CE

mase GENERATORS

PD 10 R
PD 10.4 R

I	*MANUALE DI USO E MANUTENZIONE*
GB	*USE AND MAINTENANCE MANUAL*
D	GEBRAUCHSANWEISUNG UND WARTUNGSVORSCHRIFTEN
F	*MANUEL D'UTILISATION ET D'ENTRETIEN*
E	*MANUAL DE USO Y MANTENIMIENTO*
FIN	*KÄYTTÖ- JA HUOLTO-OPAS*

Rev.2 A.A. 30-07-07 **Cod. 41954**

NR.000000

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DICHIARAZIONE CE DI CONFORMITÀ
EC DECLARATION OF CONFORMITY

Fabbricante/Manufacturer: **mase** GENERATORS S.p.A.

Indirizzo /Address : Via Tortona 345, Pievesestina (FC)

Il sottoscritto Luigi Foresti in qualità di direttore tecnico della **mase** GENERATORS S.p.A., dichiara sotto la propria responsabilità che il gruppo elettrogeno modello ..... :

The undersigned Luigi Foresti as **mase** GENERATORS S.p.A. technical manager declares, under his sole responsability, that the generator model.....:

Codice / Code	Descrizione / Model	Matricola / Serial N.

è conforme alle disposizioni delle Direttive di seguito elencate:

98/37 CE (come emendata delle Direttive **98/79 CE**)
73/23 CEE modificata da **CEE 93/68**.
89/336 CEE direttiva sulla compatibilità elettromagnetica

corresponds to the requirements of the following EEC Directives:

98/37/EEC (as amended by the Directive **98/79/EEC**)
73/23/EEC as amended by **93/68/EEC**.
89/336 EEC directive on the electromagnetic compatibility

Cesena, / /

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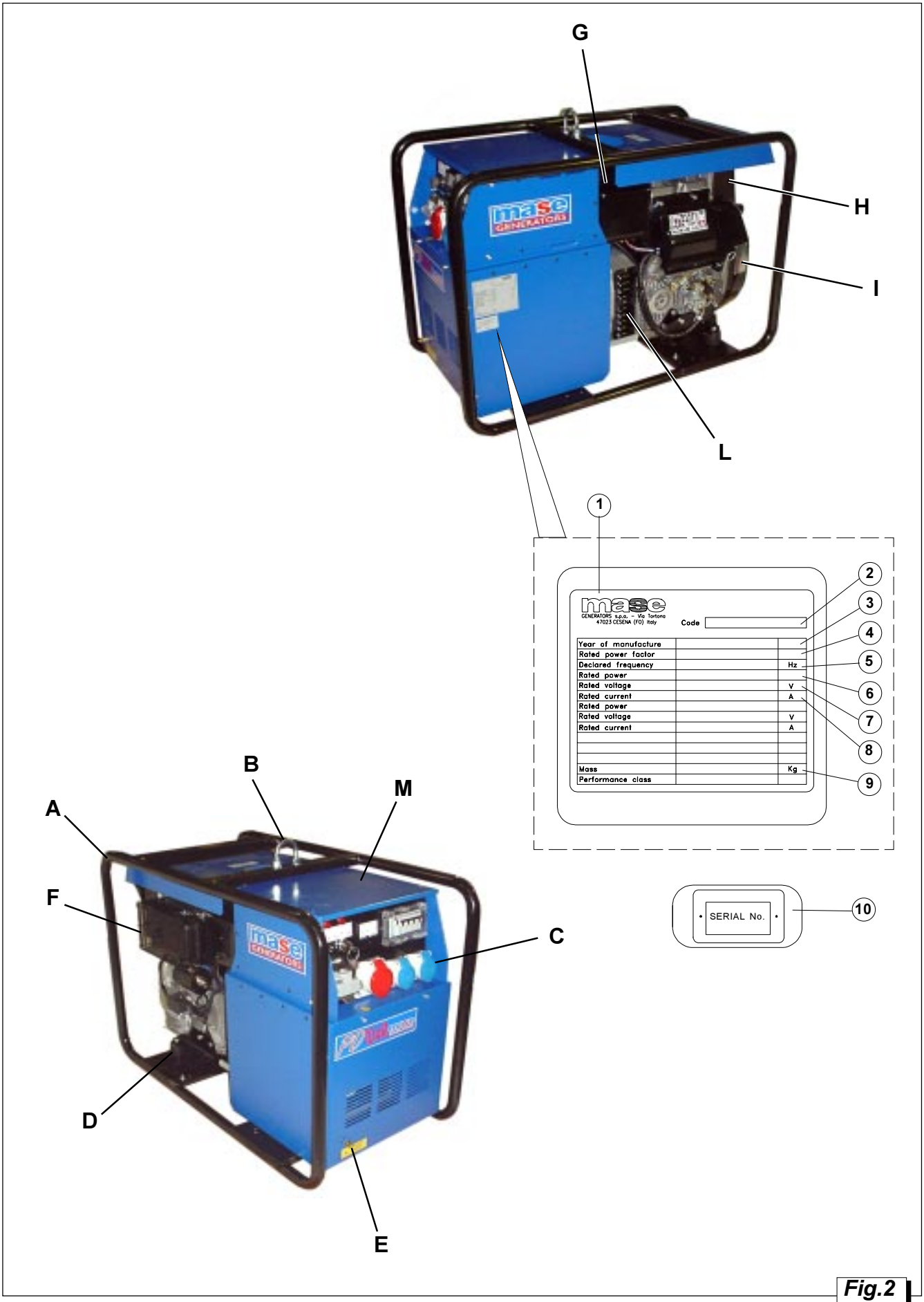
Direttore Tecnico
Technical Director


G
H
I
L
1
mase
GENERATORS s.p.a. – Via Tortona
47023 CESENA (FO) Italy
Code
Year of manufacture
Rated power factor
Declared frequency
Hz
Rated power
Rated voltage
V
Rated current
A
Rated power
Rated voltage
V
Rated current
A
Mass
Kg
Performance class
2
3
4
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SERIAL No.
10
A
B
M
F
C
D
E

Fig.2

Fig.3

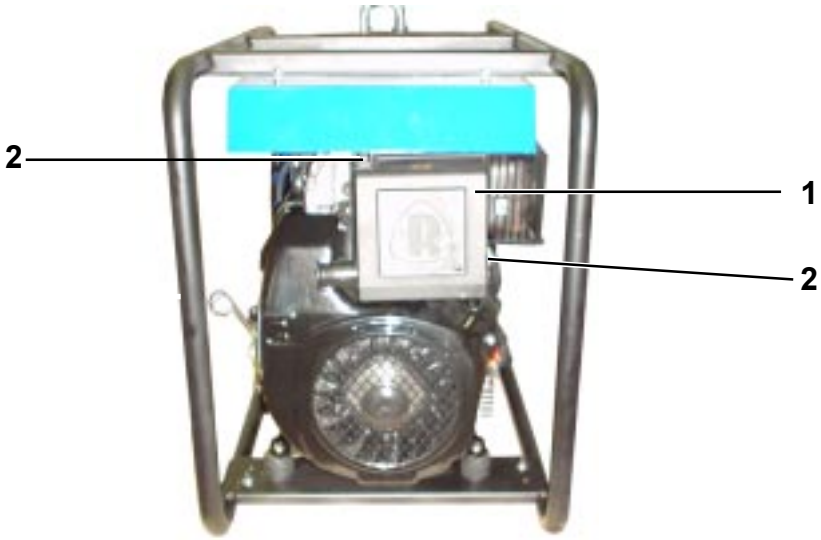

Fig.4

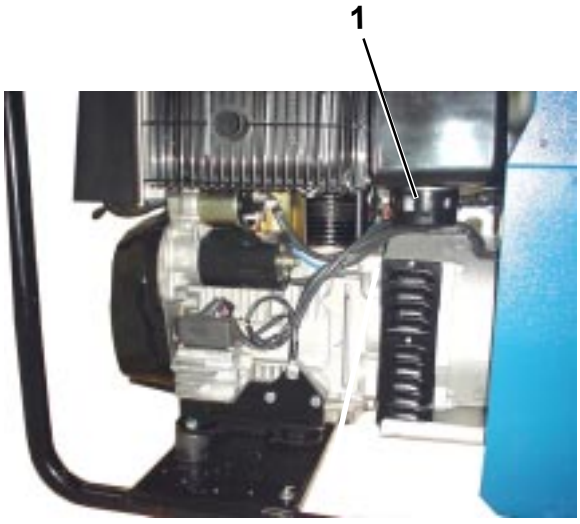

Fig.5

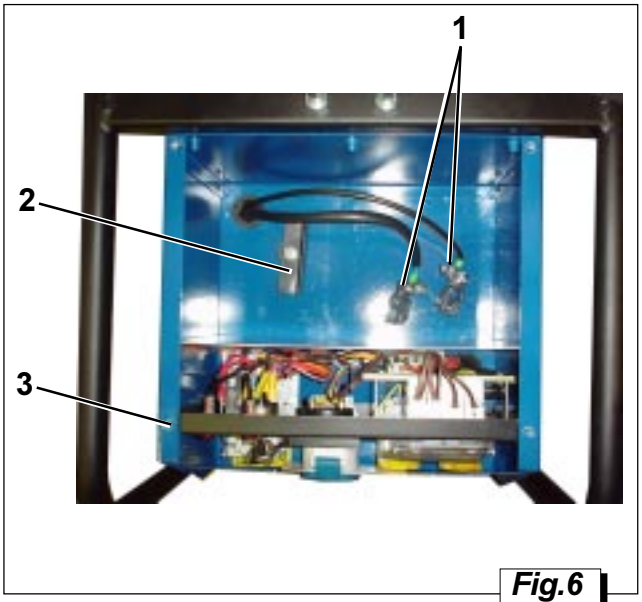

Fig.6

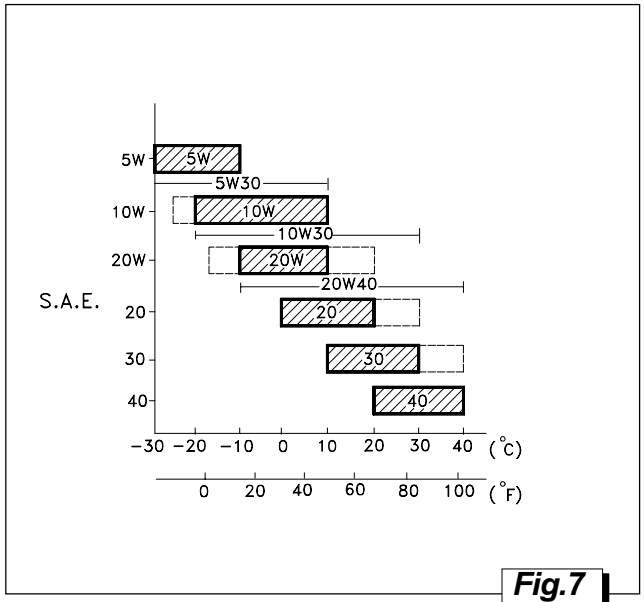

Fig.7

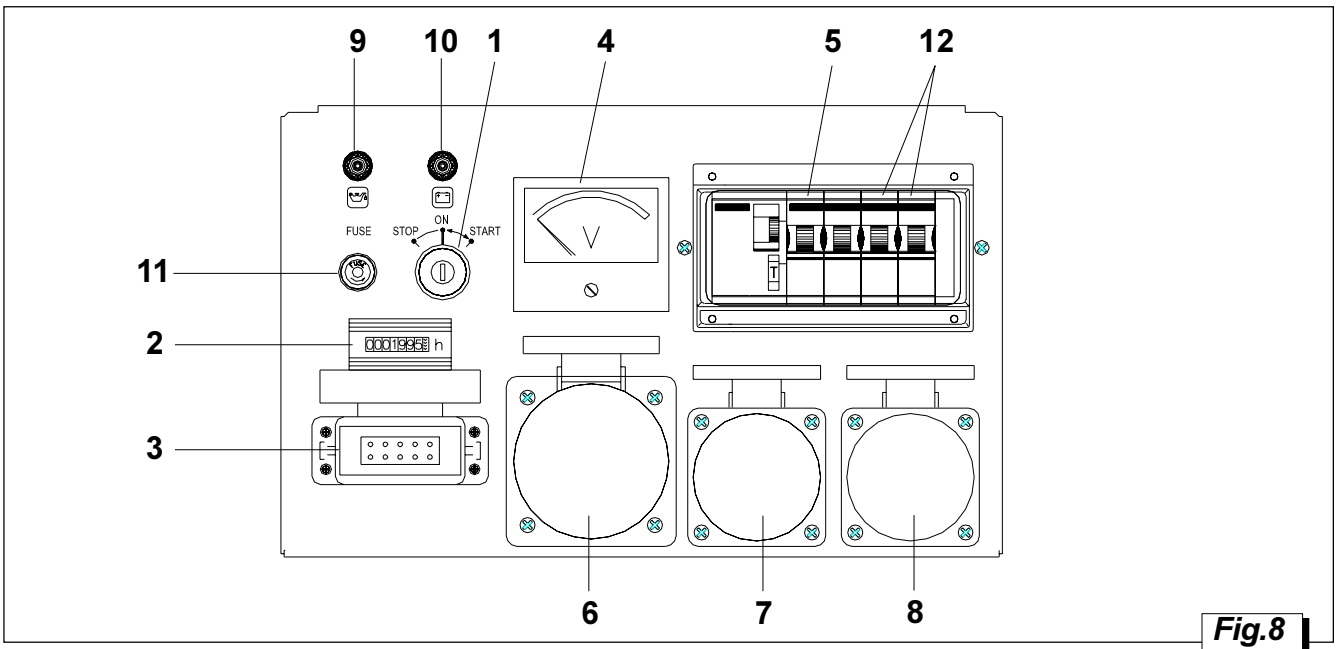

Fig.8

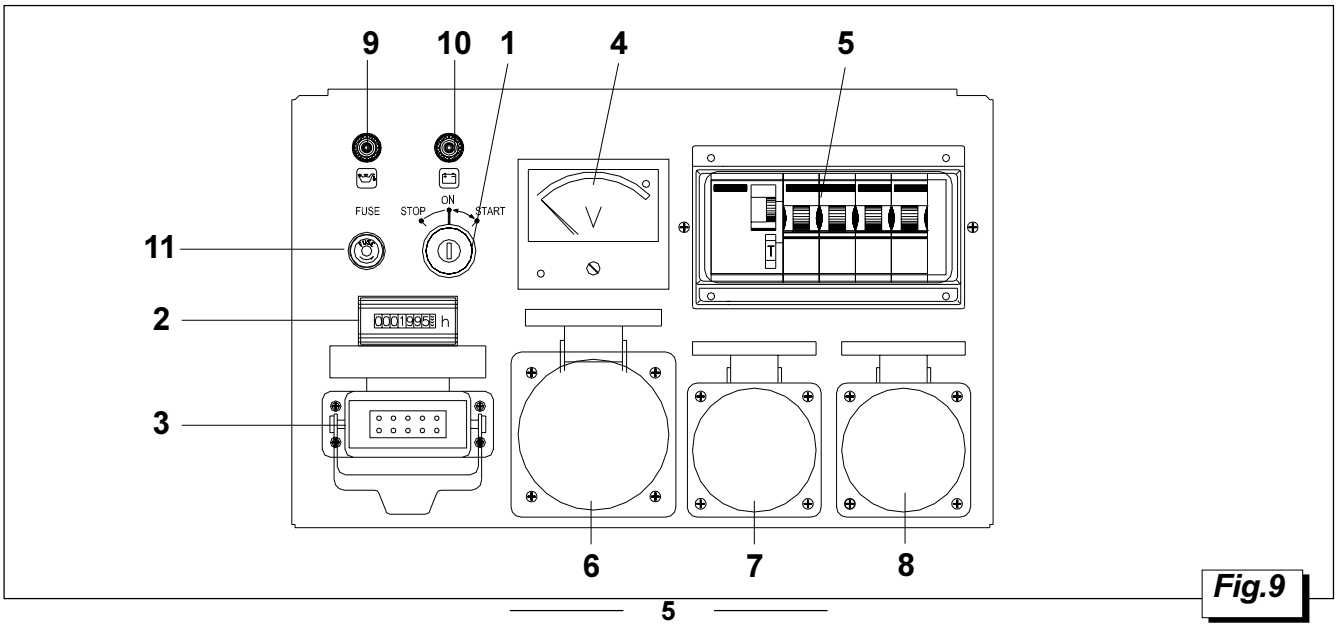

Fig.9

PD 10 R

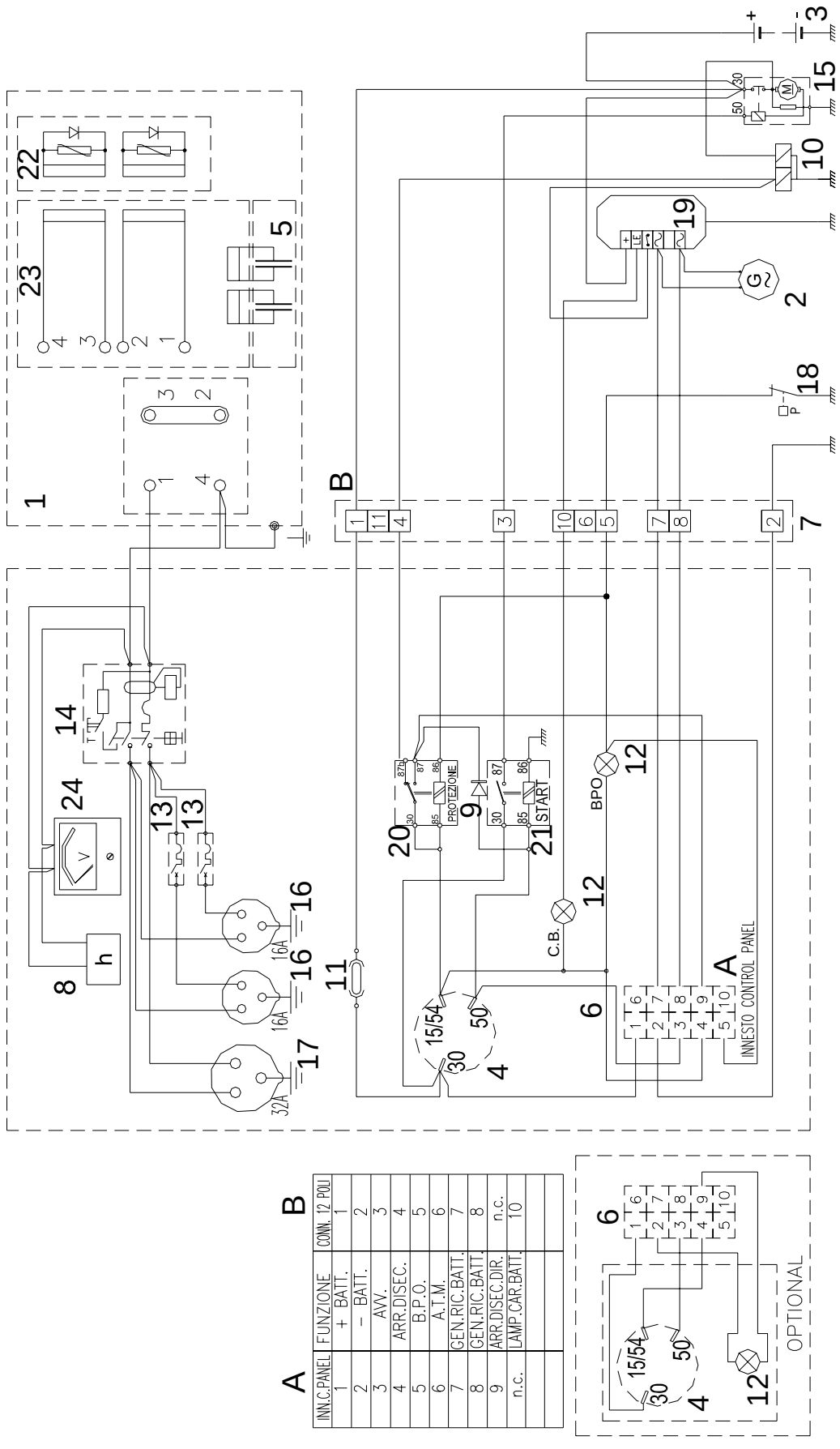
B
A
INN.C.PANEL | FUNZIONE | CONN. 12 POLI
1 | + BATT. | 1
2 | – BATT. | 2
3 | AVV. | 3
4 | ARR.DISEC. | 4
5 | B.P.O. | 5
6 | A.T.M. | 6
7 | GEN.RIC.BATT. | 7
8 | GEN.RIC.BATT. | 8
9 | ARR.DISEC.DIR. | n.c.
n.c. | LAMP.CAR.BATT. | 10
INNESTO CONTROL PANEL
PROTEZIONE
START
BPO
C.B.
OPTIONAL

Fig.10

PD 10.4 R

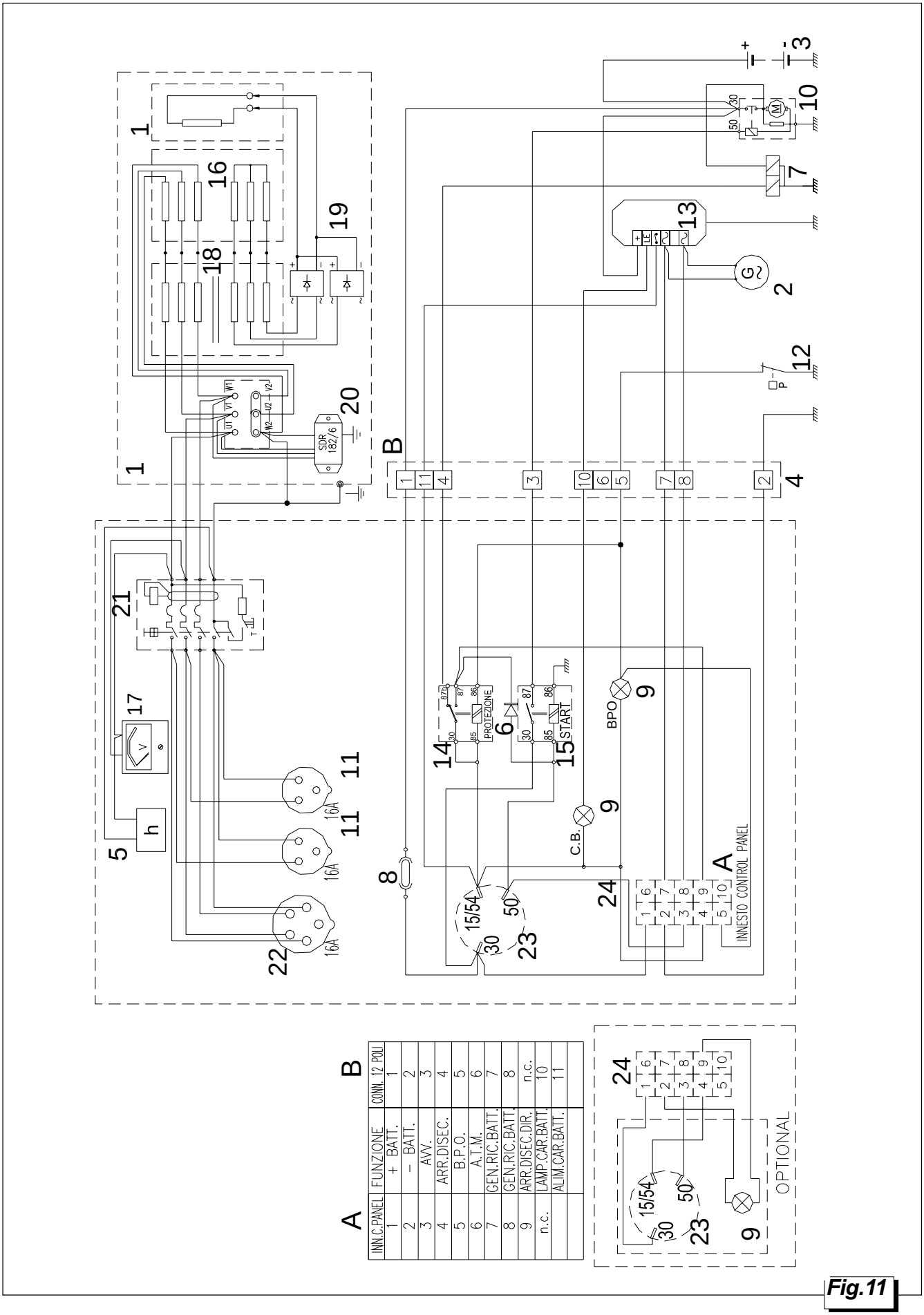

Fig.11

INDEX

1 GENERAL INFORMATION

Carefully consult this manual before proceeding with any operation on the generator.

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

1.1 Purpose and field of application of the manual

Thank you for choosing a **mase** product.
This manual has been drawn up by the manufacturer with the purpose of providing essential information and instructions for proper use and maintenance in conditions of safety and constitutes an integral part of the generator equipment. The manual must be kept safely, protected from any agent which might damage it, for the entire life of the generator and must accompany the generator if transferred to another user or owner.

The information contained in the manual is addressed to all those 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 co-ordinate the activities, arrange the necessary logistics and regulate access to the place where the generator will be installed and operated.

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, operating economy and a longer life of the generator.

It is warmly recommended to carefully read the contents of this manual and the reference documents; only thus can regular functioning and reliability of the generator be guaranteed over time, and protection against damage to persons or things.
The drawings are provided by way of example. Even if the generator in your possession differs considerably from the illustrations contained in this manual, 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.

Note: *the information contained in this publication is correct at the time of printing. The manufacturer in his pursuit of a policy of constant development and upgrading of the product reserves the right to make modifications without prior notice.*

1.2 Symbols

Those parts of the text not to be ignored are highlighted in bold type preceded by a symbol, as illustrated and defined below.

DANGER Indicates that particular attention must be paid in order to prevent running into serious danger which could lead to death or possible hazards 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.

1.3 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. Normally, the following documents are provided:

a - CE declaration of conformity.
b - Instruction manual for use of the generators (this manual)
c - Engine use and maintenance manual
d - Alternator use and maintenance manual.
e - Any other manuals for the optional accessories issued by the respective manufacturers.
f - **mase** conditions of warranty
g - Warranty card (to be filled in and sent to **mase**)
h - List of **mase** Service Centres

1.4 Facsimile of CE declaration of conformity

The generators constructed by **mase**, intended for countries in the European Community, are in conformity with the applicable EEC Directives (see 1.5) and are furnished with an EC declaration of conformity (Fig. 1).

1.5 Reference regulations and legislative provisions

All the **mase** diesel generators are designed and manufactured in compliance with the legislation in force. The generator and its components are constructed in accordance with the following applicable regulations and directives:

EN 292-1/2 : Machine safety regulations. General design principles.

EN 294 : Machine safety regulations.
Safety distances to prevent contact of dangerous parts with the upper limbs.

ISO 3046 : Alternate internal-combustion engines.

IEC 34-1 : Rotary electric machines.

ISO 8528 -1 : Alternate current generators driven by alternate internal-combustion engines.

EN 60204 -1(CEI 44-5) :
- Machine safety.
- Electrical equipment of machines.

EN 60439 -1 (CEI 17-13/1) : Assembled protection and manoeuvring equipment for low voltage (low-voltage panels).

EN 50081-1/2 (Electromagnetic compatibility) **:** General regulation on emission.
- Part 1- Residential, commercial and light-industry environments.
- Part 2 - Industrial environment.

EN 50082-1/2 (Electromagnetic compatibility) **:** General regulation on immunity.
- Part 1 - Residential, commercial and light-industry environments.
- Part 2 - Industrial environment.

89/392/EEC and subsequent amendments contained in the Directives **91/368/CEE, 93/44/CEE and 93/68/CEE :** Essential machine requirements for safety and health protection (“Machine” directive).

73/23/EEC and subsequent amendments contained in the Directive **93/68/EEC :** Guarantee of safety of electrical material intended for use within certain voltage limits (“Low Voltage” directives).

1.6 Marking

The generator identification plate carries all the identification data in conformity with ISO 8528 and in accordance with the provisions for CE marking for those cases where required. Below is a facsimile of the identification plate fixed on the control panel of each generator (Fig.2).

1.7 Machine identification

See Fig.2
1 - Manufacturer
2 - Machine code
3 - Year of construction
4 - Power factor
5 - Declared frequency
6 - Continuous power
7 - Rated voltage
8 - Rated current
9 - Weight
10 - Serial number

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..

1.8 Generator composition

See Fig.2
The generators are essentially composed of the following components:

A - Load-bearing chassis
B - Lifting hook
C - Instrument panel and outlets
D - Vibration-damper
E - Earth connection terminal
F - Exhaust
G - Tank
H - Air filter
I - Engine
L - Alternator
M - Battery compartment

1.9 Instrument panel

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

PD 10 R - See Fig .8

1 - Ignition key
2 - Hour counter
3 - Remote control connector
4 - Voltmeter 300V
5 - Differential magnetothermal switch, 2P
6 - Single-phase outlet, EEC 32A 230V 2P+GND
7 - Single-phase outlet, EEC 16A 230V 2P+GND
8 - Single-phase outlet, EEC 16A 230V 2P+GND
9 - Red low oil pressure warning light
10 - Red battery charger warning light
11 - Fusible
12 - Magnetothermal switch 1P

PD 10.4 R - See Fig.9

1 - Ignition key
2 - Hour counter
3 - Remote control connector
4 - Voltmeter 500V fs
5 - Magnetothermal Differential switch 4P
6 - Three-phase outlet, EEC 16A 400V 3P+N+GND
7 - Single-phase outlet, EEC 16A 230V 2P+GND
8 - Single-phase outlet, EEC 16A 230V 2P+GND
9 - Red low oil pressure warning light
10 - Red battery charger warning light
11 - Fusible

2 TECHNICAL CHARACTERISTICS

2.1 General characteristics

The generators of the **PD** series have been designed to assure professional users maximum efficiency and reliability for any type of work. All the models have been developed for heavy duty, using highly reliable 3000 rpm air-cooled diesel engines and are fitted with low oil pressure protection.
The alternators are type 2-pole, synchronous, self-energized, self-regulating and have a capacitor (single-phase versions) or compound (three-phase versions) for energizing; All the generators are protected by a powder-coated plate inside which also the battery compartment is housed.
A magnetothermal differential switch is positioned on the instrument panel to safeguard the operators and protect the alternator from damage caused by short-circuit or overload.

2.2 General characteristics table

MODEL		PD 10 R	PD 10.4 R
GENERAL CHARACTERISTICS			
DIMENSIONS	L	950 mm	
	W	490 mm	
	H	650 mm	
WEIGHT		150 kg	
SOUND POWER (at 7 metres)		100 Lwa	
TANK CAPACITY		6 l	
AUTONOMY AT 3/4 LOAD		3 h	
GENERATOR			
TYPE		SYNCHRONOUS, TWO-POLE, SELF-ENERGISED, SELF-REGULATING.	
SINGLE-PHASE 230V			
MAX. POWER AC		7500 W	3300 W
CONTINUOUS POWER AC		6700 W	3000 W
POWER FACTOR		1	
THREE-PHASE 400V			
MAXIMUM POWER AC		\	10000 VA
CONTINUOUS POWER AC		\	9000 VA
POWER FACTOR		\	0,8
FREQUENCY		50 Hz	
EXCITATION		CAPACITOR	COMPOUND
ENGINE			
TYPE		FOUR-STROKE DIRECT INJECTION	
MANUFACTURER		RUGGERINI	
MODEL		MD 150	
COOLING		AIR	
CAPACITY		654 cc	
NO. OF CYLINDERS		2	
MAX. POWER		12.6 HP	
RPM		3000	
FUEL		DIESEL FUEL	
OIL SUMP CAPACITY		1.8 l	
STARTING		ELECTRIC	

3 SAFETY REGULATIONS

3.1 General precautions

Before starting the generator and before starting any lubrication or maintenance operation, it is indispensable for the staff responsible to read and understand all the WARNINGS and all the CAUTION and DANGER indications listed in this manual and in the supplementary documentation furnished.
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 or things.

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 machine and respect the relevant instructions.

- Do not permit incompetent persons or without adequate training to use the generator.
- Do not permit children or animals to approach the generator when it is in operation.
- Do not access the generator with wet hands, since it is a potential source of electric shock if improperly used.
- Any inspections of the generator must be carried out with the engine off. Inspections with the engine on are to be carried out by specialised personnel only.

DANGER

Before carrying out inspection or maintenance operations on the generator connected to the automatic starting panel, the RESET function must be set, or it must be disconnected by detaching the power connector.

- Exhaust gas contains carbon monoxide and other noxious residues. Never operate the generator in inadequately ventilated places.
- Do not operate the generator near places with a danger of explosion or fire.
- Refuelling must be carried out exclusively with the engine off.
- The generator must be connected to earth using a copper wire of suitable cross-section.

DANGER

- Do not allow access to persons wearing a pacemaker because of possible electromagnetic interference with the device.
- In the event of fire, use a homologated fire extinguisher and never use water.

WARNING

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.

3.2 Prescriptions for safety during installation and setup

DANGER

- The personnel in charge of installation and starting of the generator must always wear a protective helmet; wear safety shoes and overalls.
- Immediately change wet overalls.
- Use protective gloves.
- Do not leave disassembled parts, tools or anything else not forming part of the system on or near the engine.
- Never leave inflammable liquids or cloths soaked in inflammable liquids in proximity of the generator, near electric equipment (including lamps) or parts of the electrical system.
- Take the necessary precautions to prevent the danger of electrocution.
- Check that the earthing system has been installed and constructed in accordance with regulations.

3.3 Connection to earth

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 front panel (see Fig. 2, Ref. E). For the earth connection follow the indications in the table to select the cable cross-section to use depending on the generator power.

Power kVA	1÷10	10÷20	20÷40	40÷60	60÷80
Cross-section mm²	6	10	25	35	50

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

4 USING THE GENERATOR

4.1 Positioning the generator

The generators of the **PD** series must be positioned horizontally, i.e. placed on a flat surface or made to sit horizontally by placing shims under the support feet.

CAUTION

The engine functions properly if it does not exceed a maximum inclination of 20°, both on the longitudinal and the transversal axis. Should the engine be operated in conditions at a greater inclination, there is a risk of insufficient lubrication or suction of engine oil from the air filter.

4.2 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 (Fig. 3, Ref. 1);
- 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.

4.3 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 fillercap (Fig. 2 Ref. G).

DANGER

- Fuel is toxic and inflammable and must therefore be kept in special airtight containers and stored in inaccessible places.
- Refuelling must always be carried out with the engine off.
- 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.

4.4 Battery

Position a 12V battery in the battery compartment (Fig.2, Ref.M) with a capacity of 50 A/h and dimensions of 207x175x190 to be used for starting.
The compartment is accessed by removing the plate (Fig.2, Ref.M) after having removed the retaining screws (Fig.6, Ref.3).
The battery must be charged before using it to switch on the generator, since the battery charger with which the generator is equipped is able to maintain the charge constant, but not to charge it fully.
Connect the terminals (Fig.6, Ref.1) to the battery taking care to respect the right polarity.
Spread some Vaseline grease on the positive (+) and negative (-) terminals to protect them from corrosion.
Lock the battery with the special bracket (Fig.6, Ref.2).

WARNING

- Before proceeding with charging the battery remove the cover from each cell.
- Recharge the battery in a well ventilated place.
- Interrupt charging if the electrolyte temperature exceeds 45°C (130°F).
- 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 irremediably damage the electronic equipment.
- Dispose of the acid can in an appropriate manner.

DANGER

- 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.
- In the event of contact, wash the affected part thoroughly with running water and consult a physician, in particular when the eyes are involved.

- 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 cause short-circuits by placing keys or tools on the batteries or on the cable fittings.

4.5 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 ignition key clockwise to the START position (Fig. 8,9, Ref. 1).

CAUTION
Do not hold the start key on for more than 10 seconds and let at least 15 seconds elapse before attempting to start again.

WARNING
Do not turn the key to the START position when the engine has started. This operation would damage the starter motor.

CAUTION
To prevent damage to the self-winding cord of the engine, never release it abruptly after having pulled it out fully, but guide it until complete rewinding.

WARNING
The generator engine has been calibrated, in idle, to 3150 rpm equal to 52.5 Hz, as the engine stabilises at about 3000 rpm equal to 50Hz with a load. For this reason, the accelerator lever (Fig.3, Ref.4) must never shift for any reason, since the output voltage, frequency and power values of the generator would be compromised.

4.6 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.
Each generator is equipped with the following outlets:

PD 10 R
- a single-phase outlet, EEC 32A 230V 2P+GND
- a single-phase outlet, EEC 16A 230V 2P+GND

PD 10.4 R
- a three-phase outlet, EEC 32A 400V 3P+N+GND
- two single-phase outlet, EEC 16A 230V 2P+GND

The available power is as indicated on the adhesive label carrying the technical characteristics (Fig.2).

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

4.7 Stopping

The generator is stopped by turning the ignition key completely anticlockwise (Fig. 8, 9 Ref. 1) from the ON 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.

4.8 Connection to automatic panel/remote control (optional)

The generators of the **PD** series are fitted for connection to an automatic control panel able to automatically start the generator and switch the line in case of a power failure and invert the operation when the power is restored.
The automatic panel moreover maintains the generator starter battery charged even when it is off.
The automatic panel is connected to the generator by means of a 10-pin connector on the instrument panel (Fig. 8, 9 Ref. 3) and a power plug to be inserted in the outlet on the instrument panel.
The automatic panel arrangement can also be used for connection to a remote control start, which consists of a box with the start/stop key of the generator connected to the connector with a cable of standard 50 m length.

WARNING
When the automatic panel or the remote control is connected to the generator, the ignition key on the instrument panel must remain in the STOP position.

DANGER
Set the RESET function when carrying out maintenance or repair operations on the generator to prevent it from starting in the event of a power failure.

INFORMATION
Before setting the "AUTOMATIC" function, the selector must be positioned on the "RESET" function to reset the protections.

5 PROTECTIONS

The generators of the **PD** series are fitted with a series of protections which protect them from improper use and faults which may compromise integrity of the generator and operators.

- **Low oil pressure protection**
Trips turning off the generator when the pressure in the lubrication circuit is insufficient; when it trips, no warning light comes on; therefore, if the generator stops, always check the oil level to ensure that this is not the cause of the generator stopping.
Generally, it suffices to fill up with oil in order to restart the generator.

WARNING
The low oil pressure protection does not give an indication of the oil level. The oil level must periodically be checked in order to prevent damage to the engine.

- Protection against short-circuit and overload
For protection against short-circuits and overloads, the generators have been fitted, depending on the various versions, with magnetothermal differential / magnetothermal / differential switches which trip, cutting the power, if there is an overload condition on the alternator, or a short-circuit or current leakage to earth. Before restoring the power by returning the switch lever to the ON position, remove the cause of the fault.

6 MAINTENANCE

6.1 Preamble

CAUTION
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.

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
***- Check the oil level with the dipstick.* (Fig.3 Ref.1).**
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.

6.3 Engine oil change

Use diesel engine oil 15 W 40
Top-up and fill through the hole indicated in Fig. 3 Ref. 3
.
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.7.

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.

6.4 Oil filter

Clean the oil filter (Fig.3, Ref.4) 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 filter cap (Fig.3, Ref.4.)

6.5 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. 4, Ref. 1), carry out the following operations:
- to unhook the levers to rubber band(Fig. 4, Ref. 2)
- 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.
- Remount the cover and fix it with the external butterfly screw.

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.

6.6 Fuel filter

For the engine to deliver full power the filter must be clean.
Clean the fuel filter (Fig.3, Ref.1) every 200 hours of operation (or every 3 months) and replace it every 400 hours (or every 6 months).
Follow the instructions described in the use and maintenance manual of the engine to properly clean and replace the fuel filter.

INFORMATION
Wash the fuel filter with diesel fuel.

6.7 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.

6.8 Troubleshooting

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 electromagnet valve is powered. (consult Service Centre)

The generator switches off during the operating period
- Check if the low oil level protection has been activated. (Top up if necessary)
- Check that the stop electromagnet valve is powered. (consult an authorised Service Centre)
- Check if there is fuel in the tank (fill up)

There is high smoke emission from the exhaust.
- Check that the oil level does not exceed the MAX notch. (Fill up)
- Check the state of the air filter. (clean or replace)
- Check the calibration of the injector (consult Service Centre)

The alternator voltage is too low.
- Check the engine rpm without applied loads, both 3150 (consult Service Centre)
- Check the state of the air filter. (replace)
- Check the calibration of the injector (consult Service Centre)

Starter battery flat.
- Check the electrolyte level in the battery. (fill up)
- Check the battery charging device. (replace)
- Check integrity of the battery

The engine runs irregularly
- Check the fuel filter. (clean or replace)
- Check the calibration of the injector (consult an authorised Service Centre)

The generator does not deliver power to the outlets but the voltmeter indicates that voltage is present.
- Check that the magnetothermal differential 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 Service Centre)

6.9 Scheduled maintenance table

OPERATION	HOURS
Oil level check	10
Battery fluid check	50
Air filter cleaning	200
Fuel filter cleaning	200
Oil sump replacement	200
Oil filter replacement	400
Air filter replacement	400
Fuel filter replacement	400
Equaliser play adjustment	400
Calibration and cleaning of the injector	400

7 TRANSPORT AND HANDLING

7.1 Lifting

All the versions are fitted with a lifting hook to be used for handling (Fig.2 Ref. B).
Hook the machine carefully and lift it slowly without sudden movements.

DANGER

- Hooking the generator at points different from that indicated may cause damage to the generator or be dangerous to the operators.
- During lifting all personnel must keep a safe distance and the operators must wear protective helmets.

7.2 Trailer (optional)

A trailer complete with wheels and handles is available to move the **PD** series generators.
It is a component kit which can also be assembled after purchasing the generator, and is normally used by those who need to frequently move the generator.

8 STORAGE

Before storing the generator for a long period of inactivity, the following operations must be carried out to safeguard the integrity of the generator:

- Completely empty out the fuel tank.
- Change the engine oil.
- Clean the air filter.
- Disconnect the battery from the terminals.
- Introduce a few drops of engine oil, about 2 cm^3, through the cap on the equalizer cover and manually turn the engine shaft a few times.
- Clean the outside of the generator, removing all dust and impurities.
- Cover the generator with a nylon sheet and store in a dry and ventilated place.

When reused, again change the engine oil, fill up with fuel, check the battery charge, and if necessary, charge it before use.

9 SCRAPPING

At the end of its lifetime the generator must be taken to official scrapyards.

INFORMATION

Do not dispose of the generator at household refuse disposal sites, as many of its parts are polluting.

10 WIRING DIAGRAMS

10.1 Wiring diagram PD 10 R

See Fig.10

1 ALTERNATOR
2 BATTERY CHARGER FLYWHEEL ALTERNATOR
3 BATTERY
4 KEY LIGHTING
5 CAPACITOR
6 CONNECTOR 10P
7 CONNECTOR 12P
8 HOUCOUNTER
9 DIODE
10 ELECTROMAGNET STOP
11 FUSE
12 WARNING LIGHT
13 MAGNETOTHERMAL SWITCH 1P
14 MAGNETOTHERMAL-DIFFERENTIAL SWITCH 2P
15 STARTING MOTOR
16 OUTLET 2P+T 16A
17 OUTLET 2P+T 32A
18 OIL PRESSURE GAUGE
19 BATTERY CHARGER REGULATOR
20 PROTECTION RELAY
21 START RELAY
22 ROTOR
23 STATOR
24 VOLTMETER

10.2 Wiring diagram PD 10.4 R

See Fig.11

1 ALTERNATOR
2 BATTERY CHARGER FLYWHEEL ALTERNATOR
3 BATTERY
4 CONNECTOR 12P
5 HOUR COUNTER
6 DIODE
7 STOP ELECTROMAGNET
8 FUSE
9 PILOT LIGHT
10 STARTING MOTOR
11 OUTLET 2P+GND 16A
12 OIL PRESSURE SWITCH
13 BATTERY CHARGE REGULATOR
14 PROTECTION RELAY
15 START RELAY
16 STATOR
17 VOLTMETER
18 COMPOUND
19 DIODE BRIDGE
20 RADIO SUPPRESSOR
21 DIFFERENTIAL MAGNETOTHERMAL SWITCH 4P
22 OUTLET 3P+N+T 16A
23 IGNITION KEY
24 CONNECTOR 10P