

TeSi
INDUCTION HEATING

**INDUCTION HEATING GENERATOR
IHG 120CU**

**USE AND MAINTENANCE
INSTRUCTIONS**

CE



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Chapter

1

INTRODUCTION

We jointly want to thank you for having preferred **TeSi s.r.l.** and to congratulate you on the choice you made; by purchasing your new **Induction Heating Generator IHG 120CU** you provided yourself with a product characterized by excellent performances, high efficiency and reliability.

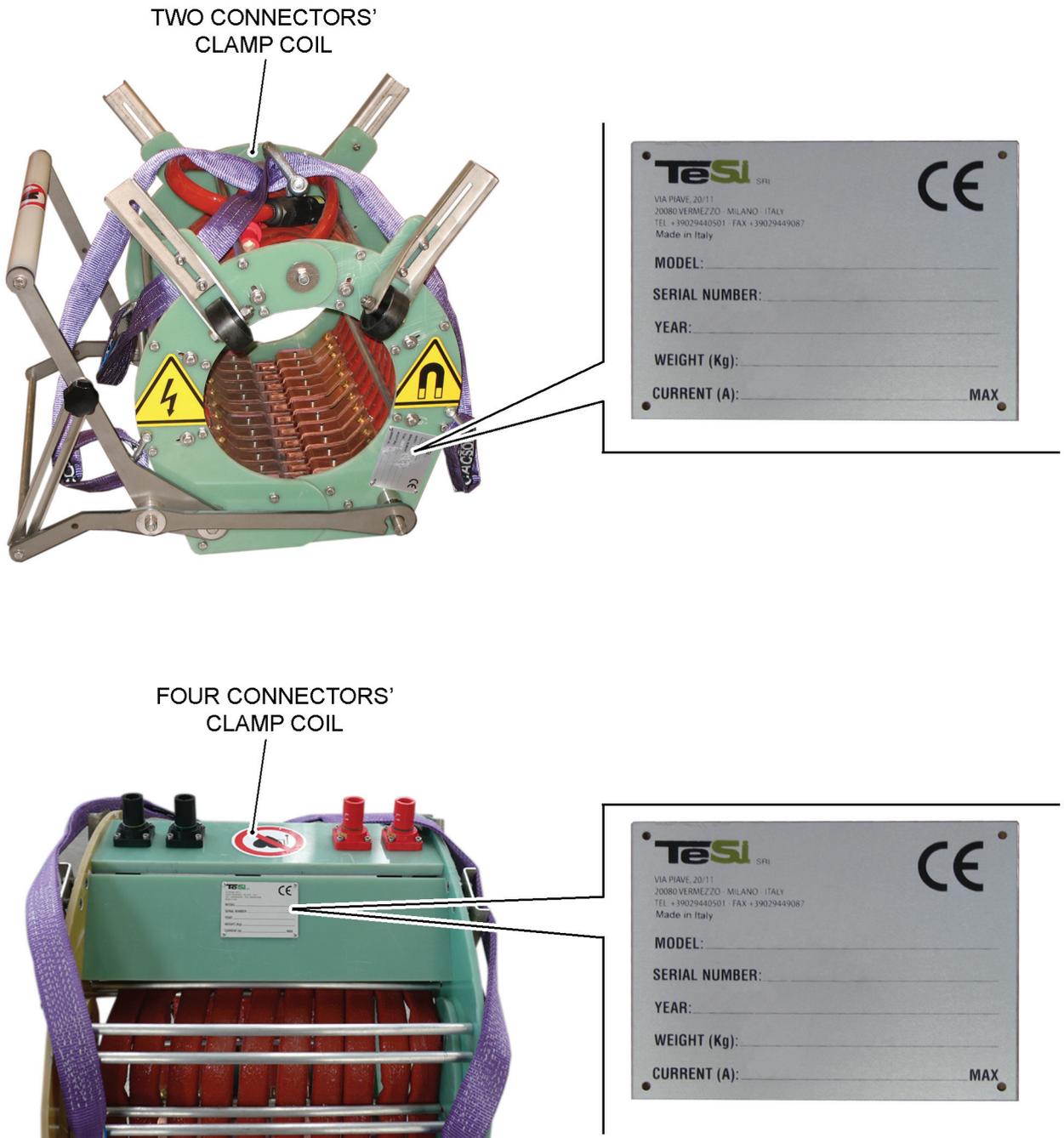
1.1 INDUCTION HEATING GENERATOR IHG 120CU IDENTIFICATION DATA

Here following, the Induction Heating Generator IHG 120CU TeSi s.r.l. identification plates (see Figure 1.1), which this manual refers to, are reported:



a. Identification plate applied on the generator

Figure 1.1 - Induction Heating Generator IHG 120CU identification plates
(Sheet 1 of 5)



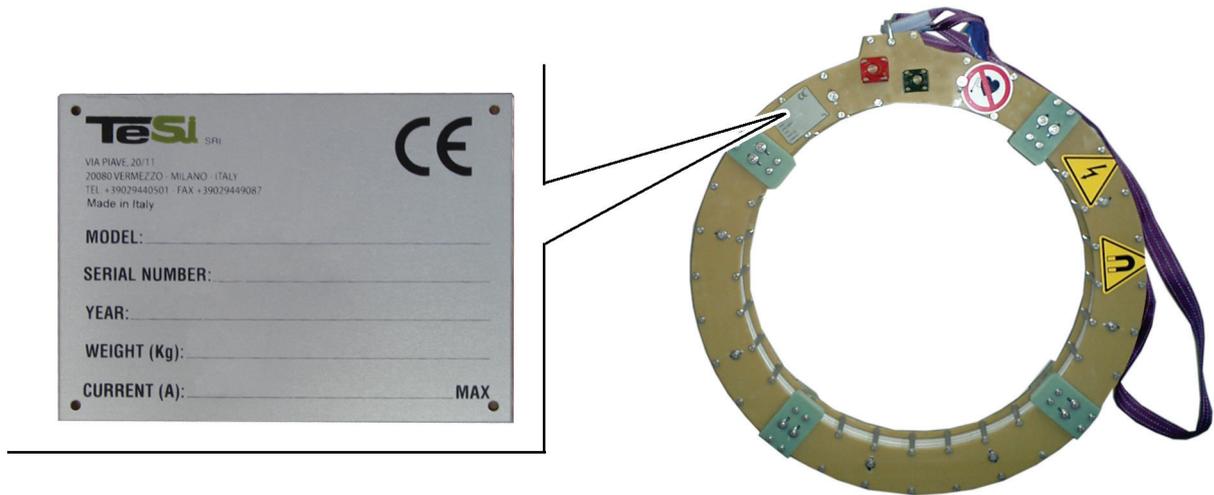
b. Identification plate applied on the standard clamp coil

Figure 1.1 - Induction Heating Generator IHG 120CU identification plates
(Sheet 2 of 5)



c. Identification plate applied on the heavy duty clamp coil

*Figure 1.1 - Induction Heating Generator IHG 120CU identification plates
(Sheet 3 of 5)*



d. Identification plate applied on the external ring coil

Figure 1.1 - Induction Heating Generator IHG 120CU identification plates
(Sheet 4 of 5)



e. Identification plate applied on the internal ring coil

Figure 1.1 - Induction Heating Generator IHG 120CU identification plates
(Sheet 5 of 5)

1.2 IDENTIFICATION OF THIS PUBLICATION

The “USE AND MAINTENANCE INSTRUCTIONS” manual is an official document issued by TeSi s.r.l. and represents an integral part of the Induction Heating Generator IHG 120CU. It is countermarked by a publication No., reported on the third coversheet, allowing an easy identification, traceability of the manual itself, as well as any later reference to it.

All the information contained in this manual were updated to its publication date. TeSi s.r.l. have the right to modify without giving any previous notice the contents of this manual and decline any responsibility for the possible errors and/or omissions present inside it.

1.3 JOINED PUBLICATIONS

- Engine manual (OWNERS MANUAL - QSB4.5 AND 6.7 ENGINE);
- Induction Heating Generator IHG 120CU wiring diagrams.

1.4 PURPOSE OF THIS PUBLICATION

This manual, meant for the users of the Induction Heating Generator IHG 120CU, contains all the information required for its handling, its installation, its operation and its maintenance. It moreover supplies the information for the personnel training, facilitates the procedure for ordering spare parts and gives indications about the safety devices and the possible residual risks.

On a careful and rational observance of the rules contained in this manual will depend both the correct operation and the useful lifespan of the Induction Heating Generator, as well as the safeguard and protection of the operator’s safety.

It is strongly recommended to carefully read and to strictly observe the directives contained in this publication, which are organized, as far as possible, according with a chronological scheme of use of the Induction Heating Generator IHG 120CU.

This manual represents a useful support for the user and a valid mean for reminding him of all the primary operations to be carried out; anyway, some minimum specific technical knowledge is required for using the Induction Heating Generator IHG 120CU on fully safe conditions.

1.5 USE OF THIS MANUAL



NOTE

This manual must be carefully preserved for the whole lifespan of the Induction Heating Generator IHG 120CU.

Should the Induction Heating Generator IHG 120CU be sold, the manual shall be delivered to the new owner together with the generator itself.

The manual is subdivided into two parts; the first part, whose pages are numbered in Roman numerals, consists of the Title Page, the List of the valid pages, the Additions’ and Variants’ Record and the Table of Contents. The Table of Contents allows to exactly locate the pages containing the topic you are interested in.

The second part, whose pages are numbered in Arabic numerals, is articulated in such a way to supply the user with the necessary indications for operating by fully observing the safety rules in all the installation, setup, use and maintenance phases of the Induction Heating Generator IHG 120CU.

Within the text, some “**symbols**” are used, in order to both highlight and visually distinguish the importance of the different types of information.

Graphic representation of the symbols and relevant meaning:

	NOTE Indicates important complementary information.
	CAUTION The inobservance of the relevant indications can cause even irreparable damages to the Induction Heating Generator IHG 120CU.
	WARNING Highlights any situation possibly dangerous for people.
	PROHIBITION Indicates the prohibition of carrying out actions, procedures, etc.. The inobservance of such a prohibition can cause even irreparable damages to the Induction Heating Generator IHG 120CU, seriously damage the environment or create dangerous situations for people.

The manual, together with the relevant enclosures and integrations, must be kept with the utmost care and be always complete, integral and legible in every part, for being preserved jointly with the Induction Heating Generator IHG 120CU, up to the final elimination of this last one.

Should the manual be lost, a duplicate shall be immediately got by contacting TeSi s.r.l.. Should the transfer printings originally applied on the Induction Heating Generator IHG 120CU be either lost, damaged, or should they result to be even only partially incomprehensible, they shall be promptly replaced.

1.6 REVISION

Should the product be modified, **TeSi s.r.l.** are exonerated from updating previous products or from revising previous manuals, exception made for exceptional cases.

This can lead to some inadequacy of the old manuals, and, therefore, the user can ask for the last revision of the manual itself or for any technical information by directly contacting **TeSi s.r.l.**

The revisions which **TeSi s.r.l.** will possibly transmit to the owner of the Induction Heating Generator IHG 120CU shall be annexed to this manual.

TeSi s.r.l. will be glad to accept any possible suggestions made by the user, purposed to improve the manual, as well as your possible communication about any property change, in case of sale of the Induction Heating Generator IHG 120CU plant to a new owner.

1.7 CONVENTIONS FOR DEFINING THE ORIENTATION

In order to facilitate the comprehension of this manual, here following the conventions for defining the orientation are reported.

The definitions used for identifying the displacement of the Induction Heating Generator IHG 120CU components include the following terms:

- front;
- rear;
- right;
- left.

The “front” part is that where the command and control panel is located, while the “rear” part is that opposite to it.

The “right” and “left” sides are referred to an operator positioned in front of the command and control panel, and looking toward it.

1.8 GLOSSARY AND ABBREVIATIONS

In this paragraph, a list containing not common terms, or terms anyway used with a meaning different from the common one, as well as the abbreviations and the units of measure used in this text, are supplied.

1.8.1 GLOSSARY

The 98/37/CE Machinery Directive (Annex I, 1.1.1.) means by:

- DANGEROUS AREA - an area inside and/or near the machine, in which the presence of an exposed person represents a risk for the safety and the health of the person himself;
- EXPOSED PERSON - any person situated either fully or partially in a dangerous area;
- OPERATOR - a person charged with the task of installing, operating, setting, carrying out the maintenance, cleaning, repairing and transporting the machine.

MAN-MACHINE INTERACTION - any situation in which an operator interacts with the machine, in any of the operative phases and in any moment of the machine lifespan.

RESIDUAL DANGER - a danger which couldn't be possibly either eliminated or sufficiently reduced in the machine designing phase.

SAFETY COMPONENTS - the components used for protecting the operator, whose faulty or bad operation can prejudice the safety and the health of the exposed persons (for example fixed or mobile protections, electric devices, pneumatic devices, etc.).

1.8.2 ABBREVIATIONS

%	percentage
°C	Celsius degree (centigrade degree)
A	ampere
Ah	ampere-hour
CFM	cubic feet per minute (flow rate)
cosφ	cosine of the phase angle between current and voltage (alternate current)
dB(A)	decibel (noise unit of measure)
etc.	et cetera
ex.	example
gal	gallons
Hz	hertz (cycles per second)
Kg	kilogram
kPa	kilopascal
KW	Kilowatt
Lt	liter
M	meter
m ³	cubic meters (volume)
Max.	Maximum
Min.	Minimum
min	minute
mm	millimeters

No.....number
 PF..... Power Factor (ratio between the active power and the apparent power)
 Pr..... progressive number
 PSI.....pounds per square inches
 rpm revolution per minute
 see..... compare
 V volt
 Vac. alternate current volt
 W..... watt

1.9 SAFETY WARNINGS

1.9.1 GENERAL WARNINGS



WARNING
 Carefully read the information reported in Chapter 3 “Safety rules” before carrying out any operation on the Induction Heating Generator IHG 120CU.

You are moreover here reminded that:

- The Induction Heating Generator IHG 120CU must not be used, neither any intervention can be carried out on it, without having previously read and fully understood this manual in every part;
- It is forbidden to use the Induction Heating Generator IHG 120CU for any use, other than those indicated in the manual, and **TeSi s.r.l.** can't be held as being responsible for failures, inconveniences and accidents due to lack of knowledge of what reported in this manual;
- It is forbidden to either tamper with the equipments treated in the instruction manual, to alter or to modify them, even partially, in particular as far as the protection guards and the doors situated on the generator and foreseen for granting people safety, are concerned;
- It is forbidden either to operate in any different way from the indicated one or to neglect the operations purposed for granting a full safety.



NOTE
 It must be considered that the rules contained in this manual can't possibly foresee some particular situations, which could occur during the different working phases.

1.9.2 PERSONNEL QUALIFICATION

All the operations relevant to the Induction Heating Generator IHG 120CU, from the maintenance up to its final elimination, require the presence of personnel with an adequate training level, in order to reduce to the minimum the risks due to a lack of professional specialization.

For this purpose, as far as the qualification of the personnel to be employed is concerned, reference shall be made to the here following enlisted indications:

- USER: is a person trained for using the Induction Heating Generator IHG 120CU, such to grant a good knowledge of the procedures both on usual and on emergency conditions.
- MECHANICAL MAINTAINER: he must have either a mechanical or an electro-technical qualification, perfectly know the contents of this manual and be adequately trained on the safety rules, in order to be authorized to operate on the Induction Heating Generator IHG 120CU.
- ELECTRIC MAINTAINER: he must have either an electro-technical or an electro-mechanical qualification, perfectly know the contents of this manual and be adequately trained on the safety rules, in order to be authorized to operate on the Induction Heating Generator IHG 120CU.

**PROHIBITION**

Don't employ any personnel having a qualification different from the indicated one.

1.9.3 PERSONAL SAFETY MEANS

When using the Induction Heating Generator IHG 120CU, the operator shall always wear the here following enlisted personal safety means:

- safety shoes;
- protective gloves;
- eyes protection;
- helmet;
- protective ear-guards;
- safety faceplate;
- body protective overalls.

1.9.4 SAFETY TRANSFER PRINTINGS

In order to safeguard the personnel safety, on the Induction Heating Generator IHG 120CU, in the most adequate places and according with the identified risks, some proper safety transfer printings were applied. The following Table 1.1 reports the transfer printings with their meaning and respective position on the Induction Heating Generator IHG 120CU.

Table 1.1 - Safety transfer printings

SYMBOL	DESCRIPTION	POSITION ON THE INDUCTION HEATING GENERATOR IHG
	Sound power level emitted by the generator = 97 dB (A)	On the generator structure, near the command and control panel
	Dangerous electric voltage	<p>On the access door to the power factor correction capacitors</p> <p>On the access door to the alternator, rear part</p> <p>On the left and right sides of the standard clamp coil</p> <p>On the front and rear sides of the heavy duty clamp coil</p> <p>On the front and rear sides of the external ring coil</p> <p>On the front side of the internal ring coil</p>

SYMBOL	DESCRIPTION	POSITION ON THE INDUCTION HEATING GENERATOR IHG
	High magnetic field	<p>On the access door to the power factor correction capacitors</p> <p>On the access door to the alternator, rear part</p> <p>On the left and right sides of the standard clamp coil</p> <p>On the front and rear sides of the heavy duty clamp coil</p> <p>On the front and rear sides of the external ring coil</p> <p>On the front side of the internal ring coil</p>
	Hot surfaces	<p>On the access doors to the engine compartment and to the alternator</p> <p>On the access door to the power factor correction capacitors</p> <p>On the generator right side, over the air exhaust grate</p>
	Moving mechanisms	<p>On the access doors to the engine compartment and to the alternator</p>
	Danger for people with a pacemaker	<p>On the access door to the power factor correction capacitors</p> <p>On the access door to the alternator, rear part</p> <p>On the opening/closing handle of the standard clamp coil</p> <p>On the front and rear sides of the heavy duty clamp coil</p> <p>On the front and rear sides of the external ring coil</p> <p>On the front side of the internal ring coil</p>
	Grounding point	<p>On the front left rail of the generator (one point)</p>

SYMBOL	DESCRIPTION	POSITION ON THE INDUCTION HEATING GENERATOR IHG
	Obligation to use lifting hooks with adequate hoisting capacity (3 t)	On the four generator plates, near the hoisting holes

	<p>NOTE</p> <p>As far as the safety transfer printings relevant to the personal safety means are concerned, observe those foreseen by the yard and/or by the relevant rules in force in the country where the Induction Heating Generator IHG 120CU is used.</p>
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1.10 PERSONNEL TRAINING

The training of the personnel using and carrying out the maintenance interventions on the Induction Heating Generator IHG 120CU is quite simple and is imparted at machine delivery.

All the necessary information is anyway supplied in this manual.

As described in this manual, the operator must execute some normal checks before setting the Induction Heating Generator IHG 120CU into operation.

When the Induction Heating Generator IHG 120CU is operating, the operator must keep the instruments situated on the command and control panel under control and, if necessary, intervene on the controls, if some malfunctions are noticed, or, anyway, he must know how to intervene in case of an emergency.

At the end of the working day, the operator must carry out some other simple checks, purposed to verify the correct operation of the Induction Heating Generator IHG 120CU.

Besides, it is very important that the operator is in a position to intervene for carrying out the routine maintenance interventions.

All these operations will be easily realized after having got the instructions given at the plant delivery and after having carefully read this manual.

1.11 CUSTOMER SERVICE

After having tested the **Induction Heating Generator IHG 120CU**, **TeSi s.r.l.** issue a certificate, by which they engage themselves to grant that the Induction Heating Generator IHG 120CU fully complies both with the specifications and with the stated characteristics.

The warranty period is of **12 (twelve) months** since delivery (the Delivery Note date will be taken for reference), exception made for the normal wearing parts, and only foresees the cost-free replacement of defective elements, when an anomaly due to any defects of materials, machining or assembly errors is ascertained.

The replaced parts keep being a property of **TeSi s.r.l.** and must be sent back to their factory within 30 days since reception of the new material; shouldn't the replaced parts be returned within that term, **TeSi s.r.l.** will provide to regularly invoice the new parts. **TeSi s.r.l.** reserve to themselves the right of requesting that the Induction

Heating Generator IHG 120CU, or a part of it, is transferred for repair to their own factory or to other factories of their choice, keeping the relevant transport costs charged to the Customer, and without that this last one can oppose to the machine getting transferred to the seat or advance any damages' compensation.

**NOTE**

The over mentioned warranty period will be valid, only provided that there aren't any different conditions reported on the purchase agreement of the Induction Heating Generator IHG 120CU.

The disassembly and reassembly expenses, as well as those relevant to the transport and packaging of the parts to be replaced in warranty, will be charged to the Customer.

Besides, if not differently specified in the purchase agreement, the journey costs, inclusive of the travelling hours, as well as of the logistic expenses of the **TeSi s.r.l.** personnel carrying out the assistance intervention on warranty terms, will be charged to the plant user.

The denunciation of the defects and the relevant request of intervention shall be made in writing by the user directly to **TeSi s.r.l.** within a term of **8 days** from their manifestation.

The warranty legally ceases when:

- the customer didn't observe the payment contract obligations;
- the purchaser eliminates, deletes or modifies the digits or the data or the marks directly reported on the Induction Heating Generator IHG 120CU, i.e., on the plates or on the identification plates applied to the **TeSi s.r.l.** product;
- the Induction Heating Generator IHG 120CU is used in a way not complying with the **TeSi s.r.l.**'s indications, and, therefore, in case of:
 - manoeuvring errors;
 - overloads;
 - use of lubricants different from the prescribed ones;
 - mounting of not original spares;
 - inobservance of the maintenance rules;
 - non-filling of the Maintenance Service Tables (see Chapter 9).

In none of the over mentioned cases the Customer can exact either the contract cancellation or a compensation for damages.

1.11.1 AFTER-SALES TECHNICAL SERVICE

For any kind of intervention, the **TeSi s.r.l.** "After-Sales Technical Service" is at their Customers' full disposal. Both qualified personnel and specific equipments are available for overhaul and/or repair interventions. The **TeSi s.r.l.** "After-Sales Technical Service" is always available for supplying explanations and advices, in order to allow you getting the best performances from your **Induction Heating Generator IHG 120CU**. In case of a failure on the Induction Heating Generator IHG 120CU, **TeSi s.r.l.** suggest to consult, first of all, Chapter 8 of this manual, which is relevant to the problems' solution, in order to identify the existing possible interventions to be carried out by your own personnel, without having to ask for the help of the **TeSi s.r.l.** "After-Sales Technical Service". After having consulted Chapter 8, it could anyway still be necessary to ask for the intervention of the **TeSi s.r.l.** "After-Sales Technical Service" technicians.

The intervention request shall be formulated to **TeSi s.r.l.** by using either the references here following reported, or those present on the identification plate fastened to the Induction Heating Generator IHG 120CU:

TeSi s.r.l.
Via Piave, 20/11
20080 Vermezzo, Milano, Italy

Phone..... **+39 02 9440501**
Fax **+39 02 9449087**
Internet web site **www.tesigroup.com**

E-Mail:

- **General information** **info@tesigroup.com**
- **Customer technical assistance**..... **support@tesigroup.com**
- **Sales** **sales@tesigroup.com**

The intervention request procedure must be the following one:

- 1) Contact **TeSi s.r.l.** either by phone or through E-Mail, specifying the Induction Heating Generator IHG 120CU data present on the identification plate and then, with the help of a technician, check the possibility of solving the problem directly on the phone.
- 2) If a solution can't be found by phone or through an E-Mail, send a fax or an E-Mail in order to request an intervention, specifying all the data both relevant to the Induction Heating Generator IHG 120CU and to the owner and place where the generator itself is installed.
- 3) Wait for a call from the "After-Sales Technical Service", to make arrangements for defining the service supply modalities.

1.11.2 SPARE PARTS

The parts to be possibly replaced must be " TeSi ORIGINAL SPARE PARTS", to be purchased at our central store.

Using not original spare parts not only causes the warranty loss, but also exonerates TeSi s.r.l. from any responsibility.

Chapter

2

GENERAL TECHNICAL INFORMATION

2.1 FOREWORD

The Induction Heating Generator IHG 120CU, this manual refers to, allows the heat transmission without any physical contact between the heat source and the metal part to be heated.

The Induction Heating Generator IHG 120CU is used in the following appliances:

- heating of the pipes before the welding process;
- heating for the laying of thermo-shrinking sleeves for anti-corrosive protection of welded joints.

As already previously mentioned, the induction heating can heat the materials at a speed which is scarcely imaginable if compared with the traditional systems (flame or resistance heating), a punctual accuracy and a high efficiency, without any contact with the surface to be heated.

2.1.1 USE DESTINATION

The Induction Heating Generator IHG 120CU is meant for an industrial use.

2.1.2 OPERATOR

No particular technical knowledge is required for using the Induction Heating Generator IHG 120CU. A careful reading of this manual will be sufficient; anyway, it is here reminded that both the experience and a good knowledge of the product represent a quite important factor.

2.1.3 WORK ENVIRONMENT

	<p>PROHIBITION Both positioning and using the Induction Heating Generator IHG 120CU in potentially explosive environments are forbidden.</p>
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The Induction Heating Generator IHG 120CU can operate in any work environment in the yard activity field, exception made for those explosive environments, in which an explosion-proof protection is required.

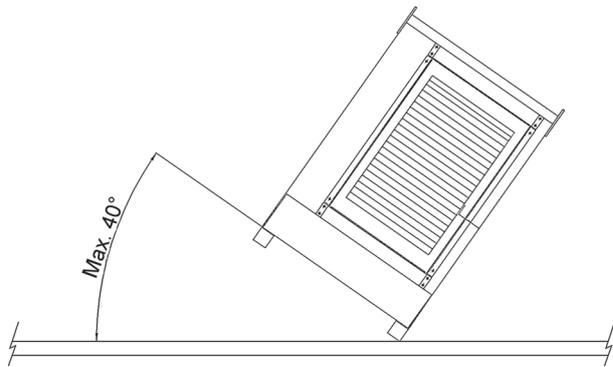
	<p>CAUTION The Induction Heating Generator IHG 120CU can operate on very steep slopes, up to a maximum of 40° (see Figure 2.1). For mobile use on very sloping terrains, possibly place the Induction Heating Generator IHG 120CU crosswise with respect to the vehicle used for its transport.</p>
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2.1.4 ENVIRONMENTAL REQUIREMENTS

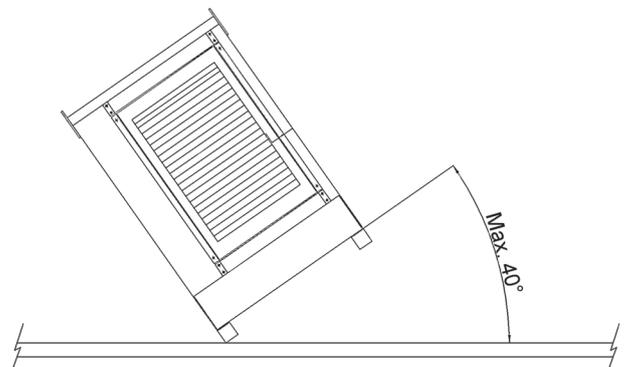
The Induction Heating Generator IHG 120CU must be used by presence of the following environmental conditions:

- Maximum temperature + 45 °C
- Minimum temperature - 15 °C
- Relative humidity 85%

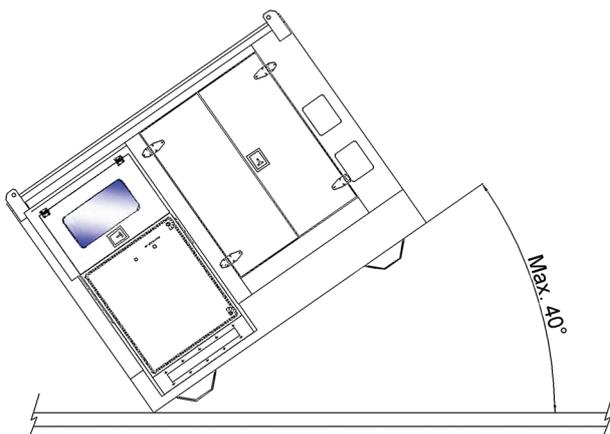
	<p>CAUTION Use a purposed antifreeze for the engine fuel, if temperatures are lower than - 5 °C.</p>
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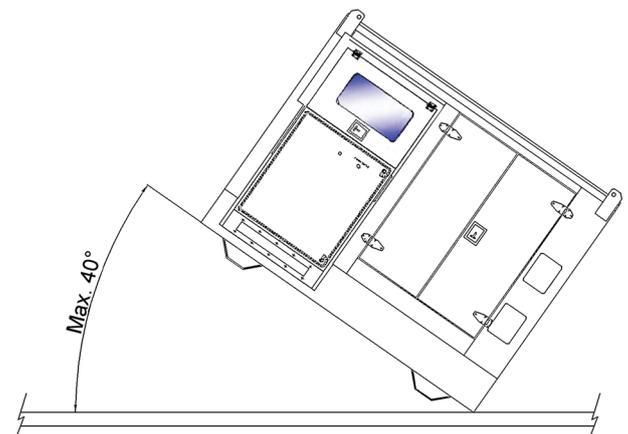
a. Front side max longitudinal gradient



b. Rear side max longitudinal gradient



c. Left side max transversal gradient



d. Right side max transversal gradient

Figure 2.1 - Max longitudinal and transversal gradients when using the Induction Heating Generator IHG 120CU

The Induction Heating Generator IHG 120CU isn't equipped with any devices for illuminating the working area, as, being usually employed in yards, and consequently in open air, no artificial illumination was held for necessary, even if required by the specifications in force.

**NOTE**

Should the Induction Heating Generator IHG 120CU be used in indoor ambiances, it is recommended to install it in an adequately illuminated area, according with the relevant specifications in force.

**NOTE**

Should the Induction Heating Generator IHG 120CU be used in a scarcely illuminated ambience and/or at night in a yard and consequently in open air, get installed near the same one some adequate artificial illumination devices.

**WARNING**

Should the Induction Heating Generator IHG 120CU be used in indoor ambiances or by scarce ventilation conditions, provide to realize an adequate intake of the exhaust gases.

2.1.5 NOISE EMISSION

The sound power level granted by the Induction Heating Generator IHG 120CU (power 150 kW) is of 97 dB.

**NOTE**

The granted sound power level isn't the noise level which the operator appointed to the Induction Heating Generator IHG 120CU is exposed to, value which must be measured in the yard, according with the law directives. Such value, even if relevant to the only Induction Heating Generator IHG 120CU, can be extrapolated from the measurements realized for calculating the LwA, according with the directive 2005-88-CE.

The acoustic pressure level measured in normal working conditions (work duty cycle 50%) at 1 m of distance and at 1.4 m of height from the ground on the whole perimeter of the Induction Heating Generator IHG 120CU is either equal to or lower than 84 dB (A).

The indicated level is that of pondered instantaneous acoustic pressure during the Induction Heating Generator IHG 120CU power using peaks. The daily or weekly exposure of the workers must be anyway determined, as previously said, in the real use conditions and generally results to be lower than the previously indicated values. Anyway, the use of ear protection-guards is recommended.

2.2 GENERAL DESCRIPTION

The Induction Heating Generator IHG 120CU (see Figure 2.2), consists of four main components, as here following indicated:

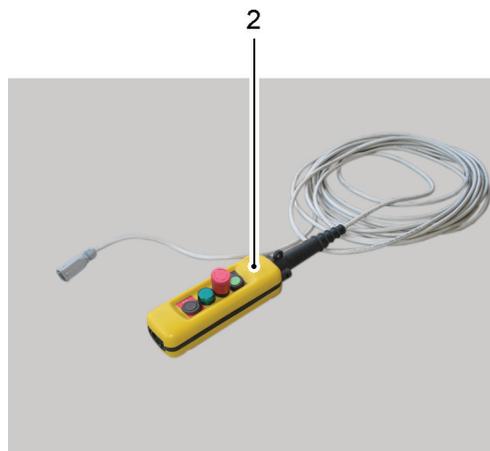
- generator (a/1);
- coil (c);
- remote control (b/2);
- power cables (d/7).

The coil (c), according with the requested appliance, can be of four types:

- standard clamp coil (c/3);
- pair of external ring coils (c/4);
- pair of internal ring coils (c/5).
- heavy duty clamp coil (c/6).



a. Generator



b. Remote control

LEGEND

- 1 - Generator
- 2 - Remote control

*Figure 2.2 - Induction Heating Generator IHG 120CU configuration
(Sheet 1 of 2)*



c. Coil (Standard clamp coil, heavy duty clamp coil, external ring coil and internal ring coil)

LEGEND

- 3 - Standard clamp coil
- 4 - Pair of external ring coils
- 5 - Pair of internal ring coils
- 6 - Heavy duty clamp coil
- 7 - Power cables



d. Power cables

Figure 2.2 - Induction Heating Generator IHG 120CU configuration
(Sheet 2 of 2)

2.2.1 GENERATOR

The generator (see Figure 2.3), whose structure is realized in a sturdy metal carpentry, houses it its inside the following main components:

- engine (11);
- batteries;
- air filter (10);
- fuel tank (17);
- generator alternator (30);
- air compressor (38) (optional);
- 120 Vac auxiliary alternator (16) (optional).

On the other hand, in the external front part of the generator structure, the following components are housed:

- command and control panel (2);
- power connectors (22);
- capacitor battery (21);
- battery charger section (27) (optional);
- 120 Vac electric sockets section (29) (optional).

In the front and rear parts, it is possible to notice the doors (4) and (35), which respectively allow to accede to the engine (11) and to the generator alternator (30) for carrying out checks and maintenance interventions.

The access doors (4), are equipped with a handle (7) for opening and closing the same ones; on closing, the over mentioned doors can be locked by means of a purposed padlock (supplied by TeSi s.r.l.).

The opening and closing of the access door (35) to the generator alternator (30) by turning the fastening screws (36) and washers (37).

In the front part, there is the access door (6) which permits accessing to the battery charger section (27) (optional) and to the 120 Vac electric sockets section (29) (optional).

A further access door (8) to the filler cap of the engine fuel tank (17) is located below the access door (6).

On the structure left side, there is the air intake grate (26), having the purpose of facilitating the cooling down inside the structure itself during the engine operation.

Besides, in the right side of the structure, an air exhaust grate (47) of the engine coolant radiator (14) is present.

The grates (26) and (47) are fixed to the structure by means of the screws (23) and relevant washers (24).

In the upper part, the exhaust pipe terminal (34) of the exhaust gases, equipped with a closing lid (33), is situated.

In the front part, a transparent hatch (1), hinged to the upper structure and having a compass-opening, protects the components situated on the command and control panel (2) against any possible bumps and against dust infiltrations. The hatch is equipped with one gas springs for keeping it locked in the maximum opening phase.

The opening and the closing of the transparent hatch (1) is performed by means of the handle (3); on closure, the over mentioned hatch can be locked by means of a purposed padlock (supplied by TeSi s.r.l.).

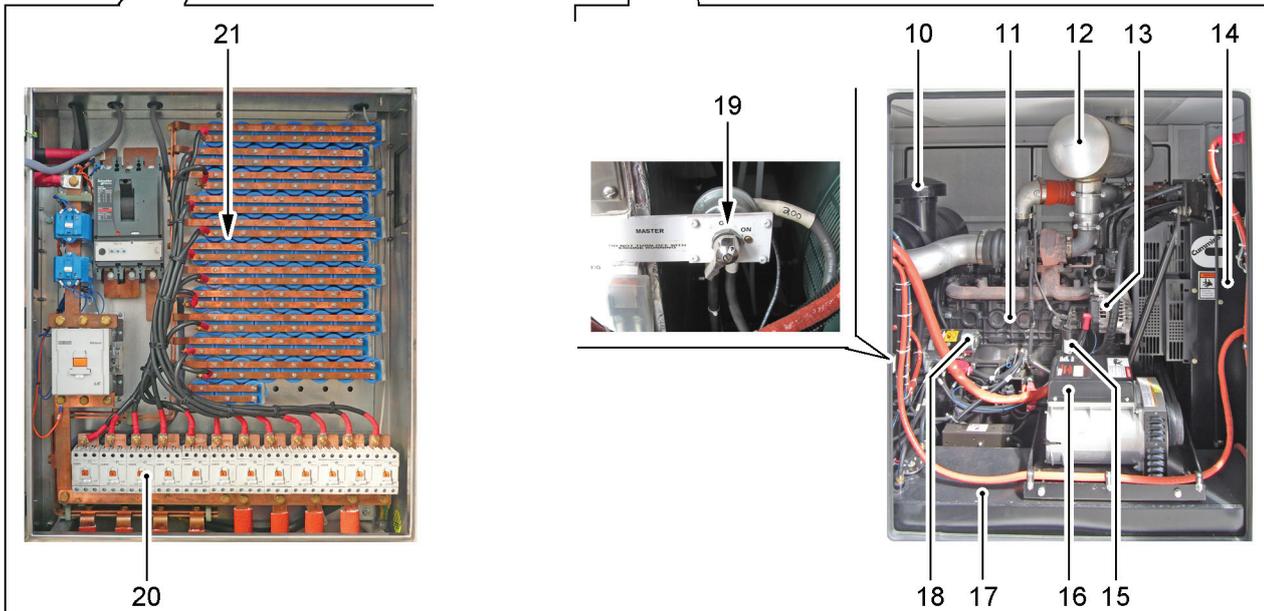
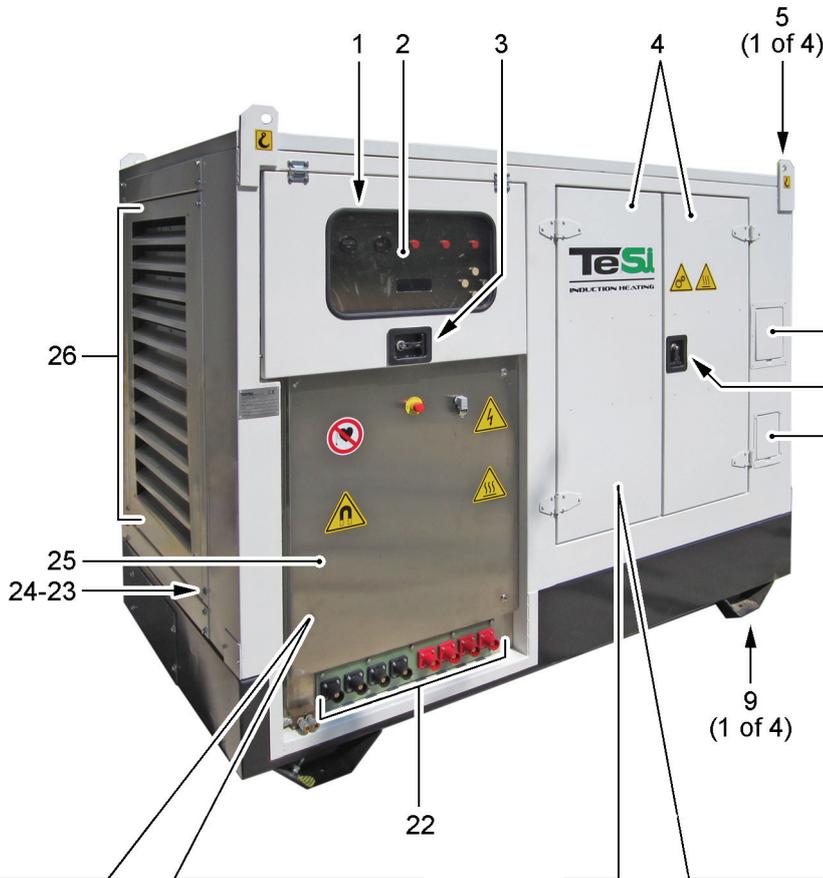
Under the transparent hatch (1), a door (25) hinged to the structure and provided with lockers, closes the capacitor battery (21) housing compartment.

In upper position, four lifting plates (5) for hoisting the machine, welded to the structure respective corners and provided with suitable holes, allow to handle the generator.

In the lower part, on the other hand, four rails (9), which are, in fact, the stands of the generator itself, can be also used for handling the same one.

LEGEND

- 1 - Transparent hatch
- 2 - Command and control panel
- 3 - Handle
- 4 - Access door (front and rear parts)
- 5 - Lifting plate (1 of 4)
- 6 - Access door
- 7 - Handle
- 8 - Access door to the fuel tank filler cap
- 9 - Rail (1 of 4)
- 10 - Engine air filter
- 11 - Engine
- 12 - Exhaust silencer
- 13 - Engine alternator
- 14 - Engine cooling liquid radiator
- 15 - Engine oil filter
- 16 - 120 Vac auxiliary alternator (optional)
- 17 - Fuel tank
- 18 - Starter engine
- 19 - Battery switch
- 20 - Capacitor contactors
- 21 - Capacitor battery
- 22 - Power connectors
- 23 - Screw
- 24 - Washer
- 25 - Door
- 26 - Air intake grate



a. Left front view

Figure 2.3 - Displacement of the parts composing the generator
(Sheet 1 of 3)

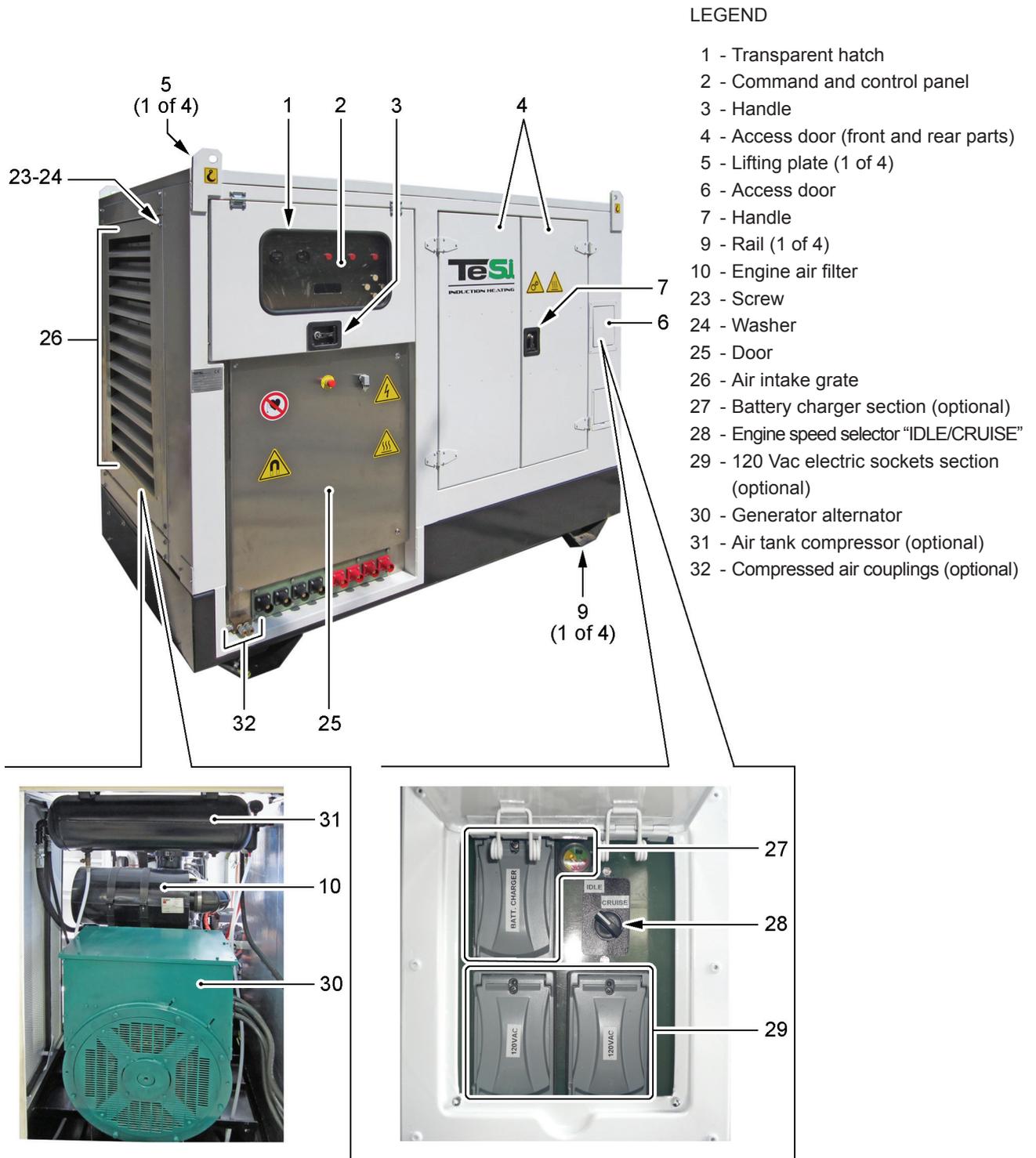
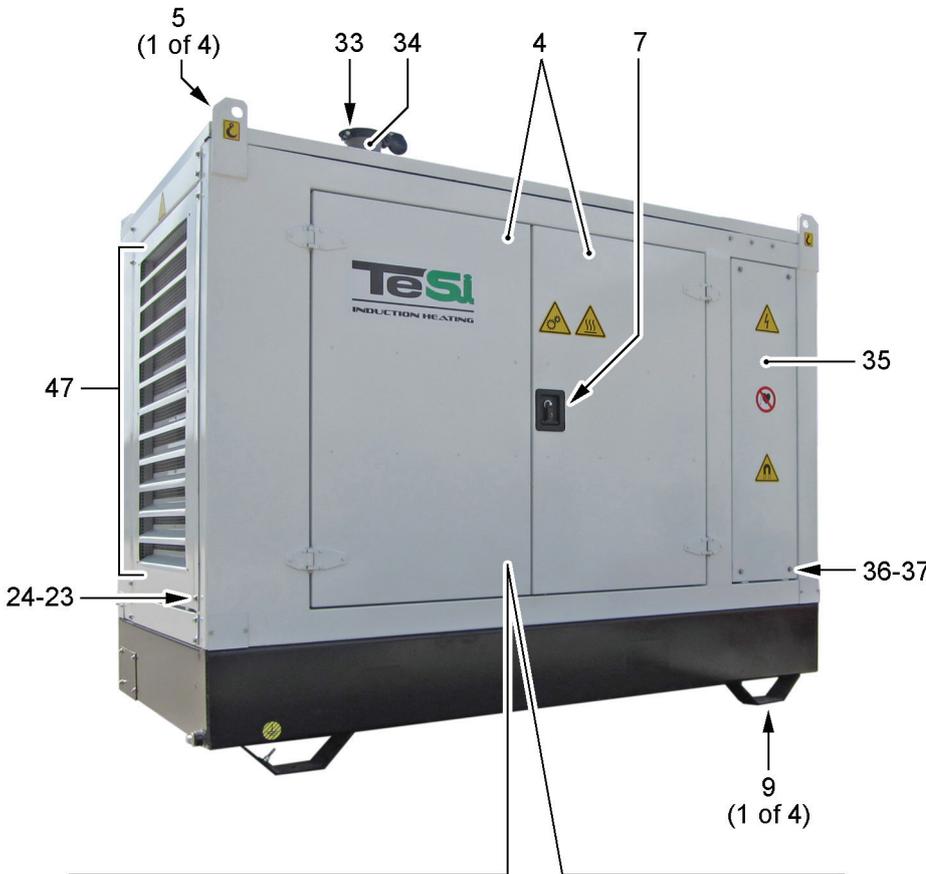
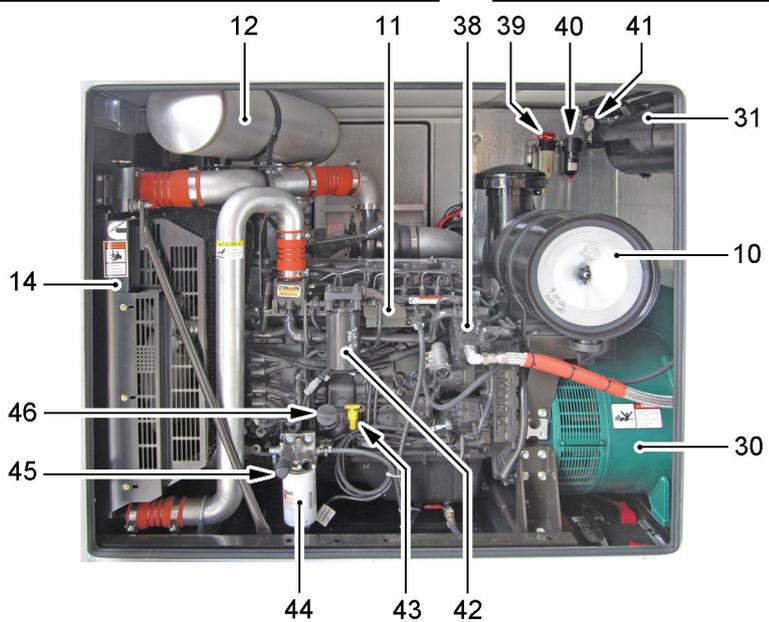


Figure 2.3 - Displacement of the parts composing the generator
(Sheet 2 of 3)

LEGEND



- 4 - Access door (front and rear parts)
- 5 - Lifting plate (1 of 4)
- 7 - Handle
- 9 - Rail (1 of 4)
- 10 - Engine air filter
- 11 - Engine
- 12 - Exhaust silencer
- 14 - Engine cooling liquid radiator
- 23 - Screw
- 24 - Washer
- 30 - Generator alternator
- 31 - Air tank compressor (optional)
- 33 - Closing lid
- 34 - Exhaust pipe terminal
- 35 - Access door (rear part)
- 36 - Screw
- 37 - Washer
- 38 - Air compressor (optional)
- 39 - Air compressor filter (optional)
- 40 - Air compressor desiccator filter (optional)
- 41 - Air compressor pressure gauge (optional)
- 42 - Engine fuel filter
- 43 - Engine oil level dipstick
- 44 - Engine fuel pre-filter
- 45 - Fuel scavenge hand pump
- 46 - Engine oil filler cap
- 47 - Air exhaust grate



c. Right rear view

Figure 2.3 - Displacement of the parts composing the generator
(Sheet 3 of 3)

2.2.1.1 Engine

The CUMMINS manufactured engine (see Figure 2.3/11), model QSB6.7, which the Induction Heating Generator IHG 120CU is equipped with, is a 6 cylinders in-line, common rail injection water-cooled Diesel engine with turbo intercooler, which is used in order to drag the generator alternator (see Figure 2.4).

This engine (see Figure 2.3/11) has such performing characteristics to make its use possible even under extremely heavy conditions, with a minimum maintenance.

**NOTE**

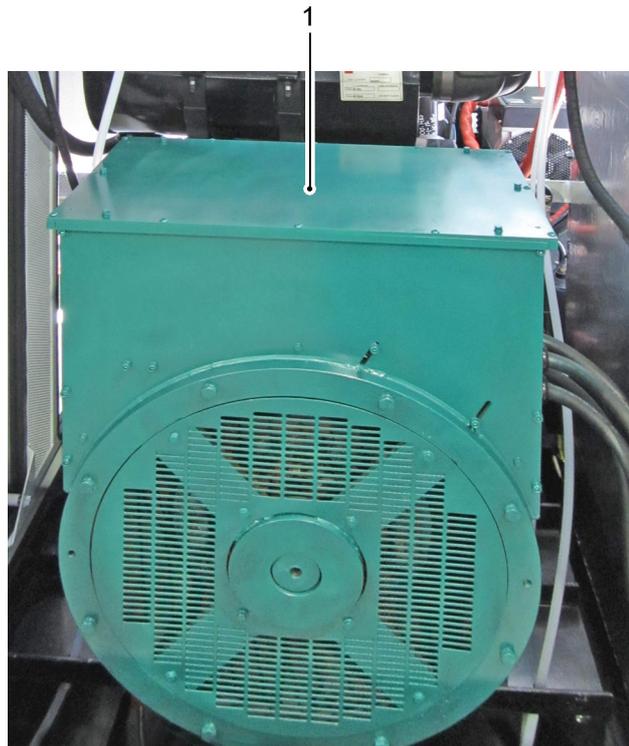
As far as the information relevant to the engine are concerned, reference shall be made to the "Owners Manual - QSB4.5 and 6.7" delivered by TeSi s.r.l. as a Jointed Publication to this manual.

2.2.1.2 Generator alternator

It is the current generator which is dragged, as previously mentioned, by the engine (see Figure 2.3/11).

The power produced by the alternator (see Figure 2.4/1) provides to power supply the coils.

The current produced by the alternator (1) is controlled by the electronic control system, which, in case of anomalies, actuates the proper safety measures (for ex., stop of the heating cycle), and provides to light up the relevant warning lights and to visualize messages on the display; the over mentioned indications are present on the command and control panel (see Figure 2.3/2).

**LEGEND**

1 - Generator alternator

Figure 2.4 - Generator alternator

2.2.1.3 Capacitors

The capacitor battery, present in the generator, allows the power factor correction of the voltage and current produced by the alternator.



WARNING

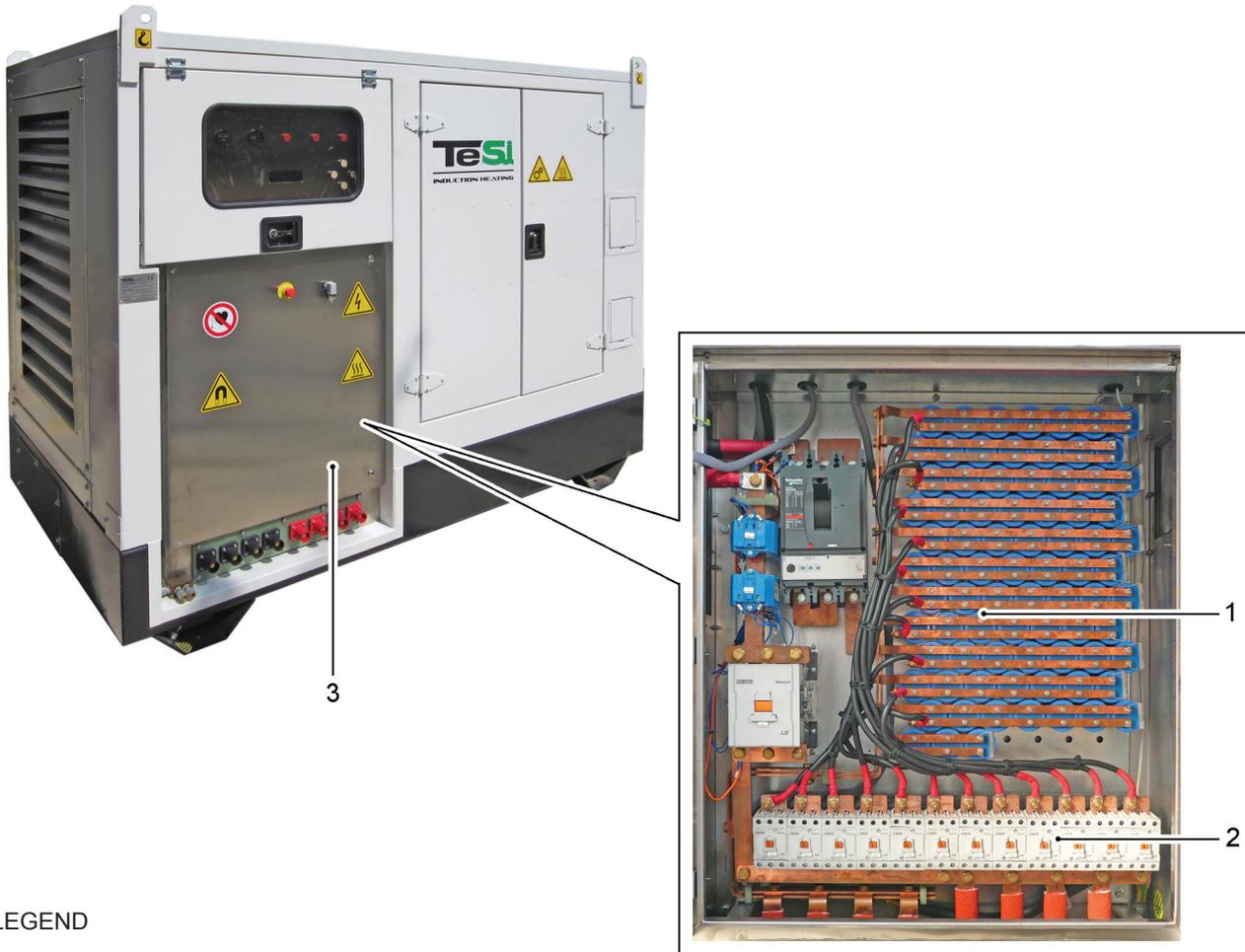
Pay attention to the capacitor bars, as they aren't insulated.



WARNING

The capacitors may be charged even after the generator was turned off.

The capacitor battery (see Figure 2.5/1) and the twelve capacitors contactors (2) are installed inside the compartment present in the front part of the generator; the compartment is closed by a door (3) hinged to the structure and provided with lockers.



LEGEND

- 1 - Capacitor battery
- 2 - Capacitor contactors
- 3 - Door

Figure 2.5 - Capacitor battery and capacitor contactors

2.2.1.4 Command and control panel

The command and control panel (see Figure 2.6), which is accessible by opening upwards the relevant transparent hatch, allows to carry out all the settings before machine starting, to identify any possible alarm condition and to both actuate and deactivate the operating cycle of the Induction Heating Generator IHG 120CU.

The operating parameters can be visualized on the display (15), which results to be visible even by absence of light, and which is characterized by a good legibility even from quite far distances and grants a regular operation even by extreme temperatures.

On the command and control panel (see Figure 2.6), there is a series of commands and controls, as here following specified:

- Hours meter indicator (1);
- Fuel level indicator (2);
- Engine oil pressure warning light (3);
- Engine high temperature warning light (4);
- Engine alternator fault warning light (5);
- “UP” menu pushbutton (6);
- “ENTER” menu pushbutton (7);
- “DOWN” menu pushbutton (8);
- “ESC” menu pushbutton (9);
- Ignition key (10);
- Remote control connector (11);
- Emergency stop mush-room-head pushbutton (12);
- Heating cycle stop pushbutton (13);
- USB connector (14) (optional);
- Display (15).

	<p>NOTE As far as the detailed description of the commands and controls is concerned, reference shall be made to Paragraph 6.2.</p>
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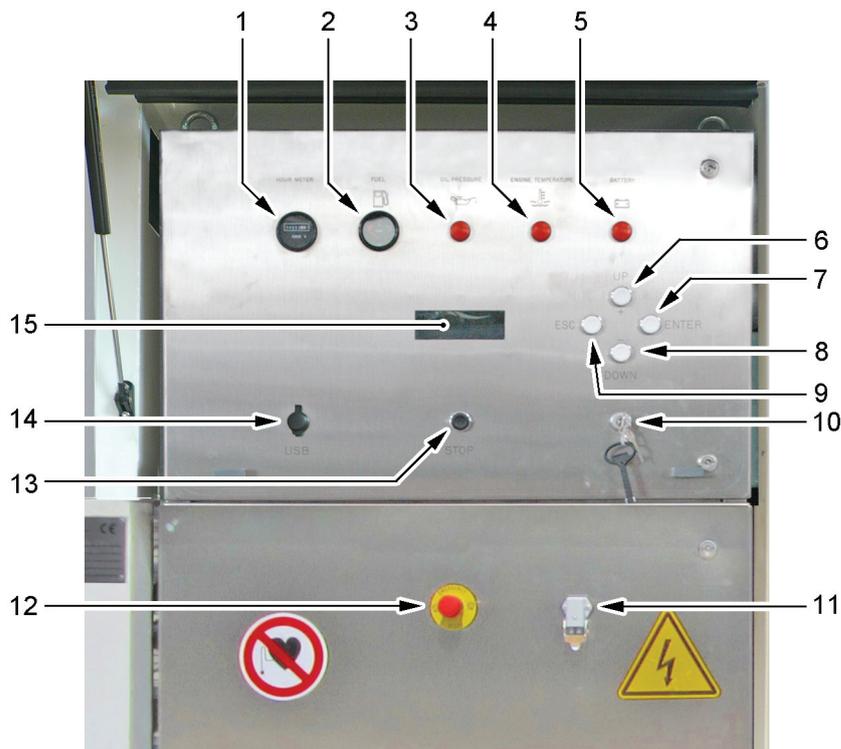


Figure 2.6 - Command and control panel

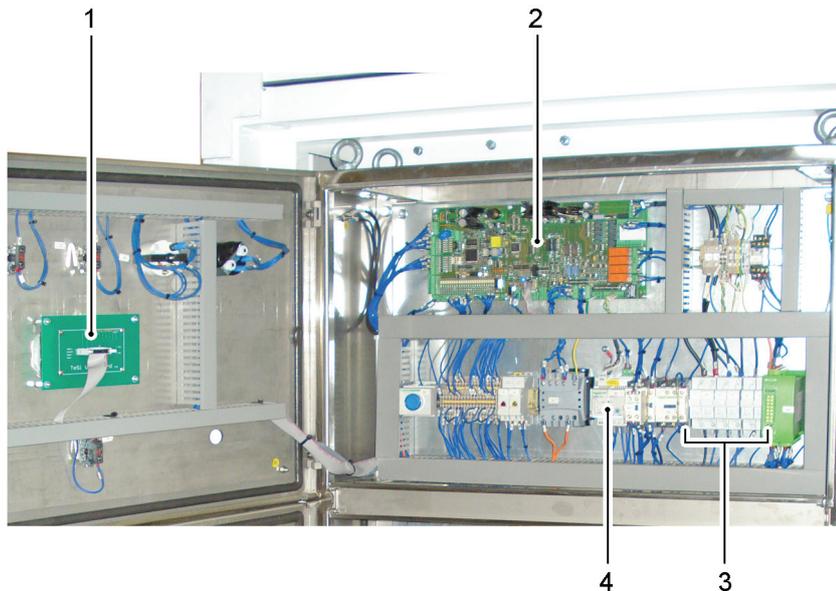
The electronic board (see Figure 2.7/2), situated inside the structure, and more precisely under the command and control panel (see Figure 2.6), houses all the equipments and the electronic card for operatively controlling both the panel itself and the safety controls.

In detail, in the electronic board the following components can be noticed:

- Display (see Figure 2.7/1);
- CPU control card (2);
- Ground fault switch (4);
- Fuses (3).

**NOTE**

In order to get further information about the electric plant of the Induction Heating Generator IHG 120CU, reference shall be made to the “Wiring Diagrams” delivered by TeSi s.r.l. as a Jointed Publication to this manual.

**LEGEND**

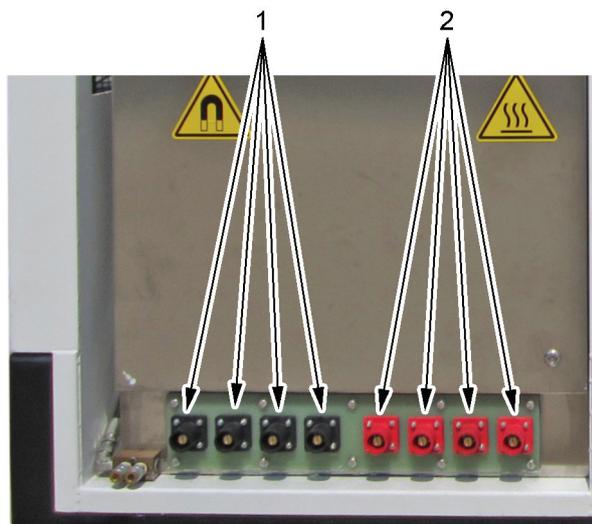
- 1 - Display
- 2 - CPU control card
- 3 - Fuses
- 4 - Ground fault switch

Figure 2.7 - Electric board, housing the components representing the control system

2.2.1.5 Output power connectors

On the Induction Heating Generator IHG 120CU front part, under the command and control panel, there are eight power insulated connectors, four of which are red (see Figure 2.8/2) and four black (1), which allow to deliver current to the coils through the relevant power cables realizing the connection between generator and coil.

	<p>PROHIBITION For no reason carry out the disconnection of the power cables during the heating cycle.</p>
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LEGEND

- 1 - Black output power connectors
- 2 - Red output power connectors

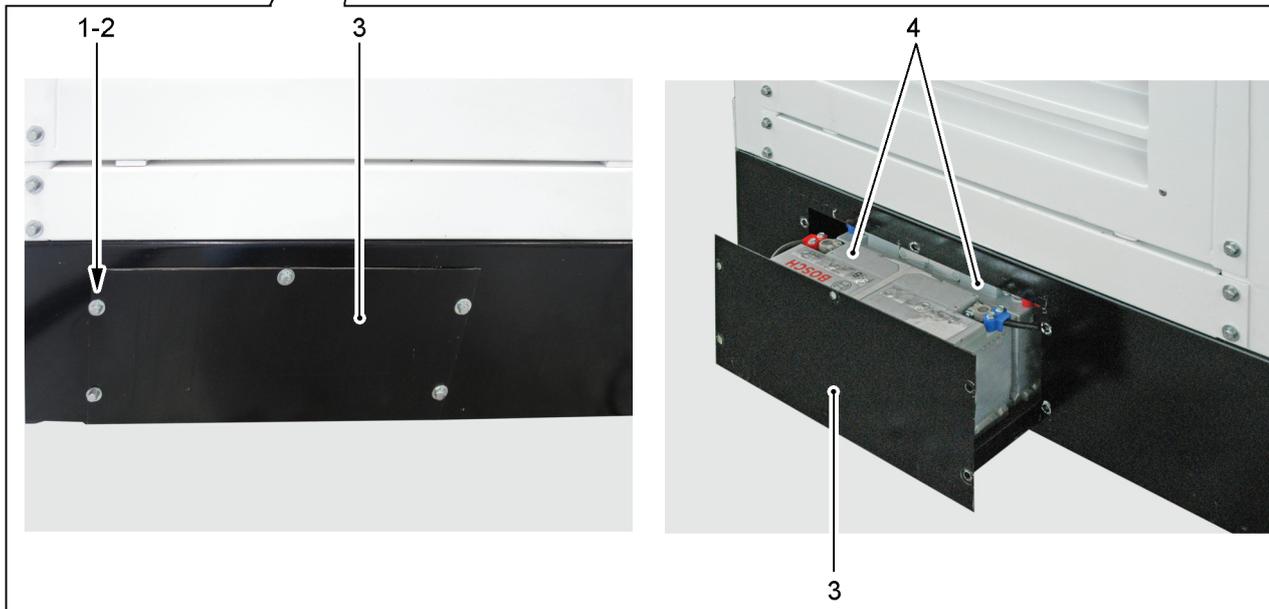
Figure 2.8 - Output power connectors, situated on the generator

2.2.1.6 Batteries

The electric plant operates by direct current with a 24V rated voltage delivered by two batteries (see Figure 2.9/4) “sealed” by 12 V, connected in series. The batteries (4), placed inside the engine compartment, provide the power supply for all the control circuits of the generator.

The batteries (4) are housed in an extractable drawer (3), situated outside the generator on the left side, and accessible after removing the screws (1) and relevant washers (2).

	<p>NOTE In order to get further information about the electric plant of the Induction Heating Generator IHG 120CU, reference shall be made to the “Wiring Diagrams” delivered by TeSi s.r.l. as a Joined Publication to this manual.</p>
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LEGEND

- 1 - Screw
- 2 - Washer
- 3 - Extractable drawer
- 4 - Batteries

Figure 2.9 - Batteries

2.2.2 COILS

The coils were both designed and realized in order to heat the pipe surface before welding and for generating the heating which precedes the laying of protective products against corrosion.

As already previously mentioned, the coils can be subdivided into three categories:

- standard clamp coil (coating) (see Figure 2.10);
- heavy duty clamp coil (coating) (see Figure 2.11);
- pair of external ring coils (before welding) (see Figure 2.12);
- pair of internal ring coils (before welding) (see Figure 2.13).

The over mentioned coils can show different structural characteristics, such as their diameter and their heating length, in order to satisfactorily meet the different requirements of the Customer, but not only, because TeSi s.r.l. can realize modifications to the coils, according with the Technical Specifications supplied by the Customer himself.



PROHIBITION

Never open or remove the coils when the Induction Heating Generator IHG 120CU is in the heating cycle phase.

2.2.2.1 Standard clamp coil

The standard clamp coil (see Figure 2.10) specifically provides to heat the pipes' junction area, before application of the protective products against corrosion. The openable structure is realized in fiberglass.

The main parts composing the standard clamp coil (see Figure 2.10) are the following ones:

- power connectors (1) and (11);
- conductors and inductive turns (10);
- contacts for turns' closure (8).

Externally, on the lower part of the standard clamp coil (see Figure 2.10) structure, a mechanism mainly consisting of a handle (2) and of two hook-levers (9), which, on their turn, get engaged on closing to the relevant pins (7) which are integral to the clamp coil, manually allows to completely open (or close) the standard clamp coil (see Figure 2.10), in such a way that the same one gets wrapped around the pipe on which it is necessary to operate.

On the clamp coil upper part, there are besides four adjustable supports (4), equipped with a wheel (5), purposed for centring the standard clamp coil (see Figure 2.10) on the pipe, when the same one is closed.

Four hooks (6) (two on each side), equipped with proper belts (3), allow not only the properly said handling of the standard clamp coil (see Figure 2.10) when it is closed, but also a fast passage from one junction to the next one by means of simple opening and lifting operations.

a) Power connectors

On the upper part of the standard clamp coil (see Figure 2.10), the two power connectors are situated, one of which is red (1) and the other one black (11), and which allow to power supply the coil itself.

The connection between the over mentioned connectors and those present on the generator, is realized through the purposed power cables.



NOTE

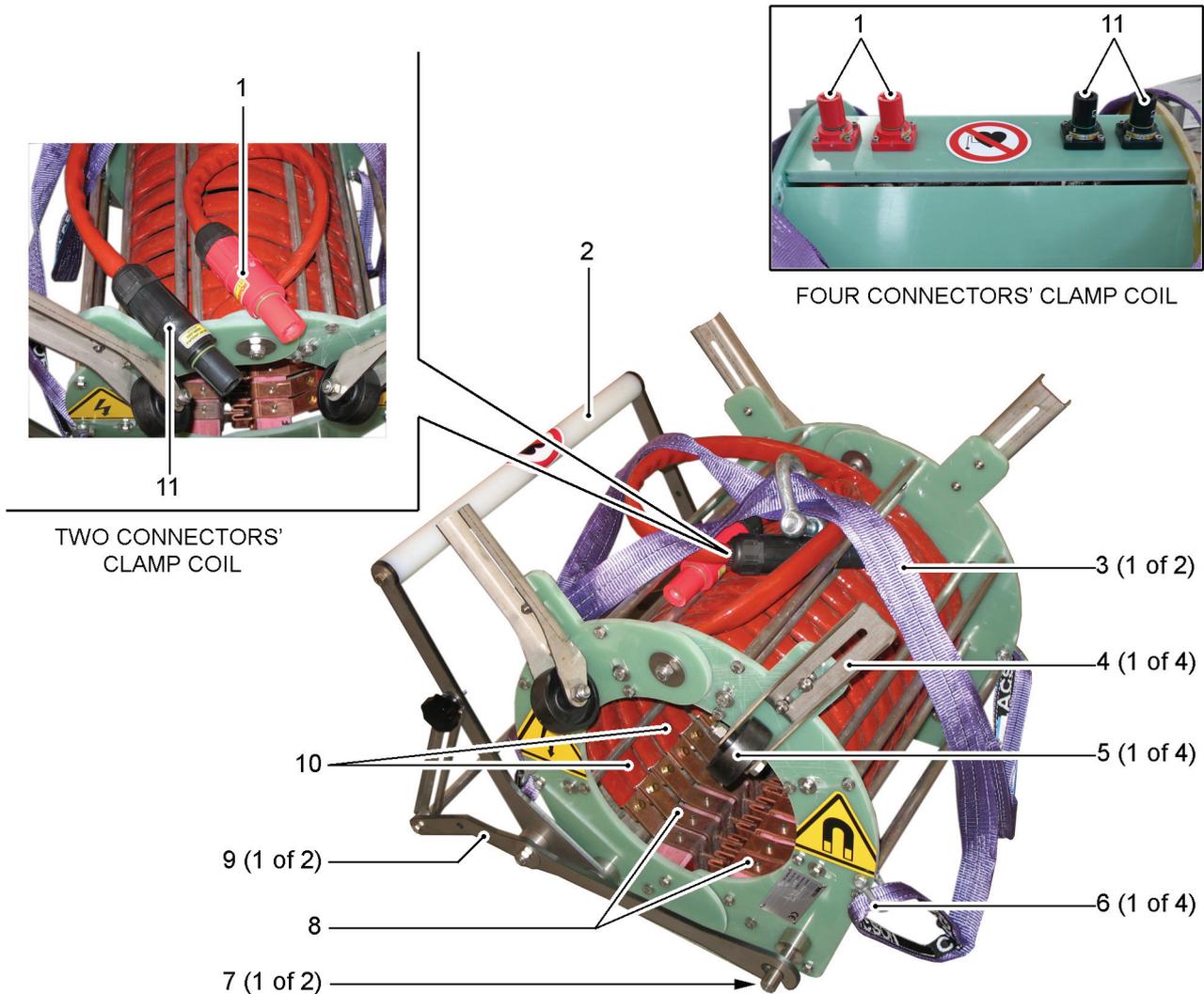
The power connectors situated on the clamp coil can be either two or four, according with the type of coil used.

b) Conductors and inductive turns

Still inside the ring structure of the standard clamp coil (see Figure 2.10), there are the conductors and the inductive turns (10), which are dimensioned in such a way to get the utmost thermal output.

c) Contacts for turns' closure

Internally, in the lower part of the standard clamp coil (see Figure 2.10) structure, there are the contacts for the turns' closure (8), also named blade contacts, which get completely connected only when the clamp coil (see Figure 2.10), is both mechanically and electrically closed.



LEGEND

- | | |
|---------------------------------|---|
| 1 - Red power connector | 7 - Pin (1 of 2) |
| 2 - Handle | 8 - (Blade) contacts for turns' closure |
| 3 - Belt (1 of 2) | 9 - Hook-lever (1 of 2) |
| 4 - Adjustable support (1 of 4) | 10 - Conductors and inductive turns |
| 5 - Wheel (1 of 4) | 11 - Black power connector |
| 6 - Hook (1 of 4) | |

Figure 2.10 - Standard clamp coil

2.2.2.2 Heavy duty clamp coil

The heavy duty clamp coil (see Figure 2.11) specifically provides to heat the pipes' junction area, before application of the protective products against corrosion. The openable structure is realized in heavy duty fiberglass. The main parts composing the heavy duty clamp coil (see Figure 2.11) are the following ones:

- power connectors (1) and (2);
- conductors and inductive turns (4);
- contacts for turns' closure.

Externally, on the lower part of the heavy duty clamp coil (see Figure 2.11) structure, two control pedals (5) and (7), with relevant mechanism, respectively allow to either open or close the heavy duty clamp coil (see Figure 2.11), in such a way that the same one gets wrapped around the pipe on which it is necessary to operate.

Two handle bars (6), situated on both the sides of the heavy duty clamp coil (see Figure 2.11), facilitate the opening and the closing of the coil on the relevant pipe.

On the clamp coil upper part, there are besides four adjustable supports (9), equipped with four wheels (10), purposed for centring the heavy duty clamp coil (see Figure 2.11) on the pipe, when the same one is closed.

Four hooks (8) (two on each side), equipped with proper belts (3), allow not only the properly said handling of the heavy duty clamp coil (see Figure 2.11) when it is closed, but also a fast passage from one junction to the next one by means of simple opening and lifting operations.

a) Power connectors

On the upper part of the heavy duty clamp coil (see Figure 2.11), the four power connectors are situated, two of which are red (1) and the other two black (2), and which allow to power supply the coil itself.

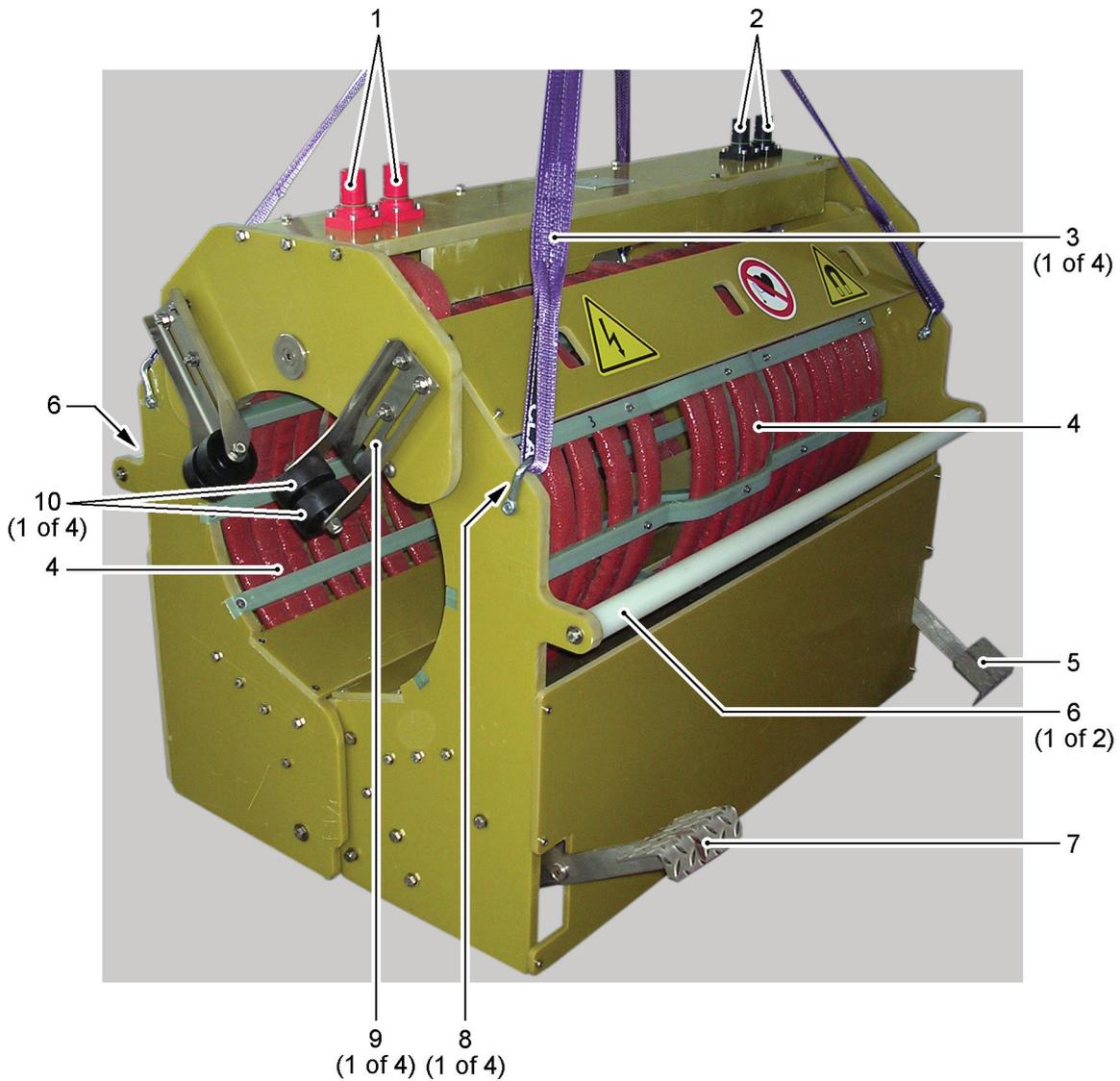
The connection between the over mentioned connectors and those present on the generator, is realized through the purposed power cables.

b) Conductors and inductive turns

Still inside the ring structure of the heavy duty clamp coil (see Figure 2.11), there are the conductors and the inductive turns (4), which are dimensioned in such a way to get the utmost thermal output.

c) Contacts for turns' closure

Internally, in the lower part of the heavy duty clamp coil (see Figure 2.11) structure, there are the contacts for the turns' closure, also named blade contacts, which get completely connected only when the clamp coil (see Figure 2.11), is both mechanically and electrically closed.



LEGEND

- | | |
|------------------------------------|---------------------------------|
| 1 - Red power connector | 6 - Handle bar (1 of 2) |
| 2 - Black power connector | 7 - Closing control pedal |
| 3 - Belt (1 of 2) | 8 - Hook (1 of 4) |
| 4 - Conductors and inductive turns | 9 - Adjustable support (1 of 4) |
| 5 - Opening control pedal | 10 - Wheel (1 of 4) |

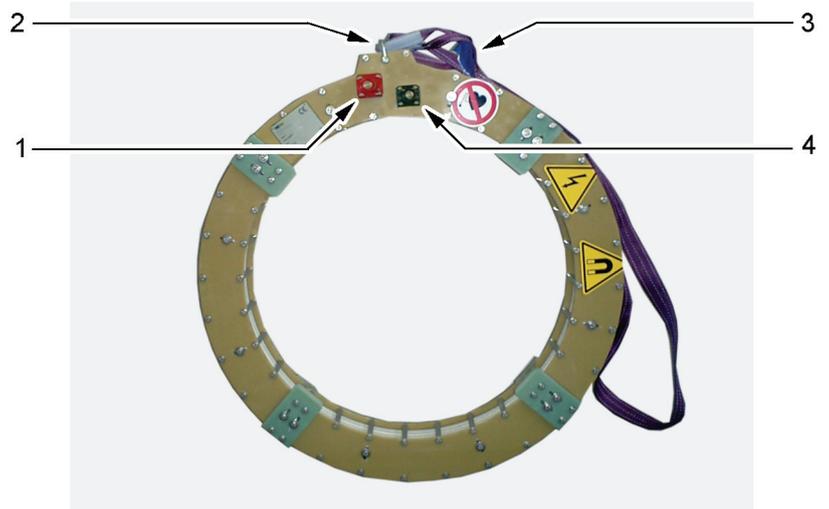
Figure 2.11 - Heavy duty clamp coil

2.2.2.3 Pair of external ring coils

The external ring coil (see Figure 2.12), on the other hand, is used for heating the pipes' ends before the welding process. Its structure is realized in plastic reinforced by fiberglass and aluminium.

Every external ring coil is equipped with two power connectors, one of which is red (1) and the other one black (4), for power supplying the coil itself, and with a hook (2) with belt (3) for its handling.

The delivery consists of a pair of external ring coils, which can be simultaneously connected to the generator.



LEGEND

- 1 - Red power connector
- 2 - Hook
- 3 - Belt
- 4 - Black power connector

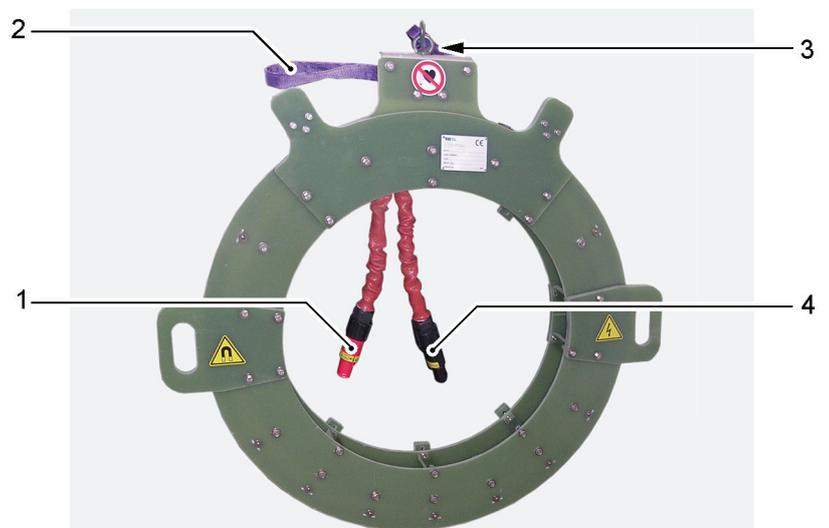
Figure 2.12 - External ring coil

2.2.2.4 Pair of internal ring coils

The internal ring coil (see Figure 2.13), on the other hand, is used for heating the pipes' ends before the welding process. Its structure is realized in plastic reinforced by fiberglass and aluminium.

Every internal ring coil is equipped with two power connectors, one of which is red (1) and the other one black (4), for power supplying the coil itself, and with a hook (3) with belt (2) for its handling.

The delivery consists of a pair of internal ring coils, which can be simultaneously connected to the generator.



LEGEND

- 1 - Red power connector
- 2 - Belt
- 3 - Hook
- 4 - Black power connector

Figure 2.13 - Internal ring coil

2.2.3 REMOTE CONTROL

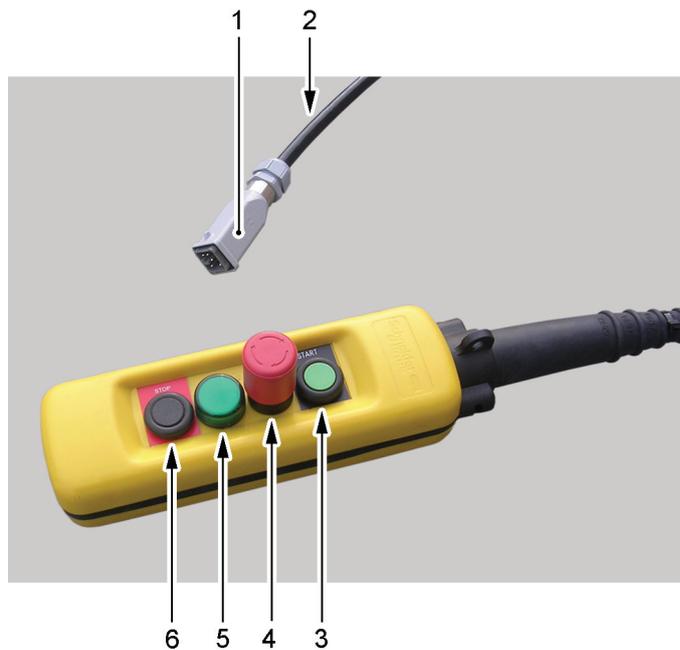
The remote control (see Figure 2.14), which can be connected through cable (2) equipped with connector (1) to the corresponding connector situated on the command and control panel, is used by the operator for the usual operation of the Induction Heating Generator IHG 120CU.

Shaped in such a way to be easily held, the remote control (see Figure 2.14) is equipped on its front side with the following commands and controls:

- a pushbutton for starting the heating cycle (START) (3);
- a mushroom-head emergency stop pushbutton (4);
- a heating in progress warning light (5);
- a pushbutton for stopping the heating cycle (STOP) (6).

**NOTE**

The Induction Heating Generator IHG 120CU only operates, provided that the remote control is connected to the purposed connector situated on the command and control panel.

**LEGEND**

- 1 - Connector
- 2 - Connecting cable
- 3 - Heating cycle start pushbutton (START)
- 4 - Mushroom-head emergency stop pushbutton
- 5 - Heating in progress warning light
- 6 - Heating cycle stop pushbutton (STOP)

Figure 2.14 - Remote control

2.2.4 POWER CABLES

The power cables (see Figure 2.15/1), as already previously mentioned, allow to connect the generator to the coil. Every cable is equipped, at the relevant ends, with power connectors (2) of the same colour, either red or black, in such a way to make the connections between the parts easier.

The delivery consists of two pairs of power cables.



LEGEND

- 1 - Power cables
- 2 - Power connector

Figure 2.15 - Power cables

2.2.5 COMPRESSED AIR SYSTEM (OPTIONAL)

On the Induction Heating Generator IHG 120CU a system for generating compressed air may be installed as optional (see Figure 2.16).

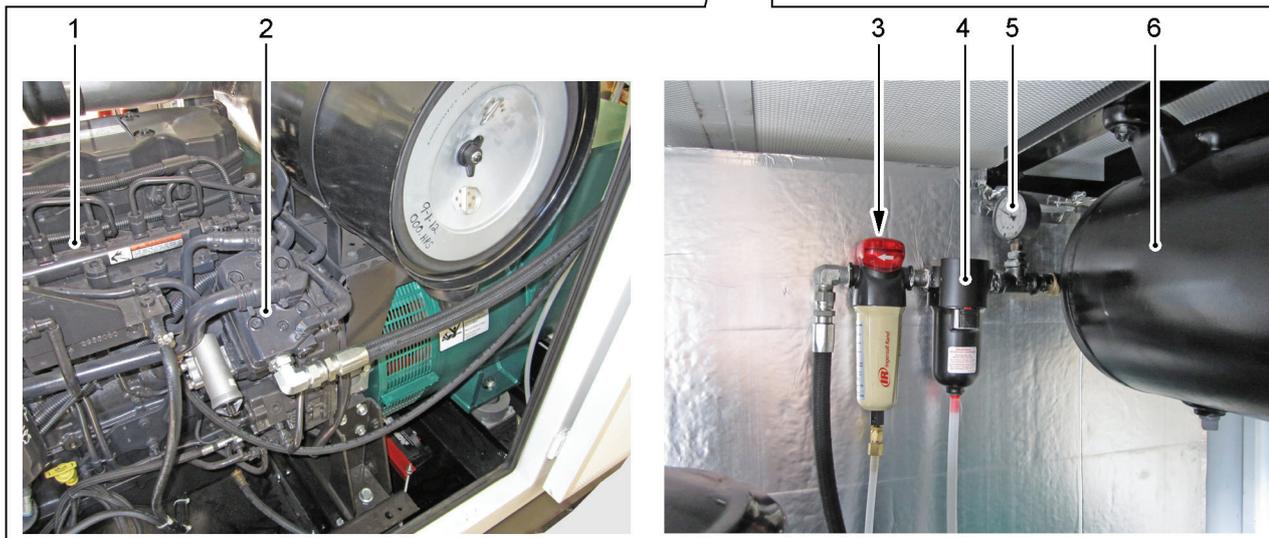
Said system essentially consists of:

- an air compressor (2), directly installed on the engine (1), with a flow rate of 17 CFM at 2400 rpm engine speed (28.9 m³/hour at 2400 rpm engine speed);
- an air tank (6), with a capacity of 10 Gallons (37.9 ltrs);
- a pressure gauge (5);
- an air filter (3);
- a desiccator air filter (4);
- two air couplings for compressed air (7).



NOTE

The flow rate of 17 CFM for the compressor can be achieved only and exclusively with the engine (1) in “CRUISE” speed (see Figure 2.17/3).



a. Internal arrangement of the components

LEGEND

- 1 - Engine
- 2 - Air compressor
- 3 - Air filter
- 4 - Desiccator air filter
- 5 - Pressure gauge
- 6 - Air tank

Figure 2.16 - Compressed air system (Optional)
(Sheet 1 of 2)



b. External arrangement of the components

*Figure 2.16 - Compressed air system (Optional)
(Sheet 2 of 2)*

2.2.6 120 VAC AUXILIARY GENERATOR (OPTIONAL)

On the Induction Heating Generator IHG 120CU a 120 Vac electric power generator may be installed as optional (see Figure 2.17).

That system essentially consists of:

- a 120 Vac auxiliary alternator, 60 Hz, 9 kW (2);
- an engine speed selector "IDLE/CRUISE" (3);
- two 120 Vac electric sockets (5).

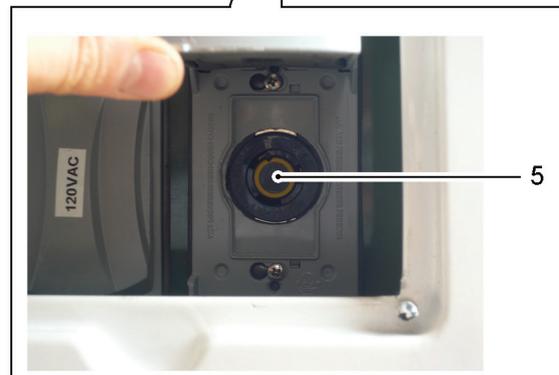
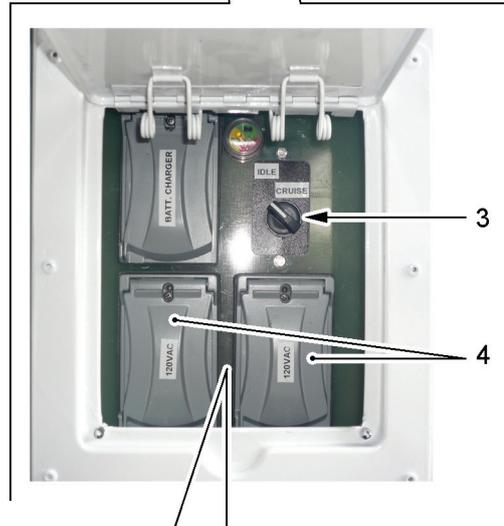
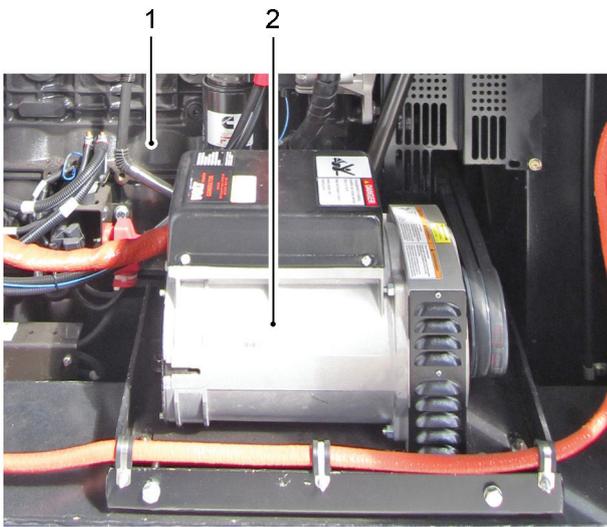
The engine speed selector IDLE/CRUISE (3), when positioned on "CRUISE", permits that the engine (1) reaches its maximum speed.

When the engine operates at its maximum speed (CRUISE speed), it is possible to connect some service accessories to the two 120 Vac electric sockets (5), located inside the relevant covers (4).



WARNING

Use the 120 Vac electric sockets (5) exclusively when the engine (1) is operating at its maximum speed (CRUISE speed).



LEGEND

- 1 - Engine
- 2 - 120 Vac auxiliary alternator
- 3 - Engine speed selector "IDLE/CRUISE"
- 4 - Cover
- 5 - 120 Vac electric sockets

Figure 2.17 - 120 Vac auxiliary generator (Optional)

2.2.7 BATTERY CHARGER (OPTIONAL)

On the Induction Heating Generator IHG 120CU a battery charger (see Figure 2.18) may be installed as optional. The activation of the battery charger can be effected by simply connecting a 120 Vac socket to the electric plug (1) located inside the cover (2).

On the battery charger is also present an indicator (3) of the batteries charge state.

	<p>WARNING Do not power the command and control panel of the generator when the battery charger (see Figure 2.18) is operating.</p>
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LEGEND

- 1 - Electric plug
- 2 - Cover
- 3 - Batteries charge state indicator

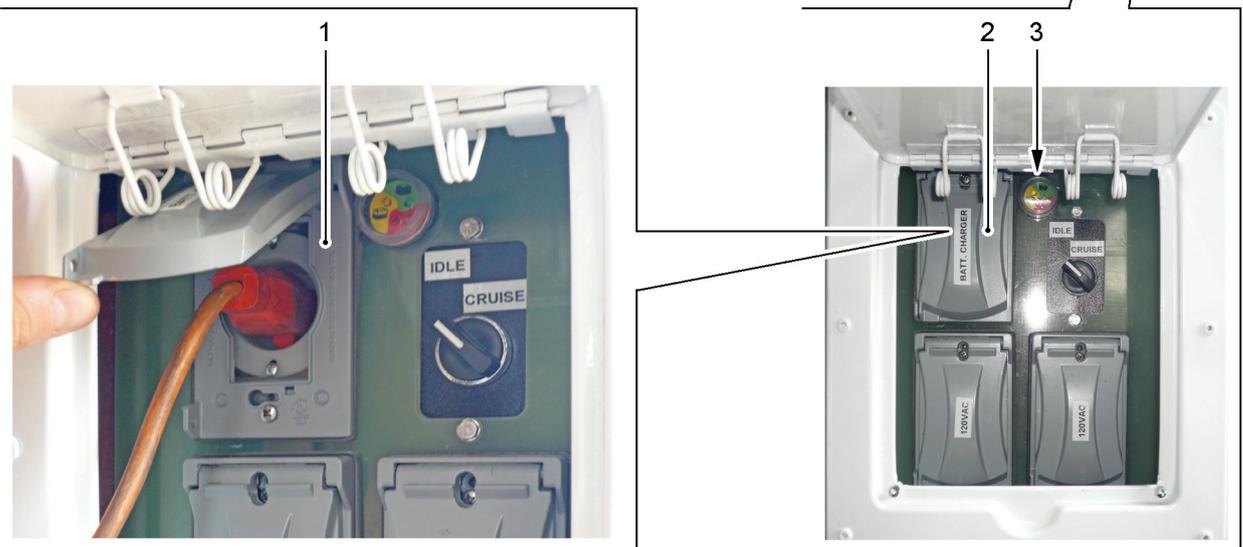


Figure 2.18 - Battery charger (Optional)

2.3 INDUCTION HEATING GENERATOR IHG 120CU TECHNICAL DATA

2.3.1 GENERATOR DIMENSIONS AND WEIGHT

- Length	2440 mm
- Width	1310 mm
- Height	2110 mm
- Weight	2400 kg



NOTE
Dimensions are expressed in mm.

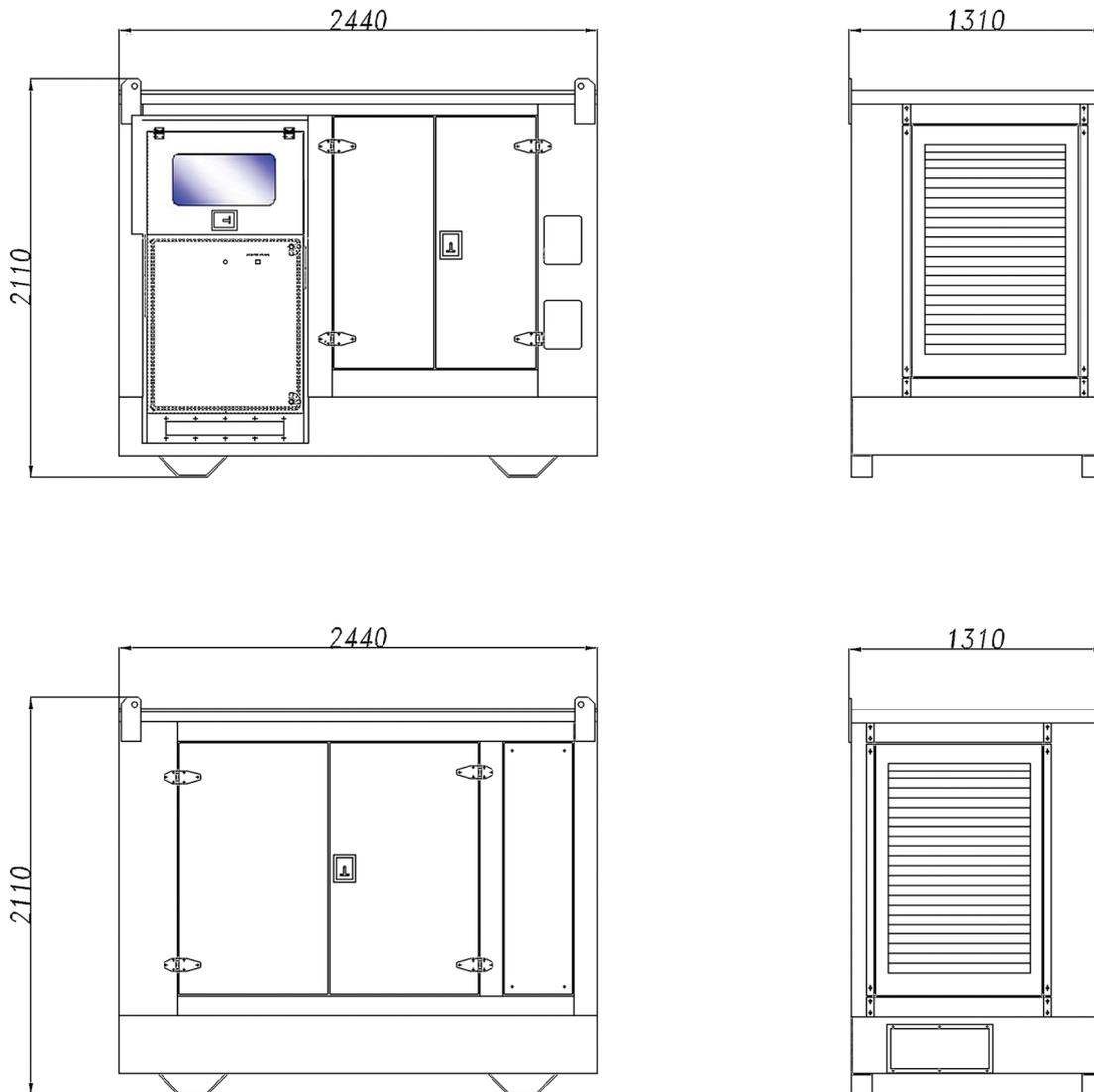


Figure 2.19 - Generator overall dimensions

2.3.2 MECHANICAL CHARACTERISTICS

2.3.2.1 Engine

- Manufacturer **CUMMINS**
- Model..... **QSB6.7**
- Type of Cycle..... **Diesel - Common rail, water-cooled with turbo intercooler**
- Cylinders' No. and arrangement..... **6 in-line**
- Maximum power (at 2400 rpm) **142 kW**

2.3.2.2 Compressed air system (Optional)

- Air compressor type **1 cylinder, water cooled**
- Air compressor flow (at 2400 rpm engine speed)..... **17 CFM (28.9 m³/hour)**
- Max pressure..... **110 PSI (758 kPa = 7.58 bar)**

2.3.3 ELECTRIC CHARACTERISTICS

- Generator
 - Maximum output voltage **165 V single-phase**
 - Frequency **480 Hz**
 - Power **120 kVA continuous, cosφ = 0.9, ambient temperature = 20 °C**
150 kVA at peak, duty cycle 50%, max ON 20', cosφ = 0.9, ambient temperature = 20 °C
- Batteries
 - Type..... **12 V - 100Ah - 830 A**
 - No..... **2**
 - Connection **in series**
- 120 Vac Auxiliary generator (Optional)
 - Output voltage (at 2400 rpm engine speed)..... **120 V, 60 Hz**
 - Max output power (at 2400 rpm engine speed)..... **9 kVA**

2.3.4 COILS' DIMENSIONS AND WEIGHT

	<p>NOTE The dimensions and weights relevant to the coils depend on the type of coil used. Consequently, reference shall be made to the identification plate applied on the same ones.</p>
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2.3.5 POWER CABLES DIMENSIONS AND WEIGHT

- Standard length **15 m**
- Weight (standard length) **~ 100 kg**

2.3.6 PACKINGS' DIMENSIONS AND WEIGHT

2.3.6.1 Wooden base

- Length **~ 2700 mm**
- Width **~ 1450 mm**
- Weight **~ 100 kg**

2.3.6.2 Wooden crate

- Length~ 2700 mm
- Width~ 1450 mm
- Height~ 2700 mm
- Weight~ 500 kg

2.3.6.3 Pallet

- Length x width euro size
- Weight~ 15 kg

Chapter

3

SAFETY RULES

Any working machine can represent a possible danger.

3.1 SAFETY GENERAL PRINCIPLES

As far as it was possible, **TeSi s.r.l.** lavished the utmost efforts in designing the **Induction Heating Generator IHG 120CU** by making it intrinsically safe.

Besides, they equipped it with all the protection and safety devices held to be necessary, and, finally, they accompanied it with the sufficient information for allowing its safe and correct utilization.

If the Induction Heating Generator IHG 120CU is employed by observing the use instructions and is regularly subjected to the required maintenance, the user can be sure to operate on safe conditions; on the contrary, the inobservance of the use and maintenance rules, makes the Induction Heating Generator IHG 120CU dangerous both for the operator and for the other people.

**WARNING**

Before using the Induction Heating Generator IHG 120CU, carefully read the instructions supplied in this manual and follow the here reported indications.

It is besides absolutely necessary that the operator observes the safety indications relevant to the yard in which he is working.

If a warning message can't be fully understood, ask TeSi s.r.l. for the relevant explanations.

For safety purposes, it is anyway not sufficient to carefully observe the safety warnings; for the whole utilization time of the Induction Heating Generator IHG 120CU, it is necessary to foresee all the possible dangers and to make every effort in order to prevent them.

Never begin any work without having before ascertained that both his own and other people' safety are safeguarded.

Never undervalue his own doubts, and, if any uncertainty exists about the Induction Heating Generator IHG 120CU or about the work to be performed, get addressed to somebody competent.

Should any leaks or anomalous situations be noticed, it is obligatory to immediately stop the Induction Heating Generator IHG 120CU and to urgently inform either the yard foreman or the competent mechanisms about the event.

Always act with:

PRUDENCE - ATTENTION - PRECAUTION**CAUTION**

As far as all the possibly required explanations are concerned, please contact TeSi s.r.l..

3.2 SAFETY INFORMATION

The following recommendations are here supplied in order to reduce the risks of danger for people and things either when the Induction Heating Generator IHG 120CU is either operating or out of service.

	<p>WARNING Presence of high magnetic fields near the generator, the coil and the power cables realizing the connection between coil and generator.</p>
	<p>The most intensive presence of high magnetic fields can be found near the coil.</p>
	<p>People with pacemaker must pay attention and keep themselves at a proper distance. It is possible to have electromedical devices' failures.</p>

	<p>PROHIBITION Never use the Induction Heating Generator IHG 120CU beyond the limits defined in its planning phase; to exceed those limits can be dangerous and can cause damages to the Induction Heating Generator IHG 120CU itself. Don't try to improve the Induction Heating Generator IHG 120CU performances by applying any unapproved modifications.</p>
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- The operator shall have all the required qualifications for using the Induction Heating Generator IHG 120CU.
- It is here reminded to the operators to adopt, during the Induction Heating Generator IHG 120CU utilization, an attentive and careful behaviour, in order to improve his own safety level, as well as that of other people and of the Induction Heating Generator IHG 120CU itself.
- The Induction Heating Generator IHG 120CU can't be used for any applications different from those stated by **TeSi s.r.l.**
- Neither connect the coil to the power connectors situated on the generator, nor start the same one if any signs of damages are noticed.
- Make sure that the environmental conditions fully correspond to the indicated ones.
- Execute several idle manoeuvres, being assisted by skilled personnel, in order to acquire the required sensibility for operating in fully safe conditions.
- DON'T tamper in any case the command and control panel.
- DON'T leave the protective hatch of the command and control panel open during the normal use of the Induction Heating Generator IHG 120CU, as that would sensibly and dangerously reduce the protection degree against external agents.
- Periodically check for the efficiency of the commands and controls present on the command and control panel as well as on the remote control.
- In case of an EMERGENCY, press the red mushroom-head pushbutton situated on the command and control panel or on the remote control; absolutely avoid resetting the red mushroom-head pushbutton before the engine has completely stopped.
- In case of a fire, extinguish it by using a powder extinguisher, **NEVER** by using water.
- Stretch the power cables, realizing the connection between generator and coil, far away from any mechanical moving mechanisms or from any sharpened objects.
- Exclusively entrust the connecting operations of the power cables, realizing the connection between generator and coil, to qualified personnel.
- Exclusively entrust the connecting operations of the grounding cable between the generator and the pipe on which it is necessary to operate to qualified personnel.
- Before starting the engine of the Induction Heating Generator IHG 120CU, make sure that the front and rear doors are closed; if not so, don't start the engine.
- Cut off the power supply to the generator before operating on the inner components, by acting on the red

- mush-room-head pushbutton, removing the ignition key and switching OFF the batteries switch.
- Don't use the Induction Heating Generator IHG 120CU when you are under the effect of some drugs or alcoholic drinks which could either alter or reduce your reactive quickness.
 - Always keep the Induction Heating Generator IHG 120CU clean, in particular as far as the command and control instruments are concerned.
 - Always when working on the Induction Heating Generator IHG 120CU, act with the utmost prudence and attention. Make every effort in trying to prevent any possible danger.
 - In order to contribute to a fully safe utilization of the Induction Heating Generator IHG 120CU, the operator can suitably integrate the information supplied by **TeSi s.r.l.** with additional working instructions, which shall obviously be complying with the instructions supplied in this manual.
 - The inobservance of the safety instructions reported on the transfer printings can lead to accidents. Keep the transfer printings clean and replace the ones become illegible or the lacking ones, before starting the working cycle. Make sure that the spare parts are equipped with the possible safety transfer printings.
 - The operator's concentration shan't be in any way either disturbed or interrupted during the Induction Heating Generator IHG 120CU operating cycle.
 - **NEVER** leave the command and control place during the operating cycle; this, in order to be in a position to promptly intervene in case of any anomalies on the Induction Heating Generator IHG 120CU.
 - The operator shall make sure that the working place is well illuminated and that it doesn't show any possibly dangerous condition. Should the illumination be scarce, provide to install the suitable artificial light devices.
 - It is absolutely forbidden to smoke, to drink or to eat during the Induction Heating Generator IHG 120CU operating cycle.
 - The access to the Induction Heating Generator IHG 120CU area of action is absolutely forbidden to the unauthorized personnel, consequently it is recommended to signal both visually and, possibly, acoustically the observance of that rule. Always fully observe all the safety rules in force for the Induction Heating Generator IHG 120CU user, and/or those in force in the country where it is used.
 - The Induction Heating Generator IHG 120CU **ISN'T** equipped with an extinguisher. It shall be a Customer's care to provide to get installed a suitable extinguisher on the working place, as well as to take care that the same one will be regularly checked by qualified personnel.
 - A defective Induction Heating Generator IHG 120CU can cause accidents, hurting both the operator and other people possibly present. Never use the Induction Heating Generator IHG 120CU on trouble conditions or if some of its parts are lacking. Before starting the work, make sure that all the maintenance procedures foreseen in this manual were completed.
 - It is absolutely forbidden to get near the engine when it is operating. For this reason, it is obligatory to keep the access doors to the engine compartment closed.


PROHIBITION

It is forbidden to open the access doors to the engine compartment, while the engine is operating. For that purpose, on the access doors there is a padlock. Such padlocks must be locked, while the engine is running, and the relevant key must be preserved by the person appointed to that task.

Only the appointed person can consciously authorize the opening of the access doors to the engine compartment.

TeSi s.r.l. held themselves as being exonerated from any responsibility if any accidents due to inobservance of the here indicated rules should take place.

- Don't intervene on the engine while it is still hot. Let it cool down before opening the access doors and, anyway, always wear the proper protective gloves.
- As the engine emits some exhaust gases harmful for the health, it was equipped with an exhaust pipe suitable for expelling the gases upwards, without that they can concern the operator's working area. It is therefore absolutely forbidden to let the engine operate without the relevant exhaust pipe.
- Use the adequate personal safety means near the engine exhaust pipe, which can reach high temperatures, and don't lean either inflammable substances or materials to that part when it is hot.
- If the Induction Heating Generator IHG 120CU is used in an indoor ambient or by reduced ventilation condi-

tions, foresee a proper intake for the exhaust gases.

- The engine produces vibrations. In order to prevent them from being transmitted to the whole structure, the engine was elastically insulated from the frame.
- Refuelling shall be always carried out by absence of free flames, and during that operation it is absolutely forbidden to smoke.
- All fuels and the majority of the oils are inflammable. Consequently, avoid getting them spread on hot surfaces or on electric components.
- Make sure that the maximum current value of the coil which is going to be used corresponds to that specified on the identification plate of the same one.

**PROHIBITION**

Never set a current higher than the 50% of that indicated on the relevant identification plate applied on the coil.

- The power connectors for the connection of the coils can be under voltage, and, even if insulated, because of their characteristics they mustn't be used in any different way than the foreseen one. The connection must be exclusively realized by using the relevant power cables.

**PROHIBITION**

Don't introduce either objects or your fingers into the power connector which is integral with the generator, and into the connectors of the power cables, when an end of the same ones results being connected to the generator.

**CAUTION**

If necessary, clean the power connectors by using compressed air, and, in their external part, by using a dry wiping cloth.

- Periodically check that the hooking points foreseen for hoisting the coil and the relevant belts don't show any signs of deterioration.

**PROHIBITION**

Never open or remove the coils when the Induction Heating Generator IHG 120CU is in the heating cycle phase. Danger of:

- electric shock;
- damages to the generator.

**PROHIBITION**

For no reason carry out the disconnection of the power cables during the heating cycle. Danger of:

- electric shock;
- damages to the generator.

- Use the 120 Vac electric sockets exclusively when the engine is operating at its maximum speed (CRUISE speed).
- Do not power the command and control panel of the generator when the battery charger is operating.

3.3 EMERGENCY BEHAVIOURS

It is extremely important to very carefully read the following information. Make sure that the personnel charged with the plant maintenance perfectly knows the here supplied information.

Should any wrong behaviour cause an accident situation, immediately request the intervention of personnel qualified in supplying first aid. While waiting for the first aid personnel to arrive, the following general instructions are here supplied in order to lend the first assistance.

3.3.1 FIRE

**CAUTION**

It shall be a Customer's care to get installed a proper fire-fighting system in the yard or, in particular, near the Induction Heating Generator IHG 120CU.

Extinguish the fire by using either carbon dioxide, dry chemical substance or powder extinguishers. Never use water: by doing so, you could increase the fire or get fulminated, if the fire was originated by electricity. Immediately call the firemen.

3.3.2 LUBRICANTS

The lubricant is toxic. Handle the lubricant as little as possible, and protect the skin by using purposed creams and gloves.

Every time it is necessary to move some lubricant, it will be required to observe the best care and hygiene rules both referred to the person and to the factory.

Never stock lubricants in open containers or in containers not countermarked by the proper label.

The lubricants' elimination must be performed in full compliance with the relevant rules in force.

Don't keep oil-drenched clothes in your pockets.

Wash the dirty garments before using them again.

Throw away the lubricant-drenched shoes.

3.3.2.1 Lubricants' first aid

Eyes: in case of contact with the eyes, abundantly rinse the eyes with water for 15 minutes: if the inflammation persists, have recourse to the medical aids.

Swallowing: don't provoke the vomit and have recourse to the medical aids.

Skin: carefully wash by using water and soap, or use a special detergent.

Using a nails' brush can help.

Never use gasoline, diesel fuel or paraffin for performing the washing.

3.3.3 SCALDS

1) Extinguish the flames on the scalded person garments by using:

- a water flood;
- a powder extinguisher, by avoiding to address the jet on the victim face;
- some blankets to be thrown on the victim or by rolling the victim itself on the ground.

2) Don't detach any fabrics' tatters adhering at the skin.

3) In case of scalds caused by liquids, remove quickly but cautiously the wet garments.

4) Cover the scald with a purposed anti-scald packet or by using a sterile bandage.

3.3.4 CARBON MONOXIDE INTOXICATIONS

The carbon monoxide contained inside the engine exhaust gases is odourless and dangerous, both because it causes intoxication and because it creates, by getting into contact with the air, an explosive mixture.

In an indoor ambient, the carbon monoxide is very dangerous, because it can reach the critical concentration within a quite short time.

In case of first aid to the victim of a carbon monoxide intoxication in an indoor ambient, immediately proceed to ventilate the room, in order to reduce the gas concentration.

When acceding to the room, the helper shall hold his breath, don't light flames, switch on lights or actuate electric bells or phones, in order to prevent any explosion.

Carry the victim of the carbon monoxide intoxication into a ventilated place in the open air, laying him on his side, if he is unconscious.

3.3.5 CORROSIONS

The corrosion to the eyes is provoked both by the lubricating oil and by the water and cement powder mixture.

Rinse the eye with water for at least 20 minutes, by keeping the eyelids open, in order to allow the water to flow along the eye contour and by moving the eye in every direction, having then immediately recourse to the medical aids.

3.3.6 FULGURATIONS

The fulguration can be provoked by:

- external electric wirings;
- electric equipments.

In both cases, the voltage value causes the passage of high currents through the human body.

In case of a short circuit provoked, for example, by a metal tool, some flooding could arise, causing scalds.

In those cases, try by every mean to cut out the current before touching the victim.

Shouldn't this be possible, remember that any other attempt is highly dangerous also for the succourer; consequently, the rescue attempt must be performed by using fully insulating means.

3.3.7 WOUNDS AND FRACTURES

The vastness of the possible cases and the specificity of the interventions necessarily requires the intervention of the medical structures.

In case of bleeding, press the wound from the outside, up to the succourers' arrival.

In case of a fracture, don't move the part of the body concerned by the fracture itself, and, only if absolutely necessary, displace the victim with the utmost care.

3.3.8 ELASTOMERIC MATERIALS

The elastomeric materials which were subjected to temperatures higher than 300° C must be handled by observing the following procedure. Wear heavy rubber gloves and special protective glasses.

- 1) Remove the material and put it into plastic bags.
- 2) Wash the polluted area by using an alkaline solution.
- 3) Then wash by using water and some cleansing agent.
- 4) Put all the polluted material used in this operation into plastic bags and eliminate them according with the relevant laws in force.

**PROHIBITION**

Don't burn any fluoroelastomeric materials.

3.3.8.1 First aid

In case of contamination of skin or eyes, immediately and abundantly rinse either in clean water for at least 15 minutes, having then immediately recourse to the cares of a doctor.

3.4 SAFETY IN MAINTENANCE**WARNING**

Before intervening on any component, either mechanical or electrical, the maintenance liable technician must remove the ignition key, switch OFF the batteries switch for a better safety and preserve on himself the key until the maintenance intervention is over, and only after that he can restore the operation normal conditions, for carrying out the check on the Induction Heating Generator IHG 120CU.

That, in order to prevent anybody from restarting the Induction Heating Generator IHG 120CU without informing the personnel carrying out the maintenance intervention.

Besides, a warning notice shall be applied on the Induction Heating Generator IHG 120CU, informing that the same one is presently subjected to a maintenance intervention.

The maintenance liable technician is the main liable person for any possible accident which could occur during these operations; it is therefore recommended to execute the above described procedure, in order to prevent every possible serious and unpleasant inconveniences.

- The maintenance technician shall have carefully read this manual before carrying out any operation on the Induction Heating Generator IHG 120CU.
- The maintenance must be performed by qualified personnel. Before starting to perform the maintenance operations, make sure that the Induction Heating Generator IHG 120CU is on safety conditions.
- When it is necessary to intervene on the Induction Heating Generator IHG 120CU in order to execute any maintenance operation, the maintenance technician shall ascertain to operate by a good visibility (by possibly using external illuminating equipments), in order to prevent any possible risk of getting hurt because of the scarce visibility.
- The maintenance technician shall be sure that no possible dangerous conditions are present.
- Cleaning the metal parts by using inadequate solvents can cause corrosion. Exclusively use detergents and solvents of adequate type.
- Don't clean the components of the command and control panel by using any corrosive agents, but only by using a dry wiping cloth.
- Don't try to carry out either repairs or any other maintenance operation without having previously asked the TeSi s.r.l. personnel for advice.
- Unauthorized modifications can lead to hurts or damages; before carrying out any modification on the Induction Heating Generator IHG 120CU, contact the TeSi s.r.l. personnel.
- When some metal pins are either driven or extracted, it is possible to be hurt by metal splinters: always wear protective glasses and use a soft mallet or drift.
- Before either connecting or disconnecting an electric component, attentively analyse the electric circuit: a wrong connection can lead to hurts and/or damages.

- When the batteries are handled, it is necessary to prevent the electrolyte from coming into contact with the hands. Therefore, use the suitable protective gloves. All possible sparks or flames near the batteries must be absolutely avoided, therefore also smoking is forbidden.
- Don't use any flammable fluids during the cleaning operations.
- The maintenance must be carried out by Induction Heating Generator IHG 120CU turned off, after having removed the ignition key from the command and control panel and switched OFF the batteries switch.
- A scarce communication level can lead to accidents. If one or more persons are working on the Induction Heating Generator IHG 120CU, make sure that each of them is informed about the work the other ones are performing. By not adopting the above mentioned precautions, the possibility is left open to very serious accidents and even to death.
- By not constantly wearing the adequate garments, there is still the possibility of serious accidents: fluttering garments can get caught into the machine parts. Always wear the adequate protective garments, complying with the kind of work you are performing, as, for example: helmet, safety shoes, protective glasses, properly-sized overalls, ears-protections and gloves for industrial use; button the cuffs, don't wear ties or scarves and keep long hair dressed in a pony-tail.
- Gaskets and O-Rings incorrectly mounted, damaged or worn out can provoke leaks and accidents: if not otherwise established, immediately replace the damaged components. Don't use either trichloroethylene or thinners for paints near the O-Rings and the gaskets.
- Some gaskets or oil seals may contain elastomeric material like Viton, Fluorel and Technoflon. The elastomeric materials exposed to high temperature can produce highly corrosive acids.

**WARNING**

The acids produced by elastomeric materials subjected to high temperatures can cause serious scalds.

- The new components kept at ambient temperature can be handled without any particular precaution.
- The elastomeric components which were exposed to 300°C temperatures don't need to be handled with any special precautions. If there are some marks of decomposition (for example, burnings), get referred to Paragraph 3.3 "Emergency behaviours".

**PROHIBITION**

Don't touch either the component or the surrounding area.

**CAUTION**

It is here pointed out that, inside the Induction Heating Generator IHG 120CU there are some materials which, if dispersed in the environment, can create serious ecological damages (for example, lubrication grease, fuel, auxiliary cleaning material, greasy wiping clothes or fuel drenched ones, etc.).

It is reminded that the collection and the elimination of the exhausted oils and of the over enlisted components are regulated by relevant laws.

Deliver all the over mentioned residuals to the authorized collecting centres.

It is severely forbidden to get rid of the residuals by depositing them in abusive dumps or, even worse, by discharging them into the rivers or into the sewerage.

The relevant laws in force, exactly defined for every country, foresee heavy penalties for the transgressors.

TeSi s.r.l. decline every responsibility in case the here enlisted safety and use instructions shouldn't be strictly observed.

3.5 SAFETY DEVICES

The Induction Heating Generator IHG 120CU is equipped with safety systems purposed either to safeguard the operator's safety or to prevent damages to the components of the generator itself.

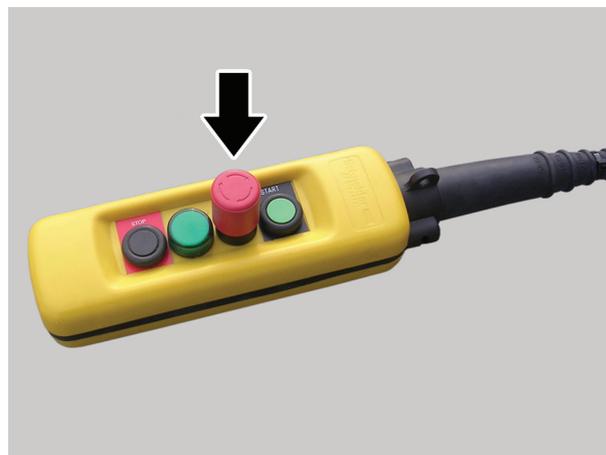
3.5.1 EMERGENCY PUSHBUTTON

This red mushroom-head pushbutton (see Figure 3.1), which is situated both on the command and control panel and on the remote control, must be pressed every time the operator identifies a dangerous situation; by pressing it, the Induction Heating Generator IHG 120CU instantaneously determines the following conditions:

- immediate stop of the engine;
- immediate shut off of the power supply to the coils.



a. Command and control panel



b. Remote control

Figure 3.1 - Emergency pushbutton

3.5.2 HOISTING ACCESSORIES

In order to allow its handling and a correct use during the whole working cycle, the coil was equipped with some accessories (belts), allowing to get hold of it by using a usual crane (see Paragraph 4.4.1).

During the properly said transport phases, the hoisting belts present on the coil must be fastened on the same one in such a way not to hinder the operations, and besides, both the generator and the coil must be fastened to the vehicle platform by means of suitable slings, ropes, tie rods etc., in order to prevent any sudden and unexpected load side skids.

As far as the Induction Heating Generator IHG 120CU installation is concerned, carefully observe the indications reported in Chapter 5 "Installation".

3.5.3 ELECTRIC PLANT

The electric plant was realized in such a way to prevent, if used within a range of temperatures comprehended between -15 °C and +45 °C, any risk due to the electric power, as defined by the Machinery Directive (98/37/CE).

**NOTE**

If requested by the Customer, TeSi s.r.l. can supply versions with a temperatures' range comprehended between -40 °C and +50 °C.

All the used components are self-extinguishing.

Warning lights, situated on the command and control panel, signal any possible anomaly or emergency situation; as soon as a signaling lights up, immediately check for the problem gravity, and, if the situation requires it, stop the Induction Heating Generator IHG 120CU and don't start it up again until the problem hasn't been solved.

3.5.4 ELECTRIC SAFETY DEVICES

The Induction Heating Generator IHG 120CU is equipped with an electronic system, which constantly performs the following checks:

- generator maximum output voltage;
- alternator maximum output current;
- alternator maximum temperature;
- (clamp) open coil;
- leakage to ground;
- engine oil low pressure;
- battery charge level;
- engine high temperature.

As the above mentioned anomalies can prove harmful for the operator during use of the Induction Heating Generator IHG 120CU, they are automatically signalled through the warning lights present on the command and control panel, and, in case of particularly serious anomalies, the safety devices get actuated, which impede the occurrence of conditions which would be dangerous even for the efficiency of the Induction Heating Generator IHG 120CU.

3.5.5 COMMAND AND CONTROL PANEL PROTECTIVE TRANSPARENT HATCH

The transparent hatch (see Figure 3.2), provided for protecting the command and control panel, must always be closed during the generator normal operating phases, in such a way to prevent, in first place, any foreign

personnel from accidentally interact on the panel itself, and, in second place, for preventing dust or humidity from damaging both the panel and the relevant components.

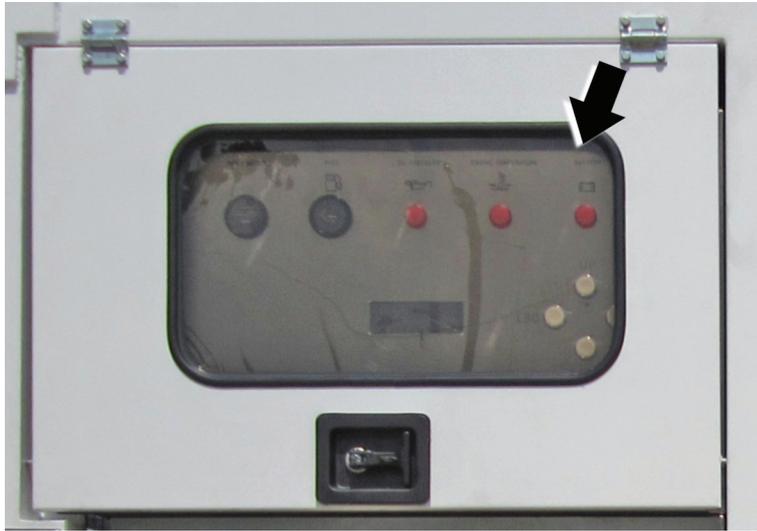


Figure 3.2 - Command and control panel protective transparent hatch

3.5.6 GROUNDING

On the rail, a point is foreseen for the grounding of the generator whole metal mass (see Paragraph 5.4.6). Such point is countermarked by a plate showing the specific grounding symbol (see Figure 3.3).



WARNING

It is obligatory to perform the grounding of the generator, together with the relevant pipe to be treated.



Figure 3.3 - Grounding point

Chapter

4

PACKING, HANDLING, TRANSPORT, RECEPTION, STORAGE AND DISMANTLING

4.1 GENERAL WARNINGS



WARNING

The majority of the accidents on the work place are due to inobservance of the most elementary safety rules. It is absolutely necessary that anybody operating on the Induction Heating Generator IHG 120CU perfectly knows and strictly observes the rules reported both in this publication (see Chapter 3 "Safety Rules") and on the warning plates.

4.2 PRELIMINARY OPERATIONS

Before proceeding to a possible packing, and anyway before transporting the generator, carry out the following preliminary operations:

- 1) Open the access door to the engine (see Figure 4.1/3), situated on the front part, by acting on the relevant handle (1), after having removed the locking padlock and switch OFF the battery switch (2).

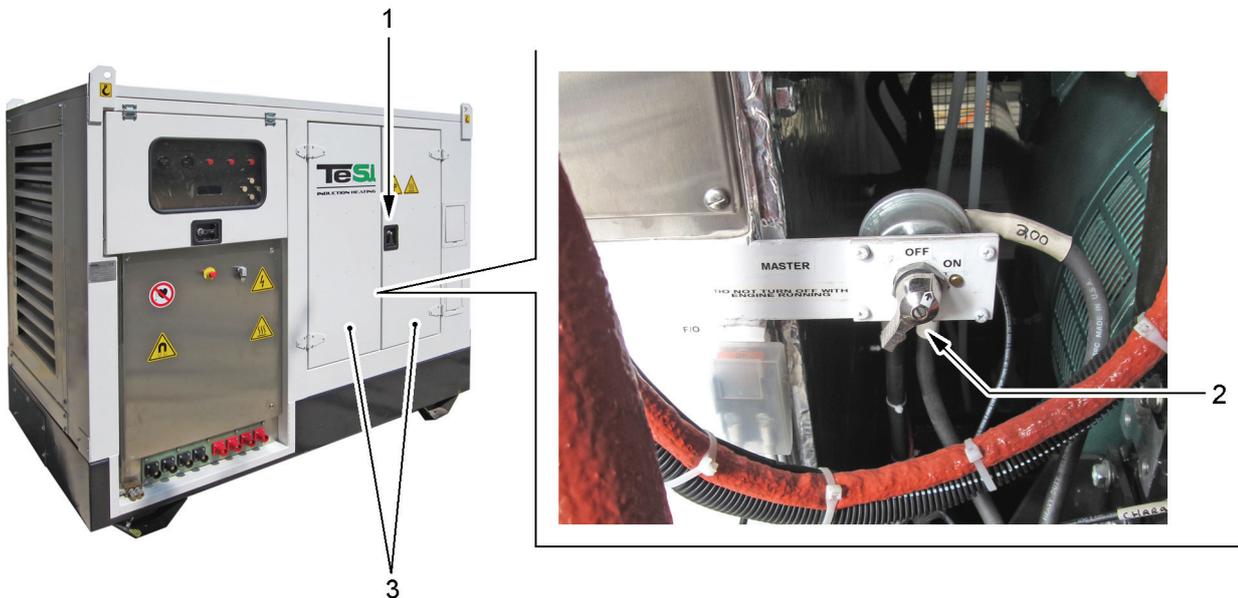


Figure 4.1 - Switch OFF the battery switch

- 2) Unscrew the screws (see Figure 4.2/1) fastening the access cover (3) to the fuel drain cock (5), situated in the generator right side; then remove the screws (1), the washers (2) and the cover (3).
- 3) Position under the drain cock (5) a suitable receptacle, and, by acting on lever (4), slowly drain all the fuel contained inside the tank; then, by acting on lever (4), close the drain cock (5).



WARNING

The operation of draining the fuel from the tank must always be carried out by absence of free flames and by observing the prohibition to smoke.

- 4) Install cover (3) in its seat and lock it there by means of the screws (1) and relevant washers (2).
- 5) Close the access door (see Figure 4.1/3), by acting on the handle (1), and lock it by means of the locking padlock.

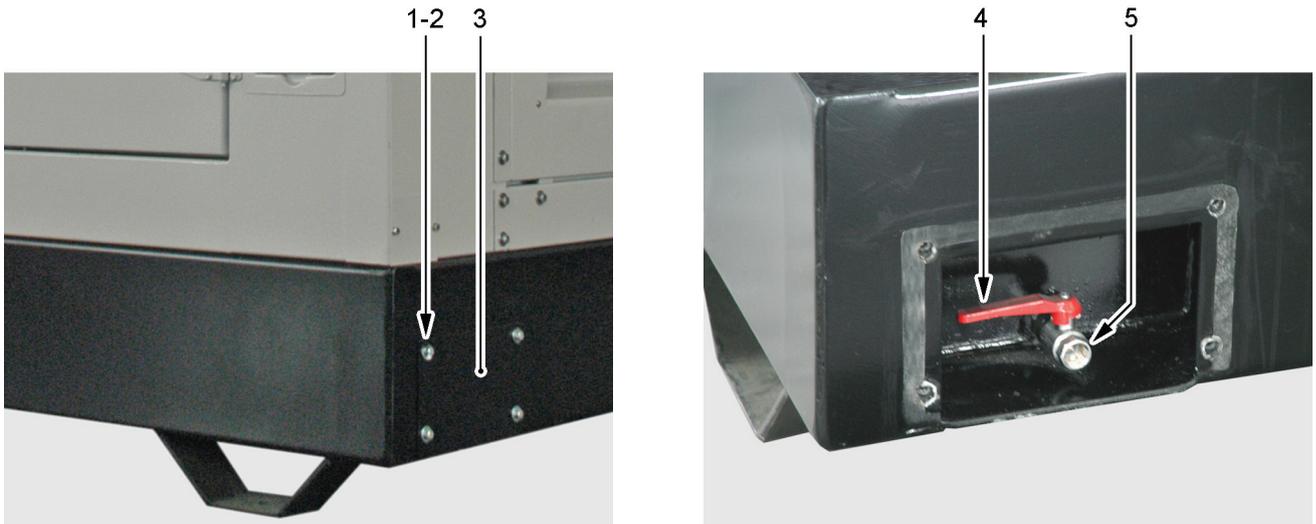


Figure 4.2 - Draining fuel from tank

4.3 PACKING

Insert into a cardboard box the “accessories”, consisting of the remote control and the Engine Owners Manual QSB4.5 and 6.7; seal the box and place it into the engine compartment, as illustrated in Figure 4.3.

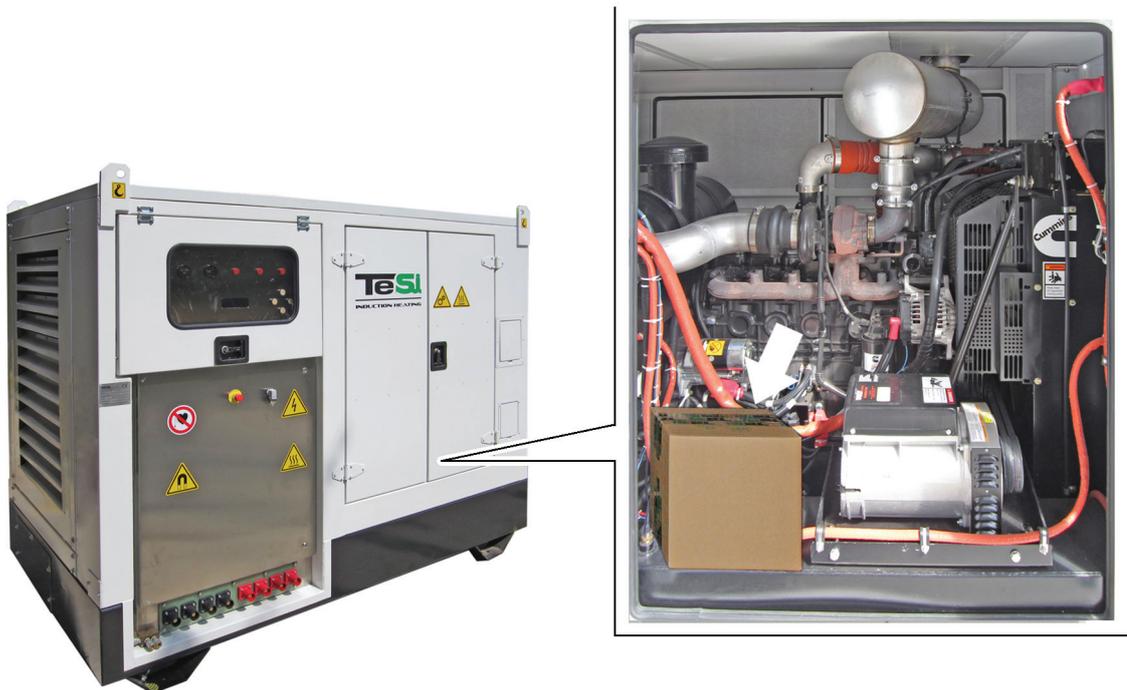


Figure 4.3 - Packing and displacement of the cardboard box containing the “accessories”

The Induction Heating Generator IHG 120CU must be considered as being the assembly formed by two fully distinct parts, the generator and the coil. When it is necessary to transport them, they don't require any particular packing, because they were designed in order to withstand the conditions present in outdoor environments.

Anyway, if requested by the Customer or agreed with Him, they can be packed by using the here following reported modalities:

- polyethylene bubble-pack sheeting for covering the generator and the possibly included coils;
- fastening on a wooden base with optional protective wooden crate (see Figure 4.4a). In this case, the generator shall be fastened to the base through the four rails (or support stands), situated in the structure lower part, while the coils possibly present shall be fixed by purposed tie rods and by using the relevant lifting rings.

The transport and packing of the power cables (see Figure 4.4b) shall be, on the contrary, realized through a (euro sized) pallet, on which the cables themselves shall be arranged and then protected by applying some polyethylene sheets over them.



a. Induction Heating Generator IHG 120CU packing



b. Power cables packing

Figure 4.4 - Packing

4.4 INDUCTION HEATING GENERATOR IHG 120CU HANDLING

Handling the Induction Heating Generator IHG 120CU is a complex operation, and therefore requires the simultaneous intervention of several skilled operators.

	<p>WARNING All the operations relevant to the Induction Heating Generator IHG 120CU must be exclusively performed by skilled personnel and by strictly observing the relevant rules in force both for the user and in the country where the machine will be used.</p>
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	<p>WARNING The handling of the Induction Heating Generator IHG 120CU must take place by full safety conditions: generator turned off, fuel tank empty and coils disconnected. Always consider the generator and the coils as being independent units.</p>
---	--

	<p>WARNING Make always sure about the capacity of the system used for handling the generator, by consulting Table 4.1 which is referred to the weights.</p>
---	--

In Table 4.1, the list of the weights concerning the generator, the coils, the power cables and the possible packing systems is reported, in order to correctly define the most suitable hoisting means to be used, for correctly handling the parts.

Generator and coils may be combined in a single group, when packed in a wooden crate, and therefore the weight to be hoisted will correspond to the sum of the weights relevant to the single components given in the table.

	<p>NOTE In order to know the weight of the different coils according with their diameter, consult the identification plate applied on every coil.</p>
---	--

Table 4.1 - Weights

COMPONENT	WEIGHT (kg)
Generator	2400 kg
Coil	According with the relevant diameter
Packing consisting of a wooden base	~ 100 kg
Packing consisting of a wooden crate	~ 500 kg
Power cables	~ 100 kg
Pallet for power cables	~ 15 kg

The Induction Heating Generator IHG 120CU can be handled by using suitable mechanical means, as here following specified:

- a) using a crane, by acting from above;
- b) using a forklift, by acting from below.



NOTE

For handling the generator and the coils, the use of a crane is recommended, even if, later on, the indications concerning the generator handling by using a forklift truck will be supplied.



NOTE

For handling the power cables, the use of a forklift truck is recommended.

In the following paragraphs, the handling of the generator, of the possibly present coils and of the power cables is taken into consideration without the relevant packings; should, on the contrary, the packings be present, the over mentioned parts shall be handled by using a suitable hoisting means, according with the type of packing adopted.

4.4.1 HANDLING BY USING A CRANE



CAUTION

The handling performed by using a crane must be exclusively carried out by trained personnel, qualified for operating with such means.

4.4.1.1 Hooking procedure

a) Generator



WARNING

Before using the ropes for handling the generator, make sure that the ropes' characteristics fully meet the requirements demanded by the relevant directives in force.

- 1) Hook suitable ropes into the purposed holes (see Figure 4.5/2) machined on the four plates (1) situated on the generator (3) upper part.
- 2) Hook the ropes' other end to the crane block and carefully hoist, by making sure that the generator (3) get correctly lifted.

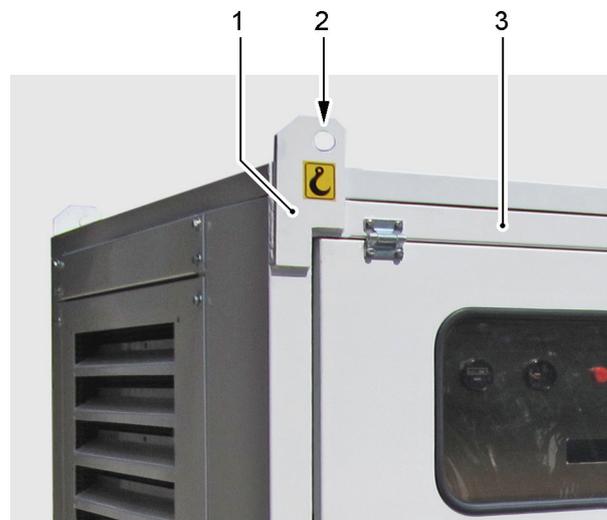


Figure 4.5 - Generator hooking

b) Coils

	<p>NOTE The standard clamp coil handling can only and exclusively take place if the same one is closed. If not so, close it by acting on the relevant handle.</p>
---	--

	<p>NOTE The heavy duty clamp coil handling can only and exclusively take place if the same one is closed. If not so, close it by acting on the relevant closing control pedal.</p>
---	---

- 1) Get the purposed belts (see Figure 4.6/3), delivered jointly with the coil (4), hooked to the omega clevis (1).
- 2) Get the omega clevis (1) hooked to the crane block (2), and carefully hoist, by making sure that the coil (4) gets correctly lifted.

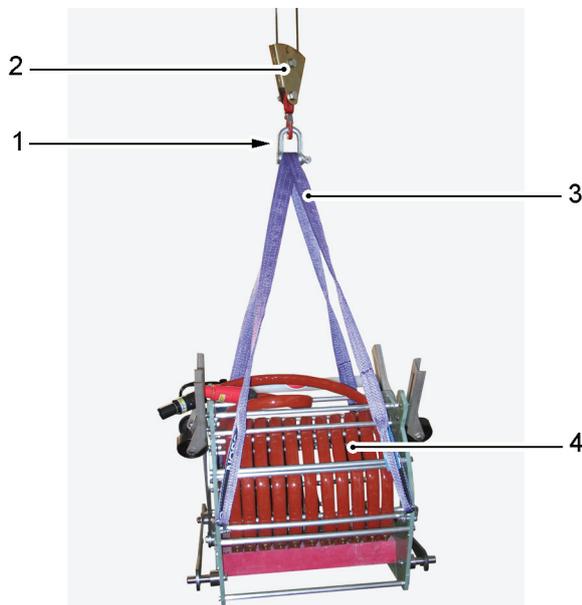


Figure 4.6 - Coil hooking

	<p>PROHIBITION DON'T either transit of stay under the generator and/or under the coil during the hoisting and handling operations.</p>
---	---

4.4.2 HANDLING BY USING A FORKLIFT TRUCK

	<p>NOTE By using a forklift truck, the handling is limited to the generator and to the power cables, if these last ones are positioned on a pallet, as the coil isn't equipped with rails for getting the forks inserted in, but only with purposed hoisting belts.</p>
---	--

4.4.2.1 Procedure

a) Generator

- 1) Move the forklift truck near the rails (see Figure 4.7/2), situated in the generator (1) lower part, and adjust the distance between the forks in such a way that the same ones get aligned with respect to the rails (2).
- 2) Insert the forks into the four rails (2) (which are usually considered as being the generator stands), for the whole width of the generator (1) and carefully hoist, by making sure that the same one gets correctly lifted.



Figure 4.7 - Generator handling, by using a forklift truck

4.4.2.2 Procedure

a) Power cables

- 1) Get the forklift truck near the purposed seats machined on the pallet (see Figure 4.8) and adjust the distance between the forks, in such a way that the same ones result to be aligned with respect to the pallet seats.
- 2) Insert the forks into the pallet seats for the pallet whole width and carefully hoist, by making sure that the same one gets correctly lifted.



Figure 4.8 - Power cables handling

4.5 TRANSPORT

The motor vehicle to be used for transporting the Induction Heating Generator IHG 120CU must fully meet the capacity requirements, according with what reported in Table 4.1, and be equipped with an antislip loading flatbed with a high friction coefficient.

The generator, the coils and the pallet with the power cables must be anchored to the motor vehicle flatbed by means of slings, ropes, tie rods etc., in such a way not to create any deformations and to prevent any possible load turnover when the motor vehicle takes a curve or by sudden stops. Besides, the motor vehicle must be equipped with a covering sheet.

4.6 CHECK AT GOODS' RECEPTION

At goods' reception, immediately check for the packing integrity (if any packing is present). Should any external damages be noticed, open the packing and extract the generator and the coil, as indicated in Paragraph 5 "Installation", and check for their condition, by also verifying the full compliance with the identification plate data (see Paragraph 1.1), with those specified in the transport freight bill and in the order confirmation.

Should any damages to the components or any irregularities in the delivery be found out, immediately inform both TeSI s.r.l. and the carrier who delivered the goods.

4.7 STORAGE

4.7.1 GENERAL

Should a storage period be foreseen before the installation, with the original packing, observe the instructions reported in Paragraph 4.7.2.

Should the Induction Heating Generator IHG 120CU be stored after its use, for a more or less long period, observe what reported in the following Paragraphs 4.7.2 and 4.7.3.

4.7.2 ENVIRONMENTAL REQUIREMENTS

Storage must be performed in a dry, dust- and condensate-free ambient, with a temperature comprehended

between -40 °C and +50 °C, as inside the generator there are the electronic cards and the batteries for starting the engine.

4.7.3 OPERATIONS TO BE CARRIED OUT BEFORE STORING THE INDUCTION HEATING GENERATOR IHG 120CU

- 1) Switch OFF the battery switch (see Paragraph 4.2).
- 2) Drain all the fuel contained inside the tank (see Paragraph 4.2).



NOTE

If they aren't used for a long period, the batteries allowing to start the engine can possibly get discharged; the most frequent reason leading to a batteries' early discharge are small dispersions inside the electric circuit.

- 3) Carry out all the checks foreseen on the engine, according with the indications reported in the relevant "Owners Manual - QSB4.5 and 6.7", delivered by TeSi s.r.l. as a Joined Publication to this manual.
- 4) It is recommended NOT to leave the generator and the coils directly resting on the ground, but to interpose between them and the ground itself some wooden or similar material beams.

4.8 DISMANTLING

The **Induction Heating Generator IHG 120CU** hasn't any limits to its lifespan, exception made for those due to an excessive wear due to heavy use.

The machine dismantling doesn't create any particular problems. The Induction Heating Generator IHG 120CU can be disassembled and, after having separated the different materials composing it, eliminated. Pay a particular attention to those substances which must be considered as being polluting.

In Table 4.2, the list of the main materials composing the Induction Heating Generator IHG 120CU, is reported.

Table 4.2 - Materials composing the Induction Heating Generator IHG 120CU

MATERIAL	DISPLACEMENT
Acids and bases	Batteries for starting the engine
Inflammable products	Fuel inside the engine tank
Lubricating oil	Inside the engine
Coolant	Inside the engine
Iron	Structure and internal components
Aluminium	Command and control panel, internal components and coils' crosspieces
Steel	Engine components
Copper	Electric conductors and bars for connecting the capacitor battery inside the generator General wirings inside the electric board
Fiberglass	Coils' frame
Wood	Possible transport packing
Polycarbonate	Command and control panel protection

**WARNING**

A particular attention must be applied in eliminating the engine lubricants (such as oil, lubrication grease, etc.) and the electric components (such as battery, etc.), as well as the electronic ones.

Those products must be eliminated by strictly observing the relevant rules in force in the country, where the Induction Heating Generator IHG 120CU is used.

Inobservance of those directives can cause quite serious damages to people, animals and environment.

The operator is held for being liable for the possible faults and for the inobservance of the above mentioned rules.

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Chapter

5

INSTALLATION

5.1 GENERAL WARNINGS



WARNING

The majority of the accidents on the work place are due to inobservance of the most elementary safety rules. It is absolutely necessary that anybody operating on the Induction Heating Generator IHG 120CU perfectly knows and strictly observes the rules reported both in this publication (see Chapter 3 “Safety Rules”) and on the warning plates.

5.2 REMOVAL OF THE PROTECTIVE PACKINGS AND PRELIMINARY OPERATIONS

The procedure for removing the possible packings from the generator and from the coils is quite simple but very important, in order to prevent the possibility of annoying inconveniences. Therefore, according with the type of packing used, it is recommended to strictly observe the here following reported instructions:

- remove the bubble-packing polyethylene sheets both from the generator and from the coils jointly delivered;
- open the wooden crate and remove the clamps locking the four rails (or support stands), situated in the structure lower part, to the wooden base, while for the coils possibly present, it will be necessary to remove the purposed fastening tie rods from the relevant lifting rings.

As far as the removal of the power cables is concerned, it will be necessary to remove both the polyethylene sheets and the cables themselves from the pallet.



NOTE

If a packing is present, it will be necessary to preserve it during the whole lifespan of the Induction Heating Generator IHG 120CU, in order to have the possibility to use it again, in case of a new machine handling.

Remove from inside the engine compartment the cardboard box (see Figure 4.3), and, after having opened it, extract the remote control and the Engine Owners Manual - QSB4.5 and 6.7.

5.3 HANDLING

As far as the handling of the generator, of the possibly present coils and of the power cables is concerned, reference shall be made to Paragraph 4.4.

5.4 INSTALLATION OF THE INDUCTION HEATING GENERATOR IHG 120CU

5.4.1 MINIMUM DISTANCES TO BE OBSERVED DURING THE GENERATOR INSTALLATION

In Figure 5.1, the minimum distances are illustrated, which must be observed during the generator installation, in order to make it possible for the operator to carry out on the generator all the foreseen use operations and to easily intervene during the execution of some maintenance operations.

The minimum distance to be observed on the generator whole perimeter is of at least 1 meter.



WARNING

In the generator upper part, the exhaust pipe of the engine exhaust gases is situated, which mustn't for any reason be obstructed, and which, when the generator is operating, reaches very high temperatures. It is therefore necessary to foresee, also in the upper part, a sufficient free space for allowing the usual release of the exhaust gases and for preventing any possible contact with foreign bodies, because of a real combustion risk.



NOTE

Dimensions are expressed in mm.

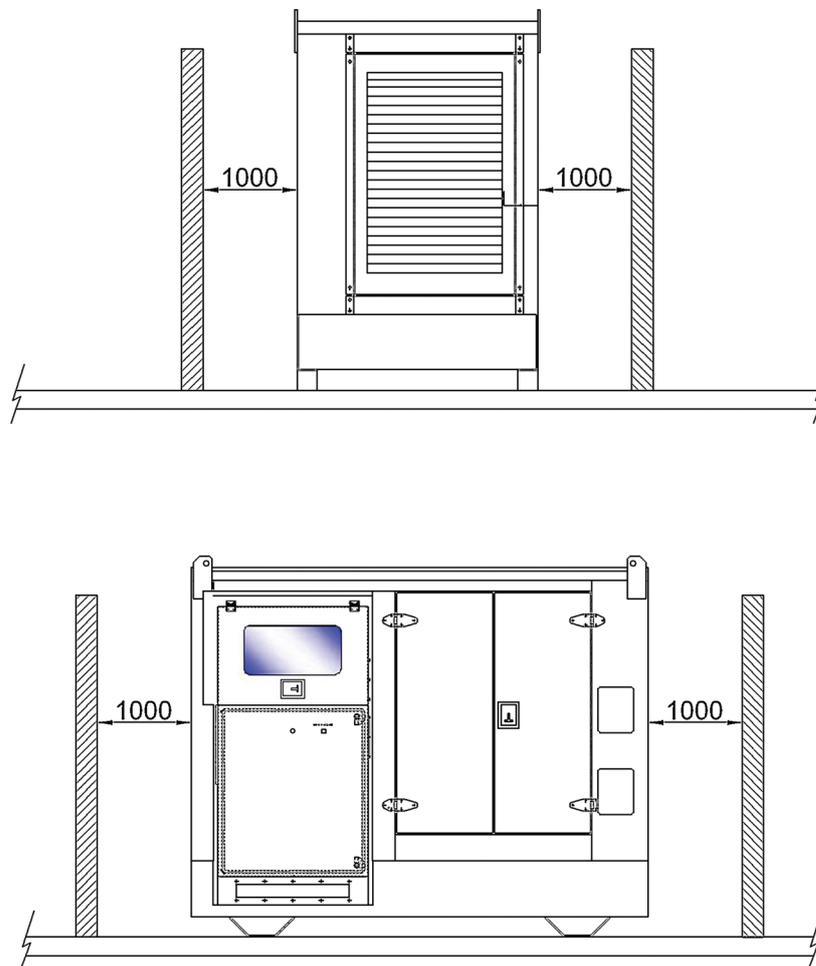


Figure 5.1 - Minimum distances to be observed during the generator installation

5.4.2 SWITCH ON THE BATTERIES SWITCH

Before proceeding to carry out the generator positioning, switch ON the batteries switch, as here following described:

- 1) Open the access door to the engine (see Figure 5.2/3), situated on the front part, by acting on the relevant handle (1), after having removed the locking padlock and switch ON the battery switch (2).

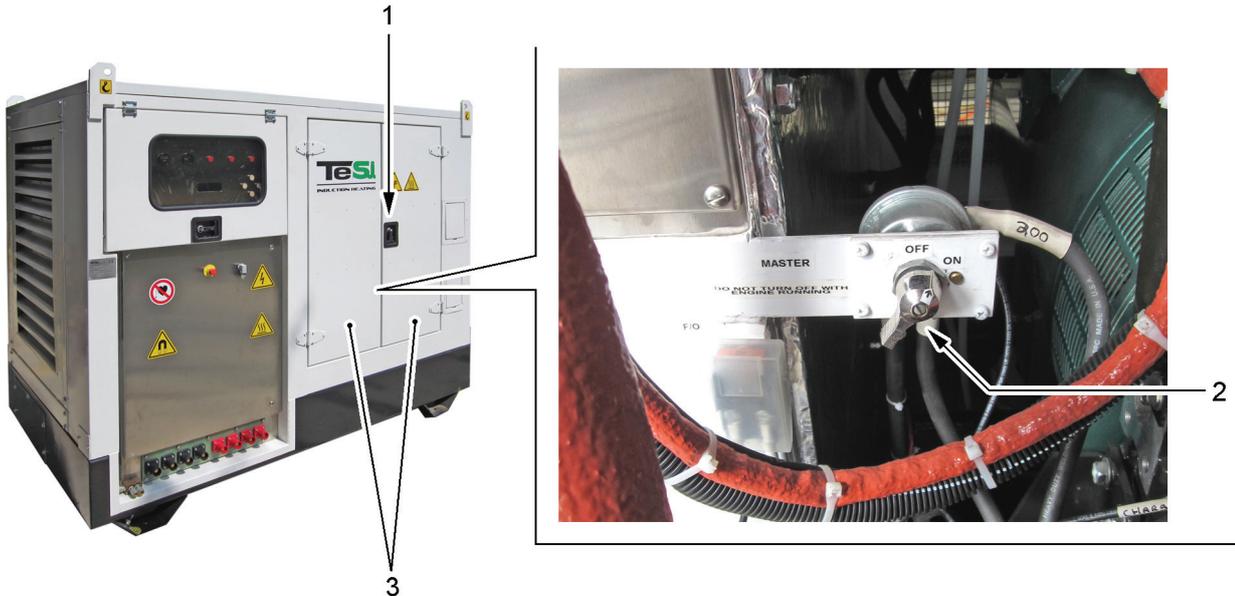


Figure 5.2 - Switch ON the batteries switch

5.4.3 POSITIONING OF THE INDUCTION HEATING GENERATOR IHG 120CU

Besides being possible to position, and then to use, the Induction Heating Generator IHG 120CU installed on suitable motor vehicles (self-propelled motor vehicles belonging to the Customer), having an adequate capacity for supporting, during use, the generator, the coil and the relevant power cables, in some particular cases the Induction Heating Generator IHG 120CU can also be positioned and used in indoor ambients; in this last case, it will be necessary to provide a proper intake for the exhaust gases produced by the operation of the generator engine, by fully observing the relevant rules in force in the country where the generator itself is used.



NOTE

The positioning of the generator on motor vehicles belonging to the Customer shall be carried out by fully observing the possibly existing relevant rules in force, and, anyway, always by providing to adequately fasten the generator to the motor vehicle structure by means of slings, ropes, tie rods etc., in order to prevent any sudden and unexpected side skids of the load.

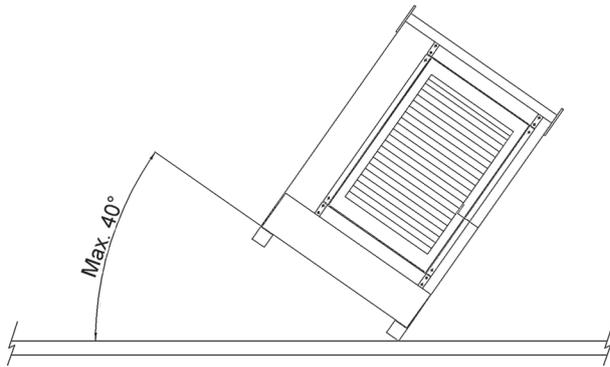
As far as the positioning of the coils to the motor vehicle mechanical arm is concerned, also that operation must be performed in full observance of the reported instructions, and, anyway, still and exclusively by qualified and properly trained personnel.



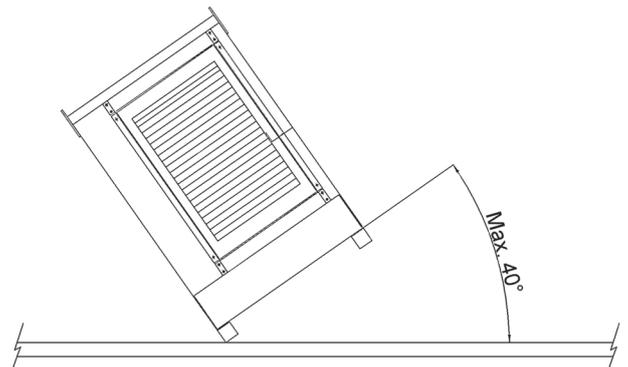
CAUTION

The Induction Heating Generator IHG 120CU can operate on very steep slopes, up to a maximum of 40° (see Figure 5.3).

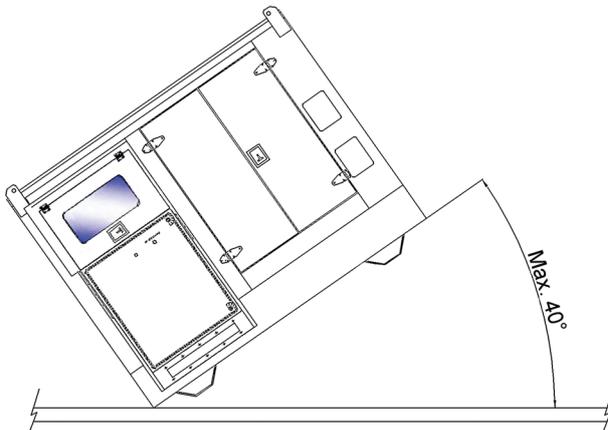
For mobile use on very sloping terrains, possibly place the Induction Heating Generator IHG 120CU crosswise with respect to the vehicle used for its transport.



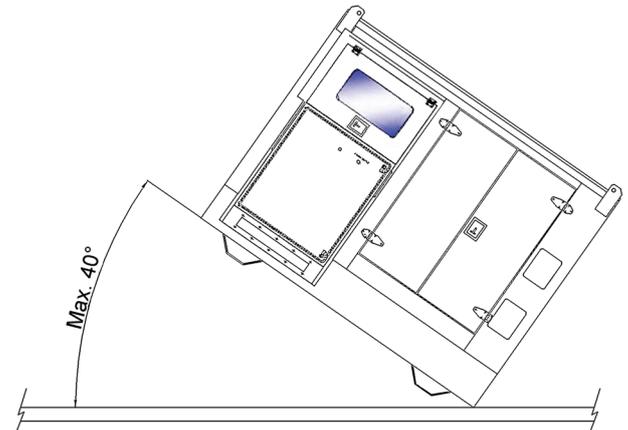
a. Front side max longitudinal gradient



b. Rear side max longitudinal gradient



c. Left side max transversal gradient



d. Right side max transversal gradient

Figure 5.3 - Max longitudinal and transversal gradients when using the Induction Heating Generator IHG 120CU

In order to get an indication about the values referred to the weights of generator, coils and power cables, for correctly defining the most suitable motor vehicle to be used, reference shall be made to Table 4.1.

**NOTE**

In case of any doubt about the weights to be supported, please contact TeSi s.r.l. Customer Service.

Independently of the motor vehicle used, it will be necessary to consider the generator and the coil as a single unit, and, therefore, to foresee for their handling a motor vehicle capable to reach the work site and then to easily move the coil onto the pipes to be treated.

The motor vehicle shall anyway be equipped with a mechanical arm (properly dimensioned for the used coil), capable to move the coil, by using the purposed belts (supplied on delivery), onto the pipe and to allow the execution of all the required operations.

**NOTE**

In order to facilitate the coil operations through the motor vehicle mechanical arm, it is recommended to use a purposed remote control.

**NOTE**

In order to facilitate all the required operations, the Induction Heating Generators IHG 120CU designed by TeSi s.r.l. are equipped with a remote control, for controlling the start and stop of the heating cycle and the emergency stop.

5.4.4 PRELIMINARY OPERATIONS TO BE CARRIED OUT ON THE GENERATOR

Before proceeding to start the generator, it will be necessary to carry out the following preliminary operations:

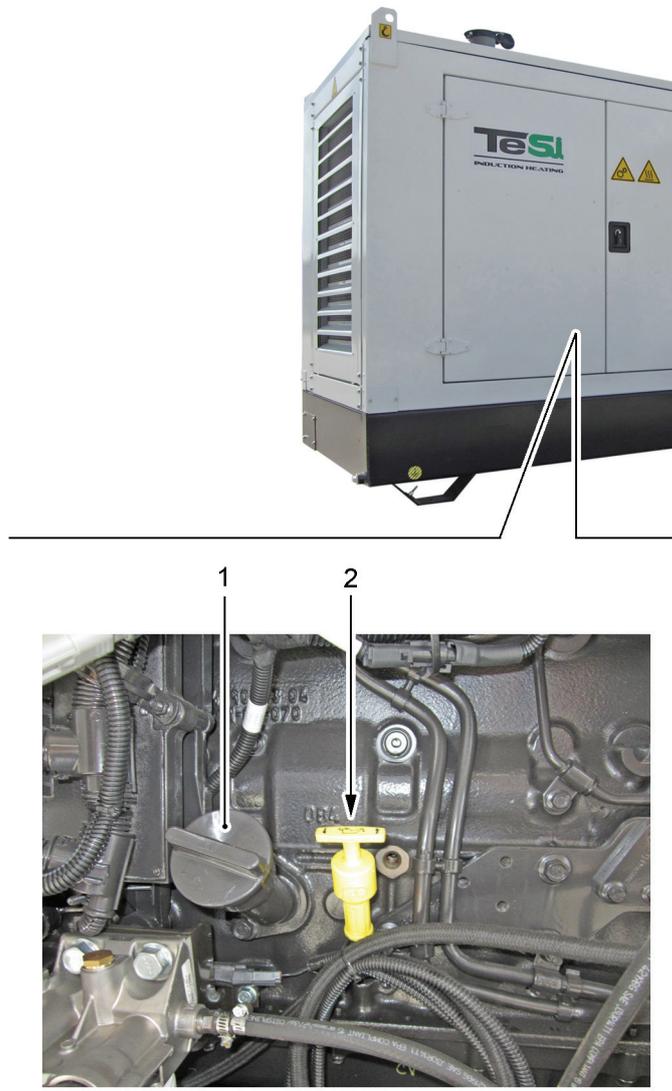
- check for the engine oil correct level (see Figure 5.4a) (see Paragraph 7.5.6);
- check for the engine coolant correct level (see Figure 5.4b) (see Paragraph 7.5.7);
- refuelling (see Figure 5.4c).

**NOTE**

In order to get more detailed information, reference shall be made to the engine "Owners Manual - QSB4.5 and 6.7", delivered by TeSi s.r.l. as a Joined Publication to this manual.

**WARNING**

Refuelling must be always carried out by absence of free flames, and during that operation it is absolutely forbidden to smoke.



a. Engine oil correct level check

LEGEND

- 1 - Engine oil filler cap
- 2 - Engine oil level dipstick

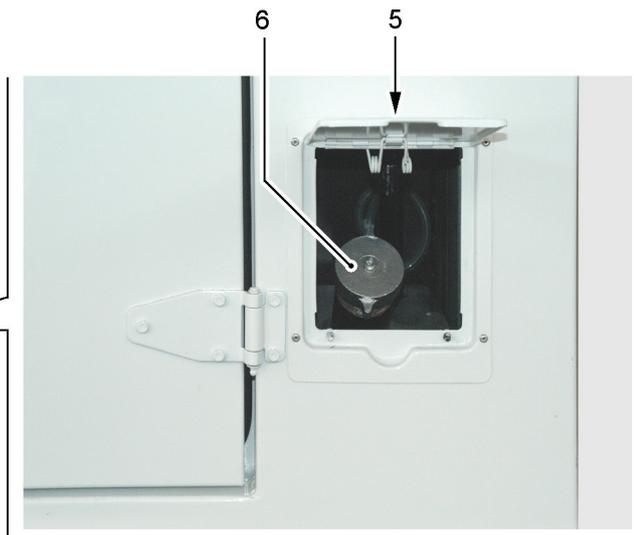
*Figure 5.4 - Preliminary operations to be carried out on the generator
(Sheet 1 of 2)*



LEGEND

- 3 - Coolant filler cap
- 4 - Coolant level inspection window
- 5 - Access door to the filler cap
- 6 - Fuel filler cap

b. Engine coolant correct level check

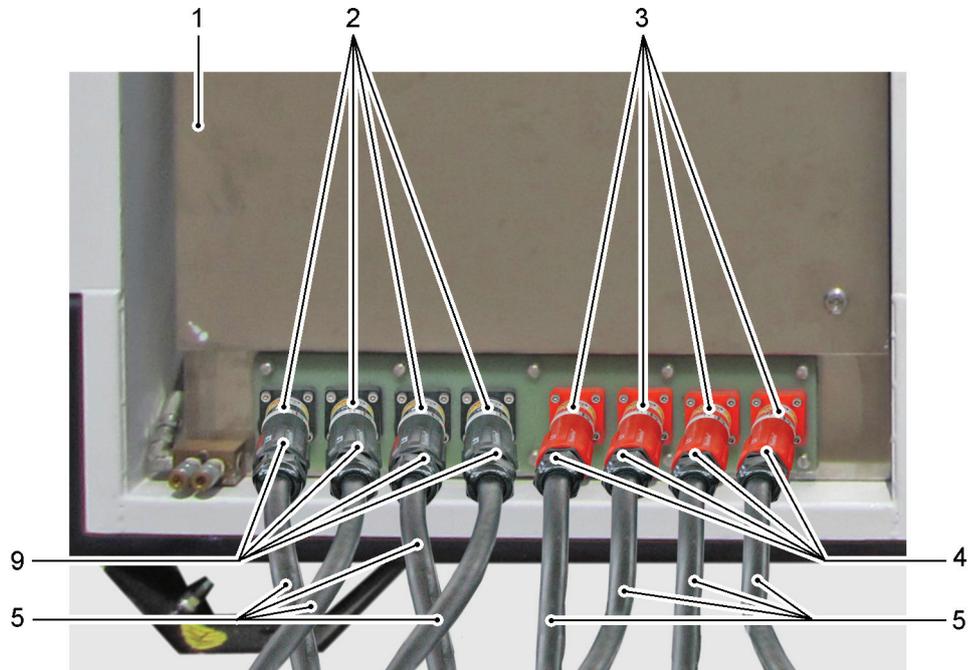


c. Refuelling

Figure 5.4 - Preliminary operations to be carried out on the generator
(Sheet 2 of 2)

5.4.5 ELECTRIC CONNECTIONS BETWEEN GENERATOR AND COIL

The generator (see Figure 5.5/1) and the coil (8) for heating the pipes must be connected the one to the other through purposed cables (5), which are also provided with power connectors (4) and (9), differently coloured (red and black), in order to make their use easier.



LEGEND

- 1 - Generator
- 2 - Power red connectors (on the generator)
- 3 - Power black connectors (on the generator)
- 4 - Power black connectors (on the cables)
- 5 - Power cables
- 6 - Power red connectors (on the coil)
- 7 - Power black connectors (on the coil)
- 8 - Coil
- 9 - Power red connectors (on the cables)

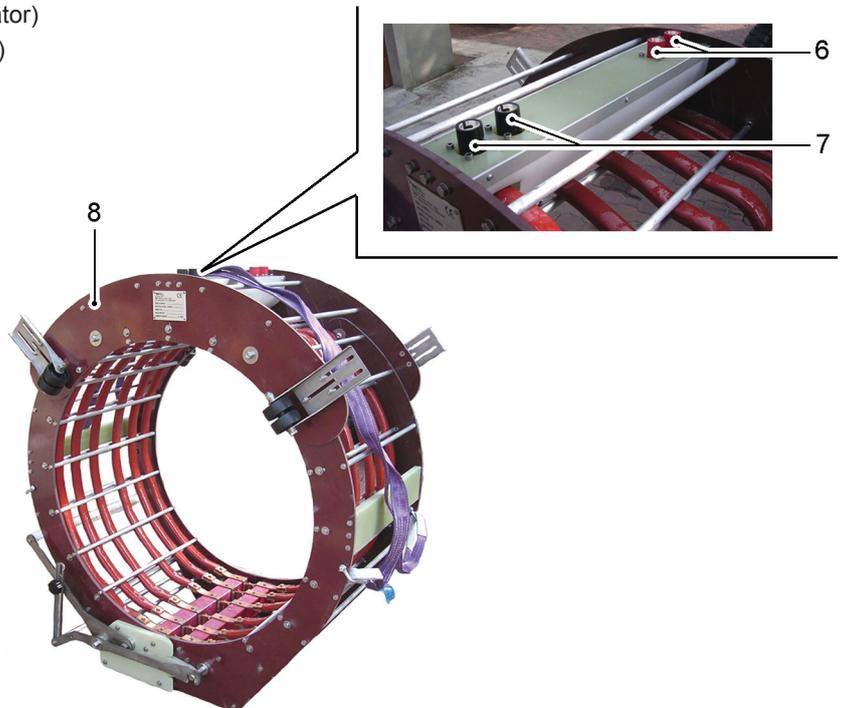


Figure 5.5 - Electric connections between coil and generator

In order to realize the electric connection between the coil (8) and the generator (1), which foresees the use of two or four power cables (5), proceed as here following specified:



NOTE

Even if on the generator eight power connectors are foreseen, the electric connection with the coil is realized by using at most four power connectors (two red and two black ones). The other remaining power connectors keep available for being used in case a possible failure to the power connectors presently used should occur.



WARNING

The connections between generator and coil through the power cables can only and exclusively take place by turned off generator.

- connect the power connectors (4) and (9) of the relevant cables (5) to the respective power connectors (3) and (2) situated on the generator (1), by observing the modalities reported in Paragraph 5.4.5.1;
- connect the power connectors situated on the other end of cables (5) to the respective power connectors (7) and (6) situated on the coil (8), by observing the modalities reported in Paragraph 5.4.5.1..



PROHIBITION

For no reason carry out the disconnection of the power cables during the heating cycle.



WARNING

The connections between generator and coil must take place between power connectors of the same colour (red with red ones and black with black ones).



NOTE

As far as the disconnection of the power cables from the generator and from the coil, strictly observe the instructions reported in Paragraph 5.4.5.2.



WARNING

It is suggested to braid the power cables, in order to eliminate the electromagnetic field.



WARNING

Make sure the power cables (see Figure 5.6) connecting the generator to the coil are correctly stretched, in order to prevent them from creating any rings.

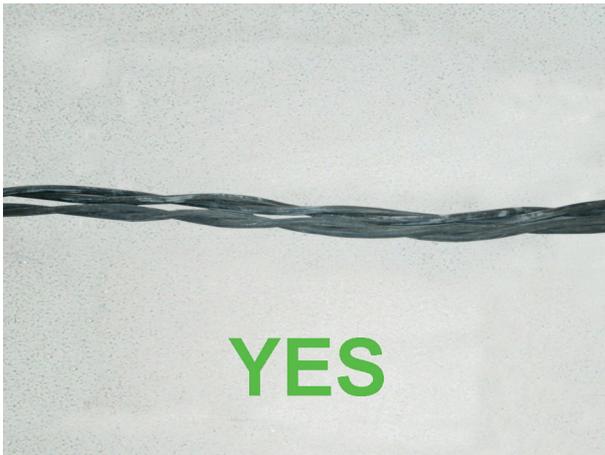


Figure 5.6 - Arrangement of the power cables

5.4.5.1 Coupling of the power connectors

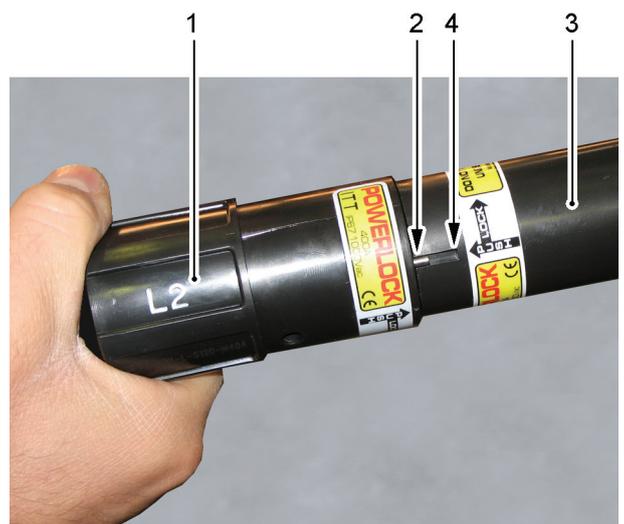
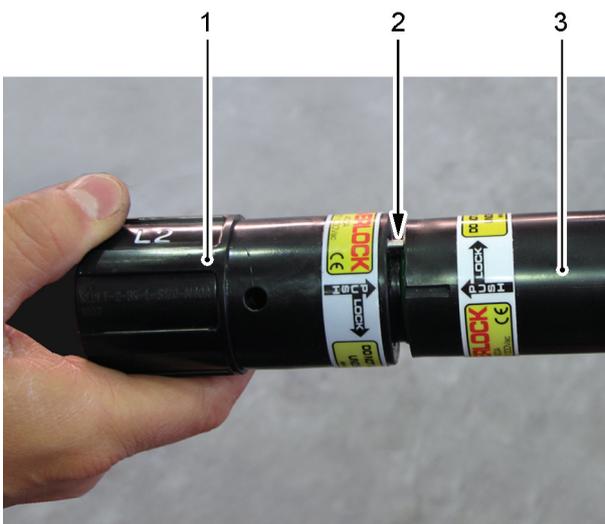


WARNING

The connections between generator and coil through the power cables can only and exclusively take place by turned off generator.

In order to carry out a correct coupling of the power connectors, strictly observe the instructions here following reported:

- get the arrow showing the indication “PUSH”, situated on the power connector (see Figure 5.7/1) of the concerned cable, aligned with the respective arrow present on the power connector (3) of either the generator or the coil;



LEGEND

- 1 - Power connector (on the cable)
- 2 - Lockpin
- 3 - Power connector (either on the generator or on the coil)
- 4 - Slot

Figure 5.7 - Coupling of the power connectors

- deeply push the power connector (1), in such a way that the lockpin (2) gets hidden inside the same one;
- turn the power connector (1), by following the indication “LOCK” reported on the arrow (clockwise), in such a way that the lockpin (2), getting out from the relevant seat, get engaged inside the slot (4) machined on the power connector (3) of either the generator or the coil; now the power connector (1) of the concerned cable results to be perfectly connected.

5.4.5.2 Uncoupling of the power connectors

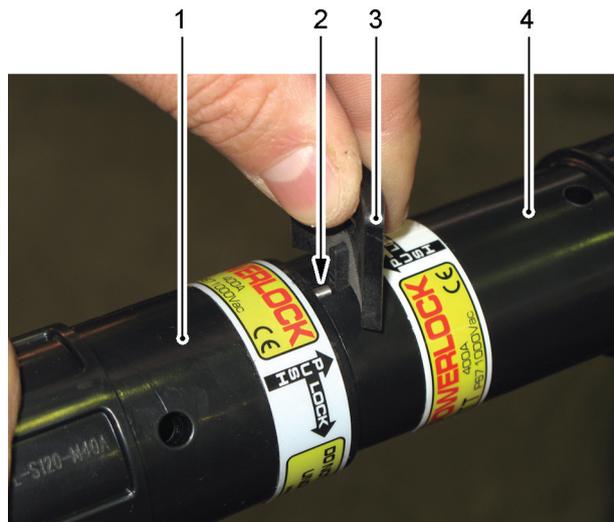
	<p>PROHIBITION For no reason carry out the disconnection of the power cables during the heating cycle.</p>
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In order to carry out a correct uncoupling of the power connectors, strictly observe the instructions here following reported:

- hold the power connector (see Figure 5.8/1) of the concerned cable and position inside the slot, machined on the power connector (4) of either the generator or the coil, the tool (3) supplied on delivery;
- by using tool (3), release the lockpin (2) from the slot, and simultaneously turn counter-clockwise the power connector (1) of the concerned cable;

	<p>NOTE Shouldn't the tool supplied on delivery be available, use a suitable screwdriver, in order to release the lockpin from the slot machined on the power connector of either the generator or the coil.</p>
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- Disconnect the power connector (1) from the respective power connector (4) of either the generator or the coil.



LEGEND

- 1 - Power connector (on the cable)
- 2 - Lockpin
- 3 - Tool (supplied on delivery)
- 4 - Power connector (either on the generator or on the coil)

Figure 5.8 - Uncoupling of the power connectors

5.4.6 GENERATOR GROUNDING

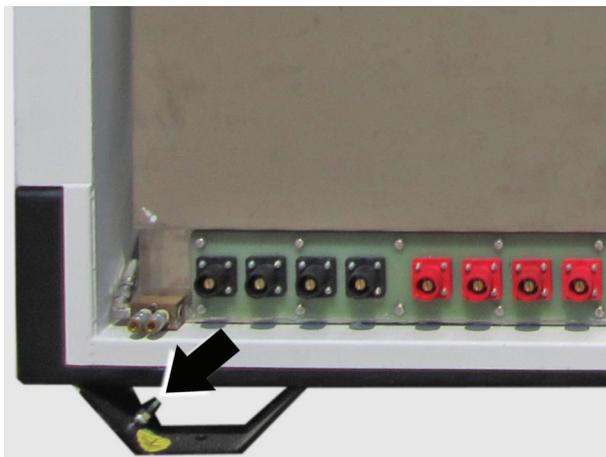
	<p>WARNING It is obligatory to realize the grounding of the generator, together with the relevant pipe to be treated.</p>
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Perform the generator grounding, by carrying out the here following described procedures:

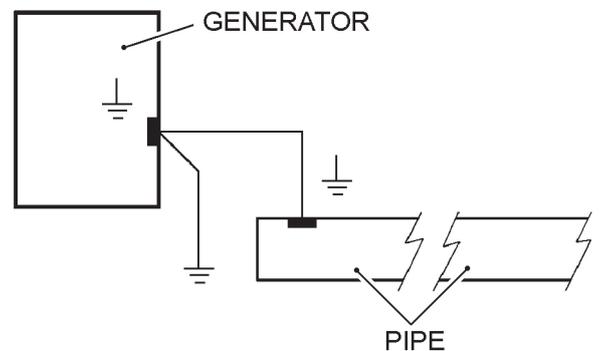
- connect a cable of adequate length and with a section of at least 120 mm², to the threaded pin for the generator grounding (see Figure 5.9), through a nut and relevant washer. Such point is countermarked by a plate showing the grounding specific symbol;
- connect the other end of the cable to the pipe to be treated.

	<p>NOTE Before performing the grounding, eliminate any possible oxidation signs from the connections' contact surface.</p>
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	<p>NOTE The cable for the generator grounding isn't included within the delivery supplied by TeSi s.r.l..</p>
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a. Threaded pin for the grounding
(on the generator)



b. Grounding connections

Figure 5.9 - Generator grounding

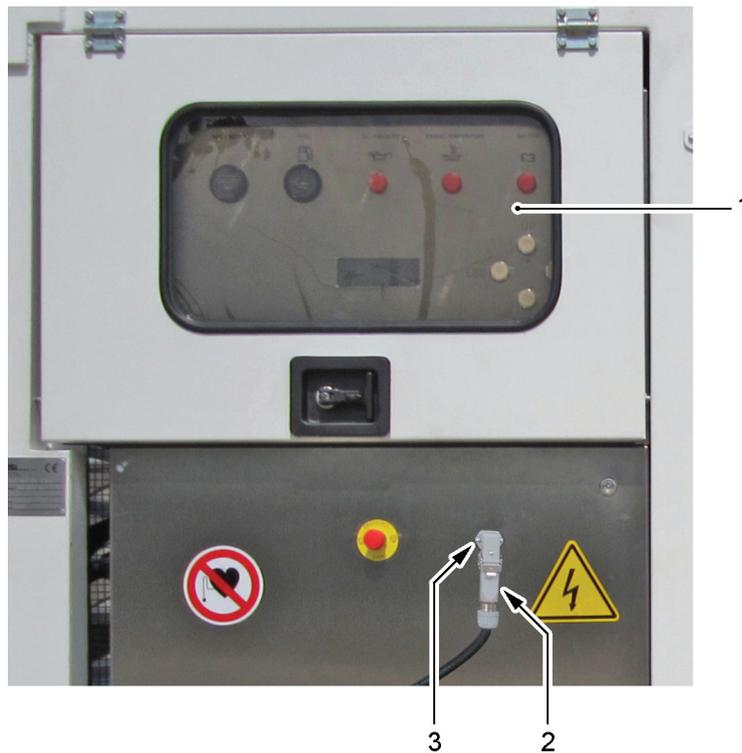
5.4.7 REMOTE CONTROL ELECTRIC CONNECTION

Get the remote control mobile connector (see Figure 5.10/2) connected to the relevant fixed connector (3), situated on the command and control panel (1).



NOTE

The Induction Heating Generator IHG 120CU only operates, provided that the remote control is connected to the purposed connector, situated on the command and control panel.



LEGEND

- 1 - Command and control panel
- 2 - Remote control mobile connector
- 3 - Connector for remote control connection

Figure 5.10 - Remote control electric connection

Chapter

6

USE

6.1 GENERAL WARNINGS



WARNING

The majority of the accidents on the work place are due to inobservance of the most elementary safety rules. It is absolutely necessary that anybody operating on the Induction Heating Generator IHG 120CU perfectly knows and strictly observes the rules reported both in this publication (see Chapter 3 “Safety Rules”) and on the warning plates.



CAUTION

Before starting up the Induction Heating Generator IHG 120CU, it is imperative to have carefully learned all the information reported in Chapter 2 “General Technical Information” and in Chapter 5 “Installation”.



CAUTION

Should any discrepancies between the operation described in this Chapter and the real operation of the Induction Heating Generator IHG 120CU be noticed, please contact TeSi s.r.l. in order to get the necessary explanations.



CAUTION

TeSi s.r.l. aren't responsible for any damages either to the Induction Heating Generator IHG 120CU or to any of its parts, if the indications reported in this manual aren't fully observed.

6.2 COMMANDS AND CONTROLS

6.2.1 GENERAL

In this Paragraph, the commands and controls present on the Induction Heating Generator IHG 120CU are described.

6.2.2 COMMAND AND CONTROL PANEL

In Figure 6.1 the front view of the command and control panel is shown, while in Table 6.1 the commands and controls situated on the panel itself are described.

Table 6.1 - Commands and controls situated on the command and control panel

POS.	PLATE	TYPE	FUNCTION
1	HOUR METER 	Indicator	It shows the engine operating hours
2		Indicator	It shows the level of the fuel present inside the tank
3		Red warning light	(If on), it signals the engine oil low pressure