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MANUALE DI USO E MANUTENZIONE I

USE AND MAINTENANCE MANUAL GB

GEBRAUCHSANWEISUNG UND WARTUNGSVORSCHRIFTEN D

MANUEL D'UTILISATION ET D'ENTRETIEN F

MANUAL DE USO Y MANTENIMIENTO E

mase GENERATORS

VOYAGER 5010 DM

REV.1 A.A. 11/11/2004

cod.42344

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CONTENTS

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This manual has to be preserved for all through life of the gen set to which ago reference

Thank you for having chosen a product MASE.

Mase Generators is a firm leader in the sector of the generator groups and offers the vast range of products in degree to space from the small portable generators from 1 kW to unity from 1600 kVA for special applications.
Founded to the beginnings of 1970, it develops him to Cesena on an area of 16000 mqs. For a long time he is distinguished for the high quality of the products and for the constant innovation promoted by the advanced Department Research and development.
Mase Generators is born as manufacturing firm of portable generator groups from 500W, light and compact, that have allowed to his/her mark to be known and appreciated all over the world.

The generator group that you have purchased is the fruit of years of experience in the sector and for the modern conception, the strong sizing, the materials employees, the continuous updatings, constitute an effectiveness answer to the demands of the operators of the sector.
This Manual instructions it will furnish her profits information and precious suggestions to be able to fully exploit all the possibilities that the gen sets offers her.
If parts of the manual resulted incomprehensible he immediately contact us.
In to renew her our thanks we cordially greet her.

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DEFINITIONS USED

The terms used are current technical terms, and where considered necessary the meaning is described below.

- **Generator**
  An assembly of an internal combustion piston engine and an alternate current, synchronous, 2-4 pole, self-excited generator, joined together to create a station for self-production of electrical energy.

- **User system**
  Composed of the power supply circuits of the user equipment, including the relevant sectioning, handling, breaking, transformation, protection, etc. devices which do not form part of the production, transmission and distribution systems.

- **Category 1 electrical system**
  A system where the rated voltage is greater than 50 V and smaller than 1000 V including alternate current.

- **Load**
  A set of numerical values of electrical and mechanical magnitudes which characterise the requirements imposed on a rotary machine by an electrical circuit or by a mechanical device at a certain instant.

- **Thermal switch**
  Main cut-out and breaking device made up of a switch which opens automatically by thermal effect.

- **Differential switch**
  Main cut-out and breaking device made up of a switch which opens automatically by differential effect.

- **Skilled person**
  A person with technical know-how or sufficient experience to allow him to avoid the dangers inherent in electricity.

- **MASE specialised personnel**
  A person able to evaluate the job assigned to him and recognise the possible dangers on the basis of training at the MASE training centres, with professional experience and knowledge of the equipment in question and of the possible dangers deriving in the event of negligent behaviour.

- **Supplier**
  A body (e.g. manufacturer, agent, installer) which supplies the equipment or services relating to the machine.

- **Control**
  Control action by which an output variable of the controlled system (controlled variable) is affected by an input variable of the controlling system in order to achieve a certain goal.

- **Manual control**
  Control where the change of a variable handled is produced by a person through manual intervention

- **Automatic control**
  Control where the change of a variable handled is produced by a controlling device (automatic controller) without the intervention of a person

- **Danger**
  Source of possible harm or damage to health

- **Protection**
  Guard or protection device as safety measure to protect persons from a present or potential danger.

- **Casing**
  Part intended to assure protection of the equipment against specific outside influences and protection in every sense against contacts.

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- **Connection in bad state**
  The live parts are not fully covered with insulation removable by destruction only, the connections are not secure because of unstable tightening of the parts and a development of oxide between the parts.

- **Direct contact**
  Contact of persons or animals with live parts

- **Control circuit**
  Circuit used to control machine operation

- **Equipment**
  General term which comprises materials, devices, equipment, accessories and similar used in conjunction with an electrical installation

DANGER ***Indicates that particular attention must be paid in order to prevent serious risks which could lead to death or possible harm to the health of personnel.***

WARNING ***A condition which may occur during the lifetime of a product, system or plant considered at risk regarding damage to persons, property, the environment or economic loss.***

CAUTION ***Indicates that particular attention must be paid in order to prevent serious consequences which could result in damage to tangible goods, such as the resources or the product.***

INFORMATION ***Instructions of particular importance.***

Carefully consult this manual before using or carrying out any operation on the generator.

The routine maintenance operations, must be carried out by qualified personnel who have the appropriate equipment and protections.

PRELIMINARY PRESCRIPTIONS

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CAMPO D'IMPIEGO:
THE GENERATOR GROUP IS PROPER FOR TO PRODUCE IN WAY AUTONOMOUS ELECTRIC ENERGY IN THE LIMITS OF TENSION AND WATT DECLARED BY THE BUILDER

FAILURE TO RESPECT THE SPECIFICATIONS CONTAINED IN THIS USE AND MAINTENANCE MANUAL WILL RESULT IN FORFEITURE OF THE GUARANTEE ON THE PRODUCT.

This manual was drawn up by the manufacturer and forms an integral part of the generator equipment, definition used as indicated in Directive 89/392/EC; the information contained in the manual is addressed to all the persons involved in the operating life cycle of the generator, and is necessary to inform both those who effectively carry out the different operations and those who coordinate the activities, to arrange the necessary logistics and to regulate access to the place where the generator will be installed and operated.

This manual was drawn up by the manufacturer with the purpose of providing essential information and instructions for proper use and maintenance in conditions of safety. It constitutes an integral part of the generator equipment and must carefully be protected from any agent which may damage it for the entire life cycle of the generator. The manual must accompany the generator if transferred to another user or owner.

The manual defines the purpose for which the generator was constructed and contains all the information necessary to guarantee safe and proper use.
Constant observance of the instructions contained in this manual guarantees the safety of the operator, protection against damage to persons or things, operating economy and a longer life of the generator.

The drawings are provided by way of example. Even if the generator in your possession differs from the illustrations contained in this manual in elements of little significance, for example the colour, the safety of the generator and the information provided are nevertheless guaranteed.

To facilitate consultation, it has been divided into sections identifying the main concepts; for a quick look at the topics, consult the index.

Ongoing improvement and development of the product may have led to modifications to the generator which are not included in this publication.

Whenever a problem concerning the generator or this publication arises, consult with Mase Generators SPA for the latest information available.

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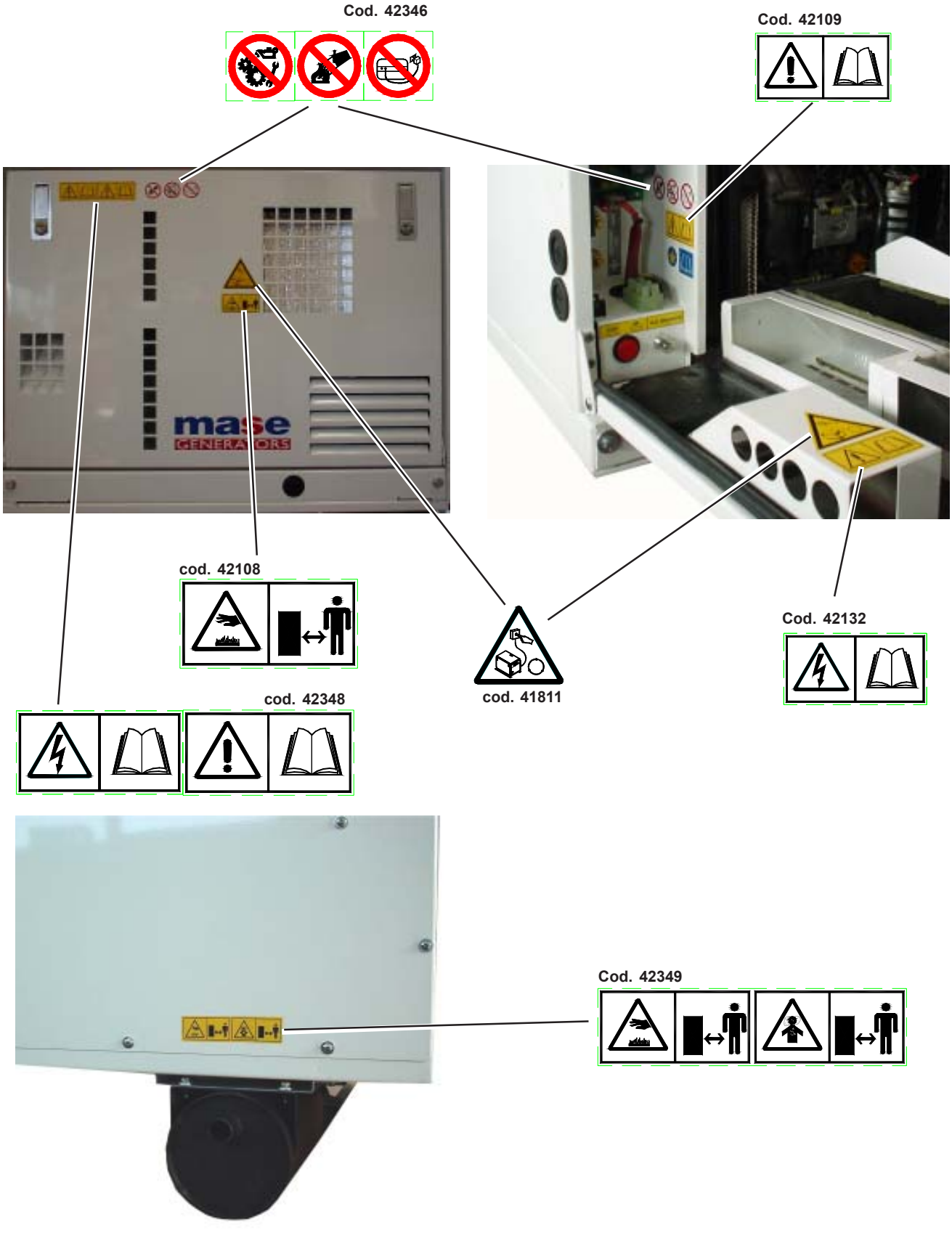
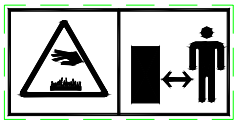
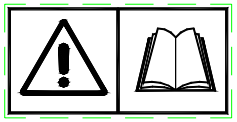
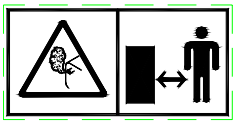
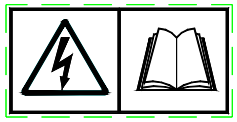
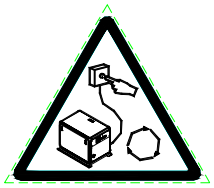
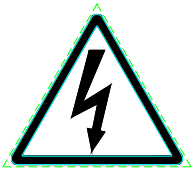
1. GENERAL SAFETY WARNINGS

1.1 Symbols on the generator group



1.2 Position of safety labels

- These labels warn the user of any danger which may cause serious injury. Carefully read the meaning and the precautions described in this manual
- If the label detaches or becomes illegible, replace it with a new one which can be requested from an authorised Mase dealer.

	· Caution to avoid burns, do not touch during operation. The exhaust manifold and the engine, pay attention to the labels on the generator. · Leave the engine to cool down before storing it indoors.
	· Read and understand the Use and Maintenance Manual before starting the generator. · The Mase generator has been designed so as to guarantee safe and reliable operation provided that the instructions are followed. Otherwise, personal injury or damage to the equipment may result.
	· The exhaust gases contain toxic carbon monoxide. · Never operate the generator in a closed space. · Provide for adequate ventilation. If installed indoors, scrupulously observe the ventilation regulations.
	- Danger of electric discharge: consult the manual.
	- Danger of sudden starting from the device distance starting. - Before effecting any operation on the generator group, to disarm the system of distance starting.
	- Danger of electric discharge: consult the manual.
	- Danger of burns: Hot surfaces.

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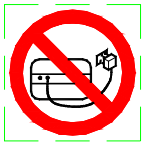
Prohibition Symbols	Meaning
	The connections to an emergency electric network must be carried out by specialised electricians in compliance with the relevant regulations in force. Improper connections may cause current feedback from the generator to the electrical lines connected. These current feedbacks may cause electroconduction to the people working for the electricity company or who come into contact with the lines during the failure. Moreover, once the line has been restored, the generator may explode, burn or cause fires in the electrical system of the facility.
	No smoking or use of open flames.
	Do not clean, lubricate, repair or adjust moving parts.
	Do not extinguish fires with water, use homologated extinguishers.
Obligation Symbols	**Meaning**
	Obligation to connect the generator to earth.

1.3 General danger information

- It is recommended to learn how to stop and operate all the controls.
- Do not allow unqualified personnel to use the generator.
- Even though the generator is protected, do not stand near it.
- Do not remove the labels for any reason and request replacement if necessary.

- Before starting the Generator or before starting any lubrication or maintenance operation, it is essential that the personnel responsible has read and understood all the WARNINGS, CAUTION and DANGER notices in this manual and in the additional technical documentation provided.

- Before any operation on the generator, ensure that the primary engine is not running and that no parts are moving, and post a sign saying DO NOT SWITCH ON or similar at the start switch or the controls before carrying out the maintenance or repair work on the generator.

- Nevertheless, the manufacturer cannot foresee all the possible circumstances which may lead to potential risks in the effective conditions of use of the Generator.
  Any operations and/or procedures for maintenance not expressly recommended or indicated in the user manuals must always be notified to and approved by the manufacturer.
  In the event that a procedure not specifically recommended needs to be applied, the user is responsible for assuring that such procedure is safe and does not cause harm to persons.

- The manufacturer declines all responsibility for damage to persons or things deriving from inobservance of the safety regulations.

- Carefully examine the safety warning plates on the generator and respect the relevant instructions.

1.3.1 Danger of entanglement

- Do not remove the original protections from any of the exposed rotating parts, hot surfaces, air intakes, belts and live parts.
- Do not carry out any maintenance operation with the generator running.
- Do not wear flapping garments, such as scarves, foulards, bracelets, etc. and all garments must be tied with elastic at the edges.
- Do not clean or carry out maintenance on moving parts.

1.3.2 Danger of burns

- Do not permit unskilled persons or without adequate training to use the generator.
- Do not permit children or animals to approach the generator when it is in operation.
- Never touch the exhaust, the relevant protection or the engine body when the generator is running or still hot.
- Do not lean against or sit on the generator for any reason whatsoever.
- Identify the position of the fire extinguishers or other protection and emergency devices and learn their functioning.
- Identify any sources of danger such as fuel, engine oil or acid solution leaks, condensate in the drip caps, high voltage, high pressure.
- Do not cause short-circuits by placing keys or tools on the batteries or on the cable fittings.
- The battery fluid contains sulphuric acid which is extremely corrosive and harmful to the skin. Always wear protective gloves and be extremely careful to avoid spillage when pouring the acid. In the event of contact, wash the affected part thoroughly with running water and consult a physician, in particular when the eyes are involved.

1.3.3 Danger of harm to hearing

• Do not stand near the generator for long periods without protective earmuffs since hearing may be reduced. **Prolonged exposure to noise above 85 dB(A) may cause health disorders. It is in any case recommended to use appropriate protection systems (e.g. headsets, earplugs, etc.).**

1.3.4 Danger of intoxication

- The exhaust gases contain toxic carbon monoxide.
- Never use the generator in tunnels or in any place with poor ventilation. If indoor use is inevitable, it is essential to provide for proper and efficient ventilation in order to prevent intoxication of persons or animals.
- Check that the engine exhaust is free and that the pipes allow evacuation of the exhaust fumes.
- Check that the exhaust gases are discharged to the outside in a safe position away from doors, windows and air intakes.

1.3.5 Danger of fire or explosion

- Always turn off the engine before refuelling.
- Do not smoke during refuelling.
- Refuelling must be carried out with extreme care, ensuring that fuel does not overflow from the engine tank respecting the maximum level.
- In the event of fuel spillage from the tank, thoroughly dry and clean the parts involved.
- Check that there are no fuel leaks and that the pipes are undamaged.
- When refuelling has been completed, tightly close the fillercap
- Keep flammable liquids, matches and other explosive and/or flammable products away from the generator, since the temperature near the exhaust is high during operation.
- Never leave flammable liquids or cloths soaked in flammable liquids in proximity of electrical equipment (including lamps) or parts of the electrical system.
- The batteries develop hydrogen, a highly explosive gas. It is recommended not to smoke nor cause sparks in the vicinity, in particular during charging.
- Do not obstruct the cooling air inlets/outlets.
- In the event of fire, use a homologated fire extinguisher and never use water.

1.3.6 Danger if failing to use personal protection devices

- The persons responsible for handling must always wear protective gloves and safety shoes.
- Wear safety shoes and overalls.
- If the generator needs to be lifted from the ground, the operators must wear a protective helmet.
- Immediately change wet overalls.
- Use protective gloves.

1.3.7 Danger caused by the engine starting

- Do not leave disassembled parts, tools or anything else not forming part of the system on or near the engine.
- Install the protections necessary for safety on the parts completing the system.
- Operate the generator on a flat surface as far as possible. For continuous operation, the maximum permitted engine inclination is 20 degrees. Greater inclination of the generator might cause the fuel to leak out or cause problems with engine oil pressure.
- To prevent the risk of fire and for proper ventilation, position the generator at least 1m (3 ft) from buildings or other equipment during operation.

- Check the oil level by means of the dipstick.
- Check that all the electrical utilities are off so that the generator is not started on load.
- Check perfect functioning of the devices which stop the generator in the event of failure due to low oil level.
- Identify the position of the emergency stop buttons, switches and other emergency systems on the generator.
- Learn the special emergency procedures relative to the installation in question.

DANGER

1.3.8 Danger of electromagnetic radiation

- Do not allow access to persons wearing a pacemaker because of possible electromagnetic interference with the device.

DANGER

1.3.9 Danger of electrocution

- When using the generator always bear in mind that in wet or very humid places and in confined conduction spaces it is obligatory to comply with Articles 313 and 318 of Presidential Decree No. 547 27/04/55, as well as Chap. 11 Section IV of the CEI 64-8 regulation.
- Immediately change wet overalls.
- Insulate all the connectors and detached wires.
- Do not leave the power terminal board of the generator uncovered; check that the electrical power and auxiliary service connections have been made properly.
- Do not power loads with a voltage different from that delivered by the generator
- Do not spray water directly onto the electrical parts
- Do not clean the internal electrical parts with compressed air, since short-circuits or other faults may occur. Do not tamper with the active protections, thermal switches and differential magnetothermal switches.
- In the event of malfunctioning, do not remove the panel to attempt repairing it. Contact Mase specialised personnel.
- Do not access the generator with wet hands, since it is a potential source of electric shock if improperly used.
- Take the necessary precautions to prevent the danger of electrocution; check that the earthing system has been installed and constructed in accordance with regulations.
- For the safety of the users, the earth connection of the generator must always be carried out paying particular attention to the cable cross-section used. For the connection of the earth cable use the dedicated terminal on the generator. For the earth connection follow the indications in the table to select the cable cross-section to use depending on the generator power. The generator must be connected to earth using a copper cable with a minimum cross-section of 6 mm^2.

The manufacturer is not responsible for any damage caused by failure to earth the system.

DANGER

1.3.10 Danger resulting from bad storage

- Packed and unpacked generators must be stored in a cool and dry place and never exposed to bad weather.
- Avoid stacking packed generators to prevent them from falling causing damage to persons and/or things.

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1.6 Reference documents

The instructions for use provided with each generator are made up of a collection of documents of which this manual represents the General Part. The following documents are normally provided separate.

a **CE** declaration of conformity.
b Instruction manual for use and maintenance of the generators,
(this manual).
c Engine use and maintenance manual.
d List of **mase** Service Centres.
e **Mase** Warranty certificate.
f Warranty card.

1.7 Reference regulations and legislative provisions

The generator groups, built by **mase**, destined to the countries of the European Community, are conforming to the applicable **EC** directives, and they are provided of a **EC** Declaration of Conformity.

98/37/EC and subsequent amendments:
Essential machine requirements for safety and health protection ("Machine" directive).

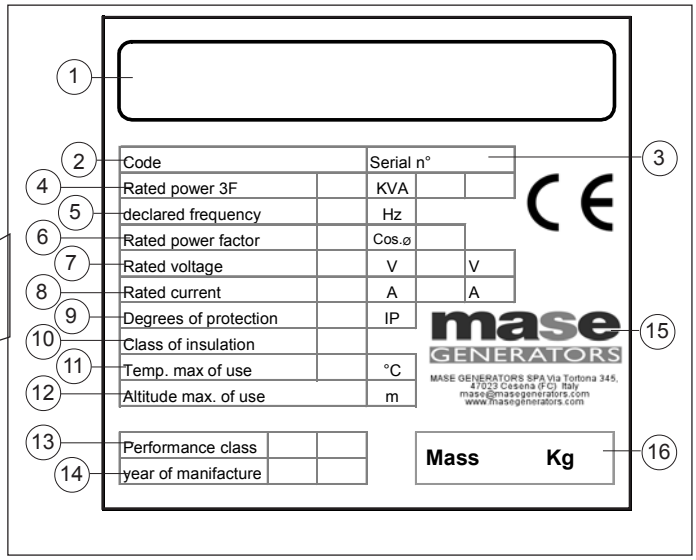
73/23/EC and subsequent amendments contained in the directive **93/68/EC :** Guarantee of safety of electrical material intended for use within certain voltage limits, ("Low Voltage" Directives).

1.8 Marking

The generator identification plate carries all the identification data in accordance with the provisions for **EC** marking for those cases where required. Below is a facsimile of the identification plate fixed on the hull of each generator.

1.9 Identification of the generator unit

1 - Machine name
2 - Machine code
3 - Serial number
4 - Rated power
5 - Declared frequency
6 - Rated power factor
7 - Rated voltage
8 - Rated current
9 - Degree of protection
10 - Class of isolation
11 - Temperature max. of use
12 - Altitude max. of use
13 - Performance class
14 - Year of construction
15 - Manufacturer - Adress
16 - Weight



INFORMATION

The machine code number, the serial number and the year of construction must always be indicated when contacting the manufacturer for information, order of spare parts, etc..

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2.5 General characteristics

The ***VOYAGER*** series generators are composed of a diesel-powered combustion engine coupled to an alternator which produces alternating and direct current. They have been designed to assure professional users maximum efficiency and reliability for any type of work.
The machine is enclosed in a painted sheet steel casing soundproofed with sound-absorbent material.
The fuel is fed by means of a 12 Volt electric pump mounted inside the generator.

2.6 Tables of technical characteristics

MODEL		VOYAGER 5010	
GENERAL FEATURES			
MAX POWER (LTP)[1]		5	**kW**
CONTINUOUS POWER (PRP)[2]		4,2	**kW**
POWER FACTOR (Cos Φ)		1	
SINGLEPHASE VOLTAGE		230	**V**
RATED FREQUENCY		50	**Hz**
GRADE OF PROTECTION		IP 23	
MAX TEMP. OF USE		+40	**°C**
MIN TEMP. OF USE		-5	**°C**
DIMENSIONS	L	700	**mm**
	W	535	**mm**
	H	530	**mm**
MASS		145	**kg**
NOISE LEVEL		64 (7 m.)	**dB(A)**
ENGINE			
TYPE		4 STROKE	
MANUFACTER		YANMAR	
MODEL		L100AE	
DISPLACEMENT		406	**cm^3**
POWER		8,8 - 6,56	**CV - kW**
n° OF CYLINDERS		1	
RATED SPEED		3000	**rpm**
SPEED CONTROL		MECCANIC	
INDUCTION SYSTEM		NATURAL	
FUEL		DIESEL	
INJECTION SYSTEM		DIRECT	
FUEL FEEDING PUMPS		ELECTRIC	
MAX PREVALENCE FUEL PUMP		700	**mm**
FULL LOAD CONSUMPTION		2	**L/h**
COOLING		AIR	
LUBRIFICATION SYSTEM		FORCED	
OIL SUMP CAPACITY		1,65	**L**
ELECTRIC PLANT		12	**V**
STARTING MOTOR		12 - 0,8	**V - kW**
STARTING BATTERY		12 - 45	**V - Ah**
BATTERY CHARGER		12 - 10	**V - Ah**
STOPPING SYSTEM		ELECTROVALVE	
ALTERNATOR			
TYPE		SYNCHRONOUS, 2 POLES, SELF-REGULATED	
ISOLATION CLASS		H	
VOLTAGE REGULATOR		CAPACITOR	
VOLTAGE STABILITY		±2%	
FREQUENCY STABILITY		±5%	
COOLING		AIR	

(1) **Limited - time running power (LTP) ISO 8528-1**
It is the maximum power that, under the environment conditions established by the norm ISO 3046/1, the generator group it is able to disburse for a maximum of 500 hours for year, of which a maximum of 300 hours among the interval of maintenance prescribed by the builder. It is accepted the operation to this power conditions the duration of the group. An overload of the 10% is admitted only for regulation.

(2) **First powers (PRP) ISO 8528-1**
It is the available maximum power for a variable power cycle that the generator group is able to disburse for a boundless number of hours for year among the interval of maintenance prescribed by the builder and under the environment conditions established by the norm ISO 3046/1. The middle power during a period of 24 hours, doesn't have to exceed 80% of the PRP.
An overload of the 10% is admitted only for regulation.

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2.6 Configuration

2.7 Generator composition

See Fig. 1
The generators are essentially composed of the following components:

1 Base chassis
2 Openable cowling engine side
3 Support foot
4 Control panel
5 Lock with key
6 Engine
7 Alternator
8 Door support rod

Fig.1

2.8 Instrument and control panel

See Fig. 2
Each generator is fitted with an instrument panel for the controls with the following components:

1 Start enable switch / STOP
2 Start button
3 Hour counter
4 Generator pilot light
5 Low oil pressure light
6 Engine/alternator overtemperature light
7 Low-fuel warning light

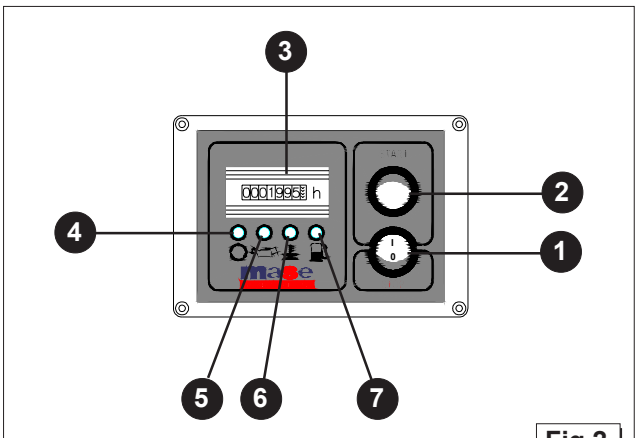

Fig.2

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3. INSTALLATION

Fig.3

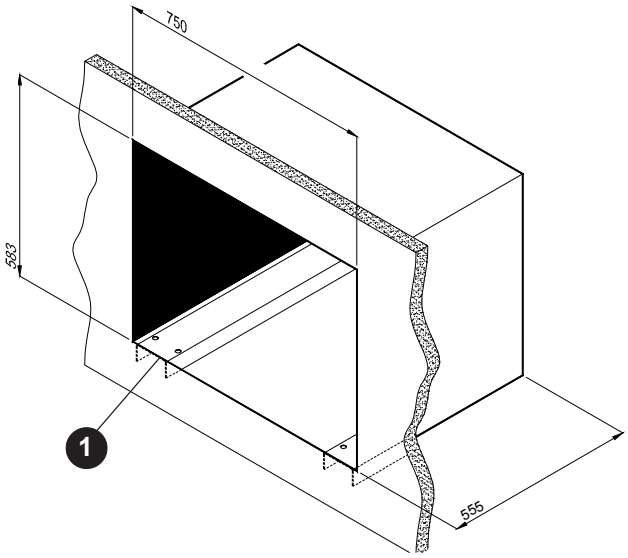

Fig.4

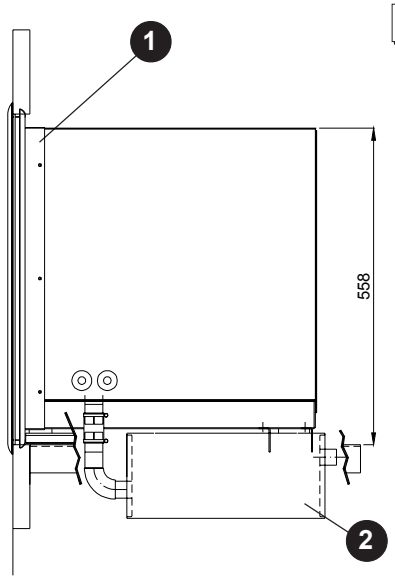

Fig.5

DANGER ***All the instructions provided in the chapter "INSTALLATION" must be carried out by specialised installers only.***

3.1 Characteristics

VOYAGER is a generator designed for installation on motor vehicles, but can nonetheless be used in a fixed place taking care to leave the cooling air intake and escape vents free. The degree of protection against water and entry of foreign bodies is **IP23** which allows using the generator outdoors. The engines used are air-cooled diesel engines complete with fuel pump and filtering systems. The generator is connected to a control panel that can be installed in the motor vehicle, which controls the starting/stopping functions and the safety protections.

3.2 Ventilation

The **VOYAGER** generator is equipped with an internal forced-air cooling system. The air required for cooling and combustion is aspirated into the soundproof casing through two different grilles: (Fig.3 Ref.1-2) and expelled through the escape grilles (Fig.3 Ref.3-4-5). It is of the utmost importance for good functioning of the generator that the air intake and escape grilles are always free and away from heat sources.

DANGER ***The cooling air of the generator may contain noxious gases and it must therefore never be used to heat living space. It is recommended to seal the housing in which the generator is installed in order to prevent infiltration of vapours or gas into the living space.***

3.3 Positioning the generator

The housing in which the **VOYAGER** generator will be installed must have suitable dimensions as indicated in **Fig.4**. The lower part of the housing must have supports of dimensions (**Fig.4 Ref.1**) suited to support the weight of the generator and the stress created when the vehicle is running. There must be a space of about **20mm** around the casing such as to prevent propagation of vibration to the vehicle. The **VOYAGER** generator is supplied standard with brackets to fix the finishing gasket (**Fig.5 Ref.1**). Anchoring brackets with supplementary vibration-dampers (**Fig.1 Ref.3**), and lower exhaust silencer (**Fig.5 Rif.2**).

The gasket fixing brackets (**Fig.5 Ref.1**) allow assembling the generator in the prearranged housing (**Fig.6**) sealing it onto the wall of the vehicle.

3.4 Connecting the tank

The tank must be as close as possible to the generator with a maximum difference in height of 50 cm.
The generator is fitted with a fuel delivery and return hose.
Avoid reducing the cross-section of the hose by crushing or bends that cause hose constrictions.
For the connection use a hose with 8 mm inside diameter and characteristics conform to the use of "DIESEL FUEL".

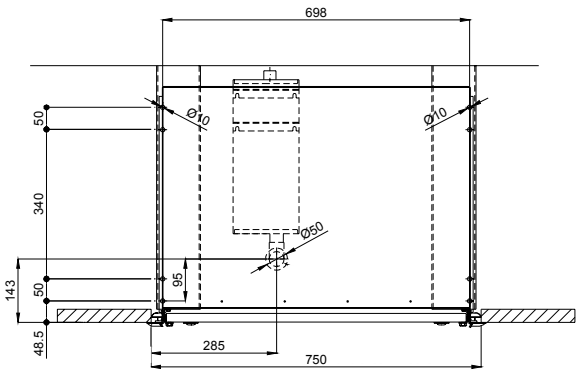

Fig.6

3.5 Electrical connection

Make the ground connection on the terminal board (Fig. 7 Ref. 2) 230V power cable Use the cable conduit (Fig. 7 Ref. 1) to enter the connection compartment.
Connect to the terminal board (Fig. 7 Ref. 2) and fix with a hose clamp at the point (Fig. 7 Ref. 3).
Use a standard cable whose cross-section can be taken from the table **TAB1**.

3.5.1 External emergency connection

Provision has been made for connection of an external emergency button if necessary.
Remove the jumper and connect (Fig.7 Ref.4).
Use a standard cable whose cross-section can be taken from the table TAB1.

3.5.2 Volt auxiliary output

The generator is fitted with a 12 VDC output to power an auxiliary electric fuel pump.
Characteristics (see **TAB1**).
Connect to the Faston "E" (Fig.7 Ref.5) with the positive cable and connect to the point (Fig.7 Ref.6) with the negative cable.

3.5.3 Fuel reserve connection

The generator has an input to signal **the fuel reserve in the tank** (Fig.1 Ref.7) on the control panel.
Characteristics (see **TAB1**).
Connect one end of the fuel reserve float to the Faston "F" (Fig.7 Ref.8) and the other end of the float to the point (Fig.7 Ref.6) (**-**) of the generator or the vehicle chassis.

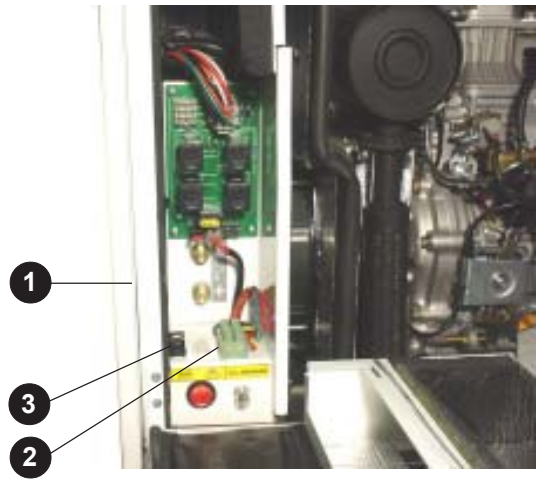

Fig.7

3.6 Battery connection

TAB1

Cross-section mm²		Cross-section mm²		OUTPUT	EMERGENCY BUTTON		Cross-section mm²	
230V		12 V BATTERY		12 V AUXILIARY			12 V	
= 2 mt.	>2mt.>12mt.	>0 mt.6mt.	>6mt.<12mt.	Max. amp. 1	2 mt.	>2mt.>12mt.	= 2 mt.	>2mt.>12mt.
4	6	10	16		2.5	4	1	1.5
					NC contact			

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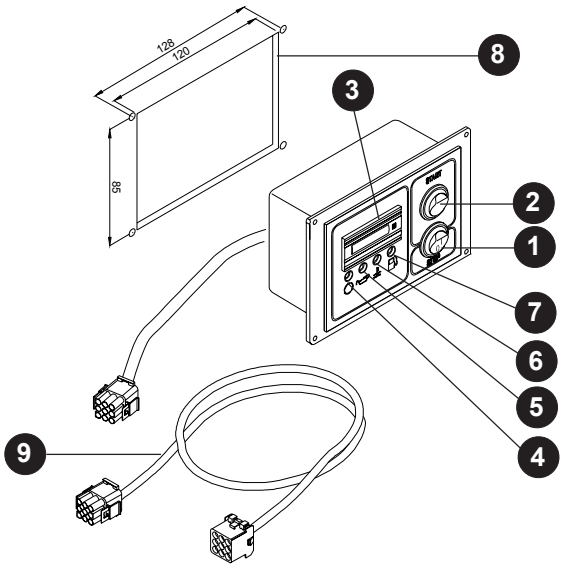

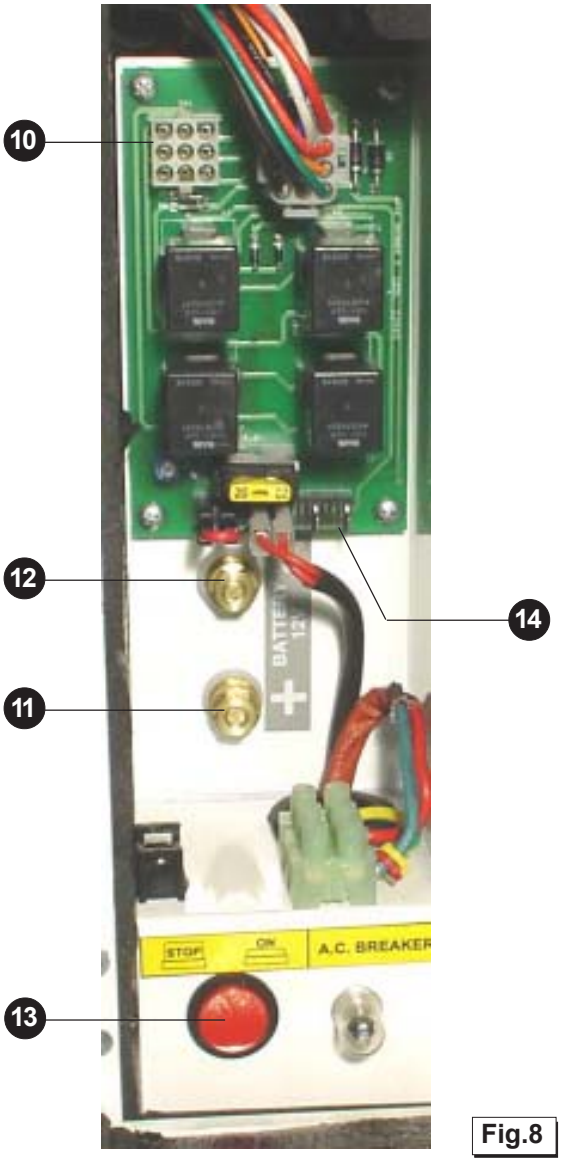

Fig.8

3.6.1 Connecting to the vehicle battery

Connect to the positive pole (**+**) of the battery with a standard cable with adequate cross-section (see TAB1) Connect at the point (Fig. 8 Ref. 11) (**+**) of the generator.

Connect the point (Fig.8 Ref.12) (**-**) of the generator directly to the negative pole of the battery or the vehicle chassis, ensuring that the connection is properly made, removing any paint or rust from the contact surface.
Protect the contact points with grease.

3.6.2 Connecting to a stand-alone battery

An auxiliary battery can be installed only for the generator, following the instructions in the previous paragraph.
The generator is supplied with a 15A 12V battery charger

3.7 Connecting to the remote control panel

Choose the most comfortable position for use and fix the panel (Fig. 8).
Connect the remote control extension to the control panel (Fig. 8 Ref. 4) and to the connector (Fig.8 Ref.10).
The control panel and the extension are supplied standard with the generator.
Fig. 8 Ref.8, panel cut-out for control panel housing.

4. USING THE GENERATOR

WARNING

The "first startup" operations must be carried out by the installer or qualified personnel only

4.1 First startup \ diesel fuel bleeding

At first startup or if the generator has stopped due to lack of fuel, proceed as follows:
- Position the "**STOP 0/1**" switch (Fig.8 Ref.1) on "**0**"
- Press the emergency button (see paragraph 3.5.1) if present
- Open the engine cowling
- Position the red "**STOP/ON**" switch (Fig.8 Ref.13) on "**STOP**".
- Activate the electric fuel pump and with a wire jumper the terminal **"E"** (see wiring diagram) of the relay board (Fig.8 Ref.14) and the (**+**) positive pole of the battery (Fig.8 Ref.11). The electric fuel pump starts aspirating fuel.
- When the fuel pipes are full, remove the jumper wire.
- Position the red "**STOP/ON**" switch (Fig.8 Ref.13) on "**ON**", close the engine cowling, and release the emergency button.
  Start the generator.
  Repeat the above operations if necessary

4.2 Starting the generator

Before starting the generator disconnect the utilities connected to it.
Position the "**STOP 0/1**" switch (Fig.8 Ref.1) on "**1**".
Press and hold down the "**START**" button (Fig.8 Ref.2); when the oil light (Fig.8 Ref.5) has gone off, the generator starts running; release the "**START**" button.
The generator is running properly when the green run light (Fig.8 Ref.4) on the control panel is on.
Let the generator run for a few minutes, especially in cold periods, then apply the load
Do not insist for more than 5 consecutive seconds when trying to start, but wait a few seconds between one attempt and the next.

WARNING ***Never make more than 5 consecutive starting attempts, since this could damage the starter motor.***

WARNING ***During the running-in period (the first 50 hours) do not apply loads exceeding 70% of the rated power of the generator.***

4.3 Stopping the generator

The generator can be switched of in several different ways:

4.3.1 Stopping from control panel

Disconnect the load and let the generator run for about 1 minute. Position the "STOP 0/1 " switch (Fig.8 Ref.1) on "STOP 0" .
When the generator is not used, keep this switch in the "STOP 0" position in order not to discharge the battery.

DANGER

4.3.2 Stopping from onboard the machine

The generator can be switched off with the red "**STOP/ ON** " switch (Fig.8 Ref.13) onboard the machine, setting it to the "**STOP**" position.

4.3.3 Emergency stop

The generator can be stopped with an emergency mushroom-button if present in the vehicle installation (see paragraph 3.5.1).

4.4 Generator alarms

The generator is fitted a series of protections that turn it off signalling the alarm.

4.4.1 Low oil pressure

Triggered when the engine oil pressure is too low, the red light comes on (Fig.8 Ref.5) .
Check the engine oil level.
Each time the "**STOP 0/1**" switch (Fig.8 rif.1) is positioned on "**1**" , or the generator turns off for another reason, this light comes on.

4.4.2 Engine / alternator overtemperature

Triggered when the temperature probes of the engine or the alternator detect high temperatures, the red light comes on (Fig.8 Ref.6)
Check that the applied load does not exceed that applicable.
Check that the ventilation openings are not obstructed.
Wait for the light to go off before starting the generator.

WARNING ***Before restarting the generator, remove the cause of the alarm.***

4.4.3 Fuel reserve

Triggered when the fuel level probe (if present in the installation, see paragraph 3.5.3) of the external tank goes into reserve, the red light comes on (Fig.8 Ref.7)
It does not turn off the generator, but only triggers a visual alarm.
It is recommended to switch off the generator and fill the tank with fuel.

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5. CARE AND MAINTENANCE

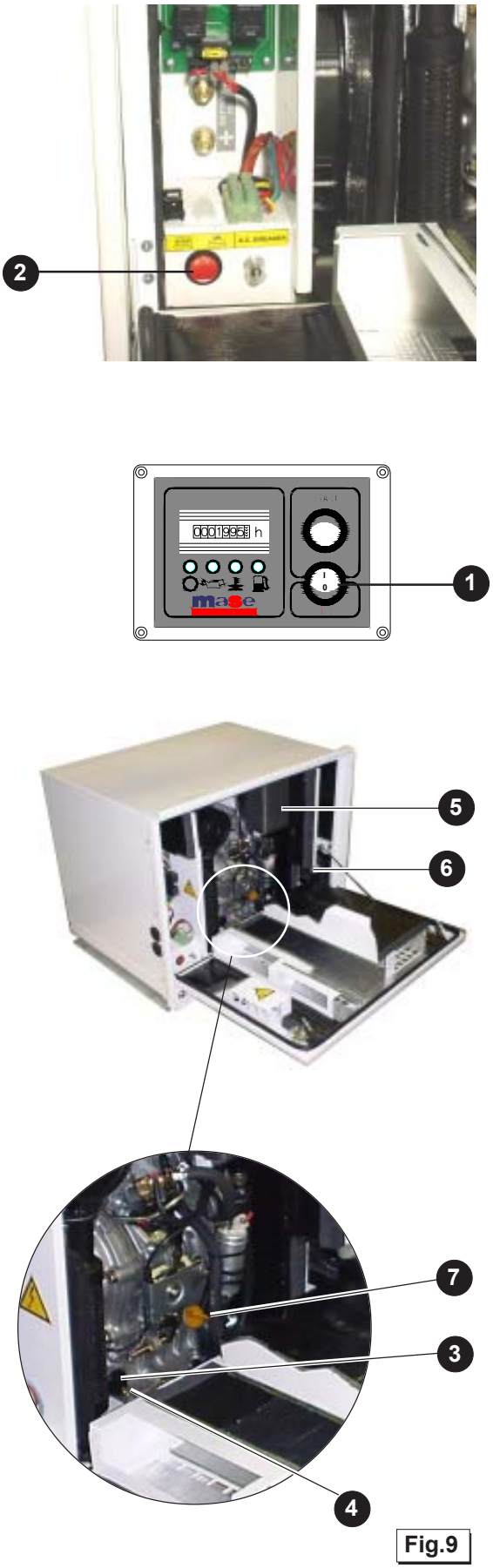

Fig.9

5.1 Preamble

DANGER

Before opening the engine compartment door, switch off the generator from the remote control panel positioning the switch (Fig.9 Ref.1) on 0.
Before any type of maintenance operation, deactivate the starting panel onboard the machine positioning the switch (Fig.9 Ref.2) on STOP.

DANGER

Failure to observe this procedure, may result in accidental starting!

DANGER

Any maintenance operation on the generator or the electrical line must be carried out with the engine off and leaving it to cool down sufficiently.
If necessary, disconnect the battery from the generator.
This type of operation must be carried out by authorised and duly trained personnel.

It is recommended to scrupulously follow the instructions in the manual provided by the engine manufacturer with each generator.
It is important to regularly inspect and carry out maintenance on the generator. The frequency of maintenance should be decided on the basis of the number of hours of operation.

5.2 Ordinary engine maintenance

The periodic maintenance operations to be carried out on the engine are indicated in the table in point **5.9**. For more detailed information consult the manual provided by the engine manufacturer with each generator.

DANGER

- ***Check the oil level with the cap/dipstick. (Fig. 9 Ref.7). The oil level must always be between the MAX and MIN notches on the dipstick.***
- ***When checking the oil level, ensure that the generator is positioned horizontally.***

5.3 Engine oil change

Use diesel engine oil 15 W 40
Top-up and fill through the hole indicated in Fig. 9 Ref.7.
For detailed information in this connection, consult the engine use and maintenance manual which accompanies the machine.
It is recommended to drain the oil when it is still sufficiently warm to flow easily.

INFORMATION

Always check correct viscosity of the engine oil in relation to the range of ambient temperatures in which the generator operates as indicated in the table in Fig.5.

WARNING

Dispose of the used oil in an appropriate manner, since it is a polluting product.
Take the used engine oil to special collection centres for disposal.

CAUTION

Protect the hands from contact with oil by wearing gloves.
In the event of accidental contact with engine oil, thoroughly wash the affected part with soap and water.

CAUTION

During oil top-up and refuelling, respect the maximum level indication. An excessive quantity of engine oil may cause damage to the engine.

5.4 Oil filter

Clean the oil filter (Fig.9 Ref.3) every 200 hours of operation or every 6 months.
Replace it every 400 hours of operation or every 12 months.
The oil filter is accessed by removing the retaining screw (Fig.9 Ref.4).

5.5 Air filter

For proper functioning and a long life of the engine it is important to periodically clean and replace the air filter. An inefficient filter may cause loss of engine power and excessive smoke at the exhaust.
To replace the air filter (Fig. 9 Ref. 5), carry out the following operations:

- Remove the cover from the filter holder by unscrewing the screws.
- Remove the filter, extracting it from its housing and clean or replace it.
- The paper element is cleaned with a blast of dry air, from the inside to the outside, with a pressure not exceeding 2 bar. Should it be very dirty or have holes, replace it.
- Position the filter and remount the cover.

WARNING

Replace the air filter for the first time after 50 hours of operation, then every 200 hours of operation. Reduce the intervals if the generator operates in particularly dusty environments.

CAUTION

Never turn on the engine without the air filter, since this would cause serious damage to the engine.

5.6 Fuel filter

For the engine to deliver full power the filter must be clean. Replace the fuel filter (Fig.9 Ref.6) every 400 hours of operation (or every 6 months).

5.7 Battery check

Periodically check the electrolyte level in the battery and cleanliness and integrity of the connection cables to the positive and negative terminals.
Normally, the acid level must be within the level lines shown on the battery body.
When the MIN level is reached, top up the cells taking care not to exceed the MAX level indicated on the battery case.

INFORMATION

If necessary, top up with distilled water.

5.8 Period of inactivity

If the generator is not to be used for a long period of time, the following operations must be carried out.

- Change the engine oil.
- Clean the air filter.
- Disconnect the battery cables. We recommend you recharge the battery every month in order to prevent it from going completely flat which, sometimes, compromises its integrity.
- Clean the outside of the generator, removing all dust and impurities.

5.9 Scheduled maintenance table

OPERATION	HOURS
Oil level check	10
Battery fluid check	50
Oil sump replacement 🛠	200
Oil filter replacement 🛠	400
Air filter replacement	400
Fuel filter replacement 🛠	400
Equalizer play adjustment 🛠	400
Injector calibration and cleaning 🛠	400

(*) Change the oil for the first time

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after 20 hours of operation.

6. ANOMALIES, CAUSES AND REMEDIES

Listed below are the most common problems that may occur during use of the generator and the possible remedies.

ANOMALY

6.1 When the "START" button (Fig.2 Ref.2) is pressed, nothing happens

CAUSE
Electrical connections interrupted Relay board faulty (Fig.10 Ref.1)
Fuse (Fig.10 Ref.2) burned.
REMEDY
Have them checked by qualified personnel

CAUSE
"STOP 0/1 " switch (Fig.2 Ref.1) on "0"
REMEDY
Position the **"STOP 0/1 "** switch (Fig.2 Ref.1) on "1"

CAUSE
Red **"STOP/ON"** switch (Fig.10 Ref.3) onboard the machine on **"STOP".**
REMEDY
Position the red **"STOP/ON"** switch (Fig.10 Ref.3) onboard the machine on "ON".

CAUSE
Emergency mushroom-button, if present, activated.
REMEDY
Deactivate the emergency mushroom-button, if present.

CAUSE
Fuse (Fig.10 Ref.2) burned.
REMEDY
Replace the fuse.

CAUSE
The generator battery does not deliver sufficient power
REMEDY
Check the state of the generator battery

CAUSE
The relays (Fig.10 Ref.4) are not properly inserted in their housings.
REMEDY

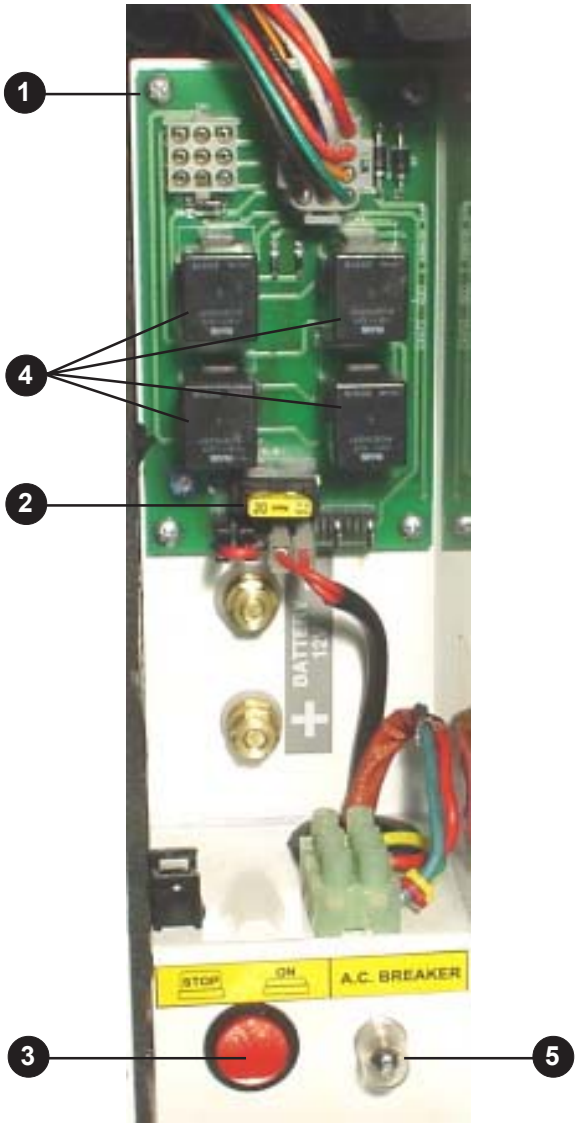

Fig.10

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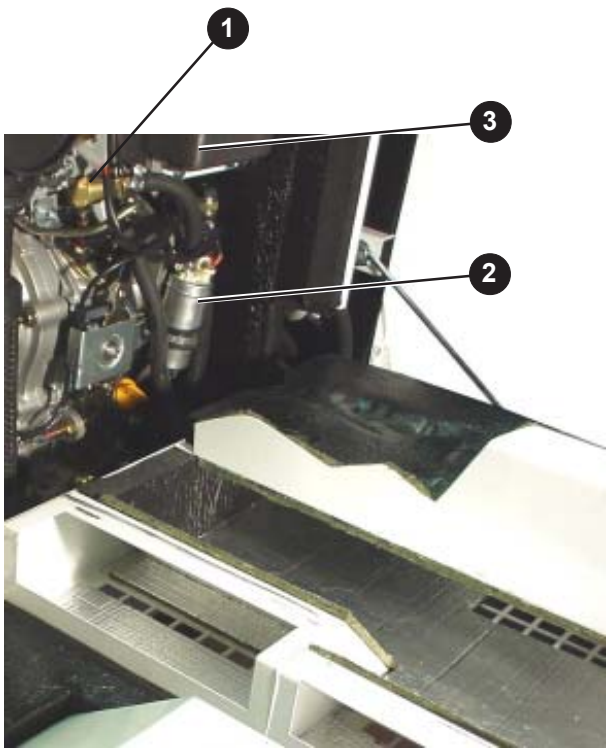

Fig.11

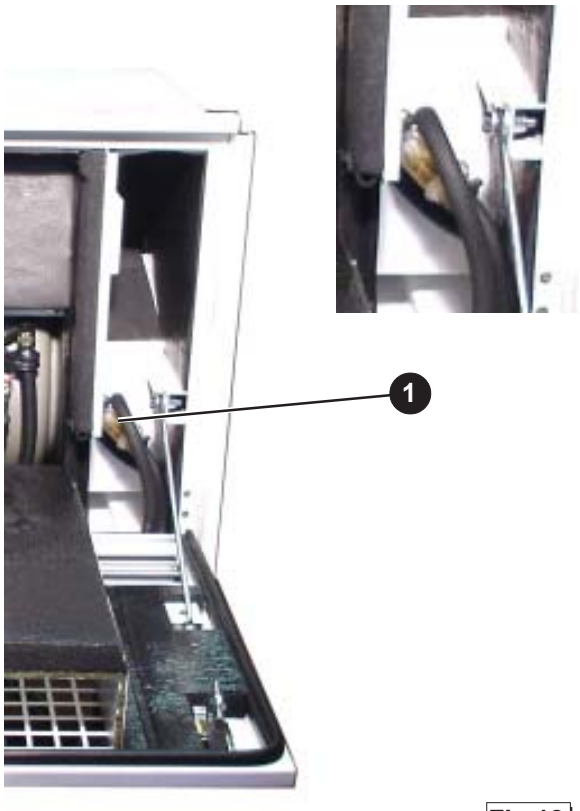

Fig.12

Insert them in their housings.

ANOMALY

6.2 The starter motor turns but the generator does not start

CAUSE
A protection of the generator is active.
REMEDY
(see paragraph 4.4)

CAUSE
No oil in engine.
REMEDY
Fill up.

CAUSE
No fuel.
REMEDY
Fill up.

CAUSE
Low-fuel warning light on
REMEDY
(see paragraph 3.5.3)

CAUSE
Fuel pipes interrupted or worn, or hose clamps loosened.
REMEDY
Have them checked by qualified personnel

CAUSE
Solenoid valve faulty (Fig.11 Ref.1).
REMEDY
Have them checked by qualified personnel

CAUSE
Electric pump filter clogged or faulty (Fig.11 Ref.2)
REMEDY
Have them checked by qualified personnel

CAUSE
Fuel filter clogged (Fig.12 Ref.1)
REMEDY
Have them checked by qualified personnel

CAUSE
Electrical connections interrupted
REMEDY
Have them checked by qualified personnel

CAUSE
Relay board faulty (Fig.10 Ref.1)

REMEDY
Have them checked by qualified personnel

ANOMALY

6.3 The generator runs with an irregular number of revolutions

CAUSE
The fuel is running low, low-fuel warning light on
REMEDY
(see paragraph 3.5.3 **)**
Fill up

CAUSE
Solenoid valve faulty (Fig.11 Ref.1)
REMEDY
Have them checked by qualified personnel

CAUSE
Electric pump filter clogged or faulty (Fig.11 Ref.2)
REMEDY
Have them checked by qualified personnel

CAUSE
Fuelfilter clogged (Fig.12 Ref.1)
REMEDY
Clean or replace

CAUSE
Air filter dirty (Fig.11 Ref.3)
REMEDY
Have them checked by qualified personnel

ANOMALY

6.4 The generator does not deliver 230 V power but the generator pilot light is on (Fig.2 Ref.4)

CAUSE
Thermal switch off (Fig.10 Ref.5)
REMEDY
Switch it back on by pressing it
CAUSE
Electrical connections interrupted
REMEDY
Have them checked by qualified personnel

ANOMALY

6.5 The generator does not deliver power

CAUSE
Capacitor faulty
REMEDY
Have them checked by qualified personnel
CAUSE
Electrical connections interrupted
REMEDY
Have them checked by qualified personnel

CAUSE
Alternator demagnetised or faulty
REMEDY
Have them checked by qualified personnel

CAUSE
Too low number of revolutions
REMEDY
Have them checked by qualified personnel

ANOMALY

6.6 Too low voltage

CAUSE
Too low number of revolutions
REMEDY
Have them checked by qualified personnel
CAUSE
Possible overload
REMEDY
Disconnect the applied loads
CAUSE
Capacitor faulty
REMEDY
Have them checked by qualified personnel
CAUSE
Alternator faulty
REMEDY
Have them checked by qualified personnel

ANOMALY

6.7 Too high voltage

CAUSE
Too high number of revolutions
REMEDY
Have them checked by qualified personnel
CAUSE
Capacitor of incorrect value (Fig.13 Ref.1)

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REMEDY
Have them checked by qualified personnel

ANOMALY

6.8 The battery does not recharge or is unable to start the generator

CAUSE
The **"STOP 0/1"** switch (Fig.2 Ref.1) has remained in position "1" for too long and the battery has discharged
REMEDY
Check and recharge the battery

CAUSE
Battery faulty
REMEDY
Check and replace

CAUSE
Electrical connections of battery loose
REMEDY
Check the battery connections (see paragraph 3.6.1, 3.6.2)

CAUSE
Battery charger faulty (Fig.13 Ref.2)
REMEDY
Have them checked by qualified personnel

CAUSE
Alternator faulty
REMEDY
Have them checked by qualified personnel

ANOMALY

6.9 Excessive overheating of the machine

CAUSE
Ventilation openings obstructed (Fig.3, Ref. 1 - 2 - 3 - 4 - 5)
REMEDY
Check and remove any obstructions
Have them checked by qualified personnel

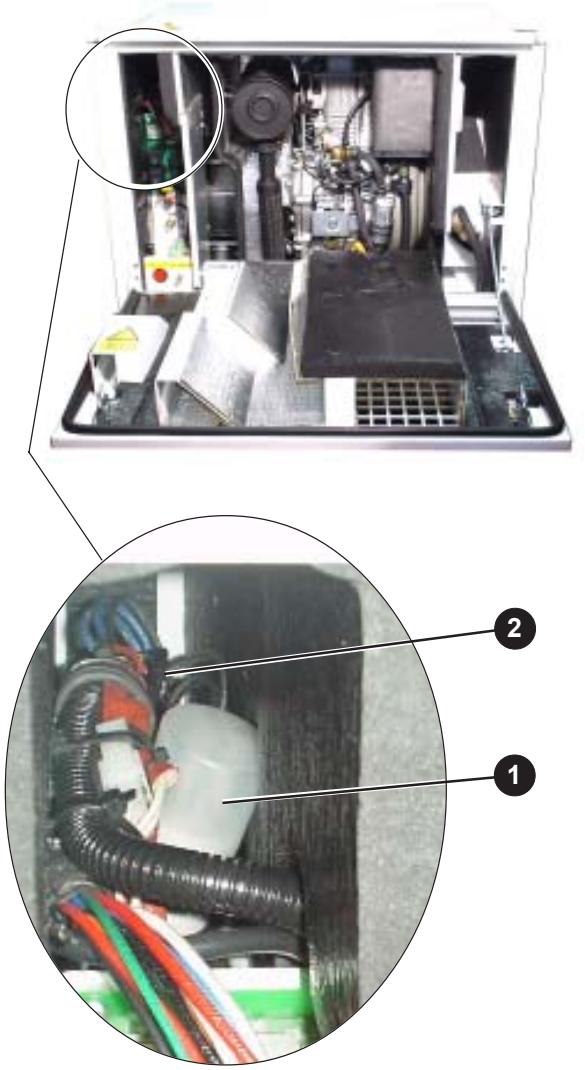

Fig.13

7. WIRING DIAGRAM

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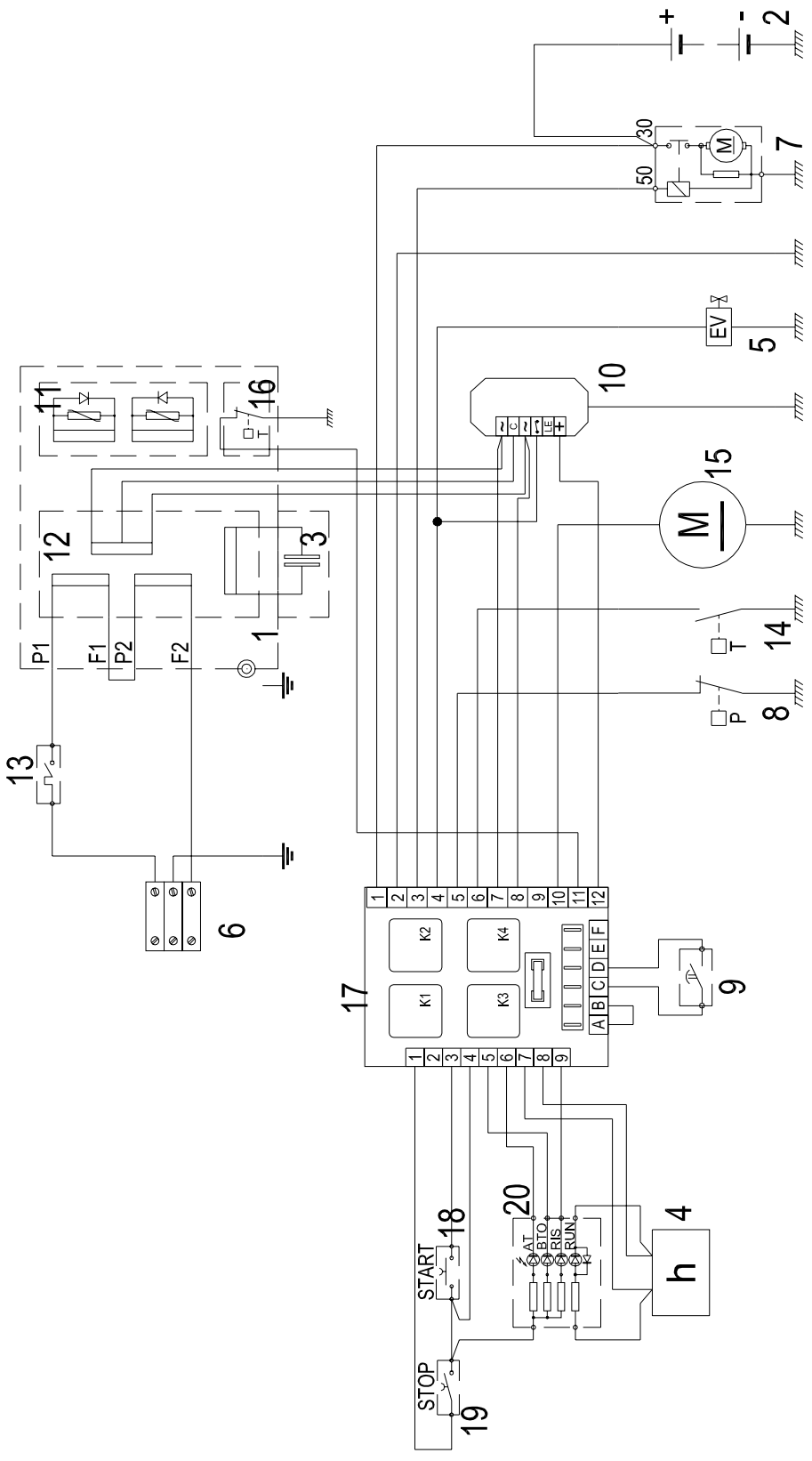

1 ALTERNATOR
2 BATTERY
3 CAPACITOR
4 HOUR COUNTER
5 STOP SOLENOID VALVE
6 POWER TERMINAL BOARD
7 STARTER MOTOR
8 OIL PRESSURE SWITCH
9 EMERGENCY STOP BUTTON
10 BATTERY CHARGE REGULATOR

11 ROTOR
12 STATOR
13 THERMAL SWITCH
14 ENGINE THERMOSTAT
15 FUEL RESET PUMP
16 ALTERNATOR THERMOSTAT
17 RELAY CARD
18 START BUTTON
19 STOP SWITCH
20 LED CARD

Fig.11

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8. TRANSPORT. STORAGE. LIFTING AND HANDLING

8.1 Transport and storage

Packaging: Supplied directly by Mase Generators.
The total weight of the packed generator is given in **Paragraph 2.5 "Table of technical characteristics".** ***It is strictly prohibited to pollute the environment with the packaging***

Transport: During transport the generator (with or without packaging) must be protected against atmospheric agents, it must not be turned upside down and must be protected against knocks. The generator must be transported without oil and fuel to prevent leaks during travel.

Storage: The generator must be stored in horizontal position and away from atmospheric agents and humidity.

8.2 Lifting and handling

CAUTION

Always check that the capacity of the lifting means and its accessories is greater than the weight of the generator printed on the identification plate.

Use a lift truck to handle the generator (with capacity greater than the weight of the generator indicated in the table of technical characteristics - Paragraph **2.9** of the Use and Maintenance Manual), inserting the forks under the base at the lower part of the generator.

For lifting with a crane, hook steel cables or robust chains onto the special points marked with the label "lifting hook" (or an eye-bolt for the smaller generators) taking care not to crush or damage any part, lift the generator without jerking and place it on the ground gradually, then move it carefully (with a lift truck or transpallet) to its working place.

For handling on level ground, a transpallet is sufficient with a suitable capacity according to the table of technical characteristics - Paragraph **2.9** of the Use and Maintenance Manual.

N.B. The centre of gravity of the generator corresponds to about the centre of its geometrical volume.

9. GUARANTEE AND RESPONSIBILITY

9.1 Guarantee

- **The MASE** generators and all their components are guaranteed free of defects and are covered by the guarantee for a period of **2 year** from the date of installation.

- Not covered by the guarantee are: failed observance of the installation regulations, damage caused by natural disasters, accidents, defects of the electrical system including the load to which the generator is connected, negligence, improper use or abuse by the operator and damage caused by repairs carried out by unqualified personnel.

- Repairs that cannot be carried out at the place of installation can be carried out at MASE laboratories or at authorised workshops. Transport expenses will be

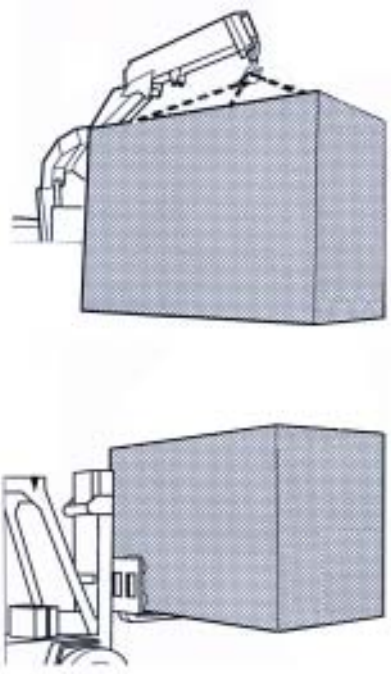

Fig.12

borne by the Customer.

- Under no circumstances does the Customer have the right to claim compensation for damages or side effects caused by use of the machine in a manner not conform to what is described in this manual.

9.2 Limits of responsibility

MASE GENERATORS S.p.A is responsible for anything regarding the safety, reliability and performance of the Generator on the condition that:

- The generator is used by persons trained through the use and maintenance manual.
- The installation is carried out according to MASE instructions.
- The service procedures are carried out exclusively by MASE specialised technical personnel.
- The electrical system and the loads to which the generator is connected is in conformity with the applicable CEI regulations.
- The Generator is installed and used in accordance with the installations provided in this manual.
- Use original spare parts specific to each model.
- Use suitable fuel.

10. DISPOSAL

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10.1 Disposal of the waste materials deriving from maintenance and scrapping

- The packaging used for transport is biodegradable and thus easy to dispose of by companies authorised for paper collection.
- The batteries must be disposed of according to the regulations regarding toxic and noxious waste.
- The engine oil and engine oil filters, both after an oil change and when scrapping, must be taken to companies authorised for this collection.
- The electrical components must be taken to companies authorised for the collection of electronic material.
- All the painted metal parts must be taken to companies authorised for the collection of metals.
- Any other material not listed above must be taken to companies authorised for the collection of industrial waste.