



MERSSO
GENERATORS

GRUPPO ELETTROGENO MANUALE DI USO E MANUTENZIONE

I

GENSET USE AND MAINTENANCE MANUAL

GB

ELEKTROAGGREGATE BRAUCHSANWEISUNG UND
WARTUNGSVORSCHRIFTEN

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GRUPE ÉLECTROGÈNE MANUAL DE USO Y MANTENIMIENTO

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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.

As a leading generator manufacturer, Mase Generators offers a wide range of generators with an output from 1 KVA portable generators to 1600 KVA units for special applications. Founded in 1970, the Cesena-based company extends over a area of 16,000 square meters, including a 9,000 sq. mtr. manufacturing facility. Mase Generators began as a company producing 500 Watt, light and compact portable generators. These generators made the Mase Generators name well known throughout the world. Mase Generators is a leader in high quality, reliable products, and innovative research performed by Research and Development Department.

The generator 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, constitutes an effective answer to the operators' demands of the sector.

This Manual instructions will furnish you useful information and precious suggestions so you can fully exploit all the possibilities that the generators offers you.

If any part of the manual resulted incomprehensible, please contact us.

In to renew our thanks we cordially greet you.



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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.

- 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.

1.1 CONFORM USE

The generator is suitable for independent production of electrical energy within the voltage and wattage limits declared by the manufacturer.

Any other use outside the already stated field of use is prohibited: the generator is intended for industrial use. The generator has been designed to operate independently (without operator) if not for sporadic checks.

The limits of use are:

- operating temperature: -15° +40°
- relative humidity: 30% - 90%
- the generator is suitable for operation outdo; it may not be operated in closed environments since the generator produces exhaust gas.

Inside installation is subject to approval by **mase** or an installer authorised by **mase**.

Arbitrary modifications to the machine are prohibited for safety reasons.

Original spare parts must be used on pain of losing machine conformity.

All the operations that require dismantling of special parts may only be carried out by technicians authorised by the local dealer or the manufacturer.

Only **mase** technicians or personnel trained by **mase** have the necessary knowledge of the generator and the special equipment as well as the experience to carry out any operation in the most economical and reliable way.

1.2 RESIDUAL RISKS

The generator has been designed taking into account the safety regulations set out in the EC directives and standards; nonetheless, the following residual risks remain:

- injury caused by contact with hot parts during maintenance.
- injury caused by electrocution during maintenance on the electric panel.
- risks connected with long periods of exposure to the noise of the generator.
- risks due to contact with the generator lubricants during maintenance.
- risks due to the fire hazard the fuel represents.

Because of the typical intrinsic danger of the Generators, you are reminded that, although the generator has been designed, constructed and tested in accordance with the safety regulations, only proper and careful use can guarantee full safety; to this end, the various precautions to be taken during use of the Generator are listed below.

1.3 SYMBOLS ON THE GENERATOR GROUP

Cod. 42347

	MACCHINA AD AVVIAMENTO AUTOMATICO A DISTANZA		
	AUTOMATIC REMOTE STARTING		
	MASCHINE MIT AUTOMATISCHER FERNSTARTVORRICHTUNG		
	MAQUINA CON PUESTA EN MARCHA AUTOMATICA A DISTANCIA		
	MACHINE A DEMARRAGE AUTOMATIQUE A DISTANCE		

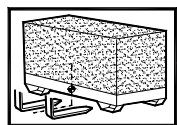
Cod. 41810

Cod. 42352

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Cod. 41775

Cod. 42118

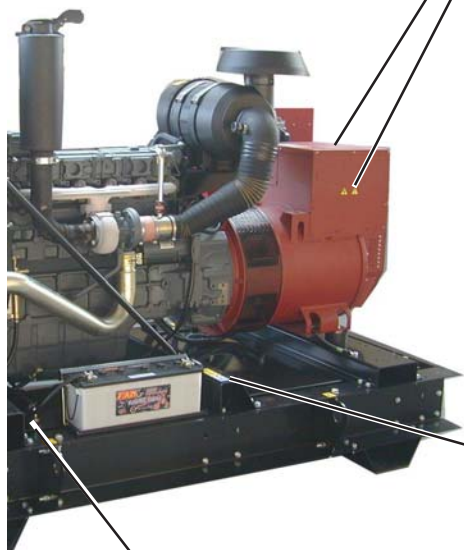


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Cod. 41777



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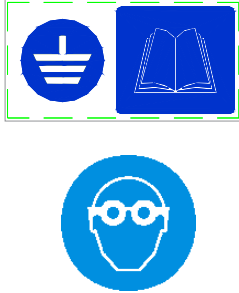

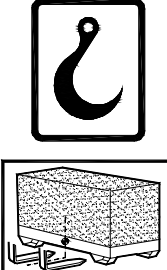
Cod. 42351

	D I E S E L		D I E S E L	
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1.4 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.

Danger Symbols	Meaning
	<ul style="list-style-type: none"> - 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.
	<ul style="list-style-type: none"> - 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.
	<ul style="list-style-type: none"> - 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.
	<ul style="list-style-type: none"> - The fuels are highly flammable and in certain conditions also explosive. - Fill up in a well-ventilated area with the engine off. - Do not smoke or create sparks while filling up. - Immediately clean off any fuel leaks.
	<ul style="list-style-type: none"> - Danger of electric discharge: consult the manual.
	<ul style="list-style-type: none"> - Danger of electric discharge: consult the manual.
	<ul style="list-style-type: none"> - Danger of possible corrosive acid leaks.
	<ul style="list-style-type: none"> - Danger of explosion.

Danger Symbols	Meaning
	<ul style="list-style-type: none"> - Danger of entanglement and cutting: Presence of rotating parts, pulleys, belts and fan. - Danger of burns: Hot surfaces. - Danger of burns: Possibility of pressurised hot water expulsion.
Obligation Symbols	Meaning
	<ul style="list-style-type: none"> - Obligation to connect the generator to earth. - Obligation to wear eyes protection.
Prohibition Symbols	Meaning
	<ul style="list-style-type: none"> - 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.
Information Symbols	Meaning
	<ul style="list-style-type: none"> - Indicates the location of a point of the lifting hook of the generator. - Indicates the location of the centre of gravity for the lifting with fork.

1.5 GENERAL DANGER INFORMATIONS

- 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.



1.5.1 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.



1.5.2 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.



1.5.3 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.).**



1.5.4 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.



1.5.5 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 filler cap.
- 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.



1.5.6 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.



1.5.7 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 1 m. (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.

**1.5.8 DANGER OF ELECTROMAGNETIC RADIATION**

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

**1.5.9 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.

The manufacturer is not responsible for any damage caused by miss-ground to the system.

**1.5.10 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.

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).

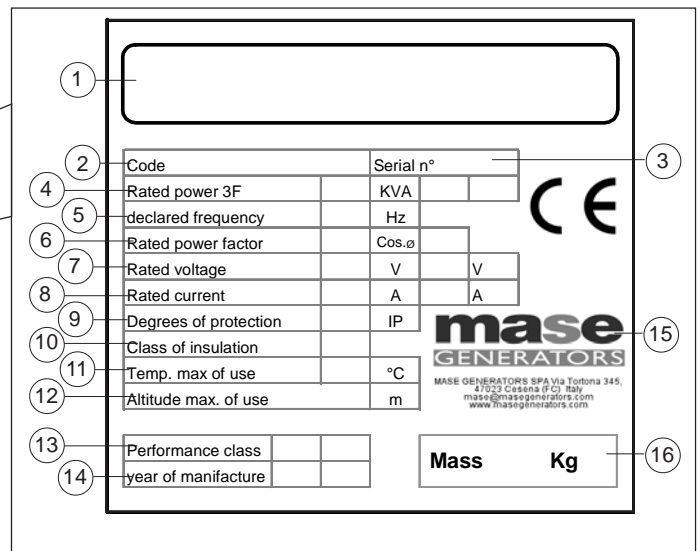
Directive 2006/95/EC (73/23/EC and subsequent amendments contained in the directive **93/68/EC**):
Guarantee of safety of electrical material intended for use within certain voltage limits, ("Low Voltage" Directives).

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 - Address
- 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..

2 GENERAL CHARACTERISTICS

The generators have been designed for use in the industrial field, using highly reliable 1500 rpm water-cooled diesel engines. Particular attention has been paid to the degree of protection against external agents, engine protection and protection of the electrical parts against overload or overheating, adopting automatic systems able to stop the generator in the event of malfunctioning.

The generator is particularly quiet thanks to an internally insulated soundproof casing and an advanced soundproof system for combustion smoke exhaust.

The alternators used are the synchronous self-energized type with electronic voltage adjustment.

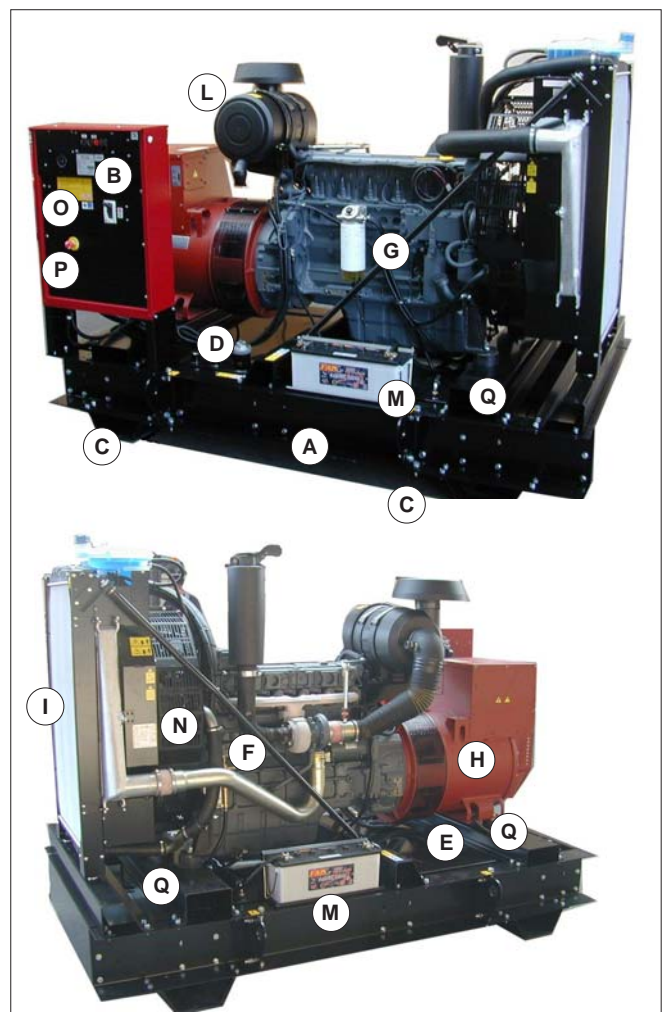
2.1 CONFIGURATIONS

The configuration of the generating set is only for fixed installation.

2.2 COMPOSITION OF GENERATOR UNIT

The generator unit is essentially composed of the following components.

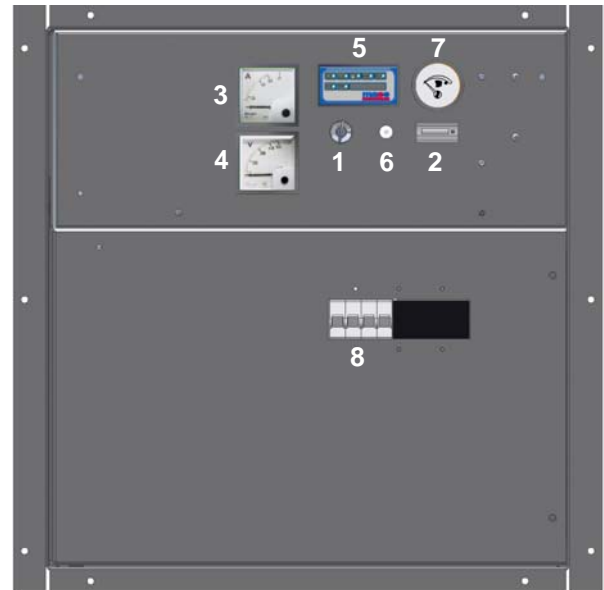
- A - Fixed frame
- B - Instrument panel
- C - Support
- D - Filler cap
- E - Fuel tank
- F - Gas exhaust pipe
- G - Engine
- H - Alternator
- I - Radiator
- L - Air filter
- M - Battery
- N - Charge battery alternator
- O - Ground connection
- P - Emergency push button
- Q - Dampers



2.3 INSTRUMENT PANEL

Each generator is fitted with an instrument panel for commands and controls with the following components:

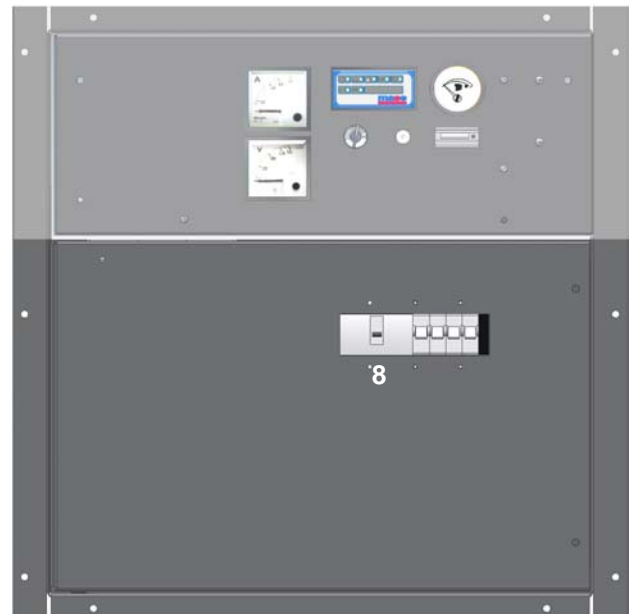
- 1 - Ignition key
- 2 - Hour counter
- 3 - Ammeter
- 4 - Voltmeter
- 5 - Engine protection module (see **par.5**)
- 6 - Low voltage thermal protection
- 7 - Fuel level
- 8 - General magnetothermal switch



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2.3.1 DIFFERENTIAL MEGNETOTHERMAL PANEL VERSION (OPTIONAL)

- 8 - Differential magnetothermal switch



2.3.2 SOCKETS PANEL VERSION (OPTIONAL)

- 9 - Three-phase outlet, EC 63A 400V - 3P+N+GND
- 10 - Three-phase outlet, EC 32A 400V - 3P+GND
- 11 - Single-phase outlet, EC 16A 230V - 2P+GND
- 12 - Single-phase outlet, EC 16A 230V - 2P+GND
- 13 - Differential magnetothermal switch on socket line



2.4 TABLE OF TECHNICAL CHARACTERISTICS

GB

MODEL		MPL 206 A	MPL 226 A	
GENERAL FEATURES				
MAX POWER (LTP) ¹		206	226	kVA
CONTINUOUS POWER (PRP) ²		180	205	kVA
POWER FACTOR (Cos φ)		0,8		
THREEPHASE VOLTAGE		400		V
RATED FREQUENCY		50		Hz
GRADE OF PROTECTION		IP 23		
MAX TEMP. OF USE		40		°C
MIN TEMP. OF USE		-15		°C
MAX ALTITUDE OF USE		1000		m
COOLING AIR FLOW		90		m ³ /min
DIMENSIONS	L	3613		mm
	W	1300		mm
	H	1904		mm
MASS		2950	2950	kg
ENGINE				
TYPE		4 STROKE		
MANUFACTURER		DEUTZ		
MODEL		BF 6M 1013 FC G2	BF 6M 1013 FC G3	
DISPLACEMENT		7146		cm ³
MAXIMUM POWER		243 / 178,7	268 / 197,1	CV - kW
n° OF CYLINDERS		6		
RATED SPEED		1500		rpm
SPEED CONTROL		MECHANICAL		
INDUCTION SYSTEM		TURBO/INTERCOOLER		
FUEL		DIESEL		
INJECTION SYSTEM		DIRECT		
FUEL FEEDING PUMPS		MECHANICAL		
FUEL TANK CAPACITY		400		L
AUTONOMY AT 3/4 LOAD		12,5	11,5	h
COOLING		WATER		
LUBRIFICATION SYSTEM		FORCED		
OIL SUMP CAPACITY		17		L
COMBUSTION AIR VOLUME		13,5	14,3	m ³ /min
EXHAUST GAS MASS FLOW		14,3	16,3	m ³ /min
ELECTRIC PLANT		24		V
STARTING		ELECTRIC		
STARTING MOTOR		24 - 3,1		V - kW
STARTING BATTERY		2 x (12 - 140)		V - Ah
BATTERY CHARGER		28 - 35		V - A
STOPPING SYSTEM		STOP SOLENOID VALVE		
ALTERNATOR				
TYPE		SYNCHRONOUS, 4 POLES, SELF-REGULATED		
ISOLATION CLASS		H		
VOLTAGE REGULATOR		ELECTRONIC		
VOLTAGE STABILITY		± 2%		
FREQUENCY STABILITY		± 5%		
COOLING		AIR		
SINGLEPHASE 230V				
POWER FACTOR (Cos φ)		1		
CONTINUOUS POWER A.C.				

⁽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⁾ Prime power (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.

2.5 DERATING FOR OPERATIVE AMBIENT CONDITIONS

Diesel engines

Important: the outputs of Diesel engines for stationary applications refer to the following standard ambient conditions in agreement with ISO 3046/1 Standard

- ambient temperature +25 °C
- ambient pressure 1000 mbar (750 mm/Hg, corresponding to 0 m. above sea level);
- relative humidity 30%.

Synchronous generators

The ambient conditions for reference for synchronous generators and stationary applications, in agreement with IEC 34 standards, are the following:

- ambient temperature 40 °C
- altitude 1000 metres above sea level (674 mm/Hg).

For installation and operating ambient conditions other than those indicated for reference, appropriate “derating” of the power supplied by the unit must be performed.

The impact of every factor described in this section must not be considered individually but in combination with the other factors.

The derating of synchronous generators is less demanding than for Diesel engines; inasmuch, the derating of the power generator in general coincides with the derating of the Diesel engine.

Particular deratings may be determined on the basis of the effective conditions of use.

For information: the following Table indicates the derating values for aspirated and turbocompressed engines.

Table with derating estimates for aspirated and turbocompressed Diesel engines (for more information about the type of intake, see “Table. Technical Features” Chap.2.4)

The two coefficients K1 and K2 must both be multiplied to the rated power of the generator to obtain the power at ambient conditions different to standard conditions.

Altitude (m.a.s.l.) a 25°C	0	500	1000	1500	2000	2500	3000
Reduction factor (K₁) for naturally aspirated engine	1	0,95	0,89	0,83	0,76	0,74	0,68
Reduction factor (K₁) for turbo aspirated engine	1	0,96	0,92	0,88	0,83	0,79	0,75

Ambient temp. (°C) a 0 m.a.s.l.	25°	30°	35°	40°	45°	50°
Reduction factor (K₂) for naturally aspirated engine	1	0,98	0,96	0,95	0,93	0,91
Reduction factor (K₂) for turbo aspirated engine	1	0,98	0,96	0,94	0,92	0,90

Resultant power = Rated power x K₁ x K₂

EXAMPLE: Machine Operation - power: 100 kVA a 35°C a 1000 m.s.l.
 100 x 0.96 x 0.92 = 88.3 kVA

3 INSTALLATION

3.1 GENERAL INSTALLATION CRITERIA

The installation of one or more Generating Sets must be designed by specialised engineers qualified for the design of this type of plant. The installation must be carried out by qualified organisations employing specialised personnel and using suitable equipment. The systems must be installed in workmanlike manner and upon completion the installer must issue the client with a Declaration of Conformity of the systems installed in accordance with the design specifications and the specific standards.

3.2 IMPORTANT INFORMATIONS

3.2.1 INSPECTION OF MATERIALS

On receiving the set, it is advisable to check that the materials correspond to that listed on the delivery note accompanying the shipment. Some of the packages may be opened at random to check that no damage has occurred during transit. If damage is noted, the carrier must be informed immediately to enable the relevant claims procedure to be started.

3.2.2 SAFETY STANDARDS FOR DIESEL ENGINES

The location and installation of the generating set (foundations, fuel tank, air intake, gas exhaust) must comply with the "Safety Standards" in force in the country of installation.

3.2.3 FOUNDATIONS

The foundations must be calculated and designed by civil engineers, taking maximum care to avoid the transmission of vibrations and noise to other parts of the structure.

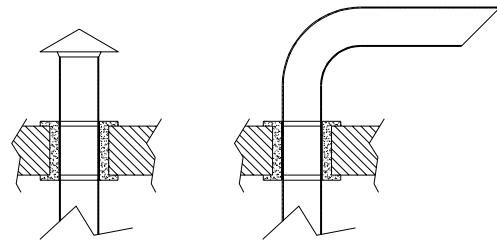
3.3 EXHAUST PLANT

3.3.1 EXHAUST PIPE

The exhaust pipe must convey the exhaust gas to a zone where it will not cause damage or harm, and away from doors, windows and air intakes.

The outlet must be provided with a fixed protection to prevent the ingress of rainwater.

Sections of pipes passing through walls must be insulated to prevent the transmission of heat to the walls themselves.



3.3.2 EXHAUST PIPE DESIGN

The backpressure on the engine exhaust greatly influences the power delivered by the engine and its thermal load. Any excessive back pressure (measured on the outlet side of the exhaust manifold for induction engines and on the turbine outlet side for turbocharged engines) causes a decrease in power, an increase in the temperature of the exhaust gases, produces smoke, increases fuel consumption and superheats the cooling water, with subsequent deterioration in the lubricant and consequences for other engine parts.

The pipelines should be as short as possible and with a minimum number of bends.

3.4 VENTILATION

Ventilation of the room in which the generating set is installed is of fundamental importance for the proper operation of the set itself (SEE ALSO PAR. 3.8).

3.5 FUEL SYSTEM

The standard Generating Sets normally supplied by **mase** are fitted with a complete fuel system from the engine to the standard fuel tank incorporated.

3.6 ELECTRICAL CONNECTION

The electrical connection must be carried out exclusively by a specialised technician according to EN 60 204.1 (IEC 204.01) regulations.

The generating sets are supplied already set-up for connection to the user.

The function of the generating set is to substitute the mains electricity supply, and as such, must be considered as an external source of energy. In the execution of the connections must be respected the suitable connections in the wiring diagram furnished with the group.

3.6.1 POWER CABLES SIZES

The choice and size of cables to use is the responsibility of the plant installer.

It should be emphasised that using smaller sections than that recommended would cause excessive voltage drops and lead to dangerous overheating of cables.

3.6.2 POWER CABLE CONNECTION

The set of generator-utility-network connection cables must be properly arranged in a suitable duct or underground passage (also see para 3.7/3.8).

For installation, use the following procedure:

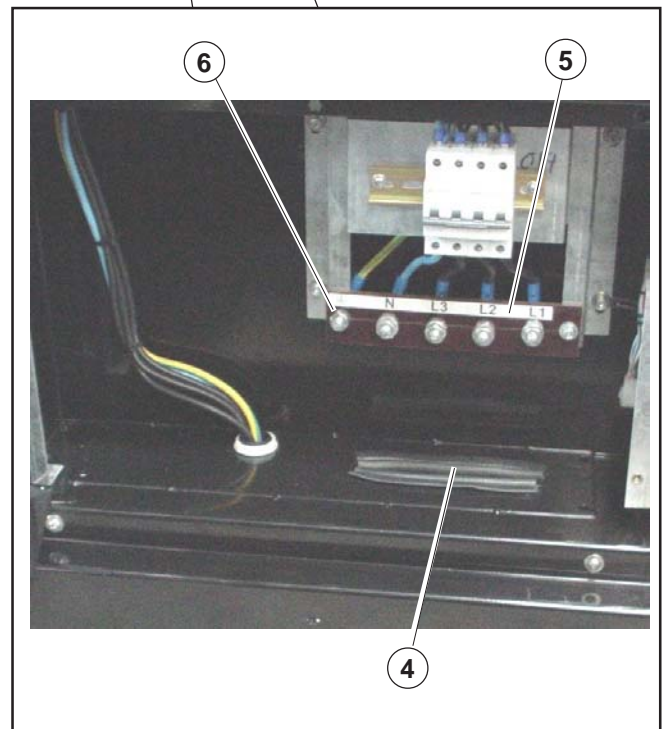
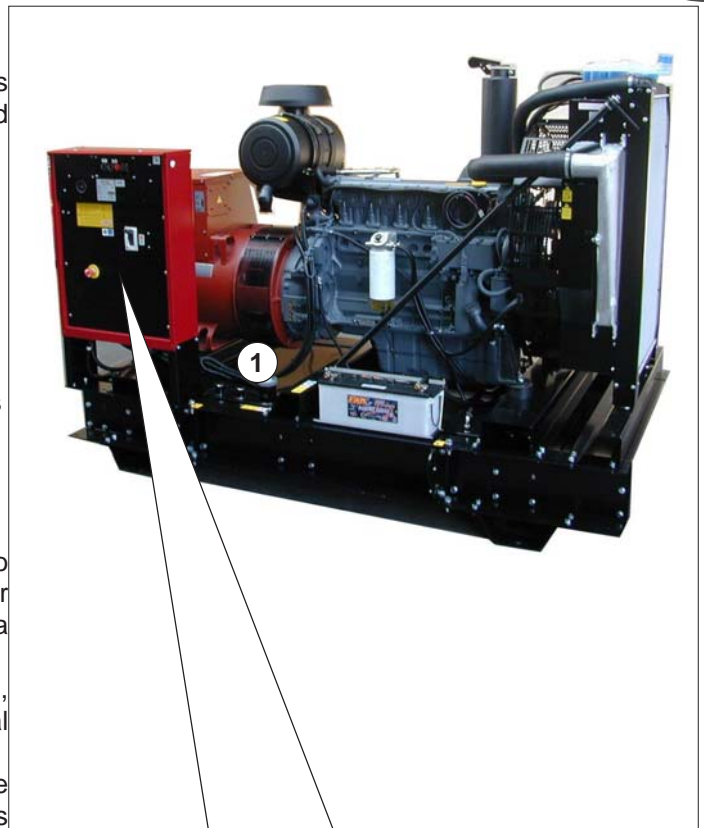
- 1) Remove the small panel (ref.1).
- 2) Fit the cables inside the panel (ref.1), through the gasket (ref.4), as far as the power terminal board (ref.5).
- 3) Clamp with specific cable retainers.
- 4) Connect the power cables to the respective terminals indicated by the icons.

3.6.3 GROUND CONNECTION

Metal parts of the plant with which people can come into physical contact and which, due to an insulation fault or other reasons, may become live, must be connected to a ground system.

To connect to ground, use the procedure given in par.3.6.2, then connect the ground cable to the respective terminal indicated by the icon (ref.6).

The sizing of the ground wires to the ground system and the relative contact resistance must comply with current laws and standards.



⚠ DANGER

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.**
- **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.**

i INFORMATION

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

The earthing system must be located as far as possible from railway/tram lines in order to prevent electro-corrosion of the internal components of the engine in contact with water.

3.7 OUTDOOR INSTALLATION

For units in outdoor installations, it is advisable to ensure a position that provides maximum protection against atmospheric agents, powder, etc.

Avoid direct exposure to sunlight that would otherwise cause abnormal heating of the system.

It is advisable to protect the system with shed roof.

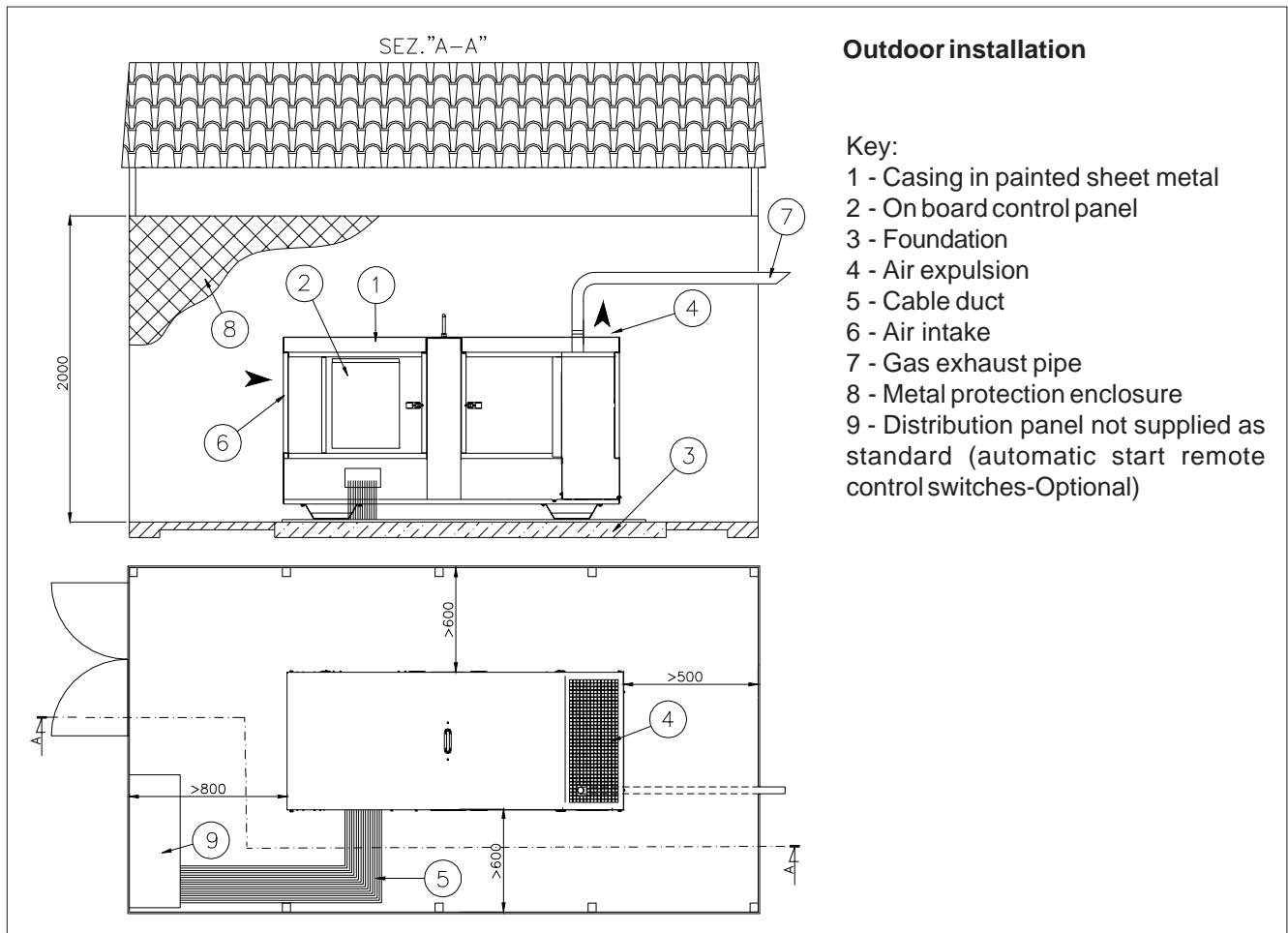
For temporary or short-term installations, the unit may simply be placed on a flat surface.

For permanent or long-term installations, it is advisable to prepare a concrete foundation.

WARNING

The area where the power set is installed must be suitably fenced off in order to prevent access by unauthorized persons.

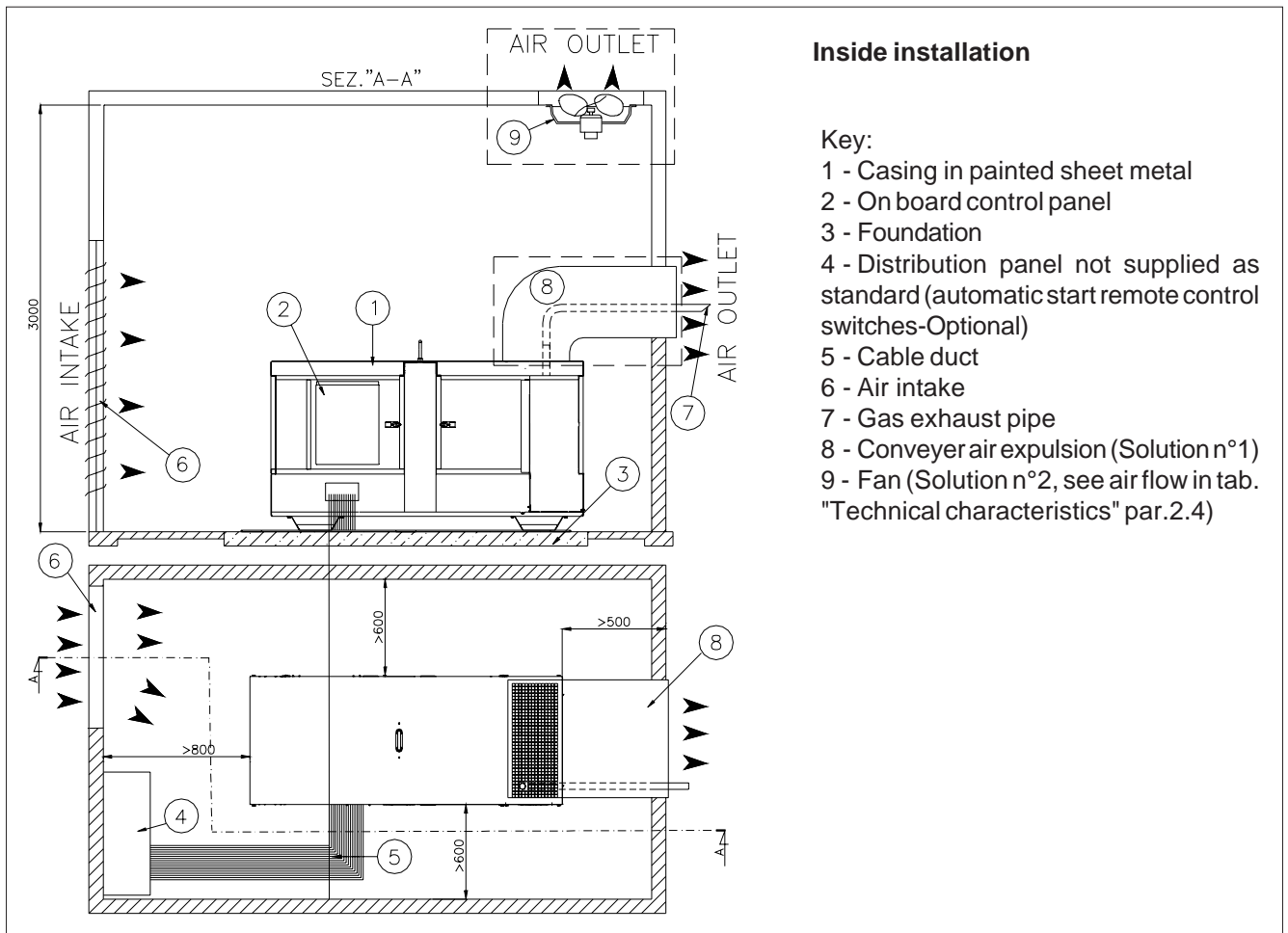
No admittance and Hazard signs must be installed as required by current legislation.



3.8 INSIDE INSTALLATION

Correct indoor installation of the system must observe the following installation requirements:

- The site must be adequately dimensioned in order to allow correct operation of the group as well as easy access for routine maintenance operations and eventual repairs. The figure shows the minimum recommended dimensions for clearance around the system and the height of the site.
- Access to the site must allow the introduction of the complete system using standard transport and handling devices available in the premises.
- There must be apertures of adequate dimensions to ensure continual and efficient recirculation of air.
- Installation of exhaust piping to the exterior of limited length and the fewest possible number of curves is compulsory.
- The system may be arranged with sufficient passage space on at least three sides, provided that easy access and observance of safety regulations are maintained.
- The control panel (for automatic sets) must be positioned so that the instruments are clearly visible to the operator working near the system (for example, see ref. 2 and 4 in the figure below).



Inside installation

Key:

- 1 - Casing in painted sheet metal
- 2 - On board control panel
- 3 - Foundation
- 4 - Distribution panel not supplied as standard (automatic start remote control switches-Optional)
- 5 - Cable duct
- 6 - Air intake
- 7 - Gas exhaust pipe
- 8 - Conveyer air expulsion (Solution n°1)
- 9 - Fan (Solution n°2, see air flow in tab. "Technical characteristics" par.2.4)

4.1 PRELIMINARY CHECKS

Before beginning with any starting procedure, it is extremely important to become «familiar» with the generator and its controls. Furthermore, a visual inspection must be carried out on the machine and the installation.

Any source of potential or real danger must be eliminated before proceeding.

- 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.
- Identify the position of the fire extinguisher 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.
- Ensure that the generator is clean and that the surrounding areas are clean and free of obstacles.
- Check that there are no obstructions in the inlets and ventilation ducts.
- Check that the exhaust pipe is not oriented against obstacles, or make sure that these are at least two metres away.
- Check that the earth connection has been carried out properly.

At first starting of the generator, after having done any type of maintenance work, it is always good practice to check:

- the oil level by means of the dipstick (**par. 6.3**);
- that all the electrical utilities are off so that the generator is not started on load;
- that the fuel pipes are undamaged and properly connected;
- that there are no electrical connections in a bad state.

4.2 REFUELLING

Refuelling must be carried out with extreme care, ensuring that fuel does not overflow from the engine tank and respecting the maximum level.

When refuelling has been completed, carefully close the filler cap (**ref.H, pag. 2.2**)



DANGER

- **Fuel is toxic and inflammable and must therefore be kept in special airtight containers and stored in inaccessible places.**
- **Refuelling must be carried out with the generator off and the key selector in position "0" (STOP)**
- **Do not smoke and do not use open flames during refuelling.**
- **Refuel in well-ventilated places.**
- **Avoid contact of fuel with the skin and do not inhale the fumes.**

4.3 BATTERY

The generator is supplied with a battery without acid.



DANGER

- **Do not cause short-circuits by placing keys or tools on the batteries or on the cable fittings.**
- **Battery fluid is a corrosive acid, extremely harmful to the skin.**
- **Always wear protective gloves and be extremely careful to avoid spillage when pouring the acid.**



WARNING

- **Do not disconnect the battery when the generator is running; the battery charger alternator and the electronic equipment may irreparably be damaged.**
- **Respect + / - polarity when connecting; failing this will cause a short-circuit when starting, which will irreparably damage the electronic equipment.**



INFORMATION

- **Have the battery activated by staff prepared with sulphuric acid for batteries and the appropriate tools.**
- **The terminals and the connections must always be maintained dry and clean; to prevent oxidation, clean and smear the terminals with a film of vaseline.**

4.4 STARTING

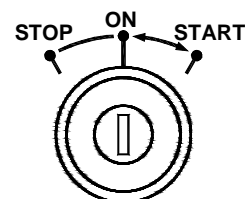
Before starting the generator check that all the utilities are off to prevent putting the still cold engine under stress.

Proceed with starting by turning the START key clockwise by one click (to the **ON** position).

The PDM1 is powered up.

The engine control conducts a LED test cycle and then it set itself up for the starting cycle which is operated by turning the key to "START" after the preheating delay (led ref.7 chap.5.4 still switched on). Then turn the ignition key to START and release it only when the engine has started, taking care not to exceed more than 5 seconds for each attempt.

All the protections will be activated when starting the generator and in case of malfunctioning, the generator is stopped and the fault signalled by the relevant warning light coming on.



4.5 USING THE GENERATOR

Before powering any utility, leave the engine to run without applied load for at least five minutes so that it gradually reaches the operating temperature. This will guarantee longer life of the engine and eliminate the risk of seizures.

The available power is as indicated on the adhesive label carrying the technical characteristics fixed on the machine and shown in detail in the table "**technical characteristics**" (par. 2.4.).



The sum of absorption of all the utilities connected to the generator must never exceed the continuous power value of the generator.

4.6 STOPPING

The generator is stopped by turning the ignition key completely anticlockwise to the STOP position.

Before stopping it, it is recommended to run it for a few minutes without applied load so that the internal temperatures of the engine and alternator are gradually reduced.

4.7 EMERGENCY STOP

For an emergency stop of the generator press the mushroom-head emergency stop button (**cap.2.2, rif.U**). Having removed the causes that determined the need for an emergency stop, release the emergency stop button in order to return to the operating conditions.



5 PROTECTIONS AND WARNING SIGNALS

The generators are equipped with a series of protections which safeguard it against improper use and faults which may compromise integrity.

5.1 PROTECTION AGAINST SHORT-CIRCUIT AND OVERLOAD

For protection against short-circuits and overloads, the generators have been fitted with magnetothermal and differential switches which trip, cutting the power.

5.2 SOCKET PANEL (OPTIONAL)

See par.2.3 "Socket instrument panel"

A main differential magnetothermal switch cuts the power to all the outlets in the event of a short-circuit, overload and current leakage to earth.

A magnetothermal protection switch at the low-power outlets, breaks the circuit if a current greater than the rated current is drawn by the outlets.

5.3 PROTECTION AGAINST DISPERSION TO GROUND/EARTH (OPTIONAL)

An optional differential switch is available that cuts out voltage supply in the event of dispersion of current to ground/earth.



Before restoring the power by returning the magnetothermal switch lever to the ON position remove the cause of the fault.

5.4 ENGINE PROTECTION MODULE



The PDM1 should be set up and used by trained personnel to avoid damages or safety hazards.

Introduction

The PDM1 is a control unit for engine protection and is used for manual starting and stopping of petrol (gasoline) or diesel engines.

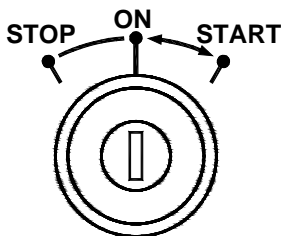
The PDM1 provides for automatic monitoring and shutdown of the engine in case of a fault and has protections for: low oil pressure, high engine temperature, low fuel level, alternator battery-charger fault, low and high engine speed.

By turning the selector key to the “ON” position, the PDM1 is powered up.

The engine control conducts a LED test cycle and then it set itself up for the starting cycle which is operated by turning the key to “START” after the preheating delay (led ref.7 still switched on).

After the “Alarms inhibition delay”, the protections are enabled and, if there are malfunction conditions, the unit stops the engine.

To proceed with the stopping cycle, turn the key to “STOP”.



Alarms

The “Pressure”, “Temperature” and “Fuel level” alarms are enabled when the engine is running after the alarms inhibition delay. The “RPM out of limits” alarm is enabled when engine running is detected.

With the unit supplied and the engine stopped or the alarms inhibition time not lapsed, the front LEDs show the input state, without causing any alarm event.

During the engine operation, it will be stopped at any alarm event. The tripping is stored and the relative malfunction LED remains switched on.

In these conditions, no other alarm is displayed except for the one causing the engine to stop.

Resetting is obtained by removing power from the unit or by pressing any of the keys at the lapsing of the Stop time.

Front panel description. See fig.9

Engine out of limits alarm LED (ref.1)

- 1) Indicate the input state before the engine is switched on.
- 2) Switched off during normal engine operation.
- 3) Switched on after alarm stopping.

High engine temperature and low coolant level alarm LED (ref.2)

- 1) Indicate the input state before the engine is switched on.
- 2) Switched off during normal engine operation.
- 3) Switched on after alarm stopping.

Low fuel level alarm LED (ref.3)

- 1) Indicate the input state before the engine is switched on.
- 2) Switched off during normal engine operation.
- 3) Switched on with low level fuel.

Low oil pressure alarm LED (ref.4)

- 1) Indicate the input state before the engine is switched on.
- 2) Switched off during normal engine operation.
- 3) Switched on after alarm stopping.

Battery-charger alternator failure LED (ref.5)

- 1) Indicate the input state before the engine is switched on.
- 2) Switched off during normal engine operation.
- 3) Switched on after alarm stopping.

“Supply” LED (ref.6)

- 1) Constantly switched on at power up.
- 2) One flash at motor running detection.
- 3) After the “Alarm enable delay”, it flashes to indicate all alarms are working.
- 4) Quick flashing during stopping cycle.

Glow plugs LED (ref.7)

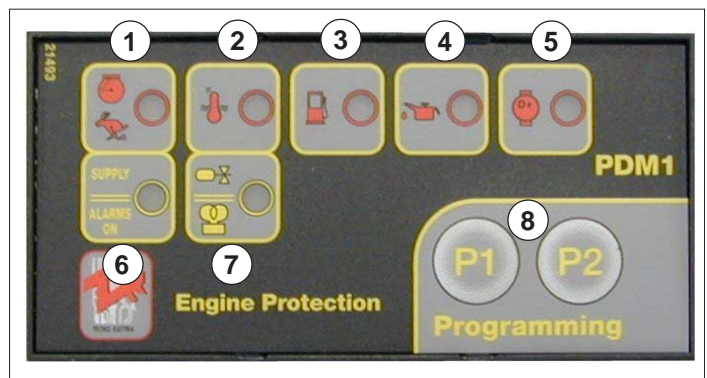
- 1) At power up the LED is constantly switched on to indicate the electro valve opening (switched off during stopping cycle).
- 2) Flashing to indicate the glow plug preheat or deceleration time lapsing.

P2 / P1 (ref.8)

Programming keys.



For engine protection module re-programming, contact a mase technical assistance centre.



6 MAINTENANCE

6.1 PREAMBLE

WARNING

Any maintenance operation on the generator must be carried out with the engine off and leaving it to cool down sufficiently, and must only be carried out by authorised and suitably trained personnel.

Carefully read paragraph 1.5 in the manual "General danger informations". Periodically check the electrical safety devices such as the emergency button, the earthing system, etc.

WARNING

Before of any operation of maintenance, to extinguish the generator group removing the key of lighting from the electric picture.

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.

6.2 ORDINARY ENGINE MAINTENANCE

The periodic maintenance operations to be carried out on the engine are indicated in the table at point 6.9. For more detailed information consult the manual provided by the engine manufacturer with each generator.

WARNING

Daily check the oil level with the graduated dipstick (ref. 3). The oil level must always be between the MAX and MIN notches on the dipstick.

6.3 ENGINE OIL CHANGE

Use diesel engine oil.

Top-up and fill through the hole indicated in ref.2.

For detailed information in this connection, consult the engine use and maintenance manual which accompanies the machine. To change the oil in the oil sump, first remove the dipstick (ref.3), that it serves for facilitating the extraction oil. If the generator is equipped with pump extraction oil, act on it, otherwise remove the cover on the base of the frame (ref.4), back off the screw (ref.5) and drain the oil from the base of the engine sump, making sure to collect all the spent oil in a recipient of adequate capacity placed underneath the base of the frame. It is advisable to perform the draining operation with oil still sufficiently warm to facilitate good flow.

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

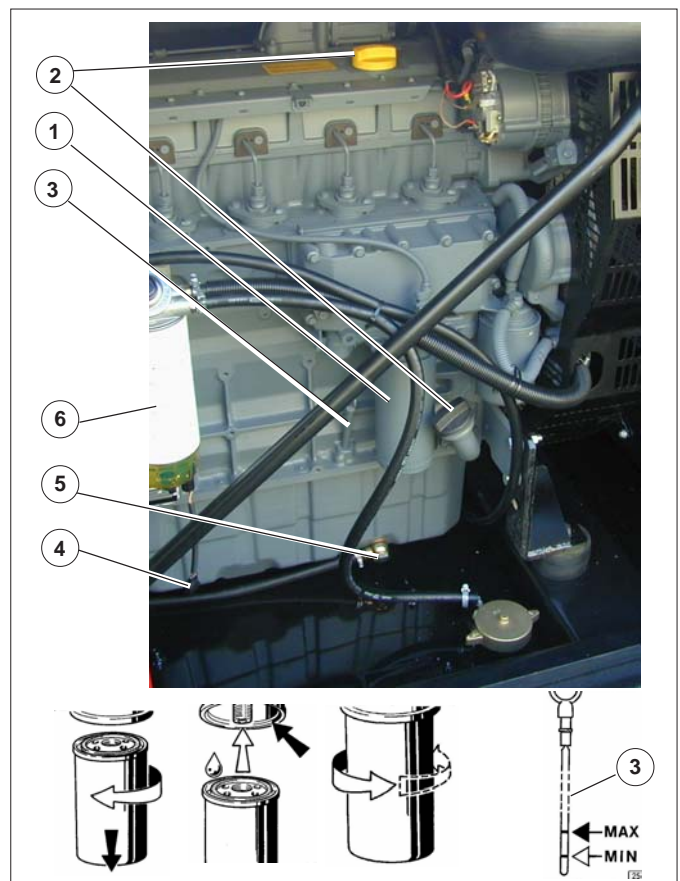
- Protect hands from contact with oil by wearing gloves. In the event of accidental contact with engine oil, thoroughly wash the affected part with soap and water.
- During oil top-up and refuelling, respect the maximum level indication. An excessive quantity of engine oil may cause damage to the engine.

6.3.1 CHANGING OIL FILTER

- Unscrew the oil filter and remove it (ref.1).
- Screw in the new filter after cleaning the rubber seal and seating surface and ensure it is in perfect condition.

6.4 CHANGING FUEL FILTER

- Unscrew the fuel filter and remove it (ref.6).
- Screw in the new filter after cleaning the rubber seal and seating surface and ensure it is in perfect condition.
- Clean the combustible circuit eventually.



6.4.1 SYSTEM BLEEDING

The presence of air bubbles in the fuel system is the cause of irregular functioning of the engine or the incapacity to reach the nominal rpm. Air might enter inside the fuel circuit through a not perfectly tight seal (pipes, filters, tank) or when the fuel in the tank is at minimum level. To remove the air bubbles from the fuel circuit, the cause which has allowed air to enter the circuit must first be removed.

The generator engine is self-bleeding, therefore, once the cause of the air intake into the fuel system has been removed, it automatically expels it.

Nevertheless, the self-bleeding operation may take several minutes.

6.5 AIR FILTER CLEANING/REPLACEMENT

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, carry out the following operations:

- Remove the cover (**ref. 1**) from the filter holder by acting on the crooks (**ref. 2**).
- Remove the cartridge (**ref. 3**), clean it, and, if necessary, replace the filter.
- Remount the cover (**ref. 1**) and fix it with the external crooks (**ref. 2**) to the filter holder, taking care to fix it with the breather pipe facing downward (**ref. 4**).

During the cleaning operation, pay attention to the following:

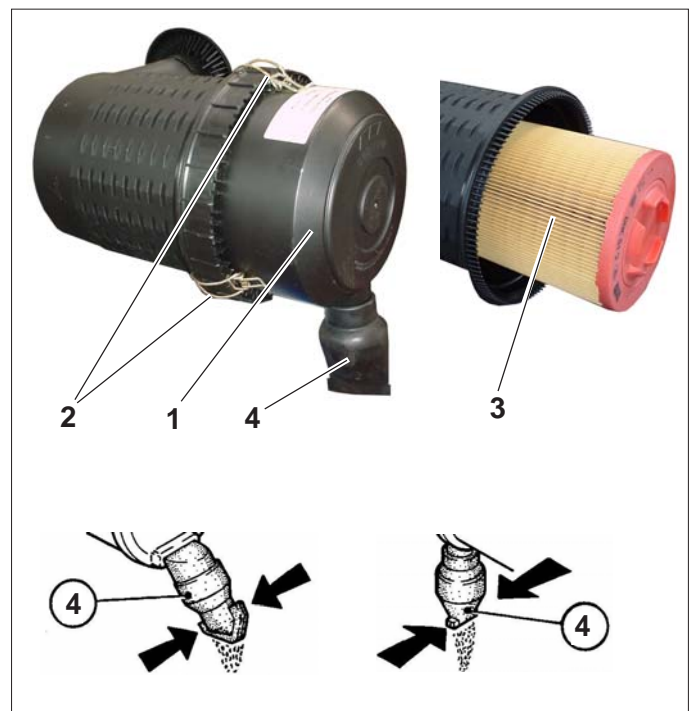
- Never beat the cartridge to remove the dirt, but use dry compressed air, from the inside to the outside, at a MAX pressure of 2 bar;
- Light up the inside of the cartridge to check its state and if there are any splits or holes, replace it.

INFORMATION

On average replace the filter cartridge every 3 cleaning operations.

6.5.1 DUST EXHAUST DEVICE

- To empty the dust exhaust device (**ref. 4**) pressing the two lips with the fingers in the sense of the arrows.
- Sometimes remember to clean the exhaust cleft.
- Possible dust incrustations inside the device can be eliminated by pressing with the fingers the top of it.



5.8 Coolant check

Check the coolant as shown in tab **cap.6.9**.
The references are indicated on the expansion tank.
If the coolant level in the radiator goes down, refill it without going upper the top reference.

! DANGER *Never open the cover of the radiator (fig.9 ref.6) and of the expansion vase when the engine is hot to avoid dangerous spillages of coolant.*

6.7 BATTERY CHECK

The battery (**rif.1**) only needs to be checked periodically for electrolyte level and, if necessary, topped up with distilled water. Normally, the acid level must be within the level lines shown on the battery body.

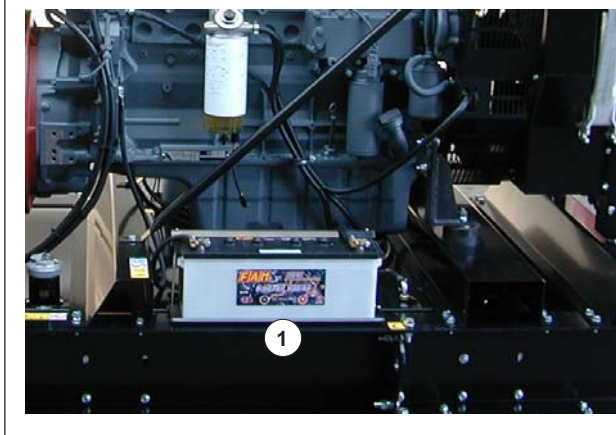
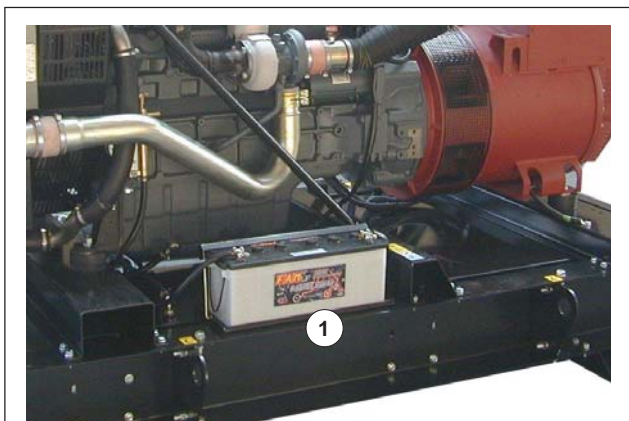
When the MIN level is reached, top up the cells with distilled water, taking care not to exceed the MAX level indicated on the battery case.

The batteries develop a highly explosive gas.

It is recommended not to smoke nor cause sparks in the vicinity, in particular during charging.

Wear protective goggles. When dismantling the battery, disconnect the negative cable (-) first.

When remounting it, connect the positive cable (+) first.



6.8 SCHEDULED MAINTENANCE TABLE

The check indicated in this section can be carried out either by the workshop or by machine user.

CHECKS	REGULARITY
Check oil level sump	daily
Check radiator/intercooler for restriction (1)	daily
Check cooling level in radiator (1)	10 hours
Check air cleaner for clogging (1)	10 hours
Check electrolyte in batteries (1) (2)	300 hours

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

ROUTINE MAINTENANCE ✖	REGULARITY
Change engine oil (2 - 4 - 5)	500 hours
Adjust drive belt tension (2)	500 hours
Change oil filters (2 - 4)	500 hours
Change fuel filter (2)	1000 hours (3)
Clean fuel pump filter (2)	1000 hours (3)
Adjust valve clearance	1500 hours
Calibrate injecto and possible nozzles replacement (2)	2000 hours

(1) = The regularity of these operations can vary depending on engine use and the ambient conditions in which it operates.

(2) = These operations must be carried out annually even when the specified operating hours have not been reached.

(3) = Maximum period, with high-quality fuel; it may vary depending on fuel.

(4) = Change after the first 50 hours of service (running-in)

(5) = If fuel with a sulphur content of more than 0.5% is used, the engine oil change intervals must be halved

6.9 PERIOD OF INACTIVITY

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

- Completely empty out the fuel tank.
- 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.
- Cover the generator with a nylon sheet and store it in horizontal position in a dry and ventilated place.

On starting, the generator does not run and the starter motor does not emit any signal.

- Check that the thermal switch located on the start unit has not tripped. *Check battery connection.*
- Check that the emergency stop button is off. *If on, turn it to switch it off.*

The starter motor turns but the main engine does not start.

- Check that there is fuel in the tank. *Fill up.*
- Check that the stop solenoid valve is powered. *Consult Service Centre.*
- Check fuel pump functioning. *Consult Service Centre.*

The generator switches off during the operating period.

- Check if there is fuel in the tank. *Fill up.*
- Check if the low oil level protection has been activated; check the level and if low, add the oil necessary to bring it up to the correct level. *There are no warning lights; always carry out a visual inspection.*

The engine runs irregularly.

- Check the fuel filter. *Replace it.*
- Check fuel pump functioning. *Consult Service Centre.*
- Check the setting of the injectors. *Consult Service Centre.*

There is high smoke emission from the exhaust.

- Check the air filter. *Clean its elements or, if necessary, replace them.*
- Check that the oil level does not exceed the **MAX** notch. *Bring it down to the correct level.*

Starter battery flat.

- Check the electrolyte level in the battery. *Fill up.*
- Check the battery charging device. *Consult Service Centre.*
- Check integrity of the battery.

The generator does not deliver power to the outlets but the voltmeter indicates that voltage is present.

- Check that the differential magnetothermal switch, or a magnetothermal switch, is in the **ON** position.

The generator does not deliver power to the outlets and the voltmeter does not indicate that voltage is present.

- Likely alternator fault. *Consult a Service Centre.*

7.1 HOW TO ORDER THE SPARE PARTS

In order to ensure a good functioning of the generator, we recommend to use original spare parts only.

The spares can be purchased from the **mase** authorized assistance network (consult the **SERVICE** manual enclosed with the generator).

You can get **any further information** contacting the **mase** central Service.

8 TRANSPORT, STORAGE, LIFTING AND, HANDLING AND PACKAGING

8.1 TRANSPORT AND STORAGE

Packaging: Supplied directly by Mase Generators.

The total weight of the packed generator is given in **Paragraph 2.4 “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 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

All the lifting operations must be carried out by personnel specialised in this type of work, such as truck drivers, crane drivers, slingers.



WARNING

The operator is considered responsible for using the correct machine slinging and lifting technique.

8.2.1 LIFTING AND HANDLING WITH CRANE

The machine must be lifted and handled with the systems indicated in the picture. Check that the hoisting cables or chains are homologated or of sufficient capacity, and also check the minimum cable length. Calculate the cable capacity considering that for each of the two sling sections a weight about double that shown on the identification plate of the machine has to be supported (this is to compensate for the cable angle). Always use the eyebolts provided by the manufacturer and always marked with a pictogram.

ALWAYS TAKE THESE PRECAUTIONS WHEN LIFTING THE GENERATOR:

- Do not swing suspended loads.
- Never leave the load unattended.
- Lower the generator to the ground very slowly.
- Always maintain the safety distance.



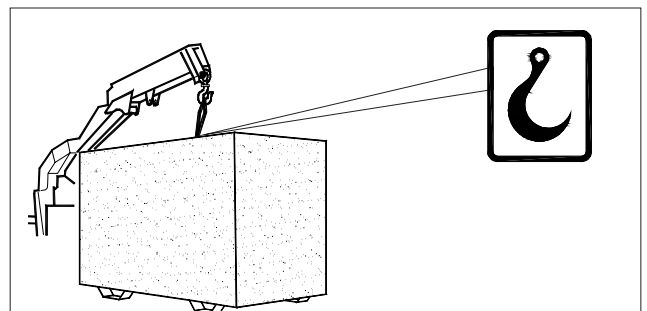
INFORMATION

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

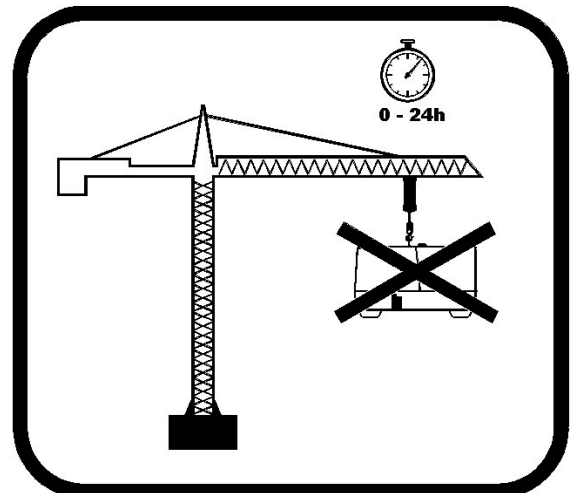
8.2.2 LIFTING AND HANDLING WITH FORKLIFT TRUCK

Use a forklift truck with wide forks and of adequate capacity and lift in a barycentric position (which corresponds to about the centre of its geometrical volume).

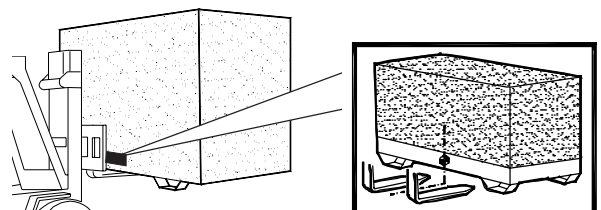
The trailed version cannot be lifted with a forklift.



The hoisting structure has been designed to hold the generator suspended for the time strictly necessary to move it.



DO NOT PARK THE SUSPENDED GENERATOR!



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8.3 PACKAGING

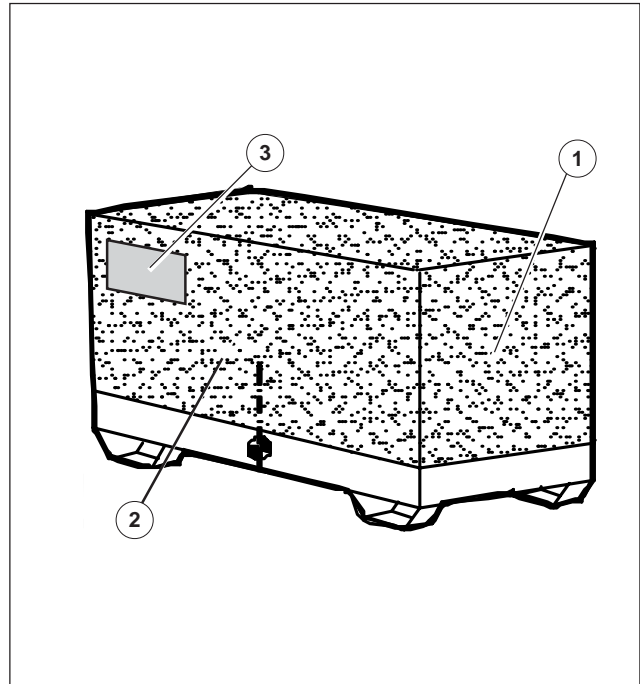
The external packaging comprises a cardboard case (ref.1) directly proportional to the dimensions of the machine contained.

Internal packaging comprises a nylon film (ref.2) wrapped around the power generator to protect it against dust and impurities.

The packaging is clearly identified with an adhesive label indicating the type of model, code and serial n° of the group (ref.3).

 **WARNING**

After aperture, all packaging materials must be collected and disposed of in accordance with current legislation in the country of installation and, in particular, the requirements of the 94/62/CE Directive for packaging and packaging waste. It is absolutely forbidden to dispose of packaging waste in the environment.



9 GUARANTEE AND RESPONSIBILITY

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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 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

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 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.

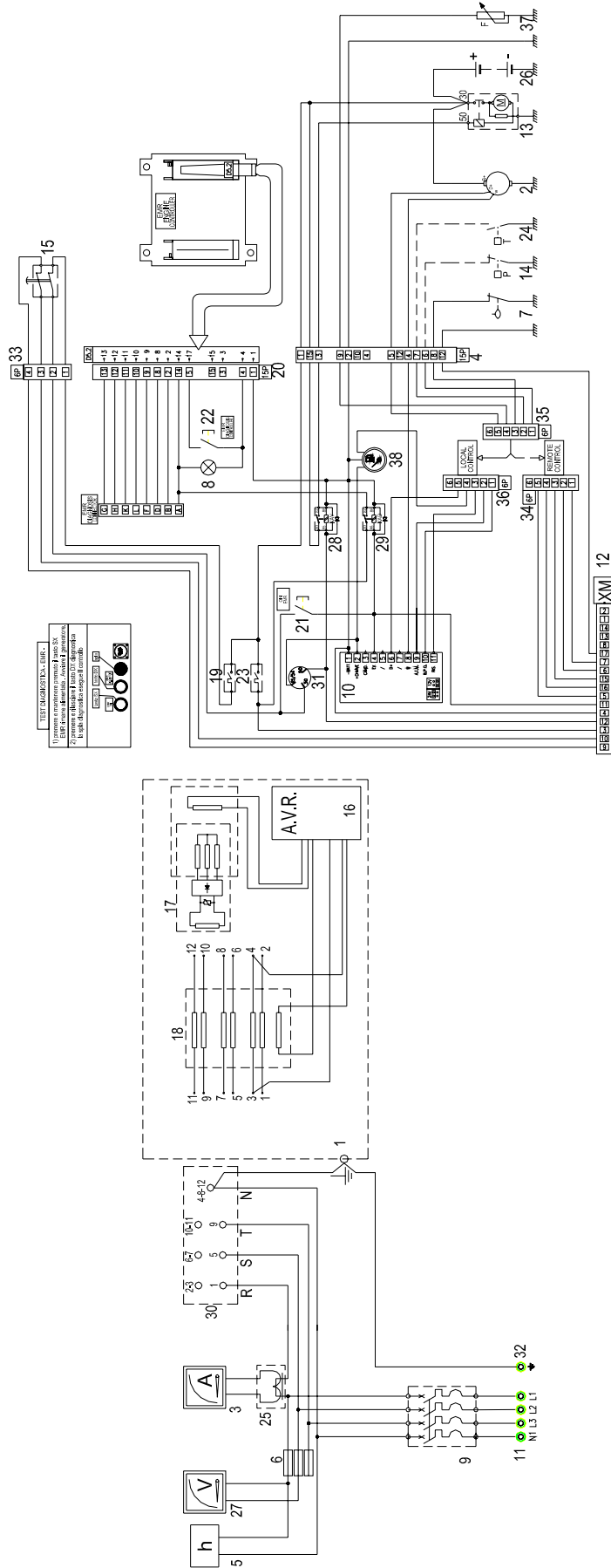


Please note that the system and its components contain materials that, if dispersed in the environment, may cause significant ecological damage.

The following materials must be delivered to specific collection centres authorised for their disposal:

- **Starter battery**
 - **Spent lubrication oils;**
 - **Mixtures of water and anti-freeze;**
 - **Filters;**
 - **Auxiliary cleaning material (e.g.: rags smeared or soaked with fuel and/or chemical cleaning products).**
- Any other material not listed above must be taken to companies authorised for the collection of industrial waste.

11.1 WIRING DIAGRAM OF STANDARD VERSION



Cod.45989

- | | | | | | |
|----|------------------------------|----|------------------------------|----|-----------------------------|
| 1 | ALTERNATOR | 14 | OIL PRESSURE SWITCH | 27 | VOLTMETER |
| 2 | BATTERY CHARGER ALTERNATOR | 15 | EMERGENCY STOP BUTTON | 28 | RELAY |
| 3 | AMMETER | 16 | ELECTRONIC VOLTAGE REGULATOR | 29 | RELAY |
| 4 | 15 POLES CONNECTOR | 17 | ROTOR | 30 | ALTERNATOR TERMINAL BOARD |
| 5 | HOUR COUNTER | 18 | STATOR | 31 | IGNITION KEY |
| 6 | FUSE | 19 | THERMAL SWITCH | 32 | EARTH CONNECTION SCREW |
| 7 | RESERVE FLOAT | 20 | 15 POLES CONNECTOR | 33 | 6 POLES CONNECTOR |
| 8 | PILOT LIGHT | 21 | BUTTON | 34 | 6 POLES CONNECTOR |
| 9 | 4-POLE MAGNETOTHERMAL SWITCH | 22 | BUTTON | 35 | 6 POLES CONNECTOR |
| 10 | ENGINE PROTECTION MODULE | 23 | THERMAL SWITCH | 36 | 6 POLES CONNECTOR |
| 11 | POWER TERMINAL BOARD | 24 | ENGINE THERMOSTAT | 37 | FUEL LEVEL SENSOR |
| 12 | SIGNAL TERMINAL BOARD | 25 | AMPEROMETRIC TRANSFORMER | 38 | FUEL LEVEL GAUGE INSTRUMENT |
| 13 | STARTER MOTOR | 26 | BATTERY | | |