	200	133	71K8C	8	0.08	DGT3A0M10	P1M2B38AA0	
	9.400	7.500			80K8C	8	0.12		P1M3B38AA0	
	12.000	9.600			80K8L	8	0.16		P1M3B38KA0	
	14.700	14.700			80K4CA	4	0.25		DGT3A0M30	P2M3B24AA0
	10.400	8.300	250	132	80K8C	8	0.12	DGT4A0M10	P1M3B28AA0	
	13.800	11.000			80K8L	8	0.16		P1M3B28KA0	
	21.600	17.200			80K4CA	4	0.25		DGT4A0M30	P2M3B14AA0
	21.600	21.600			80K4CB	4	0.32			P2M3B14KA0
	14.600	11.700	315	233	80K8L	8	0.16	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B38KA0	
	29.200	23.400			100K8C	8	0.32		P2M5B38AA0	
	29.400	29.400			100K8L	8	0.40		P2M5B38KA0	
	16.300	13.000			80K8L	8	0.16		DGT6A0M10 (r) DGT6A0M20 (l)	P2M3B28KA0
	32.600	26.000	100K8C	8	0.32	P2M5B28AA0				
	41.400	33.100	100K8L	8	0.40	P2M5B28KA0				
	32.600	=	400 R	232	100K8C	8	0.32	DGT6A0M60 (r)		P2M5B28AA0
	41.400	33.100			100K8L	8	0.40	DGT6A0M70 (l)	P2M5B28KA0	

- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's operating width (b), the average reaction (R med.) is compatible with values listed in the diagram at pages 15, 16 and 17.
- The values for travelling mass in red require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

Ø 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	Ø 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	Ø 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	Ø 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	Ø 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	Ø 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	Ø 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---


Travelling masses at 1 speed, based on the combination of components

Nominal speed (m/min)	Travelling mass (kg)		“DGT” wheel group Ø (mm)	“DGP” motoreducer		Self-braking motor specifications		Partnumbers for components		
	ISO service group (FEM)			Reducer Type	Motor Type	Poles (N°)	Power (kW)	“DGT” drive wheel group	“DGP” garmotor	
	M4 (1Am)	M5 (2m)								
10	6.700	5.360	125	033	71K4CA	4	0.16	DGT1A0M10	P0M2B34AA0	
	7.400	6.720			71K4CB	4	0.20		P0M2B34KA0	
	8.000	6.400	160	032	71K4CA	4	0.16	DGT2A0M10	P0M2B24AA0	
	9.800	8.000		71K4CB	4	0.20	P0M2B24KA0			
	9.800	9.800		132	80K4CA	4	0.25	DGT2A0M30	P1M3B24AA0	
	9.600	7.600	200	131	71K4CA	4	0.16	DGT3A0M10	P1M2B14AA0	
	12.000	9.600			71K4CB	4	0.20		P1M2B14KA0	
	14.700	12.200			80K4CA	4	0.25		P1M3B14AA0	
	14.700	14.700			80K4CB	4	0.32		P1M3B14KA0	
	11.200	8.900	250	133	80K8L	8	0.16	DGT4A0M10	P1M3B38KA0	
	17.200	13.700		80K4CA	4	0.25	DGT4A0M30	P2M3B24AA0		
	21.600	18.000	232	80K4CB	4	0.32		P2M3B24KA0		
	21.600	21.600		100K4CA	4	0.63	P2M5B24AA0			
	18.500	14.800	315	231	80K4CA	4	0.25	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B14AA0	
	23.300	18.600			80K4CB	4	0.32		P2M3B14KA0	
	29.400	29.400			100K4CB	4	0.63	P2M5B14AA0		
	26.000	20.800			233	100K8C	8	0.32	DGT6A0M10 (r)	P2M5B38AA0
	33.100	26.500	100K8L	8		0.40	DGT6A0M20 (l)	P2M5B38KA0		
	42.800	41.300	400	331	112K8L	8	0.63	DGT6A0M30 (r) DGT6A0M40 (l)	P3M6B18AA0	
	33.100	=		400 R	233	100K8L	8	0.40	DGT6A0M60 (r) DGT6A0M70 (l)	P2M5B38KA0
	51.600	41.300				331	112K8L	8	0.63	DGT6A0M80 (r) DGT6A0M90 (l)
12.5	7.400	7.400	125	031	71K2CA	2	0.32	DGT1A0M10	P0M2B12AA0	
	6.400	5.100	160	033	71K4CA	4	0.16	DGT2A0M10	P0M2B34AA0	
	8.000	6.400			71K4CB	4	0.20		P0M2B34KA0	
	9.800	8.000		133	80K4CA	4	0.25	DGT2A0M30	P1M3B34AA0	
	9.800	9.800	80K4CB		4	0.32	P1M3B34KA0			
	7.600	6.000	200	132	71K4CA	4	0.16	DGT3A0M10	P1M2B24AA0	
	9.600	7.600			71K4CB	4	0.20		P1M2B24KA0	
	12.000	9.600			80K4CA	4	0.25		P1M3B24AA0	
	14.700	12.200			80K4CB	4	0.32		P1M3B24KA0	
	14.700	14.700	231	80K2CA	2	0.50	DGT3A0M30	P2M3B12AA0		
	11.200	9.000		71K4CB	4	0.20		DGT4A0M10	P1M2B14KA0	
	14.000	11.200	250	131	80K4CA	4	0.25		P1M3B14AA0	
	18.000	14.400			80K4CB	4	0.32	P1M3B14KA0		
	21.600	21.600	315	233	100K4CA	4	0.63	DGT4A0M30	P2M5B34AA0	
	14.800	11.900			80K4CA	4	0.25	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B24AA0	
	18.600	14.900			80K4CB	4	0.32		P2M3B24KA0	
	29.400	29.400			100K4CA	4	0.63	P2M5B24AA0		
	20.800	16.600	400	231	80K4CB	4	0.32	DGT6A0M10 (r)	P2M3B14KA0	
	41.400	33.100			100K4CA	4	0.63	DGT6A0M20 (l)	P2M5B14AA0	
	41.400	33.100	400 R	231	100K4CA	4	0.63	DGT6A0M60 (r)	P2M5B14AA0	
	52.600	42.100			100K4CB	4	0.80	DGT6A0M70 (l)	P2M5B14KA0	
16	7.400	6.656	125	032	71K2CA	2	0.32	DGT1A0M10	P0M2B22AA0	
	9.800	8.000	160	031	71K2CA	2	0.32	DGT2A0M10	P0M2B12AA0	
	9.800	9.800			71K2CB	2	0.40		P1M2B12KA0	
	6.000	4.800		200	133	71K4CA	4	0.16	DGT3A0M10	P1M2B34AA0
	7.500	6.000	71K4CB			4	0.20	P1M2B34KA0		
	9.400	7.500	80K4CA			4	0.25	P1M3B34AA0		
	12.000	9.600	80K4CB			4	0.32	P1M3B34KA0		
	14.700	14.700	232	80K2CA	2	0.50	DGT3A0M30	P2M3B22AA0		
	10.800	8.600		80K4CA	4	0.25		DGT4A0M10	P1M3B24AA0	
	13.800	11.000	250	132	80K4CB	4	0.32		P1M3B24KA0	
	21.600	17.200			231	80K2CA	2	0.50	DGT4A0M30	P2M3B12AA0
	21.600	21.600	80K2CB	2		0.63	P2M3B12KA0			
	14.600	11.600	315	233	80K4CB	4	0.32	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B34KA0	
	28.900	23.100			100K4CA	4	0.63		P2M5B34AA0	
	29.400	29.400			100K4CB	4	0.80		P2M5B34KA0	
	16.300	13.000	400	232	80K4CB	4	0.32	DGT6A0M10 (r) DGT6A0M20 (l)	P2M3B24KA0	
	32.300	25.800			100K4CA	4	0.63		P2M5B24AA0	
	41.400	33.100			100K4CB	4	0.80		P2M5B24KA0	
	32.300	=	400 R	232	100K4CA	4	0.63	DGT6A0M60 (r) DGT6A0M70 (l)	P2M5B24AA0	
	41.400	33.100			100K4CB	4	0.80		P2M5B24KA0	








- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's contact surface(b), the average reaction (R med.) is compatible with the values listed in diagram at pages 15, 16, 17.
- The values for travelling mass in red require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

Ø 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	Ø 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	Ø 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	Ø 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	Ø 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	Ø 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	Ø 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---

Travelling masses at 1 speed, based on the combination of components

Nominal speed (m/min)	Travelling mass (kg)		“DGT” wheel group  (mm)	“DGP” motoreducer		Self-braking motor specifications		Partnumbers for components	
	ISO service group (FEM)			Reducer Type	Motor Type	Poles (N°)	Power (kW)	“DGT” drive wheel group	“DGP” motoreducer
20	6.720	5.376	125	033	71K2CA	2	0.32	DGT1A0M10	P0M2B32AA0
	7.400	6.720			71K2CB	2	0.40		P0M2B32KA0
	8.000	6.400			71K2CA	2	0.32		P0M2B22AA0
	9.800	8.000	160	032	71K2CB	2	0.40	DGT2A0M10	P0M2B22KA0
	9.800	9.800			71K2L	2 by inverter	0.50		P1M2B21KA0
	9.600	7.600			71K2CA	2	0.32	DGT3A0M10	P1M2B12AA0
	12.000	9.600	200	131	71K2CB	2	0.40		P1M2B12KA0
	14.700	12.200			71K2L	2 by inverter	0.50		P1M2B11KA0
	14.700	14.700			80K2CB	2	0.63		P1M3B12KA0
	11.200	8.900			80K4CB	4	0.32		P1M3B34KA0
	17.200	13.700	250	232	80K2CA	2	0.50	DGT4A0M30	P2M3B22AA0
	21.600	17.200			80K2CB	2	0.63		P2M3B22KA0
	21.600	21.600			80K2L	2 by inverter	0.80		P2M3B21KA0
	18.500	14.800	315	231	80K2CA	2	0.50	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B12AA0
	23.300	18.600			80K2CB	2	0.63		P2M3B12KA0
	29.400	23.700			80K2L	2 by inverter	0.80		P2M3B11KA0
	29.400	29.400			100K2CA	2	1.25		P2M5B12AA0
	25.800	20.600	400	233	100K4CA	4	0.63	DGT6A0M10 (r) DGT6A0M20 (l)	P2M5B34AA0
	33.100	26.500			100K4CB	4	0.80		P2M5B34KA0
	42.800	41.300		331	112K4C	4	1.25	DGT6A0M30 (r) DGT6A0M40 (l)	P3M6B14AA0
	33.100	26.500	400 R	233	100K4CB	4	0.80	DGT6A0M60 (r) DGT6A0M70 (l)	P2M5B34KA0
	51 700	41 300			112K4C	4	1.25	DGT6A0M80 (r) DGT6A0M90 (l)	P3M6B14AA0
25	5.360	4.288	125	034	71K2CA	2	0.32	DGT1A0M10	P0M2B42AA0
	6.700	5.360			71K2CB	2	0.40		P0M2B42KA0
	7.400	6.700			71K2L	2 by inverter	0.50		P0M2B41KA0
	7.400	6.700	160	033	80K2CA	2	0.50	DGT1A0M30	P1M3B42AA0
	6.400	5.100			71K2CA	2	0.32		P0M2B32AA0
	8.000	6.400			71K2CB	2	0.40		P0M2B32KA0
	9.800	8.000	200	133	71K2L	2 by inverter	0.50	DGT2A0M10	P0M2B31KA0
	9.800	9.800			80K2CB	2	0.63		P1M3B32KA0
	7.600	6.100			71K2CA	2	0.32	DGT3A0M10	P1M2B22AA0
	9.600	7.600	250	132	71K2CB	2	0.40		P1M2B22KA0
	12.000	9.600			71K2L	2 by inverter	0.50		P1M2B21KA0
	12.000	9.600			80K2CA	2	0.50		P1M3B22AA0
	14.700	12.000			80K2CB	2	0.63		P1M3B22KA0
	14.700	14.700	315	232	80K2L	2 by inverter	0.80	DGT4A0M10	P1M3B21KA0
	9.000	7.200			71K2CA	2	0.32		P1M2B12AA0
	11.200	8.900			71K2CB	2	0.40		P1M2B12KA0
	13.800	11.000	400	233	71K2L	2 by inverter	0.50	DGT5A0M10 (r) DGT5A0M20 (l)	P1M2B11KA0
	17.200	13.800			80K2CB	2	0.63		P1M3B12KA0
	21.600	17.200			100K2CA	2	1.25		P2M5B32AA0
	21.600	21.600	400 R	231	100K2CB	2	1.60	DGT4A0M30	P2M5B32KA0
	14.800	11.900			80K2CA	2	0.50		P2M3B22AA0
	18.600	14.900			80K2CB	2	0.63		P2M3B22KA0
	23.700	18.900	400 R	231	80K2L	2 by inverter	0.80	DGT6A0M10 DGT6A0M20	P2M3B21KA0
	29.400	29.400			100K2CA	2	1.25		P2M5B22AA0
	16.500	13.200			80K2CA	2	0.50		P2M3B12AA0
	20.800	16.600	400 R	231	80K2CB	2	0.63	DGT6A0M60 (r) DGT6A0M70 (l)	P2M3B12KA0
	26.500	21.200			80K2L	2 by inverter	0.80		P2M3B11KA0
	41.400	33.100			100K2CA	2	1.25		P2M5B12AA0
	41.400	33.100	400 R	231	100K2CA	2	1.25	DGT6A0M60 (r) DGT6A0M70 (l)	P2M5B12AA0
	53 000	42 400			100K2CB	2	1.60		P2M5B12KA0
	66 200	53 000			100K2L	2 by inverter	2.00		P2M5B11KA0

- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's contact surface(b), the average reaction (R med.) is compatible with the values listed in diagram at pages 15, 16, 17.
- The values for travelling mass in **red** require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---

Travelling masses at 2 speeds, based on the combination of components

Nominal speed (m/min)	Travelling mass (kg)		"DGT" wheel group Ø (mm)	"DGP" motoreducer		Self-braking motor specifications		Partnumbers for components	
	ISO service group (FEM)			Reducer Type	Motor Type	Poles (N°)	Power (kW)	"DGT" drive wheel group	"DGP" motoreducer
12.5/3.2	7.400	7.400	125	031	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2B13AA0
	7.400	7.400			71K2L	2 by inverter	0.50		P0M2B11KA0
	14.700	14.700	200	231	80K3C	2/8	0.50/0.12	DGT3A0M30	P2M3B13AA0
16/4	7.400	6.656	125	032	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2B23AA0
	7.400	6.656			71K2L	2 by inverter	0.50		P0M2B21KA0
	9.800	8.000	160	031	71K3C	2/8	0.32/0.07	DGT2A0M10	P0M2B13AA0
	9.800	8.000		131	71K3L	2/8	0.40/0.09	DGT2A0M30	P1M2B13KA0
	14.700	14.700	200	232	80K3C	2/8	0.50/0.12	DGT3A0M30	P2M3B23AA0
	21.600	17.200	250	231	80K3C	2/8	0.50/0.12	DGT4A0M30	P2M3B13AA0
20/5	21.600	21.600			80K3L	2/8	0.63/0.15		P2M3B13KA0
	6.720	5.376	125	033	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2B33AA0
	7.400	6.720			71K3L	2/8	0.40/0.09		P0M2B33KA0
	7.400	6.720			71K2L	2 by inverter	0.50		P0M2B31KA0
	8.000	6.400	160	032	71K3C	2/8	0.32/0.07	DGT2A0M10	P0M2B23AA0
	9.800	8.000			71K3L	2/8	0.40/0.09		P0M2B23KA0
	9.800	8.000		132	71K2L	2 by inverter	0.50	DGT2A0M30	P1M2B21KA0
	9.600	7.600			71K3C	2/8	0.32/0.07		P1M2B13AA0
	12.000	9.600			71K3L	2/8	0.40/0.09		P1M2B13KA0
	14.700	12.000	200	131	71K2L	2 by inverter	0.50	DGT3A0M10	P1M2B11KA0
	14.700	12.000			80K3C	2/8	0.50/0.12		P1M3B13AA0
	14.700	14.700			80K3L	2/8	0.63/0.15		P1M3B13KA0
	17.200	13.700			80K3C	2/8	0.50/0.12		P2M3B23AA0
	21.600	17.200	250	232	80K3L	2/8	0.63/0.15	DGT4A0M30	P2M3B23KA0
	21.600	21.600			80K2L	2 by inverter	0.80		P2M3B21KA0
	18.500	14.800			80K3C	2/8	0.50/0.12		P2M3B13AA0
	23.300	18.600	315	231	80K3L	2/8	0.63/0.15	DGT5A0M10 (r)	P2M3B13KA0
	29.400	23.700			80K2L	2 by inverter	0.80	DGT5A0M20 (l)	P2M3B11KA0
	29.400	29.400			100K3C	2/8	1.25/0.31		P2M5B13AA0
25/6.3	5.360	4.288	125	034	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2B43AA0
	6.700	5.360			71K3L	2/8	0.40/0.09		P0M2B43KA0
	7.400	6.700			71K2L	2 by inverter	0.50		P0M2B41KA0
	7.400	6.700		134	80K3C	2/8	0.50/0.12	DGT1A0M30	P1M3B43AA0
	6.400	5.100			71K3C	2/8	0.32/0.07		P0M2B33AA0
	8.000	6.400	160	033	71K3L	2/8	0.40/0.09	DGT2A0M10	P0M2B33KA0
	9.800	8.000			71K2L	2 by inverter	0.50		P0M2B31KA0
	9.800	8.000		133	80K3C	2/8	0.50/0.12	DGT2A0M30	P1M3B33AA0
	7.600	6.100			71K3C	2/8	0.32/0.07		P1M2B23AA0
	9.600	7.600			71K3L	2/8	0.40/0.09		P1M2B23KA0
	12.000	9.600	200	132	71K2L	2 by inverter	0.50	DGT3A0M10	P1M2B21KA0
	12.000	9.600			80K3C	2/8	0.50/0.12		P1M3B23AA0
	14.700	12.000			80K3L	2/8	0.63/0.15		P1M3B23KA0
	14.700	14.700			80K2L	2 by inverter	0.80		P1M3B21KA0
	11.200	9.000			71K3L	2/8	0.40/0.09		P1M2B13KA0
	13.800	11.000			71K2L	2 con inverter	0.50		P1M2B11KA0
	13.800	11.000	250	131	80K3C	2/8	0.50/0.12	DGT4A0M10	P1M3B13AA0
	17.200	13.800			80K3L	2/8	0.63/0.15		P1M3B13KA0
	21.600	21.600		233	100K3C	2/8	1.25/0.31	DGT4A0M30	P2M5B33AA0
	14.800	11.900			80K3C	2/8	0.50/0.12		P2M3B23AA0
	18.600	14.900	315	232	80K3L	2/8	0.63/0.15	DGT5A0M10 (r)	P2M3B23KA0
	23.700	18.900			80K2L	2 by inverter	0.80	DGT5A0M20 (l)	P2M3B21KA0
	29.400	29.400			100K3C	2/8	1.25/0.31		P2M5B23AA0
	20.800	16.600			80K3L	2/8	0.63/0.15		P2M3B13KA0
	26.500	21.200	400	231	80K2L	2 by inverter	0.80	DGT6A0M10 (r)	P2M3B11KA0
	41.400	33.100			100K3C	2/8	1.25/0.31	DGT6A0M20 (l)	P2M5B13AA0
	41.400	33.100			100K3C	2/8	1.25/0.31		P2M5B13AA0
	53.000	42.400	400 R	231	100K3L	2/8	1.60/0.39	DGT6A0M60 (r)	P2M5B13KA0
	66.200	53.000			100K2L	2 by inverter	2.00	DGT6A0M70 (l)	P2M5B11KA0

- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's contact surface(b), the average reaction (R med.) is compatible with the values listed in diagram at pages 15, 16, 17.
- The values for travelling mass in red require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

Ø 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	Ø 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	Ø 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	Ø 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	Ø 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	Ø 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	Ø 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---

Travelling masses at 2 speeds, based on the combination of components

Nominal speed (m/min)	Travelling mass (kg)		“DGT”wheel group <div><div>Ø</div>(mm)</div>	“DGP” motoreducer		Self-braking motor specifications		Partnumbers for components	
	ISO service group (FEM)			Reducer Type	Motor Type	Poles (N°)	Power (kW)	“DGT” drive wheel group	“DGP” motoreducer
	M4 (1Am)	M5 (2m)							
32/8	4.160	3.328	125	021	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2A13AA0
	5.200	4.160			71K3L	2/8	0.40/0.09		P0M2A13KA0
	6.500	5.200		121	71K2L	2 by inverter	0.50	DGT1A0M30	P1M2A11KA0
	6.500	5.200			80K3C	2/8	0.50/0.12		P1M3A13AA0
	7.400	6.656			80K3L	2/8	0.63/0.15		P1M3A13KA0
	7.400	6.656	160		80K2L	2 by inverter	0.80		P1M3A11KA0
	5.000	4.000		034	71K3C	2/8	0.32/0.07	DGT2A0M10	P0M2B43AA0
	6.300	5.000			71K3L	2/8	0.40/0.09		P0M2B43KA0
	7.900	6.300			71K2L	2 by inverter	0.50		P0M2B41KA0
	7.900	6.300		134	80K3C	2/8	0.50/0.12	DGT2A0M30	P1M3B43AA0
	9.800	8.000	80K3L		2/8	0.63/0.15	P1M3B43KA0		
	9.800	9.800	80K2L		2 by inverter	0.80	P1M3B41KA0		
	7.600	6.000	200	133	71K3L	2/8	0.40/0.09	DGT3A0M10	P1M2B33KA0
	9.600	7.600			71K2L	2 by inverter	0.50		P1M2B31KA0
	9.600	7.600			80K3C	2/8	0.50/0.12		P1M3B33AA0
	12.000	9.600			80K3L	2/8	0.63/0.15		P1M3B33KA0
	14.700	12.000			80K2L	2 by inverter	0.80		P1M3B31KA0
	14.700	14.700	250	221	100K3C	2/8	1.25/0.31	DGT3A0M30	P2M5A13AA0
	10.800	8.600			71K2L	2 by inverter	0.50	DGT4A0M10	P1M2B21KA0
	10.800	8.600		132	80K3C	2/8	0.50/0.12		P1M3B23AA0
	13.500	10.800			80K3L	2/8	0.63/0.15		P1M3B23KA0
	17.200	13.700			80K2L	2 by inverter	0.80	P1M3B21KA0	
	21.600	21.600	315	234	100K3C	2/8	1.25/0.31	DGT4A0M30	P2M5B43AA0
	14.600	11.600			80K3L	2/8	0.63/0.15	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3B33KA0
	18.500	14.800		233	80K2L	2 by inverter	0.80		P2M3B31KA0
	28.900	23.100			100K3C	2/8	1.25/0.31		P2M5B33AA0
	29.400	29.400			100K3L	2/8	1.60/0.39	P2M5B33KA0	
	20.700	16.500	400	232	80K2L	2 by inverter	0.80	DGT6A0M10 (r) DGT6A0M20 (l)	P2M3B21KA0
	32.300	25.800			100K3C	2/8	1.25/0.31		P2M5B23AA0
	41.400	33.100			100K3L	2/8	1.60/0.39		P2M5B23KA0
	32.300	=	400 R	232	100K3C	2/8	1.25/0.31	DGT6A0M60 (r) DGT6A0M70 (l)	P2M5B23AA0
	41.400	33.100			100K3L	2/8	1.60/0.39		P2M5B23KA0
	51 700	41 300			100K2L	2 by inverter	2.00		P2M5B21KA0
	40/10	3.360	2.688	125	022	71K3C	2/8	0.32/0.07	DGT1A0M10
4.200		3.360			71K3L	2/8	0.40/0.09		P0M2A23KA0
5.250		4.200			71K2L	2 by inverter	0.50		P0M2A21KA0
5.250		4.200	122		80K3C	2/8	0.50/0.12	DGT1A0M30	P1M3A23AA0
6.695		5.356			80K3L	2/8	0.63/0.15		P1M3A23KA0
7.400		6.720		80K2L	2 by inverter	0.80	P1M3A21KA0		
5.000		4.000	160	021	71K3L	2/8	0.40/0.09	DGT2A0M10	P0M2A13KA0
6.300		5.000			71K2L	2 by inverter	0.50	DGT2A0M30	P1M2A11KA0
6.300		5.000		121	80K3C	2/8	0.50/0.12		P1M3A13AA0
7.900		6.300			80K3L	2/8	0.63/0.15		P1M3A13KA0
10.000		8.000			80K2L	2 by inverter	0.80	P1M3A11KA0	
7.600		6.000	200	134	71K2L	2 by inverter	0.50	DGT3A0M10	P1M2B41KA0
7.600		6.000			80K3C	2/8	0.50/0.12		P1M3B43AA0
9.400		7.600			80K3L	2/8	0.63/0.15		P1M3B43KA0
12.000		9.600			80K2L	2 by inverter	0.80		P1M3B41KA0
14.700		14.700			222	100K3C	2/8		1.25/0.31
10.800		8.600	250	133	80K3L	2/8	0.63/0.15	DGT4A0M10	P1M3B33KA0
13.500		10.800			80K2L	2 by inverter	0.80		P1M3B31KA0
21.600		17.200		221	100K3C	2/8	1.25/0.31	DGT4A0M30	P2M5A13AA0
21.600		21.600			100K3L	2/8	1.60/0.39		P2M5A13KA0
11.600		9.300		315	234	80K3L	2/8	0.63/0.15	DGT5A0M10 (r) DGT5A0M20 (l)
14.800		11.900	80K2L			2 by inverter	0.80	P2M3B41KA0	
23.000		18.400	100K3C			2/8	1.25/0.31	P2M5B43AA0	
29.400		23.700	100K3L			2/8	1.60/0.39	P2M5B43KA0	
29.400		29.400	100K2L			2 by inverter	2.00	P2M5B41KA0	
13.000		10.400	400	233	80K3L	2/8	0.63/0.15	DGT6A0M10 (r) DGT6A0M20 (l)	P2M3B33KA0
16.500		13.200			80K2L	2 by inverter	0.80		P2M3B31KA0
25.800		20.600			100K3C	2/8	1.25/0.31		P2M5B33AA0
33.100		26.400			100K3L	2/8	1.60/0.39		P2M5B33KA0
41.300		33.100			100K2L	2 by inverter	2.00		P2M5B31KA0
42.800		41.300	400 R	331	112K3L	2/8	2.50/0.62	DGT6A0M30 (r) DGT6A0M40 (l)	P3M6B13KA0
33.100		26.400		233	100K3L	2/8	1.60/0.39	DGT6A0M60 (r)	P2M5B33KA0
41.300		33.100			100K2L	2 by inverter	2.00	DGT6A0M70 (l)	P2M5B31KA0
51 600		41 300		331	112K2L	2 by inverter	3.20	DGT6A0M80 (r) DGT6A0M90 (l)	P3M6B11AA0
66 000	52 800								

- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's contact surface(b), the average reaction (R med.) is compatible with the values listed in diagram at pages 15, 16, 17.
- The values for travelling mass in red require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

Ø 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	Ø 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	Ø 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	Ø 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	Ø 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	Ø 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	Ø 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---

Travelling masses at 2 speeds, based on the combination of components

Nominal speed (m/min)	Travelling mass (kg)		“DGT” wheel group <div>Ø (mm)</div>	“DGP” motoreducer		Self-braking motor specifications		Partnumbers for components		
	ISO service group (FEM)			Reducer Type	Motor Type	Poles (N°)	Power (kW)	“DGT” drive wheel group	“DGP” motoreducer	
	M4 (1Am)	M5 (2m)								
50/12.5	2.640	2.112	125	023	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2A33AA0	
	3.300	2.640			71K3L	2/8	0.40/0.09		P0M2A33KA0	
	4.125	3.300			71K2L	2 by inverter	0.50		P0M2A31KA0	
	4.125	3.300		123	80K3C	2/8	0.50/0.12	DGT1A0M30	P1M3A33AA0	
	5.197	4.157			80K3L	2/8	0.63/0.15		P1M3A33KA0	
	6.600	5.280			80K2L	2 by inverter	0.80		P1M3A31KA0	
	5 000	4 000	160	022	71K2L	2 by inverter	0.50	DGT2A0M10	P0M2A21KA0	
	5 000	4 000			80K3C	2/8	0.50/0.12		P1M3A23AA0	
	6 300	5 000			80K3L	2/8	0.63/0.15		P1M3A23KA0	
	8 000	6 300		122	80K2L	2 by inverter	0.80	DGT2A0M30	P1M3A21KA0	
	6 000	4 800	200		71K2L	2 by inverter	0.50		P1M2A11KA0	
	7 600	6 000			80K3L	2/8	0.63/0.15	DGT3A0M10	P1M3A13KA0	
	9 400	7 600			80K2L	2 by inverter	0.80		P1M3A11KA0	
	14 700	12 000	223	100K3C	2/8	1.25/0.31	DGT3A0M30	P2M5A33AA0		
	14 700	14 700		100K3L	2/8	1.60/0.39		P2M5A33KA0		
	8 600	6 900	134	80K3L	2/8	0.63/0.15	DGT4A0M10	P1M3B43KA0		
	10 800	8 600		80K2L	2 by inverter	0.80		P1M3B41KA0		
	17 200	13 800		222	100K3C	2/8	1.25/0.31	DGT4A0M30	P2M5A23AA0	
	21 600	17 200	100K3L		2/8	1.60/0.39	P2M5A23KA0			
	21 600	21 600	100K2L		2 by inverter	2.00	P2M5A21KA0			
	9 200	7 400	315	221	80K3L	2/8	0.63/0.15	DGT5A0M10 (r) DGT5A0M20 (l)	P2M3A13KA0	
	11 800	9 400			80K2L	2 by inverter	0.80		P2M3A11KA0	
	18 400	14 700			100K3C	2/8	1.25/0.31		P2M5A13AA0	
	23 600	18 900		100K3L	2/8	1.60/0.39	P2M5A13KA0			
	29 400	29 400	400	333	112K3L	2/8	2.50/0.62	DGT5A0M30 (r) DGT5A0M40 (l)	P3M6B33KA0	
	20 700	16 600		234	100K3C	2/8	1.25/0.31	DGT6A0M10 (r) DGT6A0M20 (l)	P2M5B43AA0	
	26 500	21 200			100K3L	2/8	1.60/0.39		P2M5B43KA0	
	33 000	26 400			100K2L	2 by inverter	2.00		P2M5B41KA0	
	41 200	33 000		332	112K3L	2/8	2.50/0.62	DGT6A0M30 (r) DGT6A0M40 (l)	P3M6B23KA0	
	42 800	42 200	112K2L		2 by inverter	3.20	P3M6B21AA0			
	33 000	26 400	400 R	234	100K2L	2 by inverter	2.00	DGT6A0M60 (r) DGT6A0M70 (l)	P2M5B41KA0	
	41 200	33 000			332	112K3L	2/8		2.50/0.62	DGT6A0M80 (r) DGT6A0M90 (l)
	52 700	42 100		112K2L		2 by inverter	3.20	P3M6B21AA0		
63/16	2.080	1.664	125	024	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2A43AA0	
	2.600	2.080			71K3L	2/8	0.40/0.09		P0M2A43KA0	
	3.250	2.600			71K2L	2 by inverter	0.50		P0M2A41KA0	
	3.250	2.600		124	80K3C	2/8	0.50/0.12	DGT1A0M30	P1M3A43AA0	
	4.095	3.276			80K3L	2/8	0.63/0.15		P1M3A43KA0	
	5.200	4.160			80K2L	2 by inverter	0.80		P1M3A41KA0	
	5 000	4 000	160	123	80K3L	2/8	0.63/0.15	DGT2A0M10	P1M3A33KA0	
	6 300	5 000			80K2L	2 by inverter	0.80		P1M3A31KA0	
	6 000	4 800		122	80K3L	2/8	0.63/0.15	DGT3A0M10	P1M3A23KA0	
	7 600	6 000			80K2L	2 by inverter	0.80		P1M3A21KA0	
	12 000	9 600	200		100K3C	2/8	1.25/0.31	DGT3A0M30	P2M5A43AA0	
	14 700	12 000	224	100K3L	2/8	1.60/0.39	P2M5A43KA0			
	6 900	5 500		80K3L	2/8	0.63/0.15	DGT4A0M10	P1M3A13KA0		
	8 600	6 900	121	80K2L	2 by inverter	0.80		P1M3A11KA0		
	13 500	10 800		250		100K3C	2/8	1.25/0.31	DGT4A0M30	P2M5A33AA0
	17 200	13 800		100K3L	2/8	1.60/0.39	P2M5A33KA0			
	21 600	17 200	100K2L	2 by inverter	2.00	P2M5A31KA0				
	14 600	11 700	315	222	100K3C	2/8	1.25/0.31	DGT5A0M10 (r) DGT5A0M20 (l)	P2M5A23AA0	
	18 700	14 900			100K3L	2/8	1.60/0.39		P2M5A23KA0	
	23 400	18 700			100K2L	2 by inverter	2.00		P2M5A21KA0	
	29 300	23 500		334	112K3L	2/8	2.50/0.62	DGT5A0M30 (r) DGT5A0M40 (l)	P3M6B43KA0	
	29 400	29 400	112K2L		2 by inverter	3.20	P3M6B41KA0			
	16 400	13 100	400	221	100K3C	2/8	1.25/0.31	DGT6A0M10 (r) DGT6A0M20 (l)	P2M5A13AA0	
	21 000	16 800			100K3L	2/8	1.60/0.39		P2M5A13KA0	
	32 800	26 200			112K3L	2/8	2.50/0.62		DGT6A0M30 (r) DGT6A0M40 (l)	P3M6B33KA0
	42 000	33 600		333	112K2L	2 by inverter	3.20	P3M6B31AA0		
	32 800	26 200	400 R		112K3L	2/8	2.50/0.62	DGT6A0M80 (r) DGT6A0M90 (l)	P3M6B33KA0	
	42 000	33 600	112K2L		2 by inverter	3.20	P3M6B31AA0			

- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's contact surface(b), the average reaction (R med.) is compatible with the values listed in diagram at pages 15, 16, 17.
- The values for travelling mass in red require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

Ø 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	Ø 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	Ø 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	Ø 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	Ø 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	Ø 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	Ø 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---

Travelling masses at 2 speeds, based on the combination of components

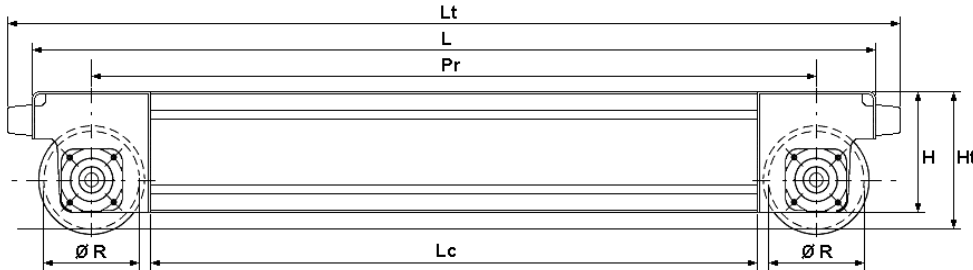
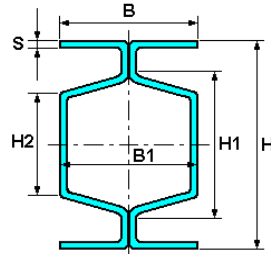
Nominal speed (m/min)	Traversable mass (kg)		“DGT” wheel group <div>Ø (mm)</div>	“DGP” motoreducer		Self-braking motor specifications		Partnumbers for components	
	ISO service group (FEM)			Reducer Type	Motor Type	Poles (N°)	Power (kW)	“DGT” drive wheel group	“DGP” motoreducer
	M4 (1Am)	M5 (2m)							
80/20	2 000	1 600	160	024	71K3C	2/8	0.32/0.07	DGT1A0M10	P0M2A43AA0
	2 500	2 000			71K3L	2/8	0.40/0.09		P0M2A43KA0
	3 200	2 500			71K2L	2 by inverter	0.50		P0M2A41KA0
	3 200	2 500		124	80K3C	2/8	0.50/0.12	DGT1A0M30	P1M3A43AA0
	4 000	3 200	80K3L		2/8	0.63/0.15	P1M3A43KA0		
	5 000	4 000	80K2L		2 by inverter	0.80	P1M3A41KA0		
	5 400	4 300	122	80K3L	2/8	0.63/0.15	DGT4A0M10	P1M3A23KA0	
	6 900	5 500			80K2L	2 by inverter		0.80	P1M3A21KA0
	10 800	8 600			250	224	100K3C	2/8	1.25/0.31
	13 500	10 800	100K3L	2/8			1.60/0.39	P2M5A43KA0	
	17 200	13 800	100K2L	2 by inverter			2.00	P2M5A41KA0	
	16 500	13 200	400	222		100K3L	2/8	1.60/0.39	DGT6A0M10 (r)
	20 600	16 500			100K2L	2 by inverter	2.00	DGT6A0M20 (l)	P2M5A21KA0
	25 800	20 600			334	112K3L	2/8	2.50/0.62	DGT6A0M30 (r)
	33 000	26 400		112K2L		2 by inverter	3.20	DGT6A0M40 (l)	P3M6B41AA0
			400 R	334	112K2L	2 by inverter	3.20	DGT6A0M80 (r)	P3M6B41AA0
								DGT6A0M90 (l)	

- The specifications refer to single motoreducer; in the case of two or more motoreducers, multiply travelling mass by the number of motoreducers used.
- Verify that, in relation to the rail's contact surface(b), the average reaction (R med.) is compatible with the values listed in diagram at pages 15, 16, 17.
- The values for travelling mass in red require a verification of average reaction (R med.) on each wheel, which must not exceed following Rx. max. values:

Ø 125 R med. ≤ Rx max. ≤ 3670 kg (36 kN)	Ø 160 R med. ≤ Rx max. ≤ 4893 kg (48 kN)	Ø 200 R med. ≤ Rx max. ≤ 7340 kg (72 kN)	Ø 250 R med. ≤ Rx max. ≤ 10,805 kg (106 kN)	Ø 315 R med. ≤ Rx max. ≤ 14,679 kg (144 kN)	Ø 400 R med. ≤ Rx max. ≤ 18,960 kg (186 kN)	Ø 400 R R med. ≤ Rx max. 30,580 ≤ kg (300 kN)
--	--	--	---	---	---	---

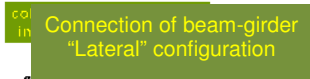
2.3.8 Operating limitations and technical specifications for “DGT” series endcarriages

- For complete technical specifications on “DGT” series endcarriages for bridge cranes, in relation to their intended operation, check and match the parameters limiting the operation of the endcarriages in combination with the “DGP” offset geared motors and related self-braking motors, in relation to the operating parameters for the bridge crane on which the endcarriages will be installed.
- Operating parameters required for selecting endcarriages:
 - type of bridge crane (mono or dual rail);
 - load bearing capacity;
 - gauge;
 - ISO / FEM service group;
 - inflection point, with a nominal load on the beam's mid-section;
 - loads on the wheels;
 - width and shape of the rail;
 - Drive speed.

Geometrical specifications based on the endcarriages for SINGLE or DOUBLE GIRDER bridge cranes																			
																			
Endcarriage construction													Tubular beam section						
Endcarriage type			Endcarriage dimensional data (mm)										Inertial data on tubular section						
“DGT” size	Wheel Ø R (mm)	basis (mm)	Lc	L	Lt	S	B	H	B1	H1	H2	Ht	Wt cm ³	Jx cm ⁴	Wx cm ³	Jy cm ⁴	Wy cm ³	Area (cm ²)	
1	125	1800	1630	1970	2050	4	160	220	150	138	100	227	120.0	2423.0	220.0	889.0	111.0	17.6	24.8
		2400	2230	2570	2650	6				127	90		162.0	3450.0	313.0	1224.0	153.0	26.4	37.2
		3300	3130	3470	3550														
2	160	1800	1590	2010	2110	4	180	250	170	164	120	265	163.0	3607.0	288.0	1336.0	148.0	20.0	28.0
		2400	2190	2610	2710	6				157	114		233.0	5194.0	415.0	1894.5	210.0	30.0	42.0
		3300	3090	3510	3610														
3	200	2100	1840	2360	2490	5	200	290	188	194	147	315	276.0	6839.0	471.0	2363.0	236.0	29.	38.8
		2700	2440	2960	3090	8				166	120		361.0	10119.0	698.0	3275.0	327.5	46.4	62.0
		3600	3340	3860	3990														
4	250	2100	1790	2410	2540	5	230	335	218	228	180	370	392.0	10772.0	643.0	3803.0	330.	33.5	44.8
		2700	2390	3010	3140	8				211	157		547.0	16135.0	963.0	5462.0	475.0	53.6	71.0
		3600	3290	3910	4040														
		3600 R				345					375		22430.0	1300.0	6326.0	550.0	55.2	93.0	
5	315	2400	2010	2790	2950	6	260	385	244	266	204	437	597.0	19214.0	998.0	6467.0	497.0	46.2	60.0
		3900	3510	4290	4450	10				230	170		829.0	29610.0	1538.0	9397.0	723.0	77.0	101.0
6	400	3900	3430	4370	4570	10	290	440	274	285	217	495	1189.0	44920.0	2042.0	14293.0	986.0	88.0	113.0
	400 R	3900 R						460				505		72260.0	3141.7	17573.0	1211.9	92.0	167.0

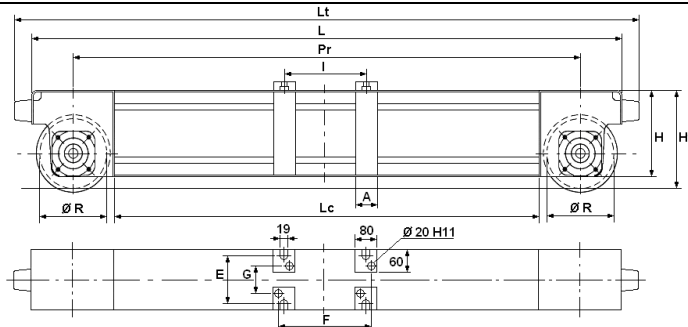
[illegible]

1 - 125			2 - 160			3 - 200			4 - 250				5 - 315
1800	2400	3300	1800	2400	3300	2100	2700	3600	2100	2700	3600	3600 R	2400
8.400	7.400		11.100	9.800		15.800	14.800		22.000	24.400	19.000	24.800	28.600

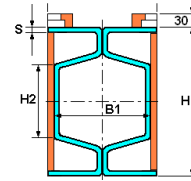


Endcarriage type	Beam codes in relation to max. span (mm) of bridge girder									(for other quotas see page 27)					Weight (kg)
	Max. width	Quota I	Beam code	Max. width	Quota I	Beam code	Max. width	Quota I	Beam code	Quotas (mm)					
										A	C	D	Ø1	Ø2	
1 – 125 – 1800	305	360	DGT110250	370	430	DGT110260	450	510	=	60	7	165	18	20	82
1 – 125 – 2400			DGT110300			DGT110310			DGT110320						128
1 – 125 – 3300			DGT110340			DGT110350			DGT110360						165
2 – 160 – 1800	305	360	DGT210250	370	430	DGT210260	450	510	=	60	7	190	20	20	105
2 – 160 – 2400			DGT210300			DGT210310			DGT210320						160
2 – 160 – 3300			DGT210340			DGT210350			DGT210360						205
3 – 200 – 2100	360	420	DGT310250	410	480	DGT310260	500	560	DGT310270	80	9	225	22	25	170
3 – 200 – 2700			DGT310300			DGT310310			DGT310320						255
3 – 200 – 3600			DGT310340			DGT310350			DGT310360						330
4 – 250 – 2100	410	480	DGT410250	490	560	DGT410260	565	640	DGT410270	80	9	270	26	25	220
4 – 250 – 2700			DGT410300			DGT410310			DGT410320						330
4 – 250 – 3600			DGT410340			DGT410350			DGT410360						410
4 – 250 – 3600 R			DGT420810			DGT420820			DGT420830						428
5 – 315 – 2400	410	500	(X)	490	580	(X)	615	710	(X)	100	12	305	30	32	340

Endcarriage type	Offset geaboxes	Max. arm width 410		Max. arm width 490		Max. arm width 615	
		"right" arm	"left" arm	"right" arm	"left" arm	"right" arm	"left" arm
5 – 315 – 2400	Size 2	DGT520750	DGT520760	DGT520790	DGT520800	DGT520830	DGT520840
	Size 3	DGT520770	DGT520780	DGT520810	DGT520820	DGT520850	DGT520860

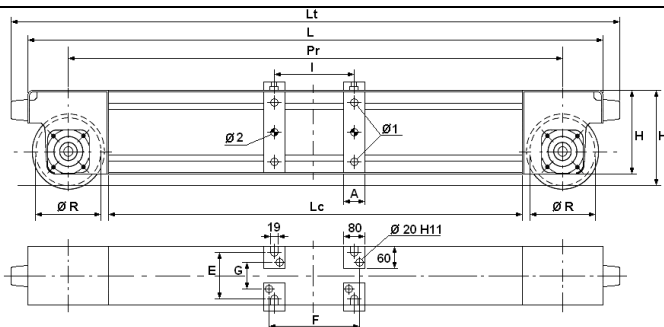


Joining of beam-girder in
"Supported" configuration

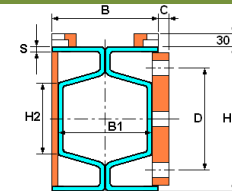


Beam joining area section

Endcarriage type	Beam codes in relation to max. span (mm) of bridge girder										(for other quotas see page 27)			Weight (kg)		
	Max. width	Quota I	F	Beam code	Max. width	Quota I	F	Beam code	Max. width	Quota I	F	Beam code	Quota (mm)			
1 – 125 – 1800	305	360	402	DGT110390	370	430	472	DGT110400	450	510	552	=	60	120	78	82
1 – 125 – 2400				DGT110440				DGT110460				128				
1 – 125 – 3300				DGT110490				DGT110500				165				
2 – 160 – 1800	305	360	402	DGT210390	370	430	472	DGT210400	450	510	552	=	60	140	98	105
2 – 160 – 2400				DGT210440				DGT210460				160				
2 – 160 – 3300				DGT210490				DGT210500				205				
3 – 200 – 2100	360	420	462	DGT310390	410	480	522	DGT310400	500	560	602	DGT310410	80	160	118	170
3 – 200 – 2700				DGT310440				DGT310460				255				
3 – 200 – 3600				DGT310490				DGT310500				330				
4 – 250 – 2100	410	480	522	DGT410390	490	560	602	DGT410400	565	640	682	DGT410410	80	190	148	220
4 – 250 – 2700				DGT410440				DGT410460				330				
4 – 250 – 3600				DGT410490				DGT410510				410				
4 – 250 – 3600 R				DGT420840				DGT420850				DGT420860				428
5 – 315 – 2400	410	500	542	(X)	490	580	622	(X)	615	710	752	(X)	100	220	178	340
(X) Code defined as follows based on the span width, type of reducer employed and "left" or "right" positioning of the reaction arm:																
Endcarriage type	Offset gearboxes		Max. arm width 410				Max. arm width 490				Max. arm width 615					
			"right" arm		"left" arm		"right" arm		"left" arm		"right" arm		"left" arm			
5 – 315 – 2400	Size 2		DGT520870		DGT520880		DGT520910		DGT520920		DGT520950		DGT520960			
	Size 3		DGT520890		DGT520900		DGT520930		DGT520940		DGT520970		DGT520980			



Connection of beam-girder in
"Lateral+Supported" configuration



Beam joining area section

Endcarriage type	Beam codes in relation to max. span (mm) of bridge girder										(for other quotas see page 27)								Weight (kg)
	Max. width	Quota I F	Beam code	Max. width	Quota I F	Beam Code	Max. width	Quota I F	Beam Code	Quota (mm)									
1 – 125 – 1800	305	360 402	DGT110550	370	430 472	DGT110560	450	510 552	=	60	7	165	120	78	18	20	82		
1 – 125 – 2400			DGT110600			128													
1 – 125 – 3300			DGT110650			DGT110670			165										
2 – 160 – 1800	305	360 402	DGT210550	370	430 472	DGT210560	450	510 552	=	60	7	190	140	98	20	20	105		
2 – 160 – 2400			DGT210600			160													
2 – 160 – 3300			DGT210650			DGT210670			205										
3 – 200 – 2100	360	420 462	DGT310550	410	480 522	DGT310560	500	560 602	DGT310570	80	9	225	160	118	22	25	170		
3 – 200 – 2700			DGT310600			DGT310620			255										
3 – 200 – 3600			DGT310650			DGT310670			330										
4 – 250 – 2100	410	480 522	DGT410550	490	560 602	DGT410560	565	640 682	DGT410570	80	9	270	190	148	26	25	220		
4 – 250 – 2700			DGT410600			DGT410620			330										
4 – 250 – 3600			DGT410650			DGT410670			410										
4 – 250 – 3600 R			DGT420870			DGT420890			428										
5 – 315 – 2400	410	500 542	(X)	490	580 622	(X)	615	710 752	(X)	100	12	305	220	178	30	32	340		
(X) Code defined as follows based on the span width, type of reducer employed and "left" or "right" positioning of the reaction arm:																			
Endcarriage type	Offset gearbox		Max. arm width 410		Max. arm width 490		Max. arm width 615												
			"right" arm	"left" arm	"right" arm	"left" arm	"right" arm	"left" arm	"right" arm	"left" arm	"right" arm	"left" arm	"right" arm	"left" arm					
5 – 315 – 2400	Size 2		DGT530010		DGT530020		DGT530050		DGT530060		DGT530090		DGT530100						
	Size 3		DGT530030		DGT530040		DGT530070		DGT530080		DGT530110		DGT530120						

Operating limitations for endcarriages on DOUBLE GIRDER bridge cranes based on: Capacity - ISO/FEM group - Span

Capacity (kg)	Group ISO/FEM	Gauge (m)																										
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27					
1000	M4/1Am M5/2m																											
1250	M4/1Am M5/2m																											
1600	M4/1Am M5/2m																											
2000	M4/1Am M5/2m																											
2500	M4/1Am M5/2m																											
3200	M4/1Am M5/2m																											
4000	M4/1Am M5/2m																											
5000	M4/1Am M5/2m																											
6300	M4/1Am M5/2m																											
8000	M4/1Am M5/2m																											
10000	M4/1Am M5/2m																											
12500	M4/1Am M5/2m																											
16000	M4/1Am M5/2m																											
20000	M4/1Am																											
25000	M4/1Am M5/2m																											
32000	M4/1Am																											
40000	M4/1Am																											

Admissible travelling mass from beams on a DOUBLE GIRDER bridge crane [Traversing mass (kg) = capacity + crane weight + weight of trolley/hoist]												
1 - 125	2 - 160			3 - 200			4 - 250		5 - 315		6 - 400	6 - 400 R
2400	3300	2400	3300	2700	3600	2700	3600	3900	3900	3900 R		
9.300	10.400	11.500	13.200	17.100	18.800	25.000	25.500	35.900	50.600	62.000		

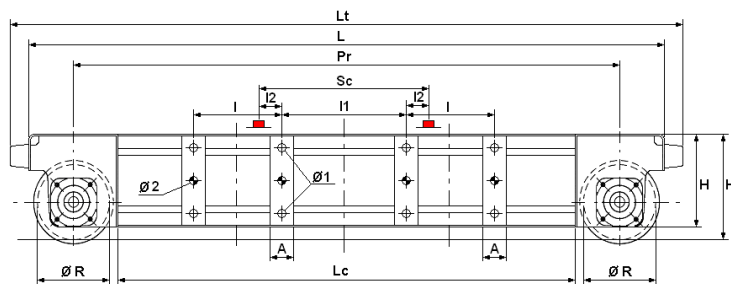
Note: operating limitations determined using Donati components (hoist, trolley, etc.) and sectioned beams sized as per arrow a = Gauge / 750

Admissible travelling mass from beams on a DOUBLE GIRDER bridge crane [Traversing mass (kg) = capacity + crane weight + weight of trolley/hoist]

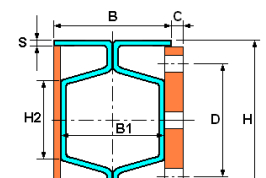
1 - 125		2 - 160		3 - 200		4 - 250		5 - 315	6 - 400	6 - 400 R
2400	3300	2400	3300	2700	3600	2700	3600	3900	3900	3900 R
9.300	10.400	11.500	13.200	17.100	18.800	25.000	25.500	35.900	50.600	62.000

Note: operating limitations determined using Donati components (hoist, trolley, etc.) and sectioned beams sized as per arrow a = Gauge / 750





Endcarriages for DOUBLE GIRDER cranes with connection cross plates to "bridge girders"

































Joining of beam-girder in "Lateral" configuration



Beam joining area section

Endcarriage type	Beam codes based on the gauge of the dual rail trolley, type of girders on the bridge crane and max. girder span				(for other quotas see page 27)								Weight (kg)	
	Double girder trolley Gauge (mm)	Bridge crane girders		Beam Code	Quotas (mm)									
		Type	Max. span (mm)		I	I1	I2	A	C	D	Ø1	Ø2		
1 – 125 – 2400	1000		Beam	305	DGT110750	360	870	65	60	7	165	18	20	130
				370	DGT110760	430	865	67.5						
			HE	305	DGT110780	360	640	180						
	1200		Beam	305	DGT120210	360	1070	65						
				370	DGT120220	430	1065	67.5						
			HE	305	DGT120240	360	840	180						

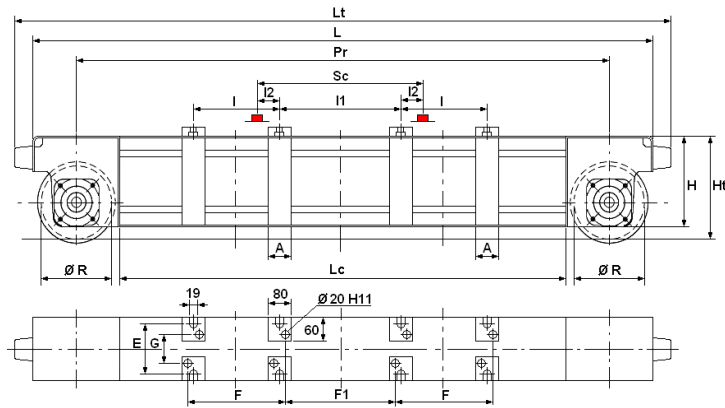
Beams for DOUBLE GIRDER cranes with connecting cross plates to "bridge girders" - "Lateral" connection												
Endcarriage type	Beam codes based on the gauge of the dual rail trolley, type of girders on the bridge crane and max. girder span				(for other quotas see page 27)							
	Double girder trolley Gauge (mm)	Bridge crane girders Type	Max. width (mm)	Beam Code	I	I1	I2	A	C	D	Ø1	Ø2
1 - 125 - 3300	1000	 Beam	305	DGT110800	360	870	65	60	7	165	18	20
			370	DGT110810	430	865	67.5					
			450	DGT110820	510	805	97.5					
	1200	 Beam	305	DGT120260	360	1070	65					
			370	DGT120270	430	1065	67.5					
			450	DGT120280	510	1005	97.5					
	1400	 Beam	305	DGT120560	360	1270	65					
			370	DGT120570	430	1265	67.5					
			450	DGT120580	510	1205	97.5					
	1600	 Beam	305	DGT120590	360	1040	180					
			370	DGT120600	430	1035	180					
			450	DGT120610	510	975	180					
2 - 160 - 2400	1000	 Beam	305	DGT210750	360	870	65	60	7	190	20	20
			370	DGT210760	430	865	67.5					
			450	DGT210780	510	840	180					
	1200	 Beam	305	DGT220210	360	1070	65					
			370	DGT220220	430	1065	67.5					
			450	DGT220240	510	840	180					
	1400	 Beam	305	DGT220290	360	1270	65					
			370	DGT220300	430	1265	67.5					
			450	DGT220320	510	1205	97.5					
	1600	 Beam	305	DGT220560	360	1040	180					
			370	DGT220570	430	1035	180					
			450	DGT220590	510	975	180					
3 - 200 - 2700	1000	 Beam	360	DGT310750	420	830	85	80	9	225	22	25
			410	DGT310760	480	846	77					
			460	DGT310780	540	846	210					
	1200	 Beam	360	DGT320210	420	1030	85					
			410	DGT320220	480	1046	77					
			460	DGT320240	540	780	210					
	1400	 Beam	360	DGT320510	420	1230	85					
			410	DGT320520	480	1246	77					
			460	DGT320540	540	980	210					
	1600	 Beam	360	DGT330800	420	830	85					
			410	DGT330810	480	846	77					
			460	DGT330820	540	846	210					
4 - 250 - 2700	1000	 Beam	410	DGT410750	480	846	77	80	9	270	26	25
			490	DGT410760	560	846	77					
			410	DGT410780	480	520	240					
	1200	 Beam	410	DGT420210	480	1046	77					
			490	DGT420220	560	1046	77					
			410	DGT420240	480	720	240					

Endcarriages for DOUBLE GIRDER cranes with connection plates to "bridge girders" - "Lateral" connection													
Endcarriage type	Beam codes based on the gauge of the double girder trolley, type of girders on the bridge crane and max. girder span				(for other quotas see page 27)								Weight (kg)
	Dual-rail trolley gauge Gauge (mm)	Bridge crane girders Type	Max. width (mm)	Beam Code	I	I1	I2	A	C	D	Ø1	Ø2	
4 – 250 – 3600	1000	 Beam	490	DGT410810	560	846	77	80	9	270	26	25	415
			565	DGT410820	640	841	79.5						
		 HE	410	DGT410830	480	520	240						
	1200	 Beam	490	DGT420270	560	1046	77						
			565	DGT420280	640	1041	79.5						
		 HE	410	DGT420290	480	720	240						
	1400	 Beam	490	DGT420570	560	1246	77						
			565	DGT420580	640	1241	79.5						
		 HE	410	DGT420590	480	920	240						
5 – 315 – 3900	1000	 Beam	410	(X)	500	826	87	100	12	305	30	32	635
			490	(X)	580	826	87						
		 HE	615	(X)	710	805	97.5						
			410	(X)	500	500	250						
	1200	 Beam	410	(X)	500	1026	87						
			490	(X)	580	1026	87						
		 HE	615	(X)	710	1005	97.5						
			410	(X)	500	700	250						
	1400	 Beam	410	(X)	500	1226	87						
			490	(X)	580	1226	87						
		 HE	615	(X)	710	1205	97.5						
			410	(X)	500	900	250						
6 – 400 – 3900	1400	 Beam	410	(X)	500	1226	87	100	12	350	36	32	810
			490	(X)	580	1226	87						
		 HE	615	(X)	710	1205	97.5						
			410	(X)	500	900	250						
6 – 400 – 3900 R	1400	 Beam	410	(X)	500	1226	87						940
			490	(X)	580	1226	87						
		 HE	615	(X)	710	1205	97.5						
			410	(X)	500	900	250						

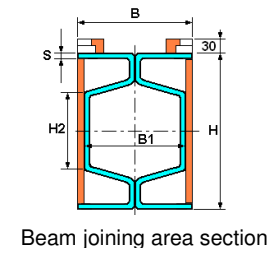
(X) Code defined as follows based on the span width, type of reducer employed and "left" or "right" positioning of the reaction arm:

Endcarriage type	Trolley gauge	Offset gearbox	Max. width 410				Max. width 490		Max. width 615	
			Beam girder Reaction arm		HE girder Reaction arm		Beam girder Reaction arm		Beam girder Reaction arm	
			"right"	"left"	"right"	"left"	"right"	"left"	"right"	"left"
5 – 315 – 3900	1000	Size 2	DGT510250	DGT510260	DGT510610	DGT510620	DGT510290	DGT510300	DGT510330	DGT510340
		Size 3	DGT510270	DGT510280	DGT510630	DGT510640	DGT510310	DGT510320	DGT510350	DGT510360
	1200	Size 2	DGT510750	DGT510760	DGT520210	DGT520220	DGT510790	DGT510800	DGT510830	DGT510840
		Size 3	DGT510770	DGT510780	DGT520230	DGT520240	DGT510810	DGT510820	DGT510850	DGT510860
	1400	Size 2	DGT520310	DGT520320	DGT520670	DGT520680	DGT520350	DGT520360	DGT520390	DGT520400
		Size 3	DGT520330	DGT520340	DGT520690	DGT520700	DGT520370	DGT520380	DGT520410	DGT520420
6 – 400 – 3900	1400	Size 2	DGT610750	DGT610760	DGT620210	DGT620220	DGT610790	DGT610800	DGT610830	DGT610840
		Size 3	DGT610770	DGT610780	DGT620230	DGT620240	DGT610810	DGT610820	DGT610850	DGT610860
6 – 400 – 3900 R	1400	Size 2	DGT620310	DGT620320	DGT620670	DGT620680	DGT620350	DGT620360	DGT620390	DGT620400
		Size 3	DGT620330	DGT620340	DGT620690	DGT620700	DGT620370	DGT620380	DGT620410	DGT620420



























Beams for DOUBLE GIRDER cranes with connection cross plates to "bridge girders" - "Supported" configuration























Joining of beam-girder in "Supported" configuration



Beam joining area section

Endcarriage type	Beam codes based on the gauge of the dual rail trolley, type of girders on the bridge crane and max. girder span				(for other quotas see page 27)									Weight (kg)		
	Double girder trolley Gauge (mm)	Bridge crane girders Type	Max. width (mm)	Beam Code	I	I1	I2	F	F1	A	E	G				
1 – 125 – 2400	1000	 Beam	305	DGT110850	360	870	65	402	828	60	120	78	130			
			370	DGT110860	430	865	67.5	472	823							
		 HE	305	DGT110880	360	640	180	402	598							
	1200	 Beam	305	DGT120310	360	1070	65	402	1028							
			370	DGT120320	430	1065	67.5	472	1023							
		 HE	305	DGT120340	360	840	180	402	798							
1 – 125 – 3300	1000	 Beam	305	DGT110900	360	870	65	402	828				60	120	78	167
			370	DGT110910	430	865	67.5	472	823							
		450	DGT110920	510	805	97.5	552	763								
	 HE	305	DGT110930	360	640	180	402	598								
	1200	 Beam	305	DGT120360	360	1070	65	402	1028							
			370	DGT120370	430	1065	67.5	472	1023							
		450	DGT120380	510	1005	97.5	552	963								
	 HE	305	DGT120390	360	840	180	402	798								
	1400	 Beam	305	DGT120660	360	1270	65	402	1228							
			370	DGT120670	430	1265	67.5	472	1223							
		450	DGT120680	510	1205	97.5	552	1163								
	 HE	305	DGT120690	360	1040	180	402	998								
2 – 160 – 2400	1000	 Beam	305	DGT210850	360	870	65	402	828	60	140	98	162			
			370	DGT210860	430	865	67.5	472	823							
		 HE	305	DGT210880	360	640	180	402	598							
	1200	 Beam	305	DGT220310	360	1070	65	402	1028							
			370	DGT220320	430	1065	67.5	472	1023							
		 HE	305	DGT220340	360	840	180	402	798							
2 – 160 – 3300	1000	 Beam	370	DGT210910	430	865	67.5	472	823				60	140	98	207
			450	DGT210920	510	816	92	552	774							
		 HE	305	DGT210930	360	640	180	402	598							
	1200	 Beam	370	DGT220370	430	1065	67.5	472	1023							
			450	DGT220380	510	1016	92	552	974							
		 HE	305	DGT220390	360	840	180	402	798							
	1400	 Beam	370	DGT220670	430	1265	67.5	472	1223							
			450	DGT220680	510	1216	92	552	1174							
		 HE	305	DGT220690	360	1040	180	402	998							
3 – 200 – 2700	1000	 Beam	360	DGT310850	420	830	85	462	788	80	160	118	260			
			410	DGT310860	480	846	77	522	804							
		 HE	360	DGT310880	420	580	210	462	538							
	1200	 Beam	360	DGT320310	420	1030	85	462	988							
			410	DGT320320	480	1046	77	522	1004							
		 HE	360	DGT320340	420	780	210	462	738							
	1400	 Beam	360	DGT320610	420	1230	85	462	1188							
			410	DGT320620	480	1246	77	522	1204							
		 HE	360	DGT320640	420	980	210	462	938							

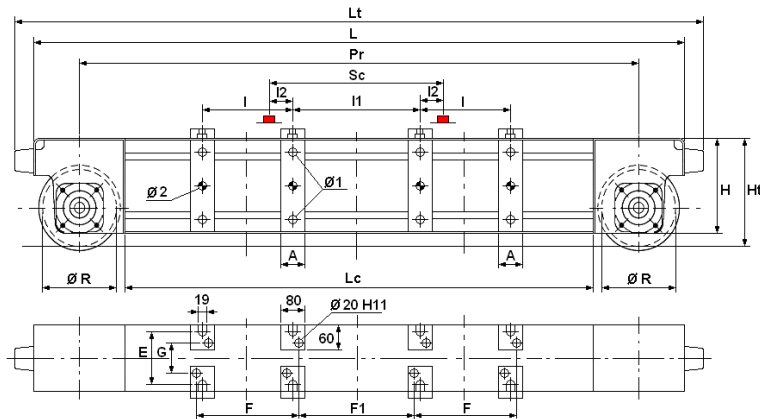
Beams for DUAL-RAIL cranes with joining cross plates to "bridge girders" - "Supported" operation

Endcarriage type	Beam codes based on the gauge of the double girder trolley, type of girders on the bridge crane and max. girder span				(for other quotas see page 27)									Weight (kg)				
	Double girder trolley Gauge (mm)	Bridge crane girders		Beam Code	Quotas (mm)					A	E	G						
		Type	Max. width (mm)		I	I1	I2	F	F1									
3 – 200 – 3600	1000		Beam	360	DGT310900	420	830	85	462	788	80	160	118	335				
			410	DGT310910	480	846	77	522	804									
			HE	500	DGT310920	560	846	77	602	804								
			360	DGT310930	420	580	210	462	538									
	1200		Beam	360	DGT320360	420	1030	85	462	988								
			410	DGT320370	480	1046	77	522	1004									
			HE	500	DGT320380	560	1046	77	602	1004								
			360	DGT320390	420	780	210	462	738									
	1400		Beam	360	DGT320660	420	1230	85	462	1188								
			410	DGT320670	480	1246	77	522	1204									
			HE	500	DGT320680	560	1246	77	602	1204								
			360	DGT320690	420	980	210	462	938									
4 – 250 – 2700	1000		Beam	410	DGT410850	480	846	77	522	804	80	190	148	335				
			490	DGT410860	560	846	77	602	804									
			HE	410	DGT410880	480	520	240	522	478								
			410	DGT420310	480	1046	77	522	1004									
	1200		Beam	490	DGT420320	560	1046	77	602	1004								
			410	DGT420340	480	720	240	522	678									
		1000		Beam	490	DGT410910	560	846	77	602				804	80	190	148	415
				565	DGT410920	640	841	79.5	682	799								
	HE		410	DGT410930	480	520	240	522	478									
	490		DGT420370	560	1046	77	602	1004										
1200		Beam	565	DGT420380	640	1041	79.5	682	999									
		410	DGT420390	480	720	240	522	678										
	1400		Beam	490	DGT420670	560	1246	77	602	1204								
			565	DGT420680	640	1241	79.5	682	1199									
		HE	410	DGT420690	480	920	240	522	878									
		5 – 315 – 3900	1000		Beam	410	(X)	500	826	87	542	784	100	220	178	635		
490	(X)				580	826	87	622	784									
	HE			615	(X)	710	805	97.5	752	763								
	410			(X)	500	500	250	542	458									
1200			Beam	410	(X)	500	1026	87	542	984								
			490	(X)	580	1026	87	622	984									
			HE	615	(X)	710	1005	97.5	752	963								
			410	(X)	500	700	250	542	658									
1400			Beam	410	(X)	500	1226	87	542	1184								
			490	(X)	580	1226	87	622	1184									
			HE	615	(X)	710	1205	97.5	752	1163								
			410	(X)	500	900	250	542	858									
6 – 400 – 3900	1400		Beam	410	(X)	500	1226	87	542	1184	100	250	208	810				
			490	(X)	580	1226	87	622	1184									
			HE	615	(X)	710	1205	97.5	752	1163								
			410	(X)	500	900	250	542	858									
6 – 400 – 3900 R	1400		Beam	410	(X)	500	1226	87	542	1184				100	250	208	940	
			490	(X)	580	1226	87	622	1184									
			HE	615	(X)	710	1205	97.5	752	1163								
			410	(X)	500	900	250	542	858									

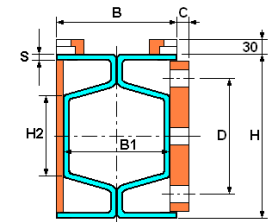
(X) Code defined as follows based on the span width, type of reducer employed and "left" or "right" positioning of the reaction arm:

Endcarriage type	Trolley gauge	Offset gearbox	Max. width 410				Max. width 490		Max. width 615	
			Beam girder Reaction arm		HE girder Reaction arm		Beam girder Reaction arm		Beam girder Reaction arm	
			"right"	"left"	"right"	"left"	"right"	"left"	"right"	"left"
5 - 315 - 3900	1000	Size 2	DGT510370	DGT510380	DGT510650	DGT510660	DGT510410	DGT510420	DGT510450	DGT510460
		Size 3	DGT510390	DGT510400	DGT510670	DGT510680	DGT510430	DGT510440	DGT510470	DGT510480
	1200	Size 2	DGT510870	DGT510880	DGT520250	DGT520260	DGT510910	DGT510920	DGT510950	DGT510960
		Size 3	DGT510890	DGT510900	DGT520270	DGT520280	DGT510930	DGT510940	DGT510970	DGT510980
	1400	Size 2	DGT520430	DGT520440	DGT520710	DGT520720	DGT520470	DGT520480	DGT520510	DGT520520
		Size 3	DGT520450	DGT520460	DGT520730	DGT520740	DGT520490	DGT520500	DGT520530	DGT520540
6 - 400 - 3900	1400	Size 2	DGT610870	DGT610880	DGT620250	DGT620260	DGT610910	DGT610920	DGT610950	DGT610960
		Size 3	DGT610890	DGT610900	DGT620270	DGT620280	DGT610930	DGT610940	DGT610970	DGT610980
6 - 400 - 3900 R	1400	Size 2	DGT620430	DGT620440	DGT620710	DGT620720	DGT620470	DGT620480	DGT620510	DGT620520
		Size 3	DGT620450	DGT620460	DGT620730	DGT620740	DGT620490	DGT620500	DGT620530	DGT620540

Endcarriages for DOUBLE GIRDER cranes with connection plates to "bridge girders"- "Lateral+Supported" configuration



Joining of beam-girder in
"Lateral+Supported" configuration



Beam joining area section

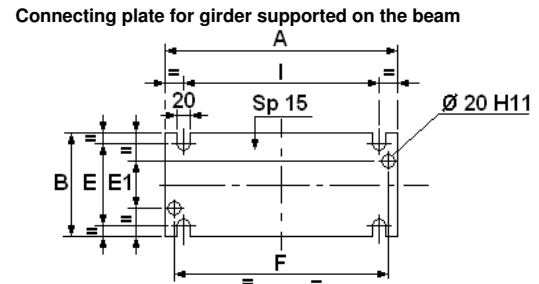
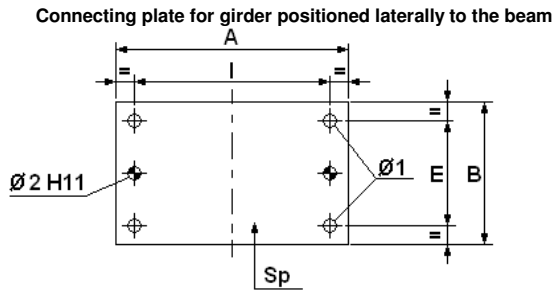
Endcarriage type	Beam codes based on the gauge of the dual rail trolley and the max. width of the beam girder span			(for other quotas see page 27)														Weight (kg)							
	Double girder trolley Gauge (mm)	Bridge crane girders Max. width (mm)	Beam Code	Quotas (mm)																					
				I	I1	I2	F	F1	A	C	D	E	G	ø1	ø2										
1 – 125 – 2400	1000	305	DGT120010	360	870	65	402	828	60	7	165	120	78	18	20	130									
		370	DGT120020	430	865	67.5	472	823																	
	1200	305	DGT120410	360	1070	65	402	828																	
		370	DGT120420	430	1065	67.5	472	823																	
1 – 125 – 3300	1000	305	DGT120060	360	870	65	402	828								60	7	165	120	78	18	20	167		
		370	DGT120070	430	865	67.5	472	823																	
		450	DGT120080	510	805	97.5	552	763																	
	1200	305	DGT120460	360	1070	65	402	1028																	
		370	DGT120470	430	1065	67.5	472	1023																	
		450	DGT120480	510	1005	97.5	552	963																	
	1400	305	DGT120760	360	1270	65	402	1228																	
		370	DGT120770	430	1265	67.5	472	1223																	
		450	DGT120780	510	1205	97.5	552	1163																	
	2 – 160 – 2400	1000	305	DGT220010	360	870	65	402	828	60	7	190	140	98	20									20	162
			370	DGT220020	430	865	67.5	472	823																
		1200	305	DGT220410	360	1070	65	402	1028																
370			DGT220420	430	1065	67.5	472	1023																	
2 – 160 – 3300	1000	370	DGT220070	430	865	67.5	472	823	60							7	190	140	98	20	20	207			
		450	DGT220080	510	816	92	552	774																	
	1200	370	DGT220470	430	1065	67.5	472	1023																	
		450	DGT220480	510	1016	92	552	974																	
	1400	370	DGT220770	430	1265	67.5	472	1223																	
		450	DGT220780	510	1216	92	552	1174																	
3 – 200 – 2700	1000	360	DGT320010	420	830	85	462	788	80							9	225	160	118	22	25	260			
		410	DGT320020	480	846	77	522	804																	
	1200	360	DGT320410	420	1030	85	462	988																	
		410	DGT320420	480	1046	77	522	1004																	
	1400	360	DGT320710	420	1230	85	462	1188																	
		410	DGT320720	480	1246	77	522	1204																	
3 – 200 – 3600	1000	360	DGT320060	420	830	85	462	788		80	9	225	160	118	22							25	335		
		410	DGT320070	480	846	77	522	804																	
		500	DGT320080	560	846	77	602	804																	
	1200	360	DGT320460	420	1030	85	462	988																	
		410	DGT320470	480	1046	77	522	1004																	
		500	DGT320480	560	1046	77	602	1004																	
	1400	360	DGT320760	420	1230	85	462	1188																	
		410	DGT320770	480	1246	77	522	1204																	
		500	DGT320780	560	1246	77	602	1204																	

Endcarriages for DOUBLE GIRDER cranes with connection plates to "bridge girders"- "Lateral + Supported" configuration															
Endcarriage type	Beam codes based on the gauge of the dual rail trolley and the max. width of the beam girder span			(for other quotas see page 27)											
	Double girder trolley gauge Gauge (mm)	Bridge crane girders Ala max. Beam (mm)	Beam Code	I	I1	I2	F	F1	A	C	D	E	G	Ø1	Ø
4 – 250 – 2700	1000	410	DGT420010	480	846	77	522	804							
		490	DGT420020	560	846	77	602	804							
	1200	410	DGT420410	480	1046	77	522	1004							
		490	DGT420420	560	1046	77	602	1004							
4 – 250 – 3600	1000	490	DGT420070	560	846	77	602	804	80	9	270	190	148	26	25
		565	DGT420080	640	841	79.5	682	799							
	1200	490	DGT420470	560	1046	77	602	1004							
		565	DGT420480	640	1041	79.5	682	999							
	1400	490	DGT420770	560	1246	77	602	1204							
		565	DGT420780	640	1241	79.5	682	1199							
5 – 315 – 3900	1000	410	(X)	500	826	87	542	784							
		490	(X)	580	826	87	622	784							
		615	(X)	710	805	97.5	752	763							
	1200	410	(X)	500	1026	87	542	984							
		490	(X)	580	1026	87	622	984	100	12	305	220	178	30	32
		615	(X)	710	1005	97.5	752	963							
	1400	410	(X)	500	1226	87	542	1184							
		490	(X)	580	1226	87	622	1184							
		615	(X)	710	1205	97.5	752	1163							
6 – 400 – 3900	1400	410	(X)	500	1226	87	542	1184							
		490	(X)	580	1226	87	622	1184							
		615	(X)	710	1205	97.5	752	1163							
6 – 400 – 3900 R	1400	410	(X)	500	1226	87	542	1184	100	12	350	250	208	36	32
		490	(X)	580	1226	87	622	1184							
		615	(X)	710	1205	97.5	752	1163							

(X) Code defined as follows based on the span width, type of reducer employed and "left" or "right" positioning of the reaction arm:

Endcarriage type	Trolley gauge	Offset gearbox	Max. width 410		Max. width 490		Max. width 615	
			Reaction arm "right"	Reaction arm "left"	Reaction arm "right"	Reaction arm "left"	Reaction arm "right"	Reaction arm "left"
5 – 315 – 3900	1000	Size 2	DGT510490	DGT510500	DGT510530	DGT510540	DGT510570	DGT510580
		Size 3	DGT510510	DGT510520	DGT510550	DGT510560	DGT510590	DGT510600
	1200	Size 2	DGT520010	DGT520020	DGT520050	DGT520060	DGT520090	DGT520100
		Size 3	DGT520030	DGT520040	DGT520070	DGT520080	DGT520110	DGT520120
	1400	Size 2	DGT520550	DGT520560	DGT520590	DGT520600	DGT520630	DGT520640
		Size 3	DGT520570	DGT520580	DGT520610	DGT520620	DGT520650	DGT520660
6 – 400 – 3900	1400	Size 2	DGT620010	DGT620020	DGT620050	DGT620060	DGT620090	DGT620100
		Size 3	DGT620030	DGT620040	DGT620070	DGT620080	DGT620110	DGT620120
6 – 400 – 3900 R	1400	Size 2	DGT620550	DGT620560	DGT620590	DGT620600	DGT620630	DGT620640
		Size 3	DGT620570	DGT620580	DGT620610	DGT620620	DGT620650	DGT620660

Geometric specifications for "girder-beam" connecting plates for SINGLE and DOUBLE GIRDER bridge cranes



Beam type		Max. beam widt h W (mm)	Plate positioned laterally to the beam									Plate supported on the beam								
Size “DGT”	Ø Wheel (mm)		Type	Dimensions (mm)							Weight (kg)	Type	Dimensions (mm)					Weight (kg)		
				A	I	B	Ø 1	E	Ø 2	Sp			F	A	I	B	E		E	
1	125	305	L 11	420	360							8.6	A 11	402	440	360				8.0
		370	L 12	490	430	220	18	165	20	12	10.0	A 12	472	510	430	160	120	78	9.3	
		450	L 13	570	510						11.6	A 13	552	590	510				10.8	
2	160	305	L 21	420	360							9.7	A 21	402	440	360				9.0
		370	L 22	490	430	250	20	190	20	12	11.5	A 22	472	510	430	180	140	98	10.5	
		450	L 23	570	510						13.3	A 23	552	590	510				12.2	
3	200	360	L 31	500	420							16.8	A 31	462	500	420				11.5
		410	L 32	560	480	290	22	225	25	15	18.5	A 32	522	560	480	200	160	11	13.0	
		500	L 33	640	560						21.6	A 33	602	640	560				14.7	
4	250	410	L 41	560	480							21.8	A 41	522	560	480				14.9
		490	L 42	640	560	335	26	270	25	15	24.5	A 42	602	640	560	230	190	14	17.0	
		565	L 43	720	640						27.6	A 43	682	720	640				19.2	
5	315	410	L 51	600	500							35.0	A 51	542	580	500				17.4
		490	L 52	680	580	385	30	305	32	20	40.4	A 52	622	660	580	260	220	17	20.0	
		615	L 53	810	710						47.5	A 53	752	790	710				23.8	
6	400 400 R	410	L 61	600	500							40.5	A 61	542	580	500				19.5
		490	L 62	680	580	440	36	350	32	20	46.1	A 62	622	660	580	290	250	20	22.2	
		615	L 63	810	710						55.1	A 63	752	790	710				26.6	

Field of application for "girder-beam" connecting plates for Single girder **M** and DOUBLE **D** GIRDER bridge cranes

		Beam type																								
Plate type		1					2					3					4					5			6	
		125					160					200					250					315			400	
		1800	2400	3300			1800	2400	3300			2100	2700	3600			2100	2700	3600	3600 R	2400	3900	3900	3900 R		
L 11	A 11	M	M	D	M	D																				
L 12	A 12	M	M	D	M	D																				
L 13	A 13		M		M	D																				
L 21	A 21						M	M	D	M	D															
L 22	A 22						M	M	D	M	D															
L 23	A 23							M		M	D															
L 31	A 31									M	M	D	M	D												
L 32	A 32									M	M	D	M	D												
L 33	A 33									M		M		D												
L 41	A 41										M	M	D	D	D	M										
L 42	A 42										M	M	D	M	D	M										
L 43	A 43										M	M		D	M											
L 51	A 51																		M	D						
L 52	A 52																		M	D						
L 53	A 53																		M	D						
L 61	A 61																				D		D			
L 62	A 62																				D		D			
L 63	A 63																				D		D			

2.3.9 Sample guidelines for selecting endcarriages and drive Units

To make the right choice of “DGT” series endcarriages in combination with drive units, firstly establish the functional parameters determining their operating limitations, defining and/or verifying the following factors (see the examples for various operating situations as illustrated below):

1. Define the crane's functional specifications: Capacity (kg), ISO (FEM) service group, Gauge (m) and running speed (m/min);
2. Define the crane's mass (weight = kg), including all accessory parts (panel, electrical system, etc.);
3. Define the weight (kg) of the lifting and traversing equipment, i.e. the weight of the hoist + trolley (or winch/trolley);
4. Calculate the total mass to be moved, i.e. the nominal Capacity + the weight of the crane + the weight of the trolley/hoist (or winch/trolley);
5. Select the type of beams from the “Operating limitations” tables, at pages 28 or 30, based on: Capacity, ISO (FEM) group and Gauge;
6. Check that the mass to be moved is \leq with respect to the travelling mass, as indicated at the margin of the “Operating limitations” tables at pages 28 or 30;
7. Verify the maximum, minimum and average reactions (kg) on the wheels, in relation to the load's juxtapositions/eccentricities;
8. Verify the correspondence of the width of the contact area in relation to the type of rail on which the wheels run;
9. Select the electromechanical drive components (select the offset motored reducer group) from the tables on pages 20 to 26.
10. Determine the code for the beams, based on the type selected and structural configuration for the connection with the bridge beam(s), using: the tables at pages 28 – 29 for a SINGLE GIRDER crane, and the tables at pages 30 – 36 for a DOUBLE GIRDER crane.
11. Using the “Geometric specifications” table at page 37, determine the type of “beam-girder” connecting plates.

1st Example: Single girder travelling bridge crane - Capacity 5 t - Span 16 m

1. nominal load $P = 5000$ kg; ISO service group M4 (FEM 1Am); gauge 16 m; 2 crane running speeds = 40/10 m/min;
2. weight of crane + accessories : $M1 \approx 2500$ kg
3. weight of hoist + trolley : $M2 \approx 500$ kg
4. total travelling mass : $5000 + 2500 + 500 = 8000$ kg
5. from the diagram at page 8, with a capacity of 5000 kg; ISO group M4 (FEM 1Am) and span 16 m, select the endcarriages:

Type	1 – 125 – 2400	or:	DGT size	1	Wheel Ø (mm)	125	Wheel basis (mm)	2400
------	----------------	-----	----------	---	--------------	-----	------------------	------

6. from the diagram at page 8, we can deduce that the endcarriages 1 – 125 – 2400 admit masses of up to 8400 kg > than the 8000 kg to haul;
7. at this point, check the suitability of the wheel Ø 125 for the selected endcarriages, in relation to its admissible reactions and the type of rail, calculated as illustrated at page 19 for gauge “S” = 16,000 mm and supposing a juxtaposition “a” = 1000 mm:
 - $R_{max} = 2500/4 + [(500 + 5000)/2] \cdot (1 - 1000/16,000) \approx 3203$ kg
 - $R_{min} = 2500/4 + 500/2 \cdot 1000/16,000 \approx 641$ kg
 - $R_{med} = (2 \cdot R_{max} + R_{min})/3 = (2 \cdot 3203 + 641)/3 \approx 2349$ kg < than 3670 kg, corresponding to the admissible R_{max} ;
8. supposing a flat laminated rail, with $l = 40$ and operating band $b = 38$ (see table at page 18), from the diagram at page 19 we can deduce that, for a Ø 125 wheel with a standard sheave width, considering the factors (speed and operating bandwidth), the average admissible reaction for the service group M4 (1Am) is: $R_{med. admissible} \approx 2400$ kg > of the ~ 2349 kg the wheel is subject to (example at page 19);
9. based on the selected speed and calculation of mass to be traversed for each drive wheel, derive the following components from the table at page 28:

Nominal speed (m/min)	The travelling mass (kg) from each gearmotor in the service group ISO M4 (FEM 1Am) is in kg:	“DGT” wheel group Ø (mm)	“DGP” motored reducer		Self-braking motor specs		“DGP” motored ucer partnum ber
			Reducer Type	Motor Type	Poles (N°)	Power (kW)	
40/10	4200 > of 4000 kg to be hauled	125	022	71K3L	2/8	0.40/0.09	P0M2A23KA0

10. supposing a “Lateral” connected girder-beam configuration and a girder span width > than 305 and \leq than 370, from the table at page 8, we can deduce that the endcarriages type 1 – 125 – 2400 have a partnumber: [DGT110310];
11. from the “Geometric specifications” table at page 17, we can deduce that, for the beams in question with a “Lateral” connected girder-beam configuration and a girder span width > than 305 and \leq 370, the type of “girder-beam” connecting cross plates are: [L12]

2nd Example: Double girder travelling bridge crane - Capacity 10 t - Span 20 m

- nominal load $P = 10,000$ kg; ISO service group M4 (FEM 1Am); gauge 20 m; 2 crane running speeds = 40/10 m/min;
- weight of crane + accessories : $M1 \cong 5,900$ kg
- weight of hoist + trolley : $M2 \cong 750$ kg
- total travelling mass : $10,000 + 5,900 + 750 = 16,650$ kg
- from the diagram at page 10, with a capacity of 10,000 kg; ISO group M4 (FEM 1Am) and span 20 m, select the endcarriages:

Type	3 – 200 – 3600	or:	DGT size	3	Wheel Ø (mm)	200	Wheel basis (mm)	3600
------	----------------	-----	----------	---	--------------	-----	------------------	------

- from the diagram at page 10, we can deduce that the endcarriages 3 – 200 – 3600 admit masses of up to 18,800 kg > than the 16,650 kg to haul;
- at this point, check the suitability of the wheel Ø 200 for the selected endcarriages, in relation to its admissible reactions and the type of rail, calculated as illustrated at page 19 for gauge “S” = 20,000 mm and supposing a juxtaposition “a” = 1000 mm:
 - $R_{max.} = 5900/4 + [(750 + 10,000)/2] \cdot (1 - 1000/20,000) \cong 6581$ kg
 - $R_{min.} = 5900/4 + 750/2 \cdot 1000/20,000 \cong 1494$ kg
 - $R_{med.} = (2 \cdot R_{max.} + R_{min.})/3 = (2 \cdot 6581 + 1494)/3 \cong 4885$ kg < than 7340 kg, corresponding to the admissible $R_{max.}$;
- supposing a flat laminated rail, with $l = 50$ and operating band $b = 48$ (see table at page 18), from the diagram at page 20 we can deduce that, for a Ø 200 wheel with a standard sheave width, considering the factors (speed and operating bandwidth), the average admissible reaction for the service group M4 (1Am) is: $R_{med.}$ admissible $\cong 5500$ kg > of the ~ 4885 kg the wheel is subject to (example at page 21);
- based on the selected speed and calculation of mass to be traversed for each drive wheel, derive the following components from the table at page 28:

Nominal speed (m/min)	The travelling mass (kg) from each motoreducer in the service group ISO M4 (FEM 1Am) is in kg:	“DGT” wheel group Ø (mm)	“DGP” motoreducer Reducer Type	Motor Type	Self-braking motor specs Poles (N°)	Power (kW)	“DGP” motored ucer partnum ber
40/10	9.400 > of 8325 kg to be hauled	200	134	80K3L	2/8	0.63/0.15	P1M3B43KA0

- supposing a “Lateral + Supported” connected girder-beam configuration with a double girder trolley gauge of 1200 mm and a girder span width > than 360 and ≤ 410 , from the table at page 15, we can deduce that the beams type 3 – 200 – 3600 have a partnumber: DGT320470;
- from the “Geometric specifications” table at page 17, we can deduce that, for the beams in question with a “Lateral + Supported” connected girder-beam configuration and a girder span width > than 360 and ≤ 410 , the type of “girder-beam” connecting cross plates are: L32 + A32

3rd Example: Double girder travelling bridge crane - Capacity 16 t - Span 27 m

- nominal load $P = 16,000$ kg; ISO service group M5 (FEM 2m); gauge 27 m; 2 crane running speeds = 40/10 m/min;
- weight of crane + accessories : $M1 \cong 14,600$ kg
- weight of hoist + trolley : $M2 \cong 1400$ kg
- total travelling mass : $16,000 + 14,600 + 1400 = 32,000$ kg
- from the diagram at page 10, with a capacity of 16,000 kg; ISO group M5 (FEM 2m) and span 27 m, select the endcarriages:

Type	5 – 315 – 3900	or:	DGT size	5	Wheel Ø (mm)	315	Wheel basis (mm)	3900
------	----------------	-----	----------	---	--------------	-----	------------------	------

- from the diagram at page 10, we can deduce that the beams 5 – 315 – 3900 admit masses of up to 35,900 kg > of the 32,000 kg to haul;
- at this point, check the suitability of the wheel Ø 315 for the selected beams, in relation to its admissible reactions and the type of rail, calculated as illustrated at page 19 for gauge “S” = 27,000 mm and supposing a juxtaposition “a” = 1200 mm:
 - $R_{max.} = 14,600/4 + [(1400 + 16,000)/2] \cdot (1 - 1200/27,000) \cong 11,963$ kg
 - $R_{min.} = 14,600/4 + 1400/2 \cdot 1200/27,000 \cong 3681$ kg
 - $R_{med.} = (2 \cdot R_{max.} + R_{min.})/3 = (2 \cdot 11,963 + 3681)/3 \cong 9,202$ kg < than 14,679 kg, corresponding to the admissible $R_{max.}$;
- supposing a flat laminated rail, with $l = 60$ and operating band $b = 58$ (see table at page 18), from the diagram at page 21 we can deduce that, for a Ø 315 wheel with a standard sheave width, considering the factors (speed and operating bandwidth), the average admissible reaction for the service group M5 (2m) is: $R_{ave.}$ admissible $\cong 9900$ kg > of the ~ 9202 kg the wheel is subject to (example at page 21);
- based on the selected speed and calculation of mass to be traversed for each drive wheel, derive the following components from the table at page 28:

Nominal speed (m/min)	The travelling mass (kg) from each motoreducer in the service group ISO M5 (FEM 2m) is in kg:	“DGT” wheel group Ø (mm)	“DGP” motoreducer Reducer Type	Motor Type	Self-braking motor specs Poles (N°)	Power (kW)	“DGP” motored ucer partnum ber
40/10	18.400 > of 16,000 kg to be hauled	315	234	100K3C	2/8	1.25/0.31	P2M5B43AA0

- supposing a “Supported” connected girder-beam configuration with a double girder trolley gauge of 1200 mm and a girder span width > than 410 and ≤ 490 , from the table at page 14, we can deduce that the endcarriages type 5 – 315 – 3900 in combination with the offset motoreducer size 2, have, respectively, the following partnumbers:
 - beam with “right” reaction arm DGT510870;
 - beam with “left” reaction arm DGT510880;
- from the “Geometric specifications” table at page 17, we can deduce that, for the beams in question with a “Supported” connected girder-beam configuration and a girder span width > 410 and ≤ 490 , the type of “girder-beam” connecting cross plates are from the “Geometric specifications” table at page 17, we can deduce that, for the beams in question with a “Lateral” connected girder-beam configuration and a girder span width > 305 and ≤ 370 , the type of “girder-beam” connecting cross plates are: A62

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. endstops);
- 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
 <p>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.</p>	 <ul style="list-style-type: none"> Warning! Exposure to moving parts can create dangerous situations. Caution! Do not touch moving Beams and/or Wheels. 	 <ul style="list-style-type: none"> 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
 <p>Risk of electrocution when performing maintenance on electrical motors without cutting off electrical power first.</p>	 <ul style="list-style-type: none"> 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. 	 <ul style="list-style-type: none"> 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.
 <p>Risks from the danger of becoming ensnared, crushed and/or exposed to falling loads during inspections, adjustments and maintenance on Beams and/or Wheels.</p>	 <ul style="list-style-type: none"> Warning! Exposure to moving parts can create dangerous situations. Caution! Do not intervene on moving parts Caution! Access to non-authorized personnel is forbidden. 	 <ul style="list-style-type: none"> 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

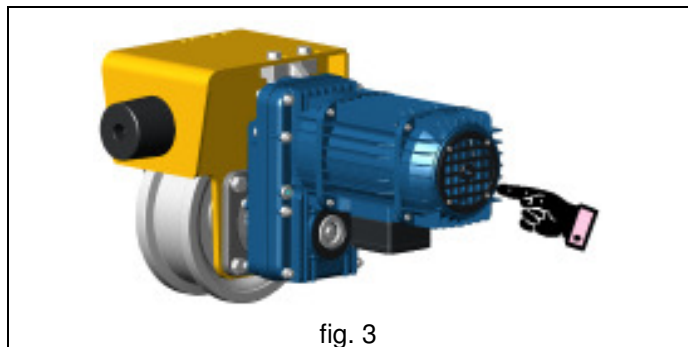
	<ul style="list-style-type: none"> • “DGT” drive units and endcarriages are supplied without command and control devices, which must be provided by the buyer incorporating these components onto an industrial lifting or handling system. • “DGT” drive units and endcarriages must not be operated before they have been incorporated, in conformity with indications outlined in Machinery Directive 98/37/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:

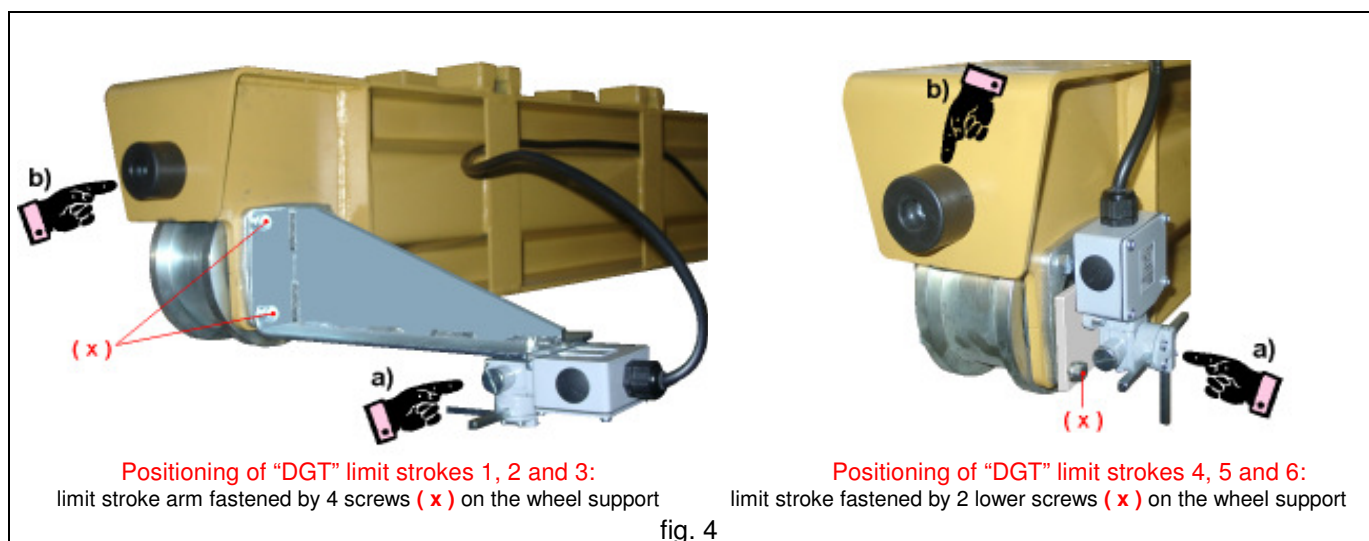
1. **Brakes** (fig. 3): mechanical, negative type, incorporated in the drive motors (self/braking) for forward / reverse manoeuvres.


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.



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.



	<ul style="list-style-type: none"> • 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 2006/95/CE;
 - Electromagnetic Compatibility Directive 2004/108/CE.

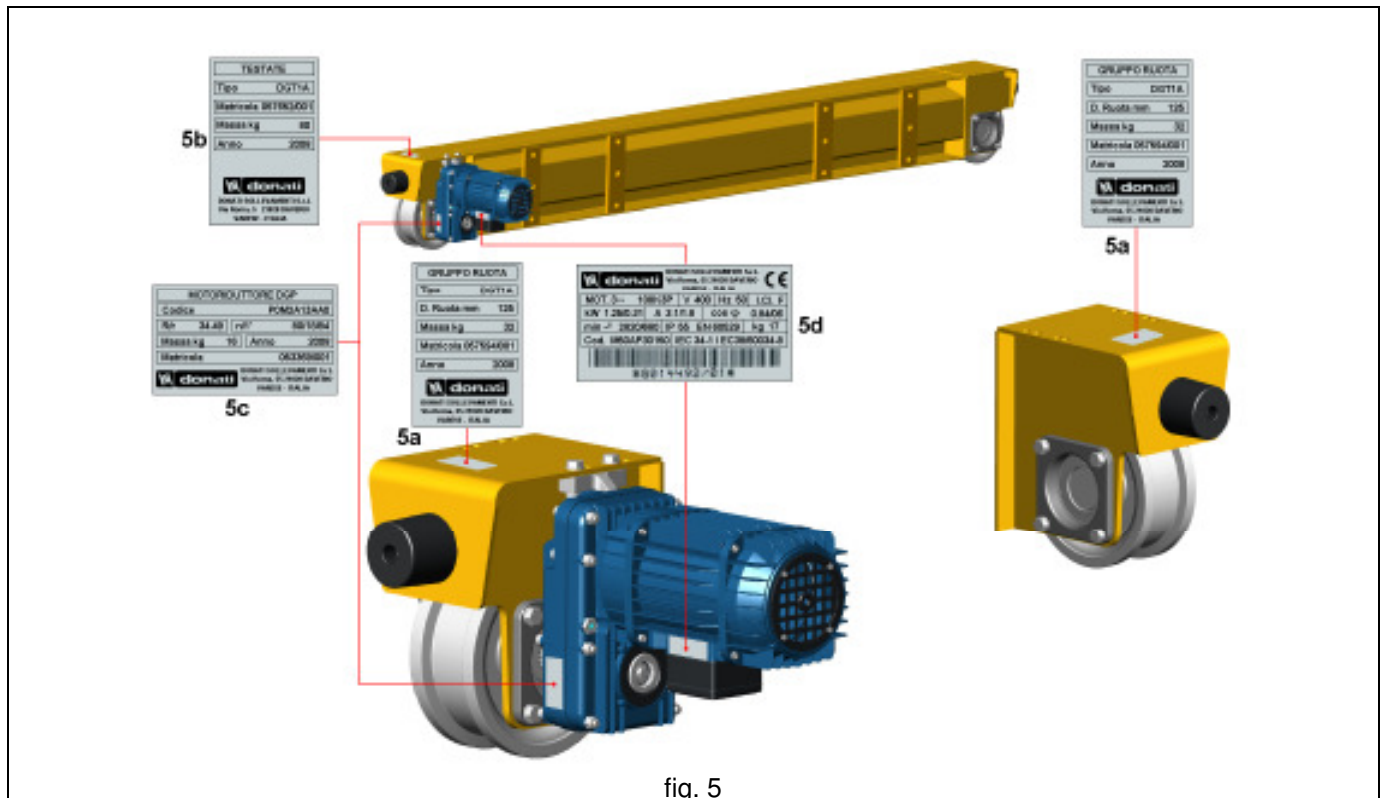


fig. 5


- **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 98/37/CE.

4. - HANDLING - INSTALLATION – SETUP


4.1 – General notes on the shipment

	<ul style="list-style-type: none"> • “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.
---	--


	<ul style="list-style-type: none"> • 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 – Attachment 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 handling 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.

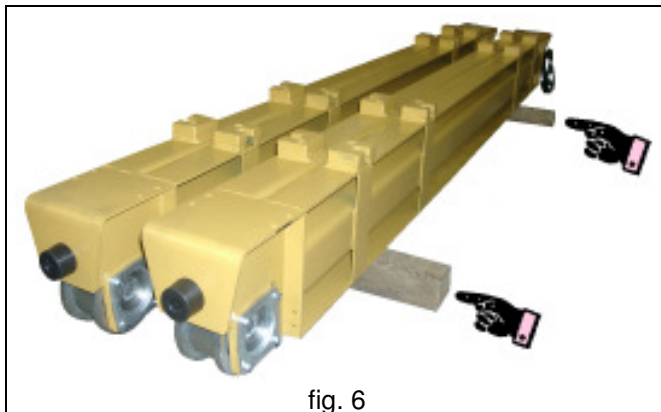


fig. 6

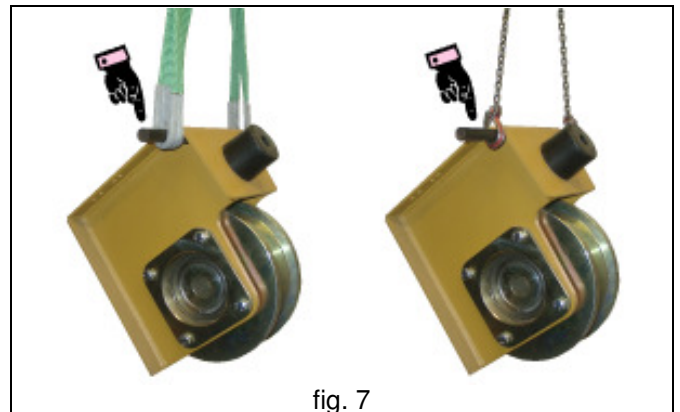


fig. 7

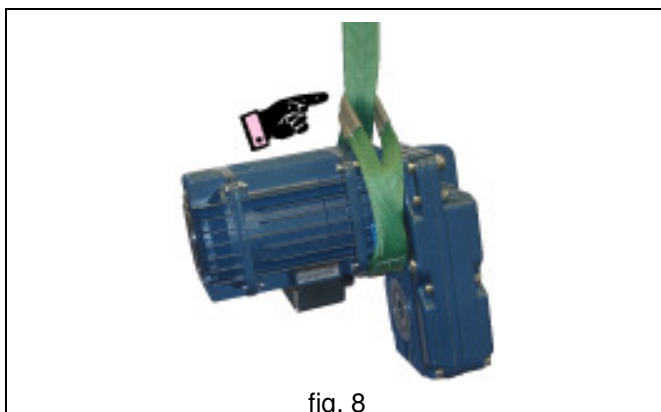


fig. 8

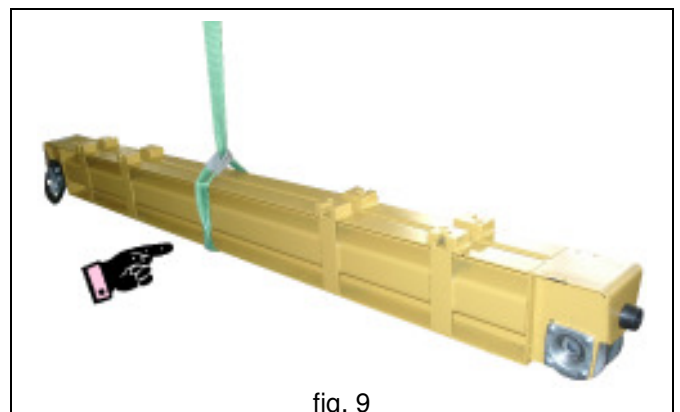





fig. 9

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



	<ul style="list-style-type: none"> • 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: <ol style="list-style-type: none"> 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 an 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

	<ul style="list-style-type: none"> • “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 (see point 2.3.7; table on “Clearance requirements for wheel groups” at page 18). • 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..
---	---

	<p>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.</p>	
---	--	---

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)

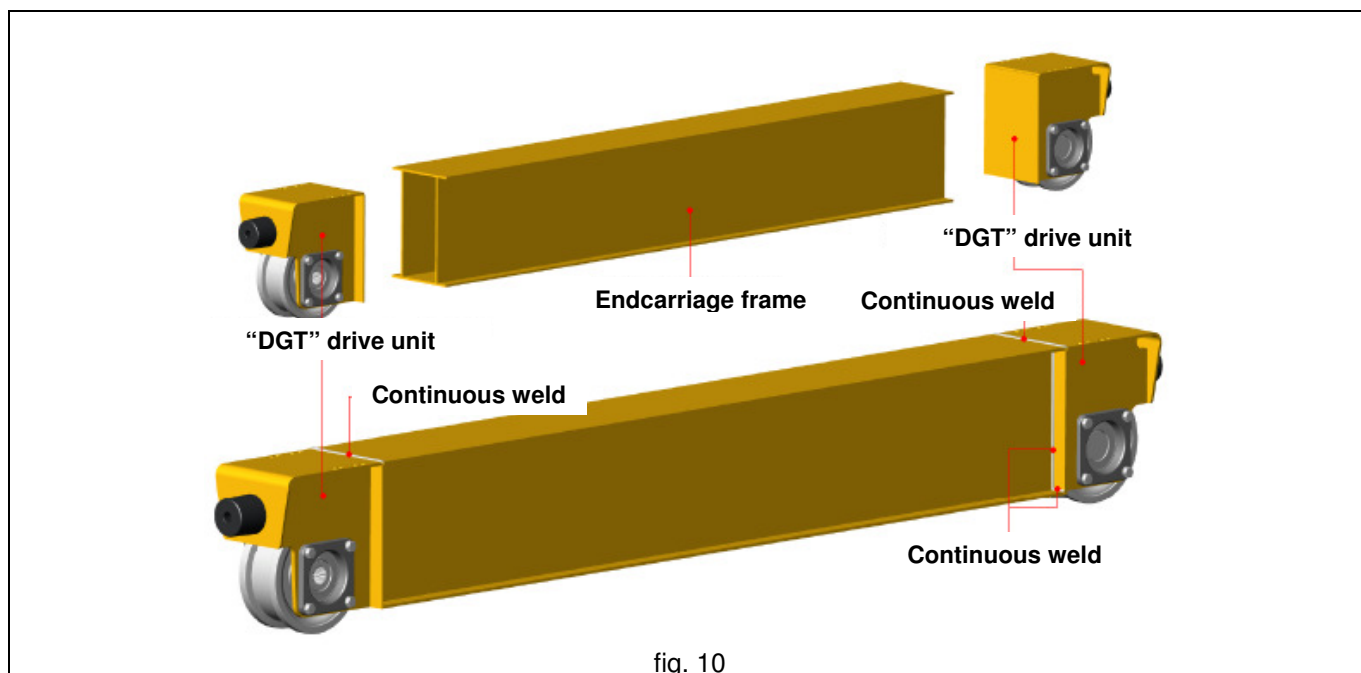
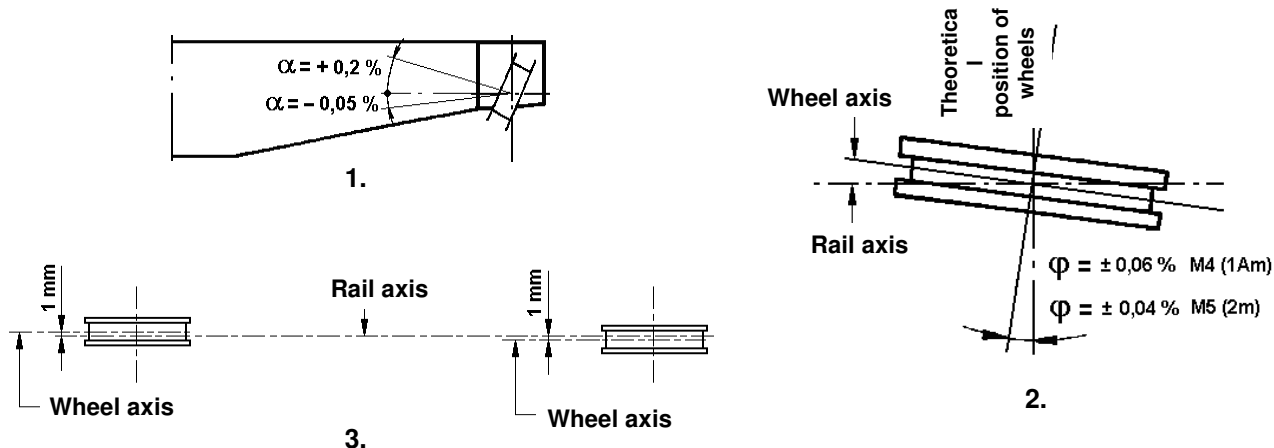


fig. 10



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).

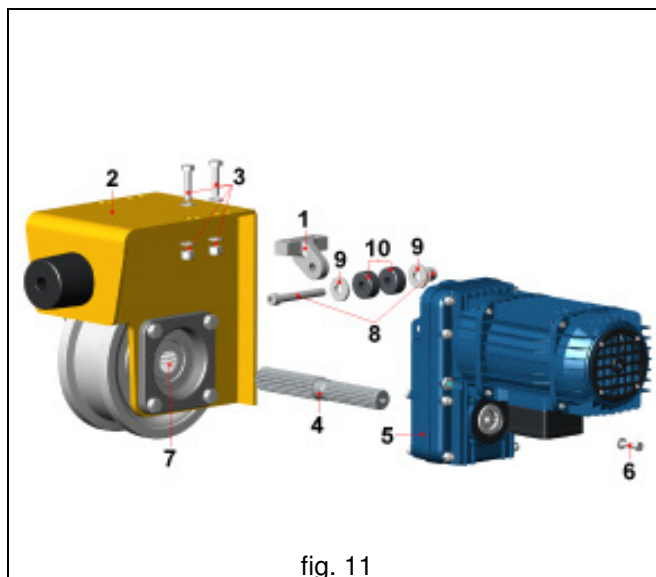
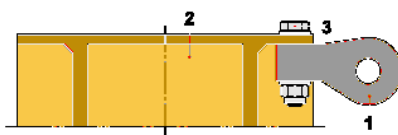
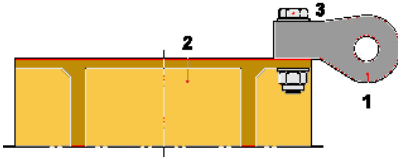
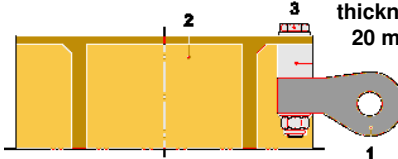
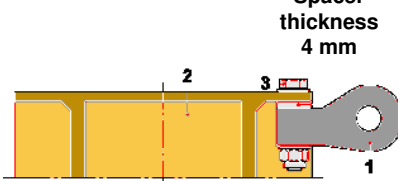


fig. 11

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

Combination of "DGT" wheel groups with "DGP" offset geared motors (valid for both "left" and "right" operation)

"DGT" wheel group		"DGP" offset gearmotors Size 0	"DGP" offset gearmotors Size 1
Size	Ø (mm)		
1	125		
2	160	 Spacer thickness 20 mm	 Spacer thickness 4 mm

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

Combination of "DGT" wheel groups with "DGP" offset gear motors (valid for both "left" and "right" operation)

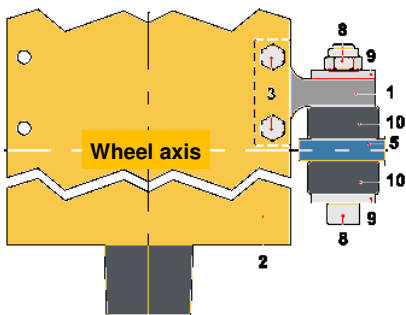
"DGT" wheel group		"DGP" offset gearmotors Size 0	"DGP" offset gearmotors Size 1
Size	Ø (mm)		
1	125		
2	160		

fig. 11a

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

"DGT" wheel group		Combination of "DGT" wheel groups with "DGP" offset gearmotors (valid for both "left" and "right" operation)	
Size	Ø (mm)	"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		Combination of "DGT" wheel groups with "DGP" offset gearmotors (valid for both "left" and "right" operation)	
Size	Ø (mm)	"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		Combination of "DGT" wheel groups with "DGP" swinging gearmotors, in "left" and "right" operation	
Size	Ø (mm)	"DGP" offset gearmotors Size 2	"DGP" offset gearmotors Size 3
5	315		
6	400		
	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 (see point 2.3.8. – table on “Geometric specifications” at page 37);
- 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)**
 - Set the girder alongside the beam, allowing the holes on the cross-plate (1) to match those on the beam (2);
 - Insert the screws (3), taking care to maintain the nuts and rings (4) on the outside, i.e. on the plate (1);
 - Screw on and set the nuts (4) without tightening them, to allow the insertion of the centring pins (5);
 - 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)**
 - Set the girder alongside the beam, allowing the slots on the cross-plate (1) to match those on the blocks (2);
 - Insert the screws (3) into the support blocks (2);
 - Screw on and set the nuts (4) without tightening them, to allow the insertion of the centring pins (5);
 - 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**
 - Proceed as outlined at previous points **L + S**, inserting the centring pins (5) for operation A.

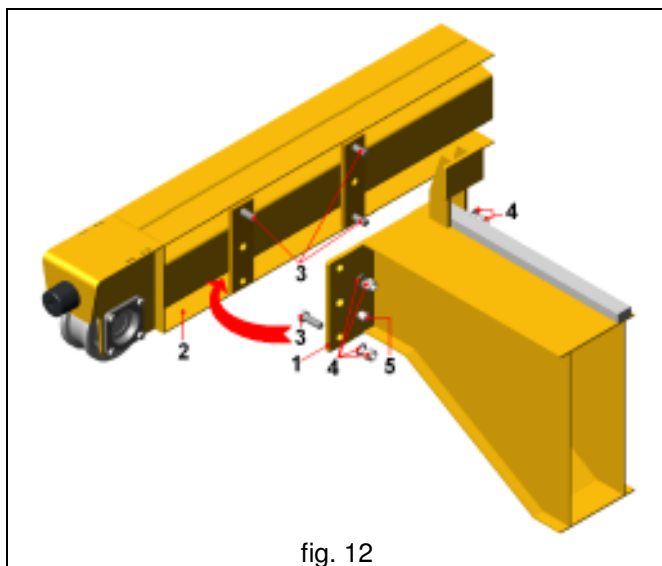


fig. 12

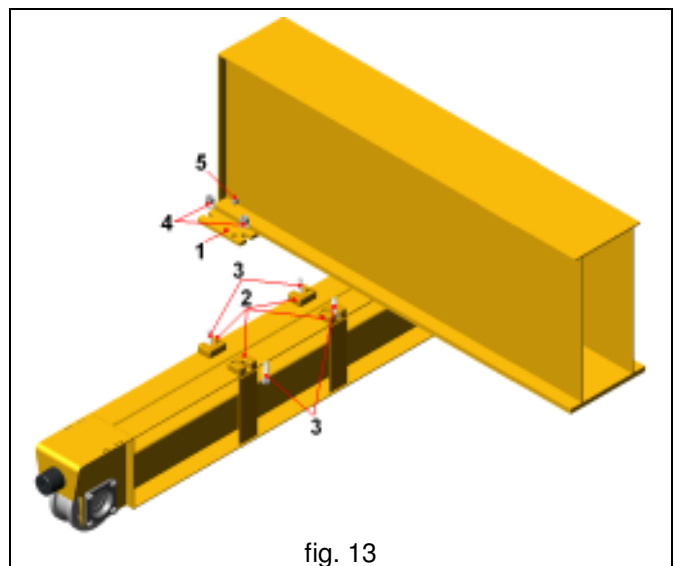


fig. 13





“DGT” beams		Beam connection in “Lateral” operation				Beam connection in “Supported” operation			
Size		Screw class 8.8			Ø centring pin (mm)	Screw class 8.8			
	wheels (mm)	Ø (mm)	length (mm)	tightening torque (Nm)		Ø (mm)	length (mm)	tightening torque (Nm)	
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				
	400	M 33 x 2.0	90	1890					
6	400 R								

fig. 14

fig. 14

4.3.3 Connections and electrical diagrams

	<ul style="list-style-type: none"> • “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. • Motor specifications (power, absorption, etc.) are outlined at page.19 • 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.

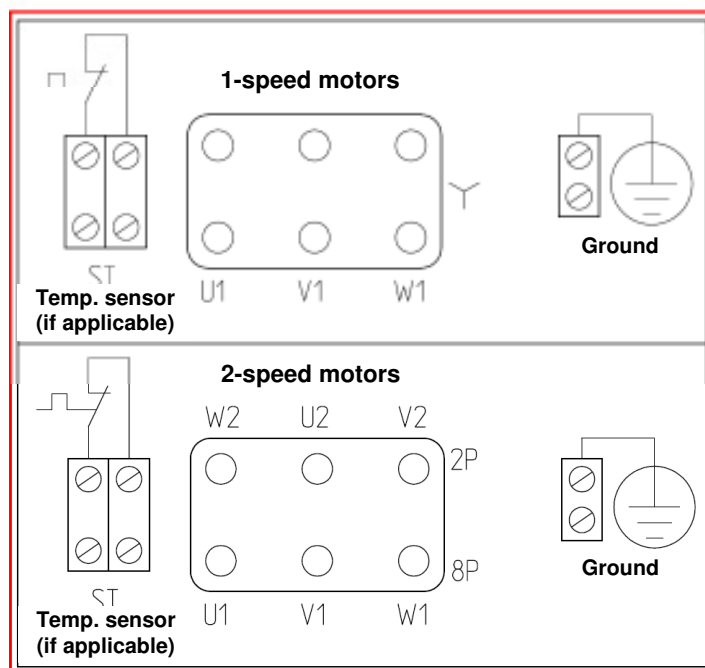





fig. 15

	<ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • “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).



	<p>All tests must be conducted in the absence of wind.</p>
---	---

	<p>Proceed with testing the “DGT” drive units or beams as follows:</p>	
---	---	---

- **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 and 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.

	<p>The handling of the following types of loads is not admissible:</p> <ul style="list-style-type: none"> • 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.

	<p>Standard series “DGT” drive units and endcarriages must not be operated in environments and areas presenting the following characteristics:</p> <ul style="list-style-type: none"> • 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.

	<p>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.</p>
--	---


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.

	<ul style="list-style-type: none"> • 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.

	<ul style="list-style-type: none"> • 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.
- These reactions are calculated as illustrated in the table “**Operating limits for wheels in relation to the rail’s operating contact area and travelling speed**” at page 15, and verify accordingly based on the limitations expressed in the diagrams at pages 15, 16 and 17.
- Operating limitations in relation to **Capacity, ISO/FEM Service Group and Gauge** for **girders on MONORAIL and DUALRAIL bridge cranes** are defined in the respective charts at pages 26 and 28.



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 causing 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

	<ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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 “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.



	<ul style="list-style-type: none"> Personnel carrying out maintenance on the “DGT” drive units and endcarriages must: <ul style="list-style-type: none"> 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 all 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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.



	<ul style="list-style-type: none"> 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:























	<p>Daily interventions performed by the operator making use of the machine on which the “DGT” drive units or endcarriages are assembled:</p> <ul style="list-style-type: none"> general visual checks functional checks on: motors, brakes and limit switches.. 	
---	--	---

	<p>Monthly interventions to be performed by qualified personnel:</p> <ul style="list-style-type: none"> visual checks on mechanisms and lubricant leaks functional checks on brakes at full load checking for abnormal or irregular noises and/or vibrations. 	
---	---	---














	<p>Quarterly interventions to be performed by qualified personnel:</p> <ul style="list-style-type: none"> 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 	Annually 	
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Structural elements Pins and hinges Bolted joints 				 Verify efficiency of pins and hinges Check bolted/welded joints	70
Rubber elastomer: <ul style="list-style-type: none"> 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:	
	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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:	
	<ul style="list-style-type: none"> • 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” 	
	<ul style="list-style-type: none"> • Replace the brake if braking spaces, times and effectiveness are inadequate, even after having made adjustments. IN CASE OF IRREGULARITIES: <ul style="list-style-type: none"> • 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:	
	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • The swinging reducers are lubricated for life and do not require any maintenance nor lubricant refilling. IN CASE OF IRREGULARITIES: <ul style="list-style-type: none"> • 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:	
	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • The thickness of the edging/s on the wheel has diminished by $\geq 50\%$ • 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: <ul style="list-style-type: none"> • structural elements • pins and hinges • bolted joints 	
	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 $\geq 10\%$, or in diameter or thickness $\geq 5\%$ with respect to initial values. 	

	On an annual basis, check the efficiency of the rubber elastomer <ul style="list-style-type: none"> • buffers on the wheel group end stops • shock absorbers on the offset gearmotors. 	
	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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:	
	<ul style="list-style-type: none"> • 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. 	
	<ul style="list-style-type: none"> • 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:	
	<ul style="list-style-type: none"> • 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. 	
	<ul style="list-style-type: none"> • Replace any cables and/or conductors that appear broken, cut, peeled or eroded. • Never carry out hasty repairs. 	

6.3.4 Cleaning and lubrication

	<ul style="list-style-type: none"> • “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. 	
<ul style="list-style-type: none"> • 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. 		
 	<ul style="list-style-type: none"> • 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 <i>DONATI SOLLEVAMENTI S.r.l.</i> 	
	<ul style="list-style-type: none"> • Lubricants, solvents and detergents are toxic/harmful products for our health which can: <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> 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.
--	--

 	<p>Adjustments on the brake on “DGT” drive units or endcarriages:</p> <p>A) Externally set the brake torque B) Internally restoring the brake play</p> <p>WARNING! The use of a safety harness is mandatory when these operations are conducted above ground level.</p>	 	
---	--	---	---

- 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.

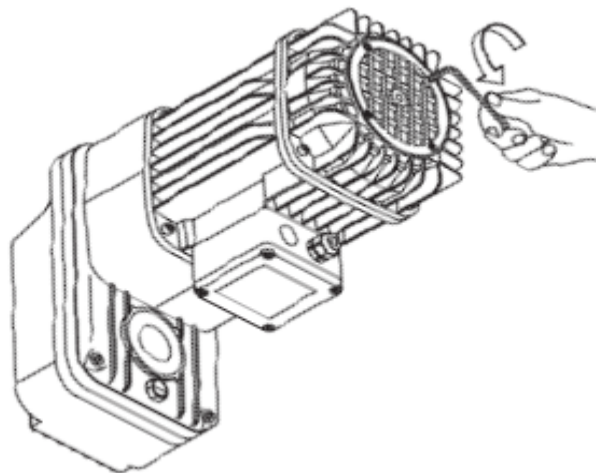
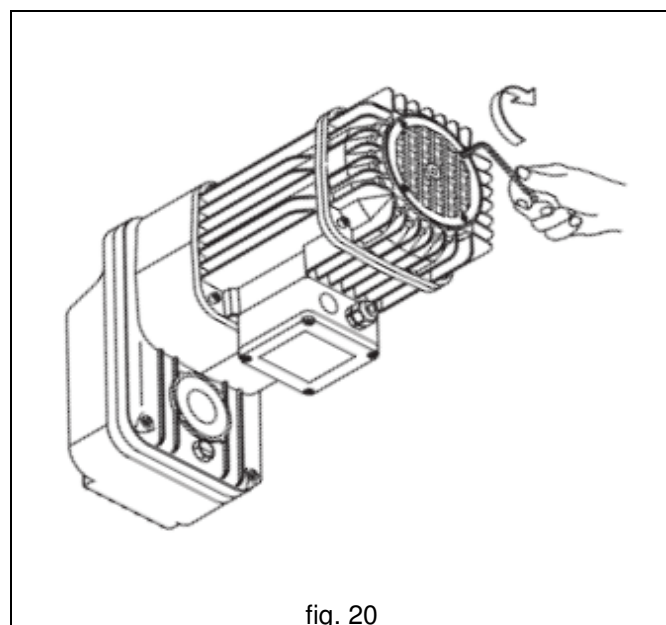
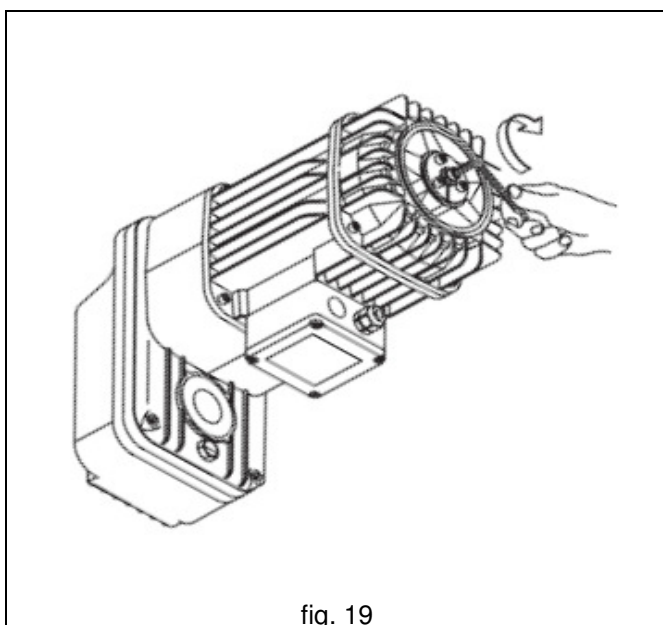
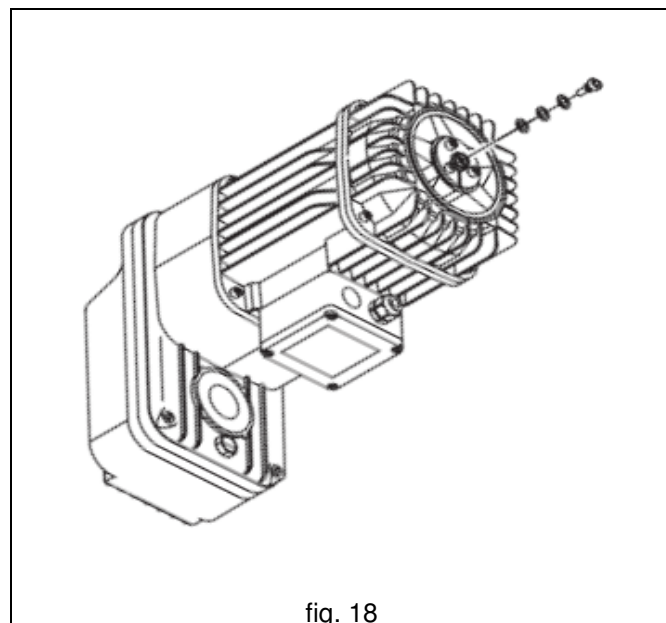
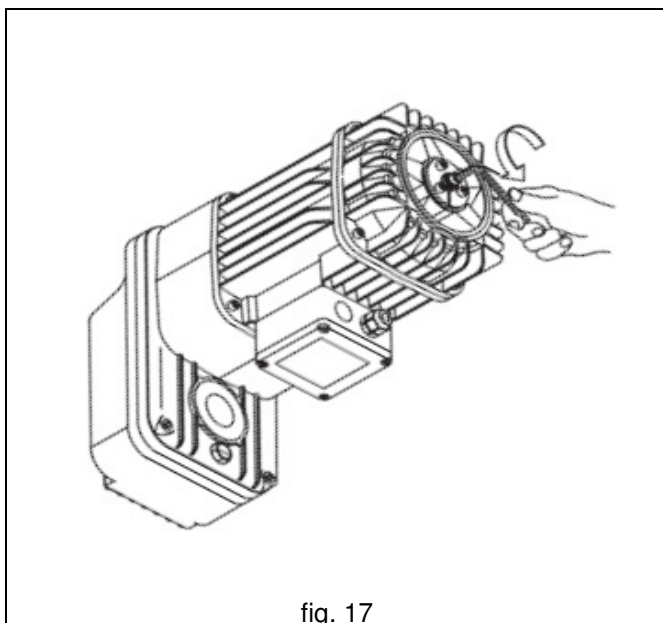


fig. 16

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).



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 ($\cong 1$ mm), 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 from 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.

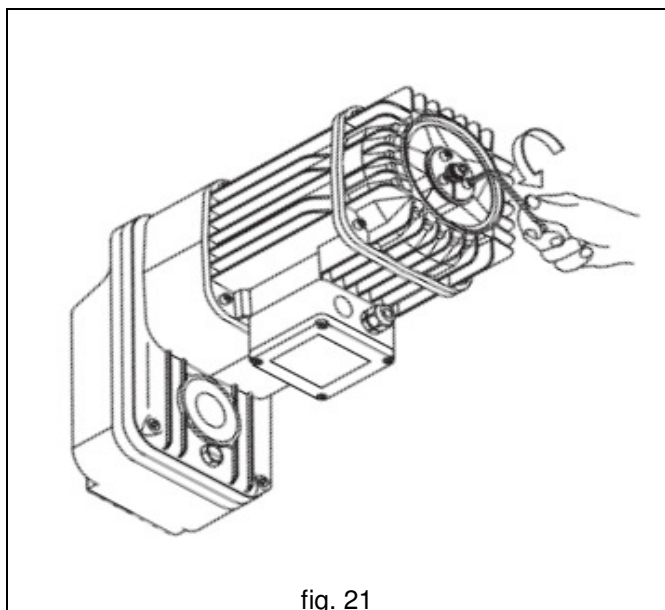


fig. 21

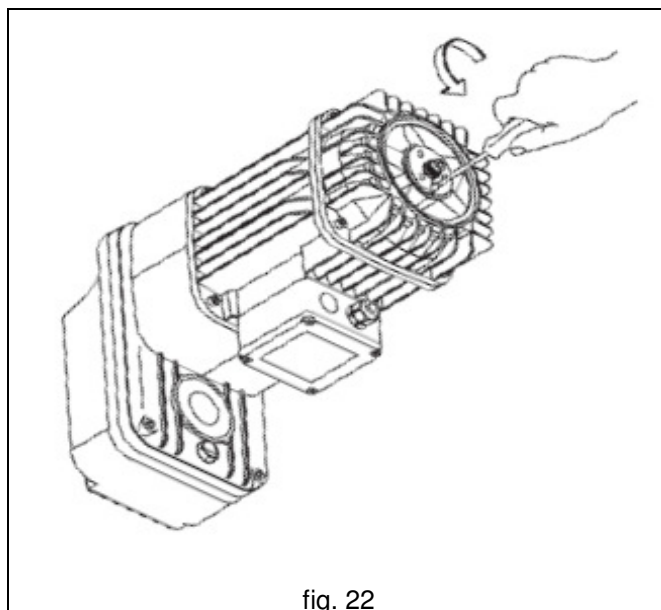


fig. 22

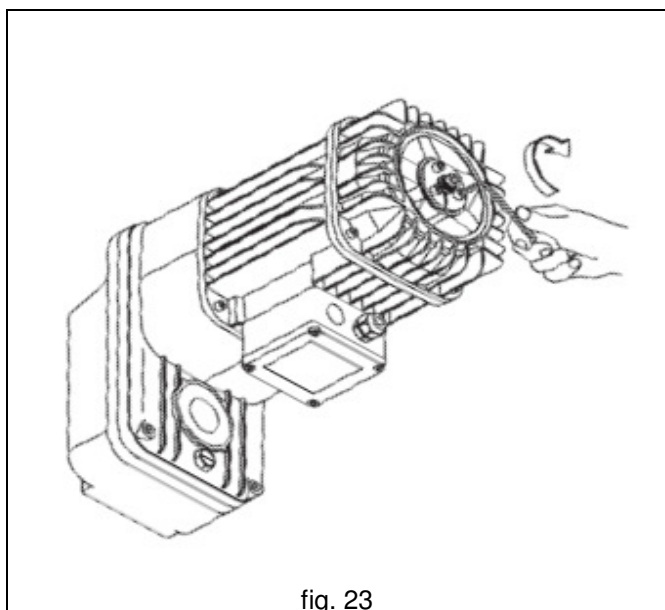


fig. 23

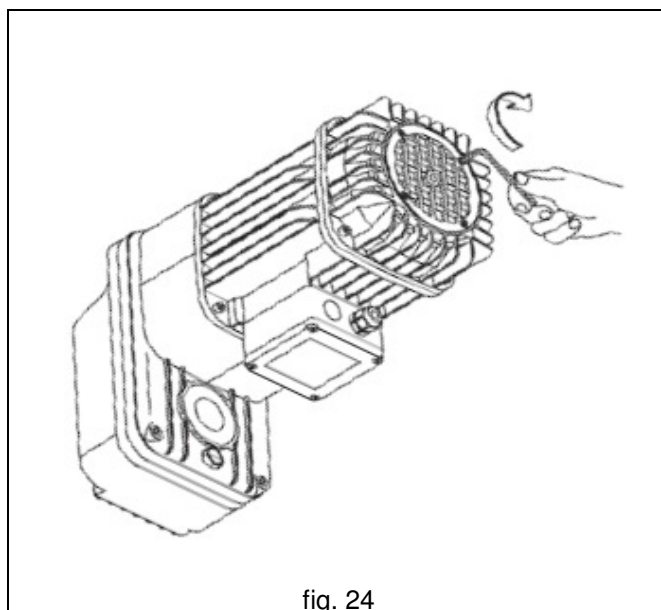








fig. 24



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.

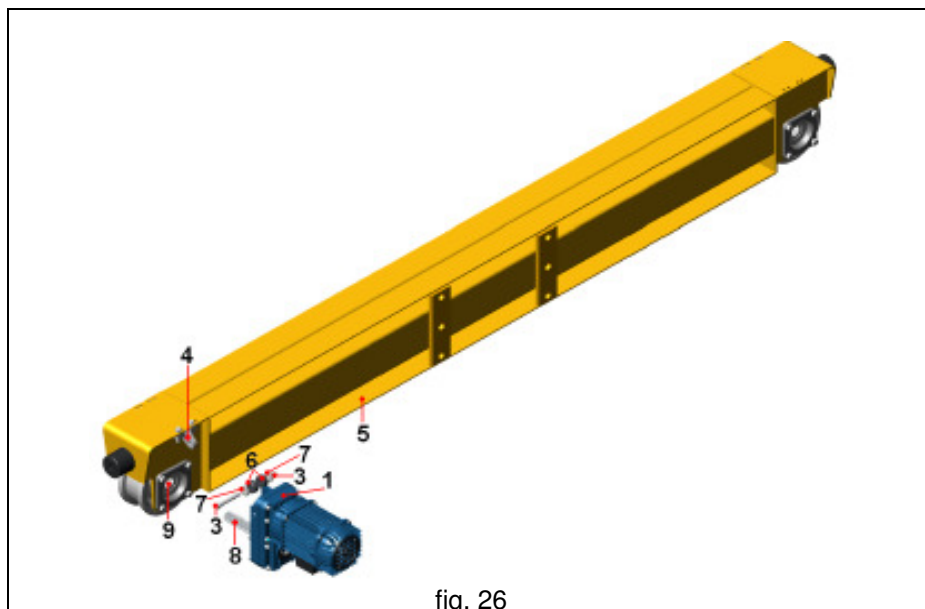
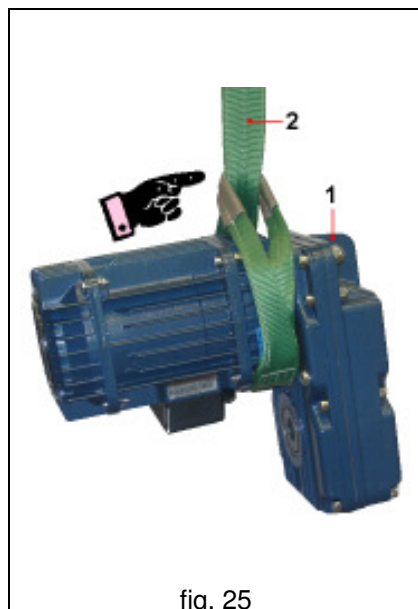
6.5 Disassembling the “DGP” offset gearmotor


 	<p>Disassembly operations must be carried out by qualified and trained personnel, and when working above ground level, equipped with:</p> <ul style="list-style-type: none"> • suitable individual protection devices (e.g. safety harnesses, etc.); • appropriate working tools (e.g. fork lift, crane, scaffolding, etc.). <p>after carefully evaluating the following parameters:</p> <ul style="list-style-type: none"> • 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 	  
--	---	---

	<p>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).</p>
---	--


	<p>Disassembling the “DGP” offset gearmotor (fig. 26):</p>	
---	--	---






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.





	<p>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.</p>
---	--

6.6 Replacing parts and components

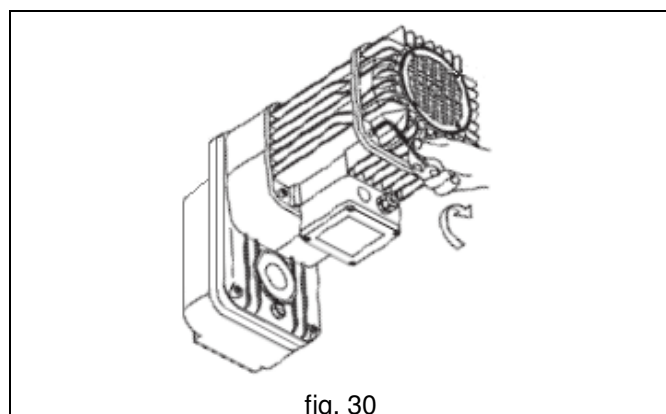
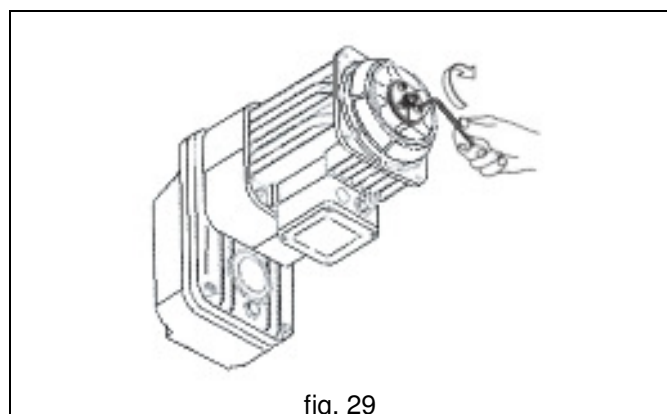
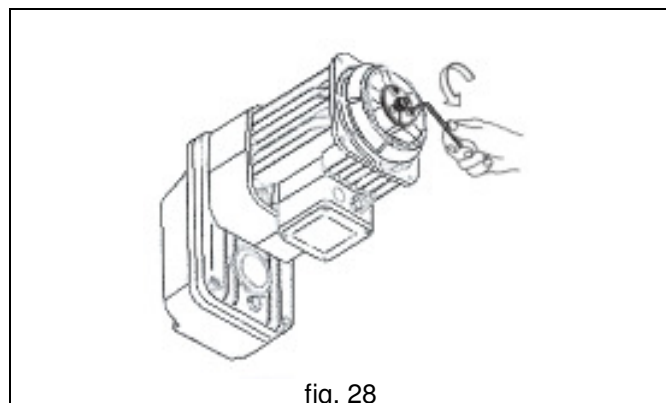
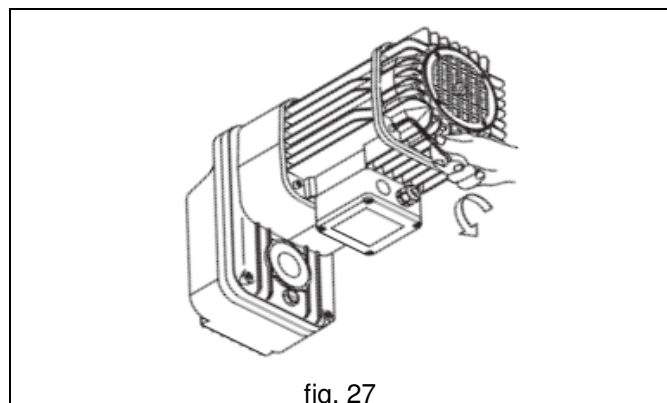
	To guarantee the operating safety of the “DGT” endcarriages units and endcarriages, it is mandatory to use original spare parts or parts recommended by DONATI SOLLEVAMENTI S.r.l.
--	---

 	<p>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:</p> <ul style="list-style-type: none"> • suitable individual protection devices (e.g. safety harnesses, etc.); • appropriate working tools (e.g. fork lift, crane, scaffolding, etc.). <p>after carefully evaluating the following parameters:</p> <ul style="list-style-type: none"> • 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 from 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.




6.6.2 Replacing the wheels on “DGT” drive units

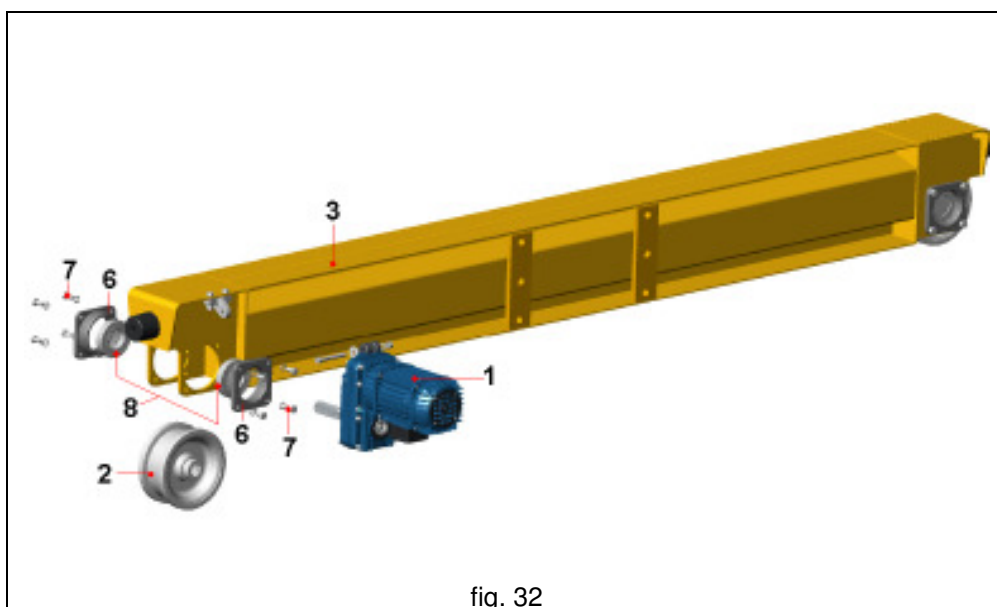
 	<p>Operations regarding the replacement of the wheels must be performed by qualified and specially trained personnel, and when working above ground level, equipped with:</p> <ul style="list-style-type: none"> • suitable individual protection devices (e.g. safety harnesses, etc.); • appropriate working tools (e.g. fork lift, crane, scaffolding, etc.). <p>after carefully evaluating the following parameters:</p> <ul style="list-style-type: none"> • 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 	  
--	---	---


	<p>The wheels must be moved SOLELY 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).</p>
---	--

	<p>It is advisable to replace all the wheels, even if some of them appear in good condition.</p>
---	--

	<p>To replace the wheels proceed as follows (Fig. 32):</p>	
---	--	---

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).



	<p>To reassemble the wheels on the operating head, proceed in reverse sequence.</p>
---	---

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	<ul style="list-style-type: none"> motor power cable motor malfunction blocked brake reducer jammed blocked wheel
The pair of “DGT” “DGT” Units or Beams won’t start	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> worn out brake
The driving operation won’t stop at the end of the stroke	<ul style="list-style-type: none"> worn out brake limit stroke operation
The reducer is excessively noisy	<ul style="list-style-type: none"> lack of lubricant incorrect/overly intense operation unsuitable rail tolerances (planarity/parallelism)
Grating brake sound during braking	<ul style="list-style-type: none"> check for dust excessive play worn out brake lining
Strident noise from the wheels (advancing in jolts)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> * brake lining wear * presence of oil/grease 	<ul style="list-style-type: none"> * set the play or replace the lining * clean the lining
Brake overheating	<ul style="list-style-type: none"> * incorrect operation * unsuitable environmental conditions * incorrect setting 	<ul style="list-style-type: none"> * reset normal operating conditions * adjust the brake
Brake not releasing	<ul style="list-style-type: none"> * incorrect power supply * incorrect setting 	<ul style="list-style-type: none"> * reset voltage values * adjust the brake
Brake tends to jam up	<ul style="list-style-type: none"> * unsuitable environmental conditions * inappropriate operation 	<ul style="list-style-type: none"> * reset normal operating conditions
Limit switch is blocked on opening, does not reset	<ul style="list-style-type: none"> * activation head clogged * incorrect confirmation * interrupted connections 	<ul style="list-style-type: none"> * clean and reset correct operating conditions
Motor too hot	<ul style="list-style-type: none"> * variation in voltage > 10% * poor cooling * ambient temperature > foreseen * use does not conform to service operation foreseen 	<ul style="list-style-type: none"> * ensure correct line voltage * reset correct air circulation * adapt motor specifications * adapt service conditions to normal
Motor won't start	<ul style="list-style-type: none"> * burnt fuse * power malfunction * overload, burnt out due to high start-up frequencies, insufficient protection 	<ul style="list-style-type: none"> * replace the fuse * check contactor/power cable * rewind the motor and ensure better protection * check the control device
Motor doesn't start up easily	<ul style="list-style-type: none"> * on start-up the tension or frequency decrease with respect to the nominal value 	<ul style="list-style-type: none"> * improve line or power supply conditions
Motor buzzes and absorbs too much current	<ul style="list-style-type: none"> * defective winding * one power phase missing * reducer blocked * brake blocked * short circuit on power supply * short circuit on motor 	<ul style="list-style-type: none"> * 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	<ul style="list-style-type: none"> * malfunction in winding 	<ul style="list-style-type: none"> * 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.
--	--


8. SPARE PARTS

	<ul style="list-style-type: none"> * 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.
---	---

	<ul style="list-style-type: none"> * 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 SOLLEVAMENTI S.r.l. Via Roma, 55 - 21020 Daverio (Varese) - Italy tel. +39 0332 942.611 - fax +39 0332 948.597 e-mail: info@donati-europe.com - www.donati-europe.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 98/37/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.