

MASE

GENERATORS



MPL 83 I

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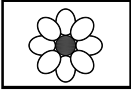

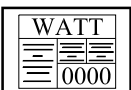
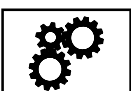
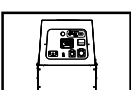
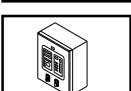
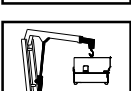
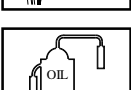
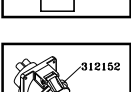
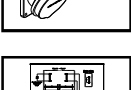
GENERATING SET FOR STATIONARY USE
USE AND MAINTENANCE MANUAL



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Machine specifications can be modified at any time without any obligation to update this publication. It is recommended to read this manual thoroughly because incorrect operation may result in the warranty being void. Therefore it is also recommended to use only original MASE Generators S.p.A. spare parts.

Reproduction of this manual is not permitted, unless written approval is obtained from MASE Generators S.p.A.

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01.1 THIS PUBLICATION

The “USE AND MAINTENANCE MANUAL”, published by the manufacturer, is an integral part of the power generator. The manual is identified by a publication identifier, printed on the cover page and repeated at the foot of every page, which allows the reader to identify and locate the publication and/or make subsequent reference to it.

All the information included herein is brought up to the date of publishing. The manufacturer reserves the right to modify it without notice, and accepts no responsibility for any error and/or omission.

01.2 PURPOSE

The USE AND MAINTENANCE MANUAL is intended for users and holds all the information necessary for using the product and perform its regular maintenance. Good working conditions, long life of the power generator, and the protection and safety of users, will be dependent upon strict observance of the instructions included in this manual. It is advisable to read thoroughly and observe the directions included in this publication, which are organised, as far as possible, according to the chronological sequence of operations when approaching the unit.

01.3 REFERENCE TO REGULATIONS

This machine is complying with the provisions of the following directives:

- 2006/42/EC: Machine Directive;
- 2014/30/EC: Electromagnetic Compatibility Directive;
- 2014/35/EC: Low Voltage Directive;
- 2000/14/EC: Noise Emission in the Environment Directive

and the following principal harmonized technical standards:

- EN 12100 - 1/2
- EN 12601

SOME NOTES ABOUT NOISE EMISSION (2000/14/EC Directive)

Sound power level (L_{WA}):

Indicates the level of noise as required by the European Directive. It represents the amount of sound energy emitted in the time unit and is a characteristic of the sound source independent of the distance from the point of measurement. dB(A) is the unit of measurement.

Sound pressure (L_p):

Measurement of the pressure generated by the emission of sound waves taken at a certain distance from the source. Its value changes with the distance from the source and is also measured in dB(A).

WARNING! Special attention must be paid to avoiding confusion between LWA and L_p . In this manual the noise emission is indicated as sound power level (LWA) and sound pressure (L_p) as well. Sound pressure values (L_p), as a function of distance, can be calculated for equipment with a given sound power level (LWA) using the following table:

L_p at 1 m = LWA - 8 dB

L_p at 4 m = LWA - 20 dB

L_p at 7 m = LWA - 25 dB

L_p at 10 m = LWA - 28 dB

L_p at 16 m = LWA - 32 dB

Example: for equipment with LWA = 90 dB:

L_p at 1 m = 90 dB - 8 dB = 82 dB

L_p at 4 m = 90 dB - 20 dB = 70 dB

L_p at 7 m = 90 dB - 25 dB = 65 dB

L_p at 10 m = 90 dB - 28 dB = 62 dB

L_p at 16 m = 90 dB - 32 dB = 58 dB

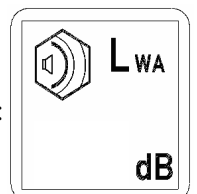
The Directive 2000/14/EC specifies that the limits of sound emissions are dependent on the power output of power generators or welding generators. The limits set down by this Directive are relating to the sound power level guaranteed and not to the sound power level measured, which does not take account of all the possible variables resulting from either the production stage or the different measurement procedures.

The reduction of the limits provided for has been divided in two phases: the first phase in force from 03/01/02 and the second phase in force from 03/01/06. The following table shows the sound power levels (LWA) approved for power generators and welding generators.

Electric power output P_{el} kW	Sound power level permitted from 03/01/02 Phase 1	Sound power level permitted from 03/01/06 Phase 2
$P_{el} \leq 2$	L_{WA} dB (A) $97 + \log P_{el}$	L_{WA} dB (A) $95 + \log P_{el}$
$2 < P_{el} \leq 10$	L_{WA} dB (A) $98 + \log P_{el}$	L_{WA} dB (A) $96 + \log P_{el}$
$10 > P_{el}$	L_{WA} dB (A) $97 + \log P_{el}$	L_{WA} dB (A) $95 + \log P_{el}$

The Directive 2000/14/EC requires that the power generator or welding generator is marked with the sound power level guaranteed and the CE Marking relating to the EC Declaration of Conformity.

The marking of the sound power level guaranteed consists of a number in dB, the LWA mark and the specific symbol:



01.4 USING THIS MANUAL

“Symbols” are used along with text to highlight and point out visually the relevance of different types of information. Graphic representation of symbols and their meaning:



Points out to important complementary information.



The non-observance of associated directions can cause damage, even irreparable, to the power generator.



Points out to possible situations dangerous for people.

This manual, together with appendices and any inclusions, must be kept with the utmost care and always be unabridged, undamaged and readable in its entirety. If lost, a copy must be promptly requested to the manufacturer.

01.5 TERMINOLOGY

Explanation of some of the terms relating to the power generator and used in this publication.

FRONT: the part of the unit where the control panel is located.

BACK: the opposite part.

RIGHT OR LEFT SIDE: referred to an operator standing in front of the unit and looking at the control panel.

01.6 ABBREVIATIONS

A	ampere
V	volt
ca	alternate current
cc	direct current
3F + N	three phase plus neutral
Ah	ampere / hour
Hz	hertz
hp	horsepower (1hp = 0,736 kW)
cos φ	power factor
kW	kilowatt
kW _m	kilowatt motor
kVA	kilovolt ampere
kg	kilogram
l	litre
l/h	litre / hour
mm	millimetre
m	metre
s	second
°C	degree Celsius
L _{WA}	sound power level
L _p	sound pressure
dB(A)	decibel



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Read carefully the instructions for use; operate according to the regulations in force in your country.

02.1 SAFETY PRECAUTIONS TO BE OBSERVED



The generating set was been designed for stationary use



WHEN FUELLING

Engine fuel can cause fire or explosion:

- Stop the engine before fuelling and let the machine cool.
- Do not fuel while smoking or near sparks or flames.
- Do not overfill the tank. In case, clean up any spilled fuel immediately before starting the engine.



WHEN PERFORMING MAINTENANCE

- Always switch off the generator before performing any service.
- It is not advisable that maintenance operations are performed by unskilled personnel.
- Always use the necessary individual protection equipment.
- The battery contains sulphuric acid in solution, and can cause explosion:
 - Always disconnect the battery.
 - Never short battery's positive and negative terminals, as this can cause battery explosion.
 - Battery explosion can cause burns and blindness.
 - Always wear protection gloves, face masks and acid resistant cloth.
- In case of contact with acid do the following:
 - In case of splash of acid into the eyes: wash immediately with clean water and seek medical advice as soon as possible.
 - In case of splash of acid on the skin: wash immediately with clean water and seek medical advice as soon as possible.
 - In case of ingestion of acid: seek medical advice immediately.
- When checking the engine oil level or changing the oil:
 - Beware: hot oil can cause burns. Always wear protective gloves.



BEFORE STARTING THE GENERATOR

- Position the machine in order to guarantee a stationary use.
- Connect the power generator to earth using the proper terminal and a cable of suitable size without interposing switches or other devices capable of breaking the electrical connection. Make sure that no load is connected to the machine.



WHEN MOVING THE GENERATOR

- When transporting the generator to the place of use, it must be firmly fastened to the vehicle.
- When moving and transporting the generator, do not tilt excessively.
- Lift the generator using the lifting eye provided on the top of the unit.
- If it is necessary to lift the generator using a forklift, the position of forks in such a way as to balance the generator weight correctly.
- When lifting and moving the generator, do not stay or walk within the proximity of the lifting and moving equipment.
- Never leave the generator slung overhead.



WHEN USING THE GENERATOR

- Check that the generator is properly connected to earth.
- Check that your tools' cables are in perfect conditions.
- Make sure that switches and controls are correctly set for starting (see Chapter 07).
- Operate the generator in well-ventilated areas, making sure that the exhaust is not restricted.
- Keep the generator away from walls or other obstructions to avoid the hot air or exhaust recycling that would cause generator overheating.
- Use fume extractors to ensure the correct air turnover when operating indoors.
- Do not operate near flammable materials.
- Fill fuel tank when engine is stopped. Do not smoke when fuelling.
- Do not overfill the tank and clean up any spilled fuel.

- Check the level of any liquids that may leak into the bund.. Empty the bund if necessary. Do not dump the liquids onto land but dispose of them according to the local legislation.
- Check daily that there are no leaks of liquids from the engine.



Do not disconnect the battery cables when the power generator is running.



USES NOT ALLOWED

- Do not connect the power generator to the commercial electrical grid.
- Do not operate near flammable materials or if explosive gases or vapours are present.
- Do not operate in narrow or poorly ventilated places.
- Do not operate if the electrical protections are not effective.
- Do not touch the silencer and the engine parts close to it.
- Do not perform service when the engine is running.
- Do not tamper with electrical components.
- Any service operation on electrical components must be performed after stopping the engine and by skilled personnel.
- Stay away from moving parts and do not get close wearing loose clothing, ties, necklaces, bracelets, and anything that can be caught by moving parts.
- A mobile use of the generating set is not allowed.

02.2 RISKS FOR THE OPERATOR WHEN USING THIS UNIT



ELECTRIC SHOCK

Electric shock can injure or kill. This electric energy can cause severe or fatal shock to the operator or others in the workplace.

- Always connect the generator to earth.
- Never touch any parts that are electrically live.
- Repair or replace all worn or damaged parts.
- Install and maintain equipment according to regulations.
- Switch off the generator and disconnect the battery before performing any service or repairs.
- Read and follow all the instructions in this Manual.



FIRE AND EXPLOSION

- Fire and explosion can be caused by hot slag or sparks.
- Be sure there is no combustible or flammable material in the workplace. Any material that cannot be removed must be protected.
 - Ventilate all flammable or explosive vapours from the workplace.
 - Do not cut or weld on containers that may have held combustibles.
 - Provide a fire watch when working in an area where fire hazards may exist.



NOISE

Noise can cause permanent hearing loss. You must protect your ears from loud noise to prevent loss of hearing.

- To protect your hearing, wear protective ear plugs and/or earmuffs. Protect others in the workplace.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.
- For information on how to measure noise, please refer to Section 01.3 on page 5.



GASES AND FUMES

Combustion gases produced by the machine, if inhaled, are hazardous to your health. Make sure that these can dissipate in the atmosphere without obstructions.

02.3 PROTECTIVE CLOTH RECOMMENDED FOR OPERATORS

It is recommended that operators wear the following equipment:




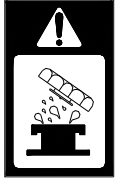
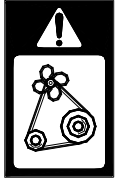
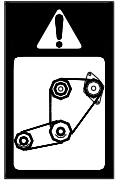
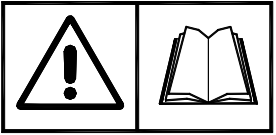
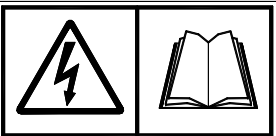
- Coveralls
- Medium/heavy duty gloves
- Acid resistant gloves (only for battery maintenance)
- Protective ear plugs and/or earmuffs

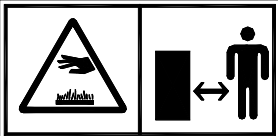
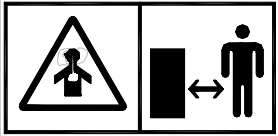
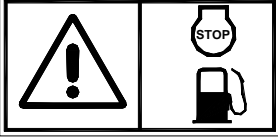
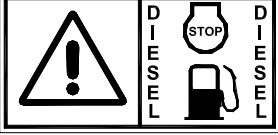
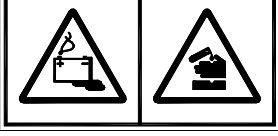





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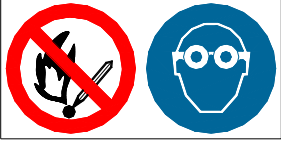



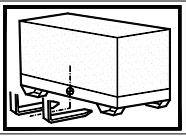
02.4 MEANING OF SAFETY SIGNS

These signs inform the user about any hazards that can cause severe injury. Read carefully the meanings and precautions indicated in this manual.

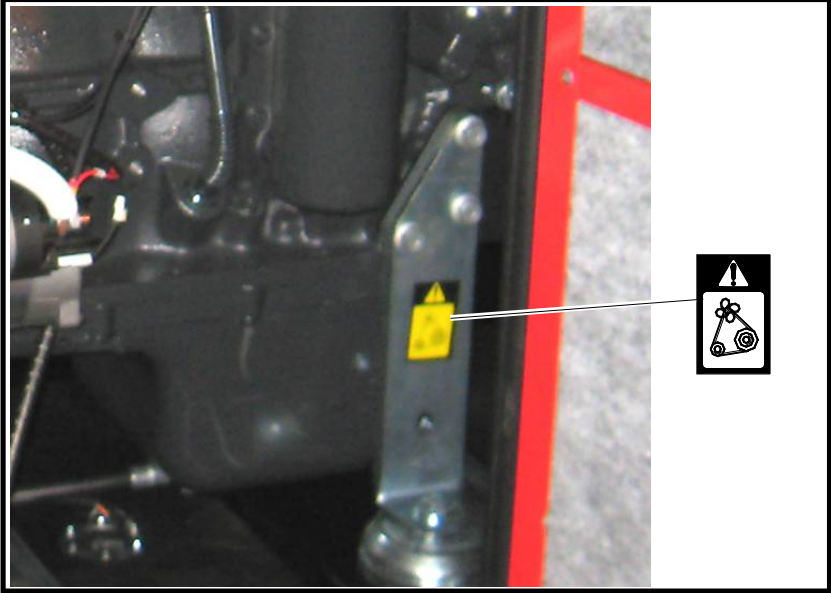
If the original stickers attached to the machine get lost, damaged or even partially unreadable, they must be replaced.

Danger signs	Meaning
	Danger of electric discharges.
	Danger: the generator can be started remotely, do not stay in the proximity.
	Danger of burns: hot surfaces.
	Danger: do not open when the engine is hot.
	Danger: belt and fan propeller. Turn off the generator before opening covers or raising the canopy.
	Danger: belt. Turn off the generator before opening covers or raising the canopy.
	Read and understand the Use and Maintenance Manual before operating the generator. The machine has been designed in such a way as to guarantee the safe and reliable operation, as long as the instructions are followed; otherwise personal injury or equipment damage could result.
	Danger of electric discharges: read the manual.

Danger signs	Meaning
	Danger of burns! Do not touch the exhaust manifold or the engine when the generator is in operation. Stay away from the generator.
	Exhaust gases contain carbon monoxide, and other components dangerous to your health.. Never operate the generator in a closed room. If installed inside, strictly observe the rules in force about ventilation.
	Fuels are extremely flammable, and in certain conditions even explosive. Fuel in a well ventilated area and after stopping the engine. Do not bring close cigarettes, sparks or flames while fuelling. Clean any petrol spill immediately.
	Fuels are extremely flammable, and in certain conditions even explosive. Fuel in a well ventilated area and after stopping the engine. Do not bring close cigarettes, sparks or flames while fuelling. Clean any diesel oil spill immediately.
	Danger of leaks of corrosive liquids.
	Danger of crushing the upper limbs.
Prohibition signs	Meaning
	Electrical connections to an emergency grid must be carried out by qualified electricians and in conformity with the rules in force on that matter. Improper connections can result in current returns from generator to connected lines. Such current returns can result in electric shocks received by workers of the electric company or by people coming into contact with electric lines during failure recovery. Moreover, as soon as the line is recovered, the generator can explode, burn or cause fires in the building electrical system.
	Prohibition of cleaning, lubricating, repairing or adjusting moving parts.
	Prohibition of extinguishing fires with water; use fire extinguishers containing proper extinguishing agents.
	Prohibition of using flames or smoking.

Obligation signs	Meaning
	<p>Do not go close to the generator with flames. Obligation of wearing protection goggles when using grinders, power tools etc., connected to the generator.</p>
	<p>Do not perform service when the generator is in operation. Wear protective ear plugs and/or earmuffs when close to the generator.</p>
Information signs	Meaning
	<p>Indicates the location of a point for lifting the generator unit.</p>
	<p>This card warns that the battery that the has no acid. Before starting the generator, prepare the battery according to the instructions of Chapter "06".</p>
	<p>Marks the position of the points for lifting the unit using a fork lift.</p>

02.5 LOCATION OF SAFETY SIGNS PROVIDED ON THE UNIT







03.1- Waste material and lubricating oil.....page.15

03.2- Disposal of the unit.....page.15

03.1 WASTE MATERIAL AND LUBRICATING OIL

When running, the generator produces no waste material. Spare parts replaced during the unit life and the lubricating oil are counted as waste, and must be disposed of according to the laws in force in the country where the generator is located.

03.2 DISPOSAL OF THE UNIT

Procedure

1. Disassemble the unit and classify its components according to the following rule:

- Reusable components
- Components made of recyclable material
- Components to be disposed of and lubricating oil (waste)

The parts so disassembled must be disposed of according to the laws in force in the country where the power generator is located.



Do not dispose of any type of lubricating oil, mineral or synthetic, onto land, drains or sewers.

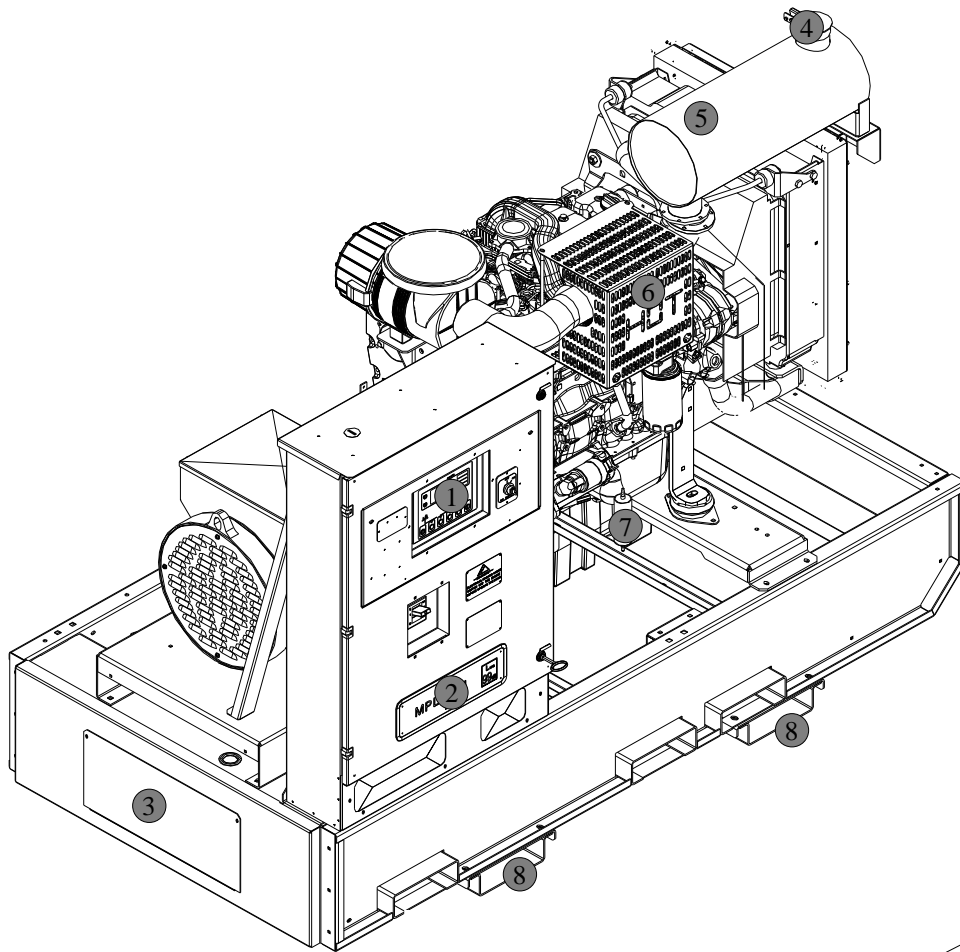
Dispose of batteries as instructed by local legislation.



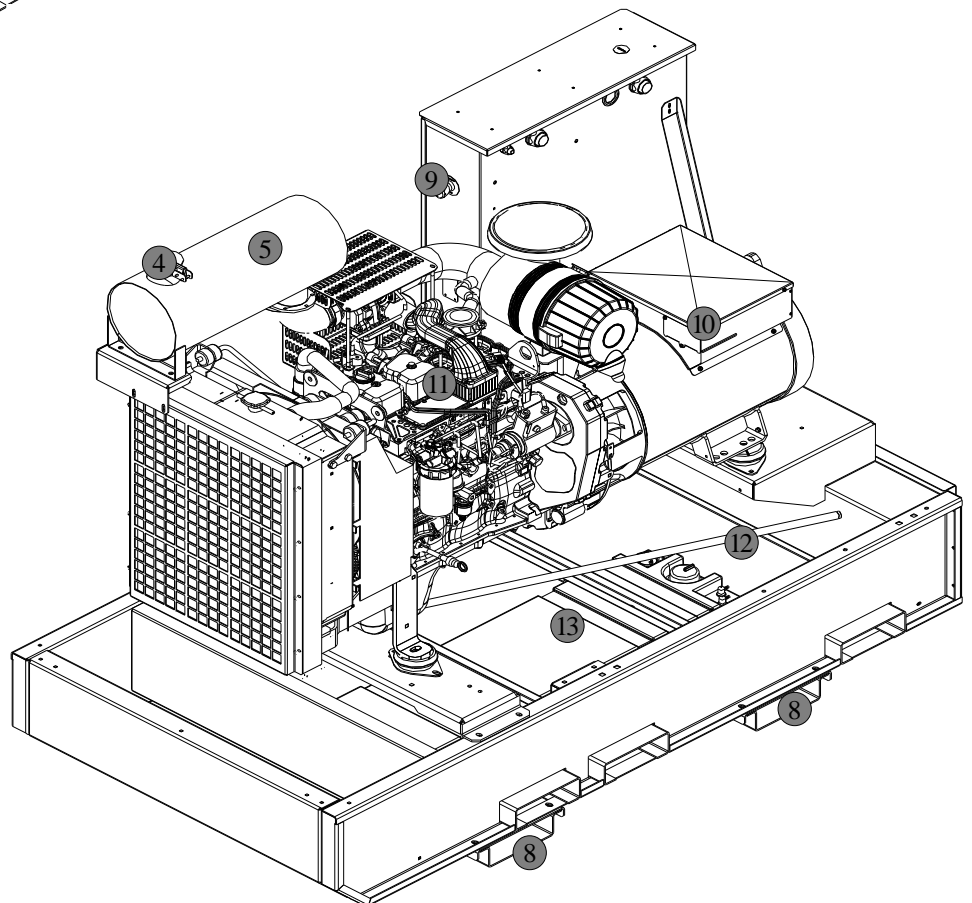
04.1- Generator components.....page 17

04.2- Control panel description.....page 19

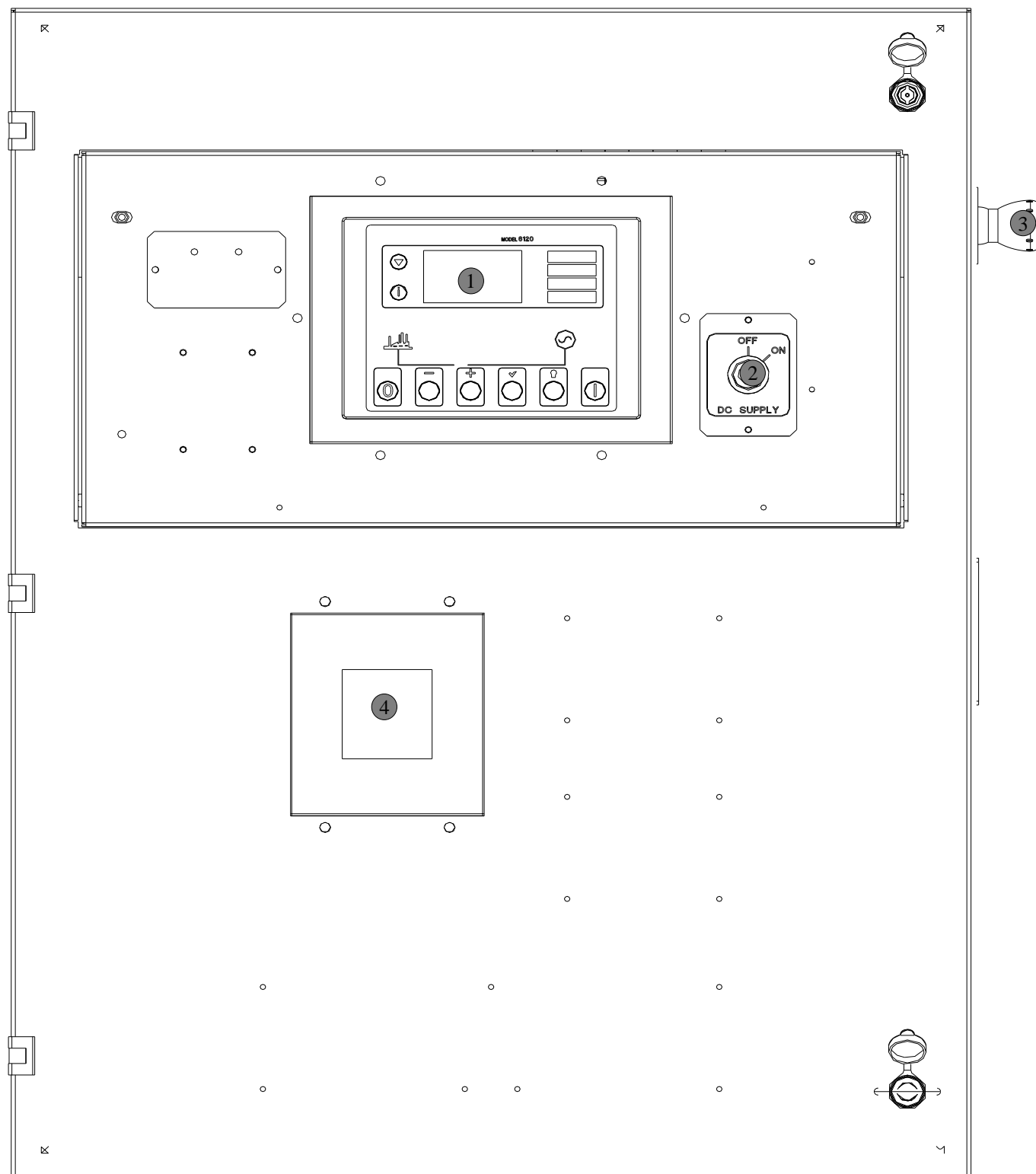
04.1 GENERATOR COMPONENTS



1. Control panel
2. Data plate
3. Battery access
4. Exhaust vent
5. Silencer
6. Turbo protection
7. Fuel pre-filter
8. Fork lift pocket
9. Emergency stop button
10. Alternator
11. Engine
12. Oil drain pipe
13. Fuel tank



04.2 CONTROL PANEL DESCRIPTION



LEGEND

1. Control panel
2. DC Supply
3. Emergency stop button
4. Circuit breaker



05.1- Generator.....	page 20
05.2- Engine.....	page 20
05.3- General specifications.....	page 20
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05.6- Overall dimensions.....	page 22

05.1 GENERATOR

Type	Synchronous
Three phase power (Standby Power)	83 kVA - 230 V (according to DIN 6271)
Three phase power (Prime Power)	75 kVA - 230 V (according to DIN 6271)
Single phase power (Prime Power)	27.6 kVA - 130 V (according to DIN 6271)
Frequency	50 Hz
Power factor	0,8
Insulation class	H
Degree of protection	IP 23

Prime power: 10% overload permitted for 1 hour every 12 hours

Standby power: no overload permitted

05.2 ENGINE

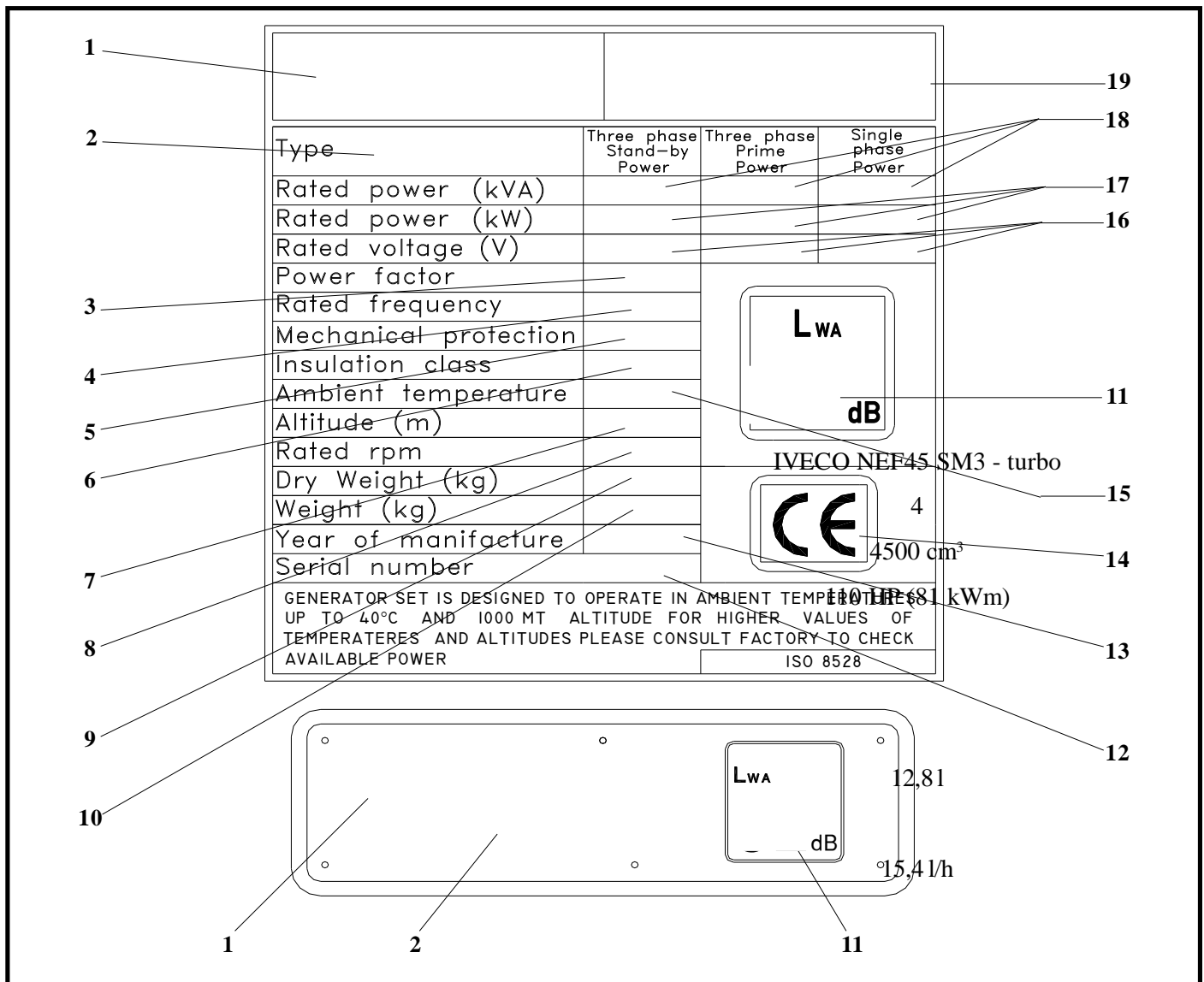
Engine type	IVECO NEF45 SM3 - turbo
Number of cylinders	4
Displacement	4500 cm ³
Power (emergency service)	110 HP (81 kWm)
Engine speed	1500 rpm
Cooling system	Water
Fuel type	Diesel
Oil tank capacity	12,8 l
Starting system	Electric
Consumption per hour (at 75% of continuous service)	15,4 l/h

05.3 GENERAL SPECIFICATIONS

Noise power emission level	L _{wa} 100
Battery	12 V - 90 Ah
Fuel tank capacity	73 l
Bounded tank capacity	---
Operating range at 75% of continuous service power	8 h ~
Dry weight	1115 kg
Weight	---

05.4 RATING PLATE DESCRIPTION

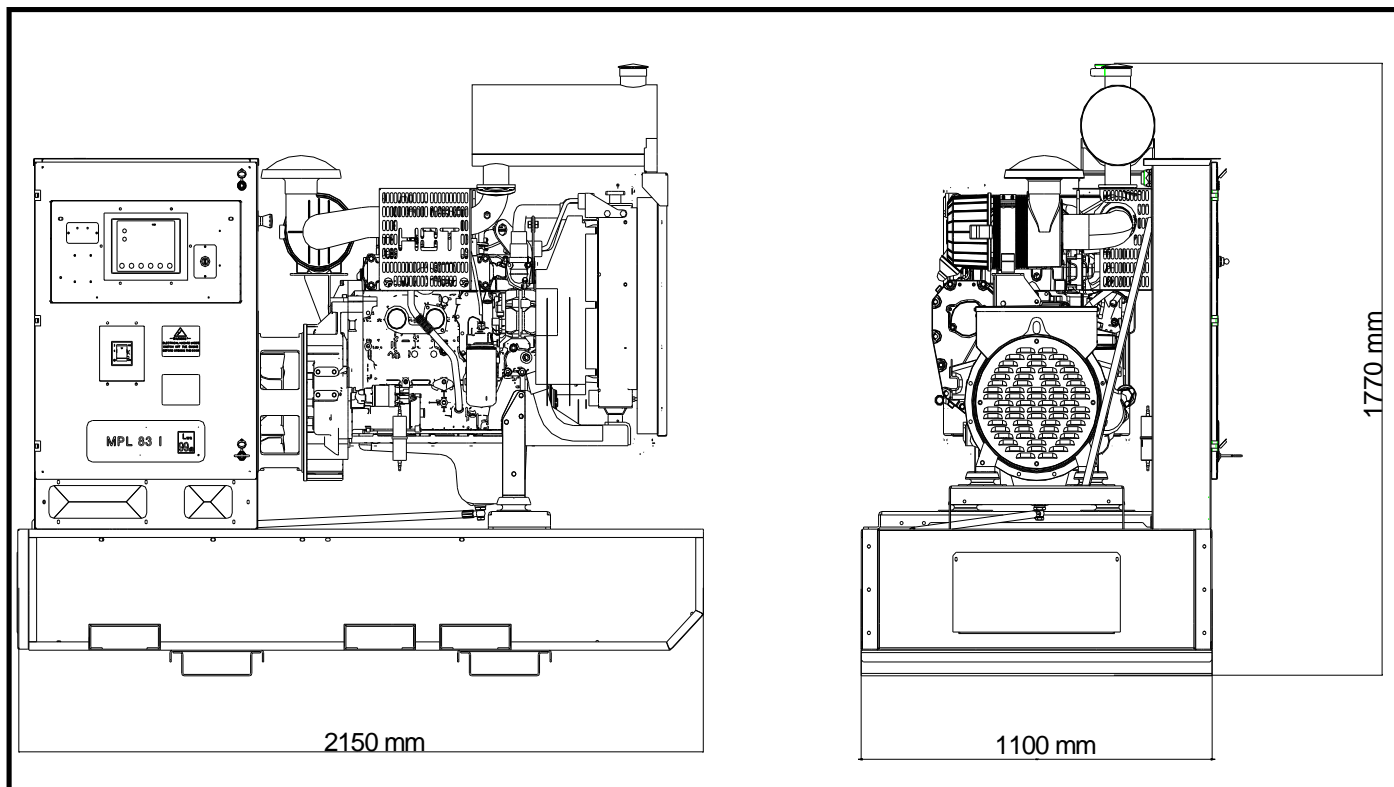
A rating plate showing the operation capabilities and performance limits is provided on the unit.



LEGEND

- | | |
|--------------------------------|----------------------------|
| 1. Manufacturer's logo | 15. Ambient temperature |
| 2. Generator model | 16. Rated voltage values |
| 3. Power factor | 17. Rated power kW |
| 4. Rated frequency | 18. Rated power kVA |
| 5. Unit's degree of protection | 19. Manufacturer's address |
| 6. Insulation class | |
| 7. Altitude reference | |
| 8. Engine speed | |
| 9. Dry weight | |
| 10. Weight | |
| 11. Noise level | |
| 12. Serial number | |
| 13. Manufacture year | |
| 14. EC mark | |

05.6 OVERALL DIMENSIONS (dimensions in mm)





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06.3-Location.....	page 25
06.4-Checking generator operation.....	page 25
06.5-Generator unit run-in.....	page 25

06.1 PRELIMINARY OPERATIONS

BEFORE STARTING THE UNIT

ENGINE OIL (picture 1)



The unit is delivered complete with lubricating oil.

Check the oil level in the sump using the dipstick (n.2) located on the left side of the engine (see Checking the oil level on page 48); refill the correct level using the oil filler (n.1), if necessary; choose the oil viscosity according to the ambient temperature (for other temperatures check the table at page 47).

Wait at least five minutes, then check the oil level again. It is important that the unit is sitting on level ground.

FUEL CHECKING (picture 1)

Before starting the machine check the fuel level, and refuel the tank if necessary.

To refuel the machine proceed as here under indicated:

- Remove the fuel cap (no.3).
- Proceed to fill up the fuel tank.
- Put the fuel cap back on.
- In case, clean up any spilled fuel immediately before starting the machine.

COOLANT CHECKING (picture 2)



The machine is supplied filled up with coolant. Before starting the machine check for the right coolant level.

To check the coolant level loosen radiator cap slowly in order to relieve any pressure and then remove the radiator cap (no.4) and make sure the coolant reaches the filler. This must be done when the engine is cold and switched off.



Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool.



If the coolant level is low because of evaporation or other reasons, just add the correct coolant mixture until the filler is reached. Reinstall the radiator cap and inspect the cooling system for leaks. In the event of leaks from the cooling circuit, contact a nearest IVECO dealer.



Don't check for the coolant level while the engine is still hot and the system is under pressure because dangerous hot coolant can be discharged.



fig.1

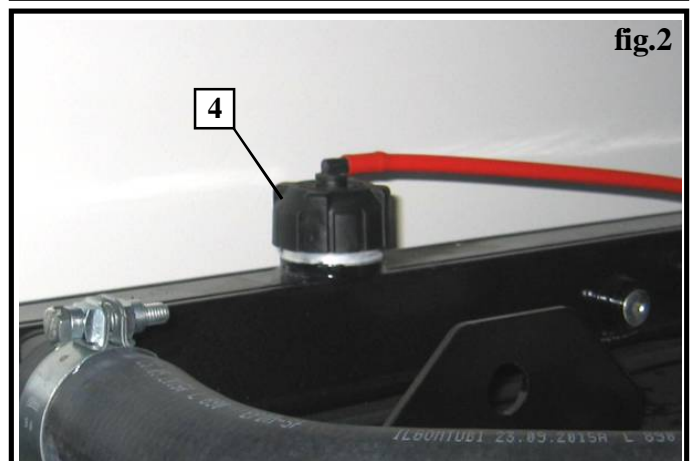
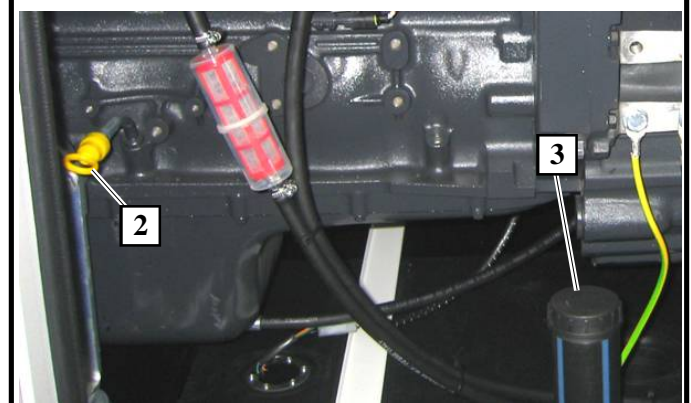


fig.2

BATTERY (picture 3)

The machine is delivered with a fully charged battery and the negative terminal disconnected.

Batteries are factory filled with acid at density of 1,28 g/ml and are ready for operation. Remove the battery cover and connect the negative terminal to the system. If the starting power is not enough, it is advisable to further charge the battery as follows. For this operation it is advisable to wear protective gloves and acid resistant overalls

- Disconnect battery cables starting from the negative terminal and remove the battery from the unit.
- Remove battery caps.
- Make sure that the room where the recharging will take place is properly ventilated.
- Use only a DC battery charger with output of 14.4V.
- Connect to the battery charger the positive terminal first and then the negative terminal.
- Operate the battery charger. It is advised that the charging current be about 1/10 of the value of battery capacity (e. g. for a 100 Ah battery it is advised that the charging current be about 10 A).
- If the acid temperature exceeds 55°C cut off the charging.
- The battery is deemed fully charged if the charging voltage has no increase in the two subsequent hours.



In case of accidental contact with the battery acid it is advised to:

- **Wash immediately with clean water any splash of acid into the eyes. Seek medical advice as soon as possible.**
- **Wash immediately with clean water any splash of acid onto the skin or clothing.**
- **In case of ingestion of acid: seek medical advice immediately.**



fig.3

06.2 MAXIMUM OPERATING ANGLES (picture 4)

Do not exceed the operating angles shown in the figure while running the power generator unit, or engine damage will occur.

06.3 LOCATION

A proper installation site should be selected for the power generator if the unit is to provide dependable service. The service life and operating efficiency of the power generator is reduced when the unit is subjected to high levels of dust, moisture, and corrosive vapours..



Operate in open, well-ventilated areas; if operated indoors, vent the engine exhaust



outside the building and make sure that the room has good air turnover. Keep the engine exhaust outlet away from building exterior and interior walls and air intakes.

06.4 CHECKING GENERATOR OPERATION

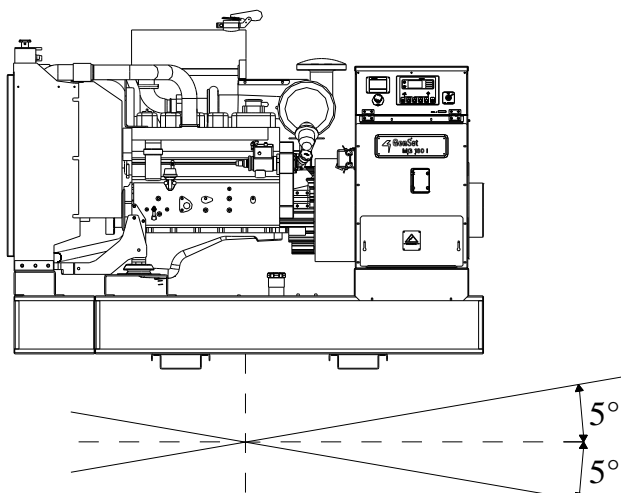
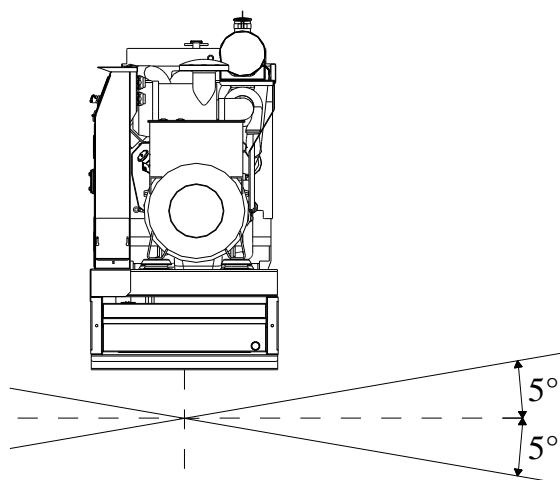
Perform a test of operation according to the instructions included in the following Chapter

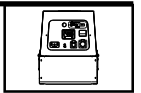
06.5 GENERATOR UNIT RUN-IN

The application of heavy loads to a new engine has the effect of shortening the engine life. During the first 20 hours of operation, and to allow for a good engine run-in, do not use more than 70% of the maximum power output rated in the technical specifications.

After first 50 hours of operation change the engine oil.

pic.4





07.1- Control devices mounted aboard.....	page 28
07.2- Earthing the power generator.....	page 28
07.3- Description of control.....	page 29
07.4- Operation.....	page 32
07.5- Module display.....	page 36
07.6- Front panel configuration.....	page 38
07.7- Using the power generator unit.....	page 40
07.8- Adjustments and settings.....	page 40
07.9- Putting the power generator temporarily out of service and restarting operation.....	page 40

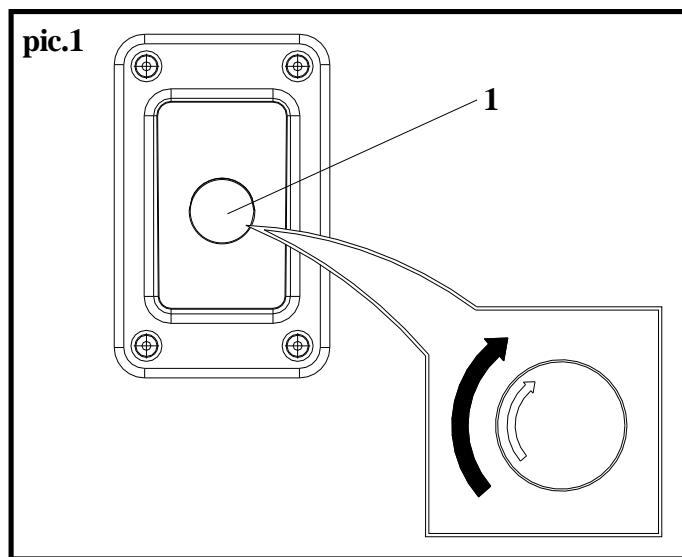
07.1 CONTROL DEVICES MOUNTED ABOARD**Emergency stop push button (picture 1)**

The power generator is equipped with an EMERGENCY STOP device to stop immediately the generator in case of danger.

The device is actuated by pressing the red pushbutton (1) located on the front of the generator. The engine stops. To disengage the emergency stop device, rotate the red pushbutton clockwise until it pops out.



The generator cannot be restarted if the emergency stop device is activated.

**DSE 6120**

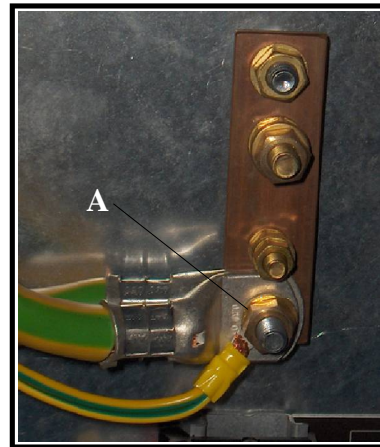
The **DSE 6120 series** module has been designed to allow the operator to start and stop the engine/generator, and if required, transfer the load. The user also has the facility to view the system operating parameters via the LCD display. The **DSE 6120** module monitors the engine, indicating the operational status and fault conditions, automatically shutting down the engine and giving a true first up fault condition of an engine failure. The LCD display indicates the fault. The powerful microprocessor contained within the module allows for incorporation of a range of enhanced features:

- *Text based LCD display*
- **True RMS** Voltage monitoring.
- *Engine parameter monitoring.*
- *Fully configurable inputs for use as alarms or a range of different functions.*
- *Engine ECU interface to **electronic engines** (specify on ordering)*

· *Magnetic pickup interface for engine only applications (specify on ordering)*

07.2 EARTHING THE POWER GENERATOR

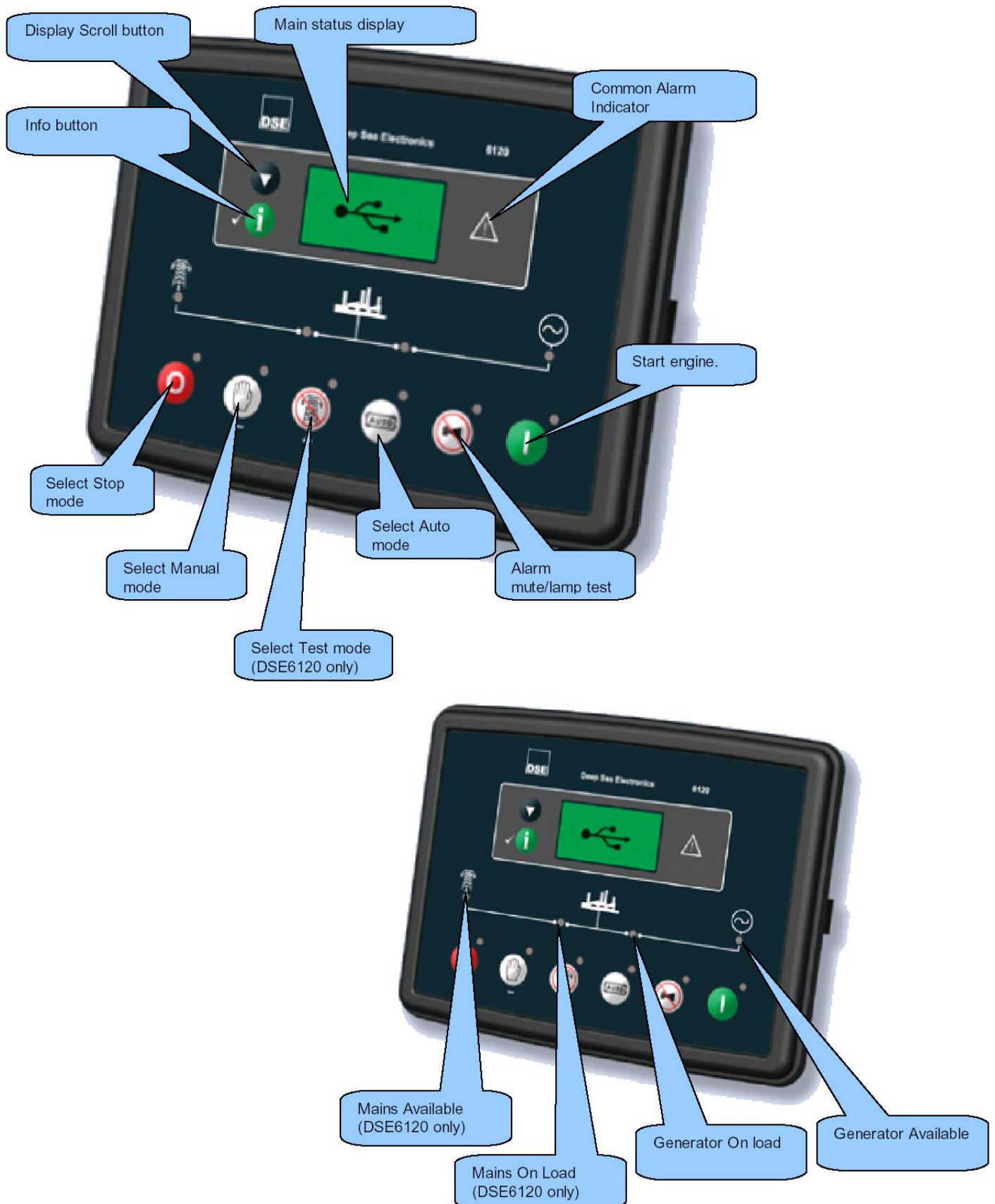
Before starting the generator, connect it to earth by using the earth connection provided (A) and a cable of suitable size without interposing switches or other devices capable of breaking the electrical connection to earth. The earth system must conform to CEI 64-8 regulations.



Do always connect the power generator to earth. Check that the cables are in perfect condition.

07.3 DESCRIPTION OF CONTROL

The following section details the function and meaning of the various controls on the module.



GRAPHICAL DISPLAY

- 4- line, 64 x 132 small Graphic Display with LED Backlight
- Icon and numeric display. Switch to select 'Icon' or 'English' display
- Software controlled contrast
- Mimic of Text insert / 4x indicators required via LCD

VIEWING THE INSTRUMENTS

It is possible to scroll to display the different pages of information by repeatedly operating the scroll button



Once selected the page will remain on the LCD display until the user selects a different page or after an extended period of inactivity, the module will revert to the status display.

When scrolling manually, the display will automatically return to the Status page if no buttons are pressed for the duration of the configurable *LCD Page Timer*.

If an alarm becomes active while viewing the status page, the display shows the Alarms page to draw the operator's attention to the alarm condition.

Metering:












- Generator Voltage, 3-phase, L-L and L-N
- Generator Amps L1, L2 and L3 (On/Off selectable in software)
- Generator Frequency
- Mains Voltage, 3-phase, L-L and L-N
- Battery Voltage
- Engine hours Run
- Oil Pressure Gauge
- Engine Temperature Gauge
- Fuel Level
- Fail to Start

Indicators:

- Fail to Stop
- Low Oil pressure
- High Engine Temperature
- Under/Over-speed
- Under/Over voltage – Warning, Shutdown or Electrical Trip
- Emergency Stop
- Failed to reach loading voltage
- Failed to reach loading frequency
- Charge Fail
- Over Current – Warning, Shutdown or Electrical Trip
- Low DC Voltage
- + AMF indications
- + CAN diagnostics


At power up, the display will display the software version, then display the default display screen, which will display Generator Frequency.

CONTROLS

<p>Stop / Reset</p> <p>This button places the module into its Stop/Reset mode. This will clear any alarm conditions for which the triggering criteria have been removed. If the engine is running and the module is in Stop mode, the module will automatically instruct the changeover device to unload the generator (<i>'Close Generator' becomes inactive (if used)</i>). The fuel supply de-energises and the engine comes to a standstill. Should a remote start signal be present while operating in this mode, a remote start will not occur.</p>	
<p>Manual</p> <p>This mode allows manual control of the generator functions.</p> <p>Once in Manual mode the module will respond to the start button  ,</p> <p>start the engine, and run off load. If the engine is running off-load in the Manual mode and a remote start signal becomes present, the module will automatically instruct the changeover device to place the generator on load (<i>'Close Generator' becomes active (if used)</i>). Upon removal of the remote start signal, the generator remains on load until either selection of the 'STOP/RESET' or 'AUTO' modes.</p> <p><i>For further details, please see the more detailed description of 'Manual operation' elsewhere in this manual.</i></p>	
<p>Auto</p> <p>This button places the module into its 'Automatic' mode. This mode allows the module to control the function of the generator automatically. The module will monitor the <i>remote start</i> input and mains supply status and once a start request is made, the set will be automatically started and placed on load.</p> <p>Upon removal of the starting signal, the module will automatically transfer the load from the generator and shut the set down observing the <i>stop delay</i> timer and <i>cooling</i> timer as necessary. The module will then await the next start event. <i>For further details, please see the more detailed description of 'Auto operation' elsewhere in this manual.</i></p>	
<p>Test</p> <p>This button places the module into its 'Test' mode.</p> <p>This allows an on load test of the generator.</p> <p>Once in Test mode the module will respond to the start button  ,</p> <p>start the engine, and run on load.</p> <p><i>For further details, please see the more detailed description of 'Test operation' elsewhere in this manual.</i></p>	
<p>Start</p> <p>This button is only active in STOP/RESET  or MANUAL  mode.</p> <p>Pressing this button in manual or test mode will start the engine and run off load (manual) or on load (test).</p>	
<p>Mute / Lamp Test</p> <p>This button silences the audible alarm if it is sounding and illuminates all of the LEDs as a lamp test feature.</p>	
<p>Scroll</p> <p>This buttons scrolls through the instrument display pages.</p>	

07.4 OPERATION

STOP MODE

STOP mode is activated by pressing the button .

In STOP mode, the module will remove the generator from load (if necessary) before stopping the engine if it is already running. If the engine does not stop when requested, the FAIL TO STOP alarm is activated (subject to the setting of the *Fail to Stop* timer). To detect the engine at rest the following must occur:

- Engine speed is zero as detected by the Magnetic Pickup or CANbus ECU (depending upon module variant).
- Generator frequency must be zero.
- Oil pressure switch must be closed to indicate low oil pressure (MPU version only)

When the engine has stopped, it is possible to send configuration files to the module from DSE Configuration Suite PC software and to enter the Front Panel Editor to change parameters. Any latched alarms that have been cleared will be reset when STOP mode is entered. The engine will not be started when in STOP mode. If remote start signals are given, the input is ignored until AUTO mode is entered.

When configured to do so, When left in STOP mode for five minutes with no presses of the fascia buttons, the module enters low power mode.

To 'wake' the module, press the button  or any other fascia control button.



MANUAL MODE




After checking and restoring if necessary the engine oil level, and fuelling the unit, (if this is the first starting, it is necessary to fuel the unit)



If a digital input configured to *panel lock* is active, changing module modes will not be possible. Viewing the instruments and event logs is NOT affected by panel lock.

Switch the DC Supply key (1) to the "ON" position.

Manual mode allows the operator to start and stop the set manually, and if required change the state of the load switching devices.

Module mode is active when the button  is pressed.

Waiting in manual mode


To begin the starting sequence, press the button  :


the engine will be started after the preheating time. In the start procedure the DSE 6120 will try the starting for three times. If, at the third attempt the engine won't start, the display of the DSE 6120 will show the "START FAIL" alarm. **Note:** if the start occurs with the main circuit breaker (2) switched on, this will be switched off automatically.



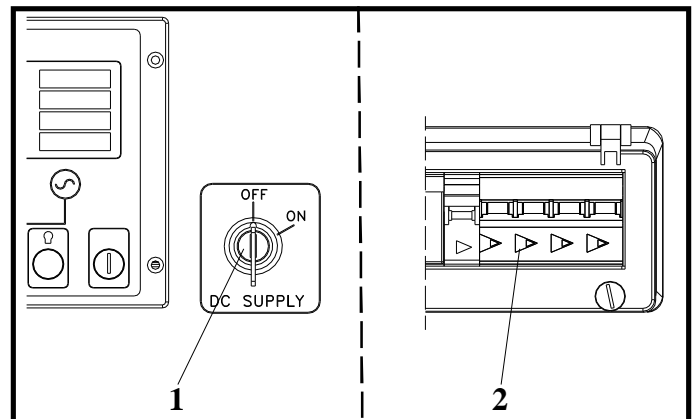
Attention: If you have connected the ATS, the generator contactor will be closed by feeding the load!

If 'protected start' is disabled, the start sequence begins immediately.

If 'Protected Start' is enabled, the icon  is displayed to indicate Manual mode and the manual LED flashes.

The button  must be pressed once more to begin

the start sequence. After a suitable heating of the unit, switch on the main circuit breaker (2).



Starting sequence



There is no start delay in this mode of operation.

The fuel relay is energised and the engine is cranked.

If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *crank rest* duration after which the next start attempt is made. Should this sequence continue beyond the set number of attempts, the start sequence will be terminated and the display shows **Fail to Start**.

When the engine fires, the starter motor is disengaged. Speed detection is factory configured to be derived from the main alternator output frequency but can additionally be measured from a Magnetic Pickup mounted on the flywheel (Selected by PC using the 3000 series configuration software). Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed).

After the starter motor has disengaged, the *Safety On* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

Engine running

In manual mode, the load is not transferred to the generator unless a 'loading request' is made. A loading request can come from a number of sources.

- Detection of mains failure
- Activation of an auxiliary input that has been configured to *remote start on load*
- Activation of the inbuilt exercise scheduler if configured for 'on load' runs.



The load transfer signal remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

- Press the *auto mode* button to return to automatic mode.

The set will observe all auto mode start requests and stopping timers before beginning the *Auto mode stopping sequence*.

- Press the *stop* button
- De-activation of an auxiliary input that has been configured to *remote start on load*

Stopping sequence

In manual mode the set will continue to run until either:

- The *stop* button is pressed – The set will immediately stop
- The *auto* button is pressed.

The set will observe all auto mode start requests and stopping timers before beginning the *Auto mode stopping sequence*.



If none emergency situation occurs, don't use the emergency stop button to stop the machine.

AUTOMATIC MODE

After checking and restoring if necessary the engine oil level, and fuelling the unit, (if this is the first starting, it is necessary to fuel the unit)





If a digital input configured to *panel lock* is active, changing module modes will not be possible. Viewing the instruments and event logs is NOT affected by panel lock.

Engage the main circuit breaker (2).

Connect the ATS panel to the terminal board (3).

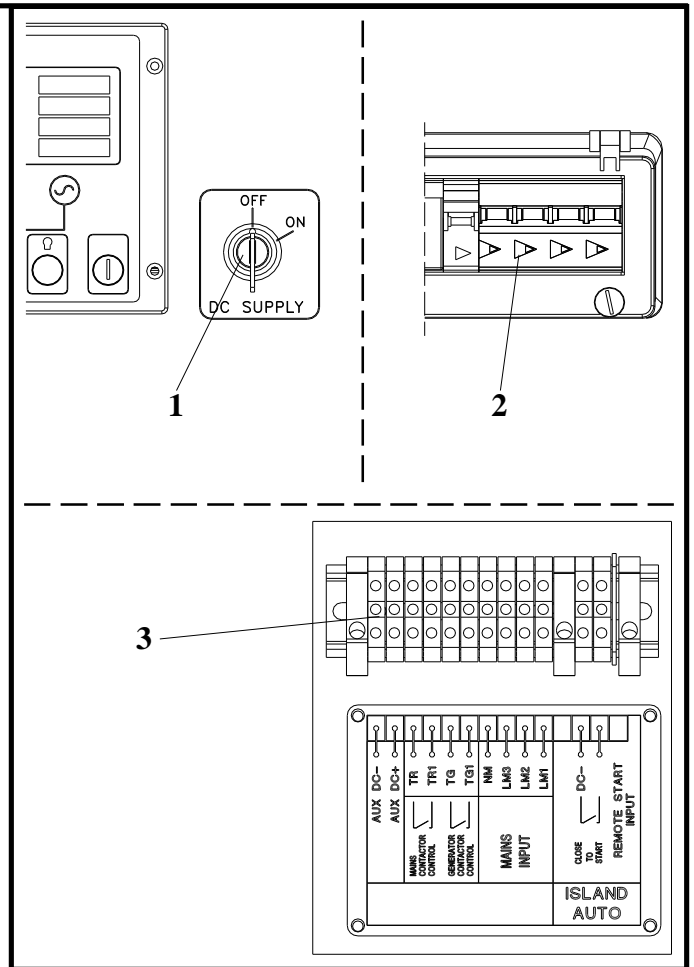
Switch the DC Supply key (1) to the “ON” position.

Activate auto mode by pressing the pushbutton .

The icon  is displayed to indicate Auto Mode

operation if no alarms are present.

Auto mode will allow the generator to operate fully automatically, starting and stopping as required with no user intervention.

**Waiting in auto mode**

If a starting request is made, the starting sequence will begin. Starting requests can be from the following sources:

- Mains failure
- Activation of an auxiliary input that has been configured to *remote start*
- Activation of the inbuilt exercise scheduler.

Starting sequence

If the Mains is switched on, the DSE 6120 controls the mains circuit breaker closing, the load is fed by the mains and the unit will stay in stand-by. When the mains is switched off, the DSE 6120 controls the mains circuit breaker opening and the starting procedure.


In the start procedure the DSE 6120 will try the starting for three times. If, at the third attempt the engine won't start, the display of the DSE 6120 will show the “START FAIL” alarm.

After a suitable heating of the unit, the DSE 6120 controls the unit circuit breaker closing. At this time, the load is fed by the generator. At the mains return, the DSE 6120 controls the unit circuit breaker opening, the mains circuit breaker closing and the engine stop occurs after the heating time.

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed).

After the starter motor has disengaged, the *Safety On* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

Engine running

Once the engine is running and all starting timers have expired, the animated icon  is displayed.
DSE6120 - The generator will be placed on load if configured to do so.



The load transfer signal remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

If all start requests are removed, the *stopping sequence* will begin.

Stopping sequence

The *return delay* timer operates to ensure that the starting request has been permanently removed and isn't just a short term removal. Should another start request be made during the cooling down period, the set will return on load.


If there are no starting requests at the end of the *return delay* timer, the load is removed from the generator to the mains supply and the *cooling* timer is initiated.

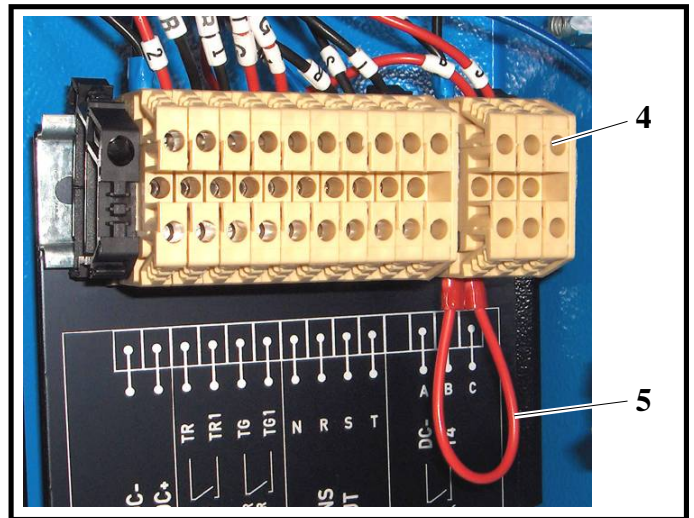
The *cooling* timer allows the set to run off load and cool sufficiently before being stopped. This is particularly important where turbo chargers are fitted to the engine. After the *cooling* timer has expired, the set is stopped.



If none emergency situation occurs, don't use the emergency stop button to stop the machine.

STARTING WITH REMOTE CONTROL

- Engage the main circuit breaker (2).
 - Remove the wire (5).
 - Connect the remote control to the terminal board (4).
 - Switch the DC Supply key (1) to the "ON" position.
 - Press the button .
 - Put the remote control switch in "START" position.
- In the start procedure the DSE 6120 will try the starting for three times. If, at the third attempt the engine won't start, the display of the DSE 6120 will show the "START FAIL" alarm.
- After a suitable heating of the unit, the remote control lamp will be lighted and the load is fed by the unit.

**STARTING WITH REMOTE CONTROL**

- Disconnect the load.
- Put the remote control switch in "STOP" position.
- Switch the DC Supply key (1) to the "OFF" position.



If none emergency situation occurs, don't use the emergency stop button to stop the machine.

07.5 MODULE DISPLAY

BACKLIGHT

The backlight will be on if the unit has sufficient voltage on the power connection while the unit is turned on, unless the unit is cranking for which the backlight will be turned off.

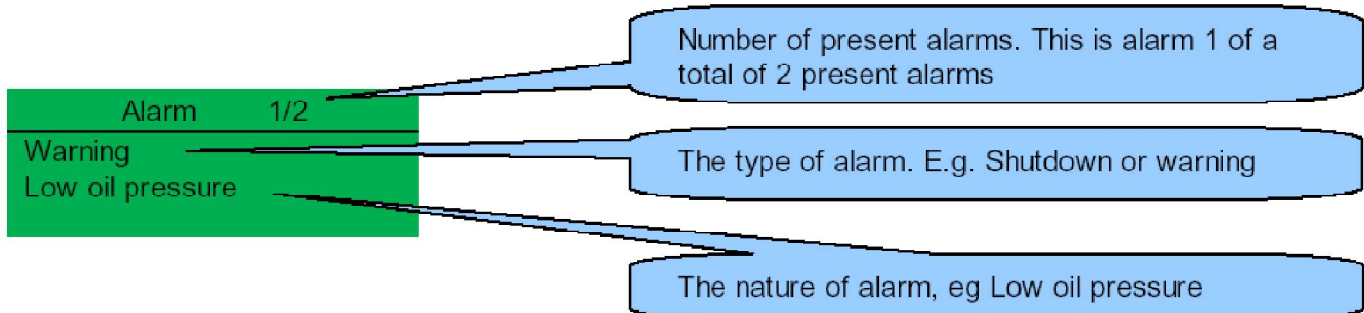
PROTECTIONS

When an alarm is present, the Audible Alarm will sound and the Common alarm LED if configured will illuminate.

The audible alarm can be silenced by pressing the *Mute button*



The LCD display will jump from the 'Information page' to display the Alarm Page



The LCD will display multiple alarms E.g. "High Engine Temperature shutdown", "Emergency Stop" and "Low Coolant Warning". These will automatically scroll round in the order that they occurred.

In the event of a warning alarm, the LCD will display the appropriate text. If a shutdown then occurs, the module will again display the appropriate text.

Example:

Alarm	1/2
Warning	
Oil pressure Low	

Alarm	2/2
Shutdown	
Coolant Temperature High	

WARNINGS

Warnings are non-critical alarm conditions and do not affect the operation of the generator system, they serve to draw the operators attention to an undesirable condition. Example

Alarm	1/1
Charge Failure	
Warning	

In the event of an alarm the LCD will jump to the alarms page, and scroll through all active warnings and shutdowns. By default, warning alarms are self-resetting when the fault condition is removed. However enabling 'all warnings are latched' will cause warning alarms to latch until reset manually. This is enabled using the 7000 series configuration suite in conjunction with a compatible PC.

Display	Reason
Battery High Voltage	The DC supply has risen above the high volts setting level for the duration of the high battery volts timer.
Battery Low Voltage	The DC supply has fallen below the low volts setting level for the duration of the low battery volts timer.
Charge Alternator Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
Low fuel level	The module detects that the fuel level is below the configured setting.
Over Current Immediate Warning	GENERATOR HIGH CURRENT, if the module detects a generator output current in excess of the pre-set trip a warning alarm initiates.

SHUTDOWN ALARMS

Shutdowns are latching alarms and stop the Generator. Clear the alarm and remove the fault then press Stop/Reset




to reset the module. Example

Alarm	1/1
Oil Pressure Low Shutdown	



The alarm condition must be rectified before a reset will take place. If the alarm condition remains, it will not be possible to reset the unit (The exception to this is the Low Oil Pressure alarm and similar 'delayed alarms', as the oil pressure will be low with the engine at rest).


Display	Reason
Emergency Stop	<p>The emergency stop button has been depressed. This a failsafe (normally closed to battery positive) input and will immediately stop the set should the signal be removed. Removal of the battery positive supply from the emergency stop input will also remove DC supply from the Fuel and Start outputs of the controller.</p> <p> The Emergency Stop Positive signal must be present otherwise the unit will shutdown.</p>
Fail To Start	The engine has not fired after the preset number of start attempts.
Generator High Voltage Shutdown	The generator output voltage has risen above the preset level.
Generator Low Voltage Shutdown	The generator output voltage has fallen below the preset level.
Low Oil Pressure	The engine oil pressure has fallen below the low oil pressure trip setting level after the Safety On timer has expired.
Low Fuel Level	The module detects that the fuel level is below the configured setting.
Over Frequency Shutdown	The generator output frequency has risen above the preset level.
Under Frequency Shutdown	The generator output frequency has fallen below the preset level.

ELECTRICAL TRIP ALARMS

Electrical trips are latching and stop the Generator but in a controlled manner. On initiation of the electrical trip condition the module will de-energise the '**Close Generator**' Output to remove the load from the generator. Once this has occurred the module will start the Cooling timer and allow the engine to cool off-load before shutting down the engine. The alarm must be accepted and cleared, and the fault removed to reset the module.

Example

Alarm	1/1
Generator Current High Electrical Trip	

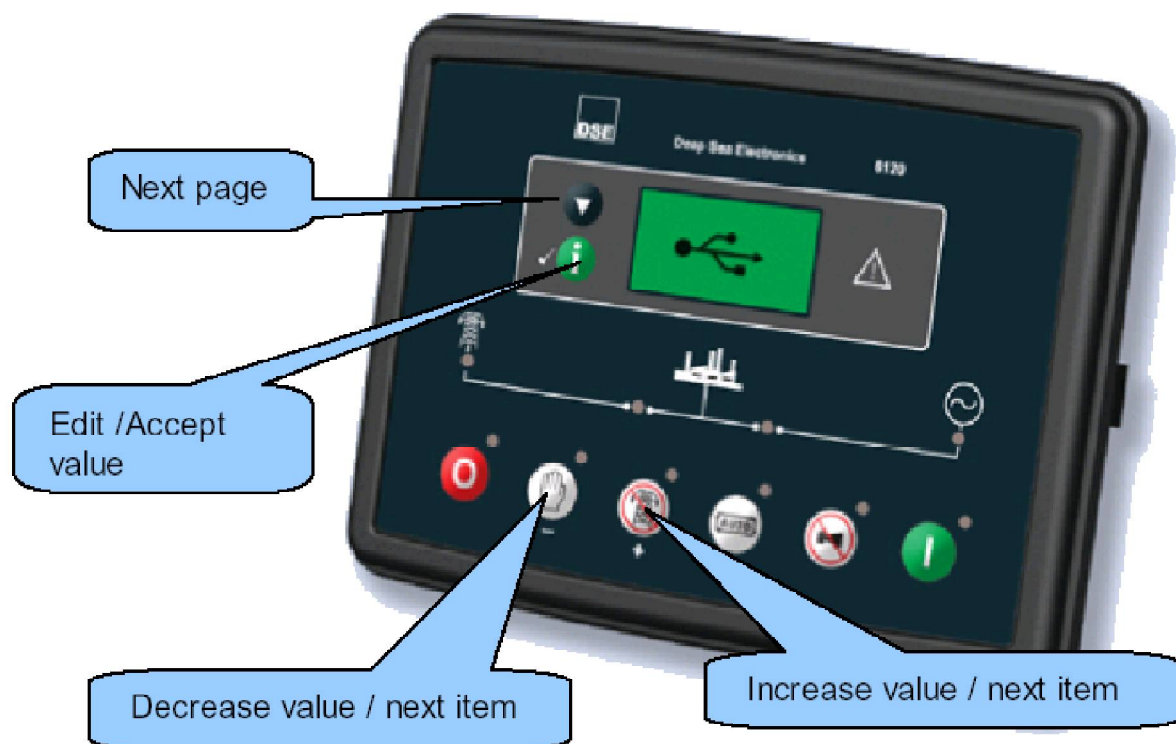
Electrical trips are latching alarms and stop the Generator. Remove the fault then press Stop/Reset  to reset the module.

Digital Input A-F	Auxiliary inputs can be user configured and will display the message as written by the user.
Generator phase rotation alarm	The phase rotation is measured as being different to the configured direction.

07.6 FRONT PANEL CONFIGURATION

This configuration mode allows the operator limited customising of the way the module operates.

Use the module's navigation buttons to traverse the menu and make value changes to the parameters:



ACCESSING THE FRONT PANEL EDITOR (FPE)

The module must be in STOP mode with the engine at rest before configuration mode can be accessed.




To enter the 'configuration mode' press both the **INFO**  and **STOP**  buttons together.

ENTERING THE CONFIGURATION EDITOR PIN NUMBER




If the module PIN number has been set, the PIN number request is then shown. The configuration cannot be viewed or changed until the PIN number is correctly entered.

Enter either the 'main' PIN or the application PIN.






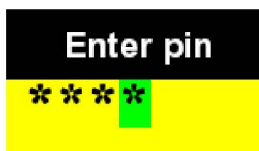
The first * is flashing. Press  (+) or  (-) buttons to adjust it to the correct value for the first digit of the PIN number.
Press  when the first digit is correctly entered.
The entered digit will turn back to a * to maintain security.






The second * is flashing. Press  (+) or  (-) buttons to adjust it to the correct value for the second digit of the PIN number.
Press  when the second digit is correctly entered.
The entered digit will turn back to a * to maintain security.



The third * is flashing. Press  (+) or  (-) buttons to adjust it to the correct value for the third digit of the PIN number.
Press  when the third digit is correctly entered.
The entered digit will turn back to a * to maintain security.




The fourth * is flashing. Press  (+) or  (-) buttons to adjust it to the correct value for the fourth digit of the PIN number.
Press  when the fourth digit is correctly entered.


 When  is pressed after editing the final PIN digit, the PIN is checked for validity. If the number is not correct, the editor is automatically exited. To retry you must re-enter the editor as described above.

If the Configuration PIN has been entered successfully (or the PIN number has not been set in the module) the first configurable parameter is displayed :

 To exit the front panel configuration editor at any time, press and hold the  () button.
Ensure you have saved any changes you have made by pressing the  button first.

 When the editor is visible, it is automatically exited after 5 minutes of inactivity to ensure security.

 If the Application Menu PIN is entered, then only the Application Menu is displayed. If the Full Configuration PIN is entered, the entire configuration menu is displayed including the Application Menu.

 The PIN number is automatically reset when the editor is exited (manually or automatically) to ensure security.

07.7 USING THE POWER GENERATOR UNIT**Earth leakage circuit breaker (picture 5)**

The unit is equipped with an earth leakage circuit breaker (1) capable of ensuring user protection in case of accidental contact with live parts or failure of the insulation system of connected users.

Press the test button T every month: the earth leakage circuit breaker should trip and de-energise the sockets.

If this would not be the case, then it is advisable not to use the unit and immediately seek technical advice.



Apply only to authorised centres for technical service on electrical components.

- Before connecting a load to sockets on the front panel of the unit, make sure that the generator supplies enough power for the tools that are connected.



Beware: electric motors' starting current requirements are considerably higher than rated full load values.



- Before connecting a load to single phase and/or three phase sockets, make sure that the circuit breakers are open.
- At the end of work, before removing plugs from panel sockets, open the circuit breakers.
- Connect loads to generator's sockets only by using cables of suitable size and in good conditions, with plugs fitted for the sockets on the panel. Do not use adapters.

07.8 ADJUSTMENTS AND SETTINGS

All controls for the adjustments and settings necessary when using the generator are mounted on the control panel and are described in this Chapter. It is forbidden to perform further adjustments and settings other than those described here.



Any adjustment and setting other than those made by the manufacturer may compromise the reliability of the power generator and make the warranty void.



The engine oil level should be checked daily by the operator, using the dipstick located on the left side of the unit.



Do not disconnect the battery cables when the generator is running as this can cause improper operation of the battery charger.



Stop the engine before fuelling. Do not smoke when fuelling. Do not perform fuelling near flames.



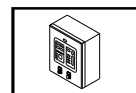
Do not overfill the fuel tank and clean up any spillages. Check daily that there is no leakage of fuel or oil from the engine.



When using the generator on road tow, it is the operator's responsibility to position the unit in a safe location.

07.9 PUTTING THE GENERATOR TEMPORARILY OUT OF SERVICE AND RESTARTING OPERATION

If the generator is put out of service for longer than 6 months, it is advisable to disconnect the negative terminal of the battery and to leave engine oil and fuel in to protect mechanical parts, along with the fuel supply, injection system and the fuel tank from oxidation. When putting the generator back to service, all fluids should be replaced, the battery should be charged, engine belts, if any, all couplings and fuel pipes and seals should be checked. In case of longer out of service periods, contact Mase Generators Department.



08.1- Warning.....page 42

08.2- General information.....page 42

08.1 WARNING



When running normally the electrical panel is powered from the Mains or the Generator.

Any maintenance work inside the equipment should only be carried out by qualified personnel.

In any event the following recommendations should be adopted to avoid direct contact:

the opening or removal of parts of the equipment can only be done by using the special key or tool (ref. CEI 17-13 section 7.4.2.2.3).

Protective devices inside the panel should not be removed when there is any voltage.

Any exceptions are subject to the adoption of prescribes safety provisions DPR 547 of 27/4/1955.

Only authorised personnel can carry out work inside the electrical panel.

The line between the generator and the service panel should be protected against the overloading of the generator's starting switch.

Respecting the recommendations in CEI 64-8 section 473.2.3 and section 551.5.1.

WARNING. IMPORTANT!!

The AMF can must be installed in a position where the short circuit current doesn't exceed 10 K A (effective value).

On the contrary, it must be protected against short circuit current by a circuit breaker or fuses. Take note that the current peak value on the ATS panel must not exceed 17 K A.

08.2 GENERAL INFORMATION

The generator combined with the ATS panel provides electrical energy just a few seconds after losing power at the mains.

It controls the operating conditions and in the event of an anomaly it stops the generator.

The equipment has been constructed in full compliance with EN60439-1 / CEI 17-13/1 and the EMC 89/336/CE directive regarding electromagnetic compatibility.

All the equipment and circuitry are arranged in such a way as to ensure they run properly and are easy to maintain, with the necessary safety class.

The IP protection class is established in line with the IEC529 / CEI 70-1 publication, and in agreement with the user. Enclosed is a technical manual for the control and management of the Generator's logic control, installation regulations, use and maintenance and an electrical layout.

POWER CONNECTION

Stick to the contents of the tables provided by the manufacturers of the conductors for fixing the size of the line and auxiliaries.

In reference to the standards set out in CEI 64-8/4, all the equipment and lines should be protected against short-circuits and overloads, and for reasons of safety all the relative prevention measures against accidental direct contact should be adopted.

Therefore, at the start of the mains cable there should be a switch with an adequate value and selectivity. Whenever Mains-Generator power switching is installed, this can be carried out with mechanically and electrically interlocked remote switches that are of a suitable size for the power of the generator, in class ACI conforming to ISO DIS8528-4. Or else with an electronically and mechanically interlocked motorised switch in **the AC21 category**.

PROTECTION AGAINST INDIRECT CONTACT

Check the state of the connection of the generator unit to the user's system and then assess the need for the use of differential circuit-breakers to protect against indirect contact.

Protection against indirect contact should be installed to protect the utilities, evaluating the system and the distribution circumstances.

The cost of the installation of differential circuit-breakers is borne by the end installer.

PROTECTION AGAINST ACCIDENTAL DIRECT CONTACTS

In observance of CEI 64-8/4 all relevant safety measures against accidental direct contacts must be adopted. All the equipment and lines should be protected against short-circuits and overloads. To this end a magnetothermic switch should be installed where the mains line starts, having a suitable value and selectivity.

Depending on the type and features of the system, the need for the installation of differential circuit-breaker protection on the line should be assessed.

CONNECTING THE BATTERY

Connect directly to the battery cables, connected to the starting motor of the three-phase motor.

The negative pole of the battery should be connected directly to earth to avoid problems.

POSITIONING THE ATS PANEL

The IP protection class of the electrical panel should be adequate for where it will be installed.

IP41 = for closed areas / regular use

IP55 = panels that will be rained on or exposed to rain.

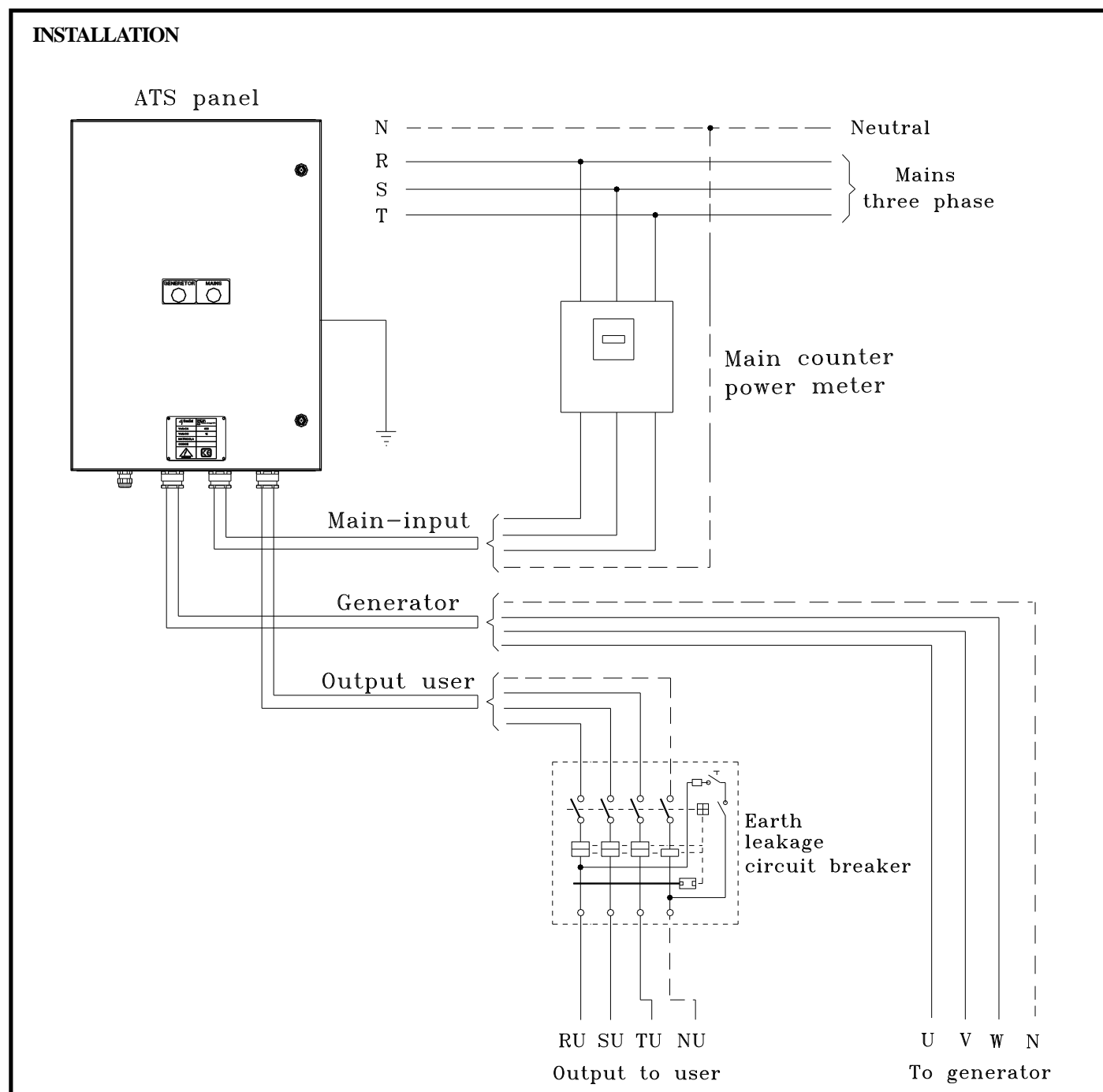
The line between the generator and the GENERATOR. CONTROL PANEL should be protected by a low magnetic magnetothermic switch.

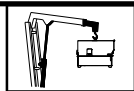
Follow the recommendations in CEI 64-8 section 473.2.3 and section 551.5.1.

EARTHING



It is absolutely essential to earth all the system's components.





09.1- Packing, transporting and storing the unit.....page 45

09.2- Lifting and moving the unit.....page 45

09.1 PACKING, TRANSPORTING AND STORING THE UNIT

Packaging

The package is provided by MASE Generators S.p.A..



Disposing of packaging onto land is strictly forbidden.

Transport (picture 1)

Do not overturn the generator (with or without packaging) during transport. The generator must be transported without fuel to avoid any leakage. The generator must be secured to the vehicle during transportation.



In case of long term installation, secure the generator using the anchor points provided in its base (picture 2).

Storage

The generator unit must be stored in the horizontal position.

09.2 LIFTING AND MOVING THE UNIT



All lifting operations must be carried out by qualified personnel, such as fork lift operators, crane operators and slingers. The operator should be deemed responsible for using the correct method of slinging and lifting the generator unit.

Lifting and moving

The generator must be lifted and moved as indicated in picture 3. Use a fork lift of proper capacity, fitted with wide forks, and lift the unit as illustrated (pic. 3).

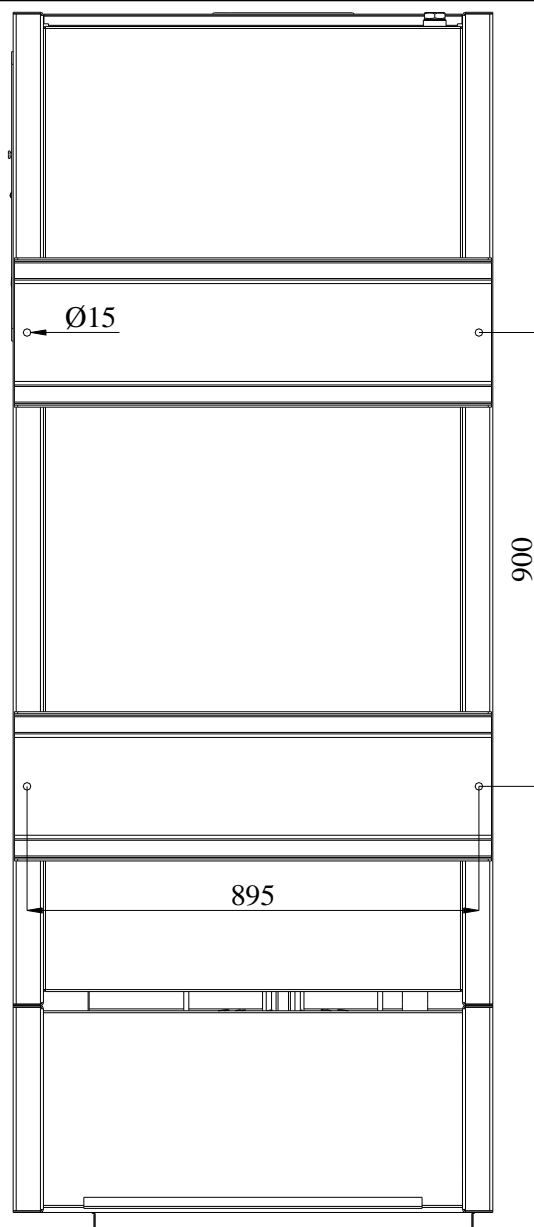
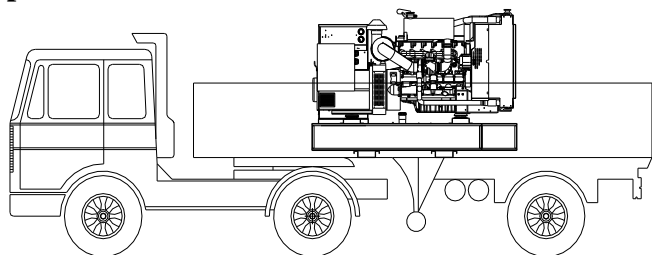


Never leave the load insecure. When lifting and moving the generator, do not stay or walk within it's proximity.



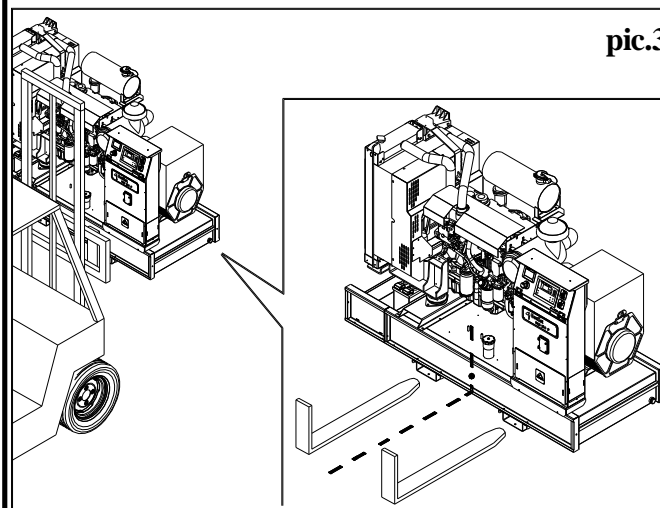
Lay the generator on the ground gently. When moving and transporting the generator, do not tilt it excessively.

pic.1

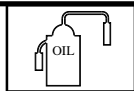


pic.2

Bottom view (dimensions in mm)



pic.3



10.1- Maintenance.....page.47

10.1 MAINTENANCE**REGULAR MAINTENANCE**

For service and maintenance operations relating to the engine, refer to the engine manufacturer's manual provided with the generator unit. To prevent breakdowns to the generator it is important to keep the engine properly serviced and maintained. Observe the maintenance directions provided in this Chapter and the "Use and Maintenance Manual" provided by the engine manufacturer.

MAINTENANCE SCHEDULE

Controls (when in use)	Frequency
Check oil level in engine	Daily
Check coolant level	Daily
Check that the heat exchangers are clean	Daily
Check that the air filter is clean	Daily
Drain water from the fuel pre-filter	150 hours
Check/top up electrolyte level in battery and clean terminals	Half-yearly
Planned maintenance	Frequency
Check state and tension of belt	300 hours
Change oil	600 hours
Change oil filter	600 hours
Change fuel filter	600 hours
Change fuel pre-filter	600 hours
Change fuel pre-filter	600 hours
Check exhaust pipes for damage	Half-yearly
Impurity drainage/suction from fuel tank	Half-yearly
Change auxiliary member belt	1200 hours
Change air filter	1200 hours
Change coolant	1200 hours or 2 years
Special maintenance	Frequency
Clean the turbocharger	1200 hours
Check then efficiency of the pre-post heating system (if available)	1200 hours
Injector calibration (Mechanical motors)	1800 hours
Overhaul injection pump (Mechanical motors)	3000 hours
Adjust play in valves-rocker arms	3000 hours

Lubricant Viscosity Recommendations for Direct Injection (DI) Diesel Engines

The correct SAE viscosity grade of oil is determined by the minimum ambient temperature during cold engine start-up, and the maximum ambient temperature during engine operation.

Refer to **Engine oil grade table** (minimum temperature) in order to determine the required oil viscosity for starting a cold engine.

Refer to **Engine oil grade table** (maximum temperature) in order to select the oil viscosity for engine operation at the highest ambient temperature that is anticipated.

Generally, use the highest oil viscosity that is available to meet the requirement for the temperature at start-up.

Engine oil grade table		
EMA LRG-1 API CH-4 Viscosity Grade	Engine Oil Viscosity	
	Minimum	Maximum
SAE 0W20	-40 °C (-40 °F)	10 °C (50 °F)
SAE 0W30	-40 °C (-40 °F)	30 °C (86 °F)
SAE 0W40	-40 °C (-40 °F)	40 °C (104 °F)
SAE 5W30	-30 °C (-22 °F)	30 °C (86 °F)
SAE 5W40	-30 °C (-22 °F)	40 °C (104 °F)
SAE 10W30	-20 °C (-4 °F)	40 °C (104 °F)
SAE 15W40	-10 °C (14 °F)	50 °C (122 °F)

Check oil level in engine (picture 1)

Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning.

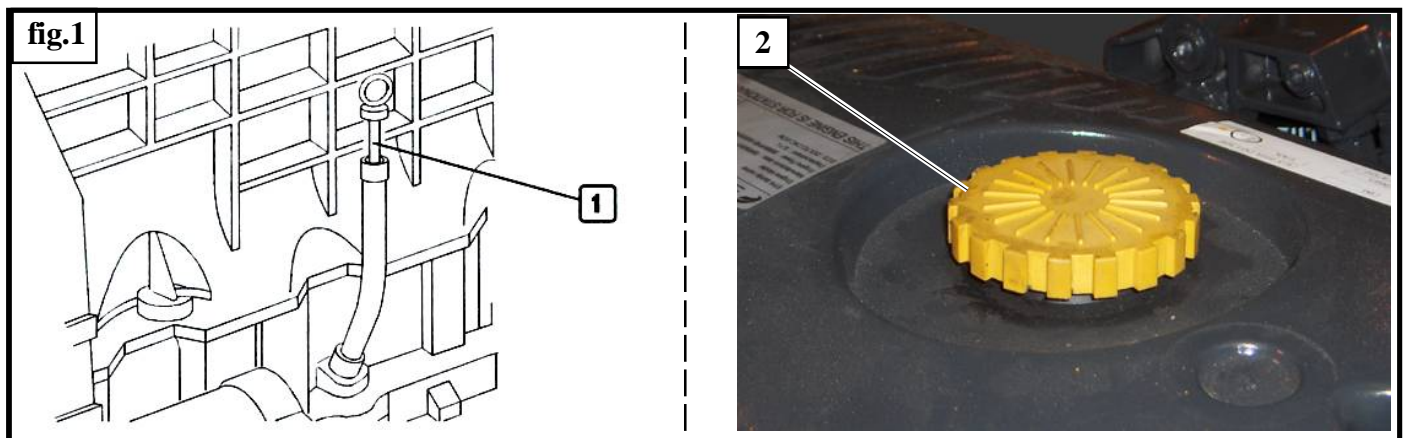
- Take all necessary action to ensure that the machine is “level”.
- Using the dipstick (1), check that the oil level is between the “Min” and “Max” levels.
- If the level is too low, top up through the inlet, after first removing the relevant cap (2).



After topping up, make sure that the oil level does not exceed the “Max” limit marked on the dipstick.



Make sure that the dipstick is inserted properly and the filler cap is turned in a clockwise direction until it stops turning completely.



Check oil level in engine (picture 1)

Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning.

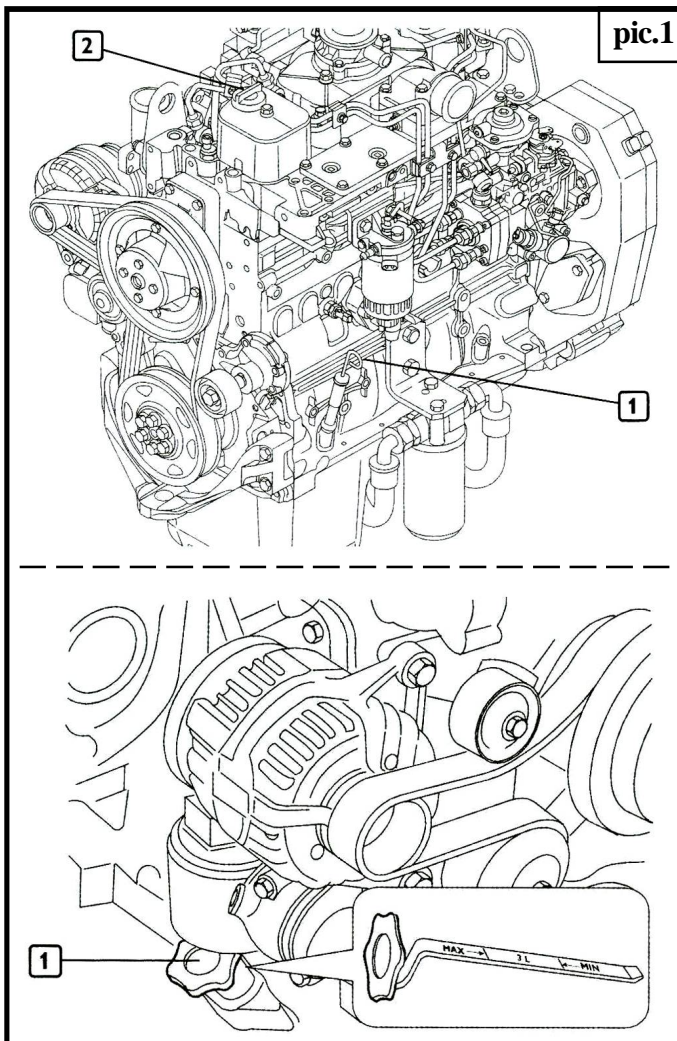
- Take all necessary action to ensure that the machine is “level”.
- Using the dipstick (1), check that the oil level is between the “Min” and “Max” levels.
- If the level is too low, top up through the inlet, after first removing the relevant cap (2).



After topping up, make sure that the oil level does not exceed the “Max” limit marked on the dipstick.



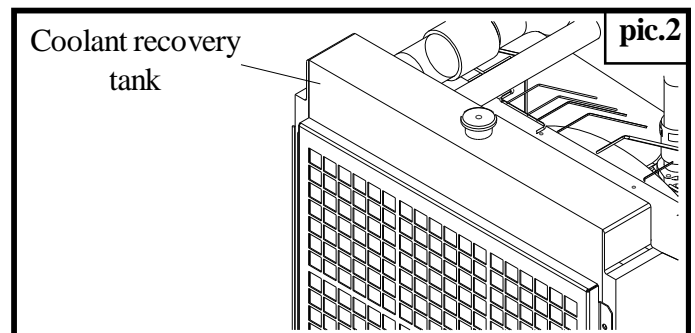
Make sure that the dipstick is inserted properly and the filler cap is turned in a clockwise direction until it stops turning completely.

**Cooling System Coolant Level - Check (picture 2)**

Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool.

- Observe the coolant level in the coolant recovery tank. Maintain the coolant level to “COLD FULL” mark on the coolant recovery tank.
- Loosen filler cap slowly in order to relieve any pressure. Remove the filler cap.
- Pour the correct coolant mixture into the tank. Do not fill the coolant recovery tank above “COLD FULL” mark.
- Clean filler cap and the receptacle. Reinstall the filler cap and inspect the cooling system for leaks.

Note: The coolant will expand as the coolant heats up during normal engine operation. The additional volume will be forced into the coolant recovery tank during engine operation. When the engine is stopped and cool, the coolant will return to the engine.

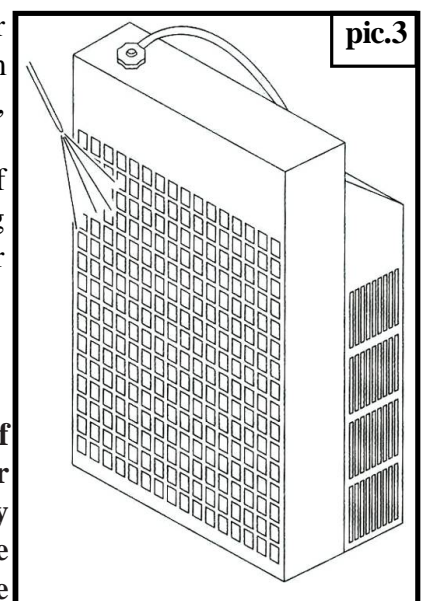
**Clean heat exchangers (picture 3)**

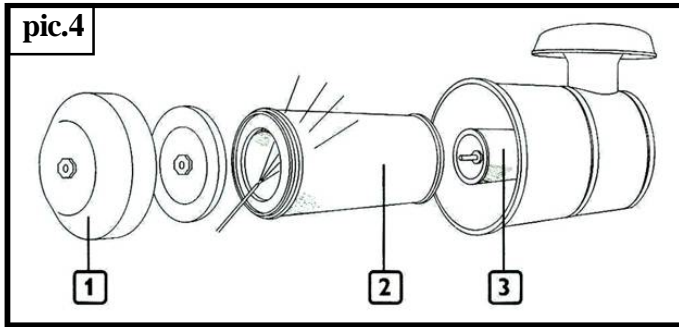
Check that the radiator air inlets are free from dirt (dust, mud, straw, etc.).

Clean them if necessary, using compressed air or steam.



The use of compressed air makes it necessary to use suitable protective equipment for the hands, face and eyes.



Cleaning the air filter (picture 4)

Only proceed with the engine stopped.

- Remove the filter cover (1) after first unscrewing the locking handle.
- Remove the external cartridge (2), after unfastening the second locking handle; during this operation, take care to ensure that no dust get into the sleeve.
- Check that there is no dirt. If there is, clean the filter element as indicated below.
- Blow dry compressed air through the filter element, from the inside outward (maximum pressure 200 kPa). Do not use detergents; do not use diesel.
- Never use tools to beat the filter element, and check its condition before replacing it.
- Replace the filter if any breakages or tears are found.
- Check that the gasket at its base is in good condition. Some filter systems are fitted with a second filter element (3) which does not require cleaning; this must be replaced at least once every 3 changes in the main element.
- Reassemble by repeating the above operations in reverse order.



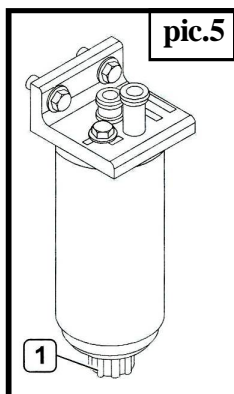
Take care to ensure that the parts are reassembled correctly.

Drain water from the fuel filter/pre-filter (picture 5)

The high risk of refueling with fuel that is polluted by foreign bodies and water makes it advisable to carry out this control every time you refuel.

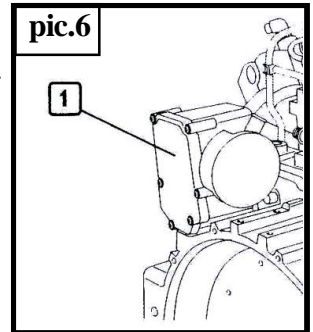
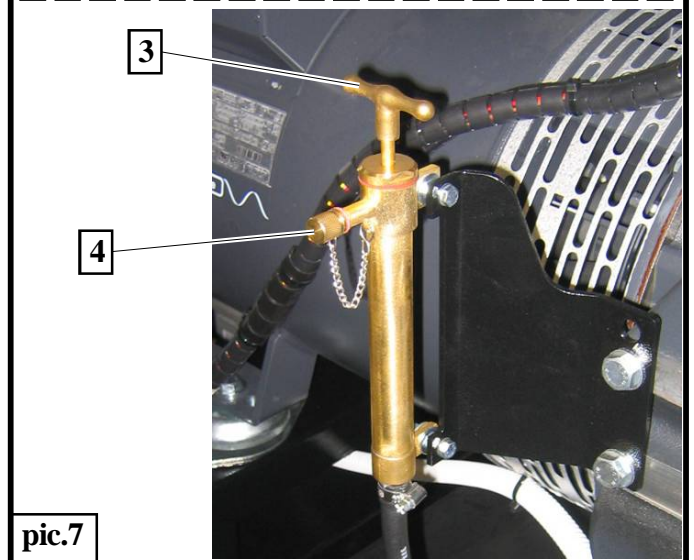
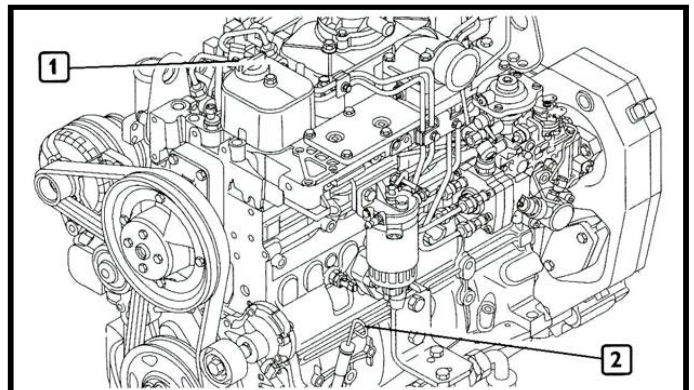
Proceed with the engine stopped.

- Place a container under the filter or pre-filter to collect the fluid.
- Unscrew the tap plug (1) in the bottom part of the filter; in some layouts the plug includes a sensor to detect the presence of water in the diesel.
- Drain off liquid until only "diesel" can be seen.
- Close the plug again, tightening it completely by hand.
- Dispose of the drained fluids according to current requirements.

**Replacing the oil vapour filter (picture 6)**

Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning.

- Loosen the screws and remove the cover (1) of the filter housing.
- Remove the two filters and proceed to the replacement.
- Install the cover again.

**Change oil (picture 7)**

Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning.

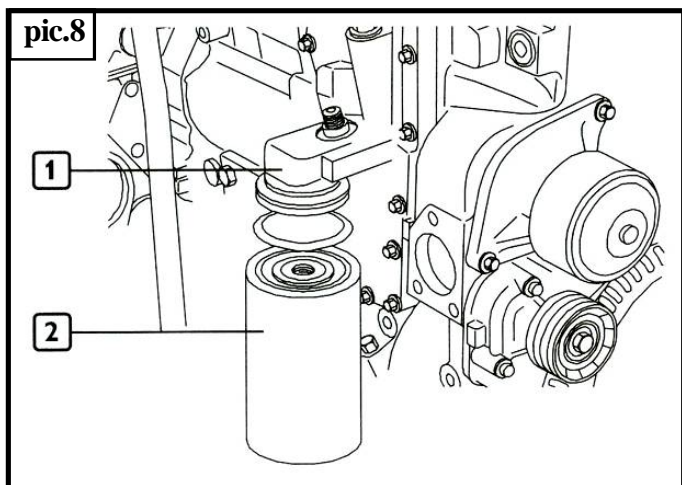
- Place a container under the plug (4) of the oil drain pump.
- Remove the plug (4).
- To pump with the oil pump handle (3).
- Fill up through the feeder hole (1).
- Using the dipstick (2), check that the oil level is between the "Min" and "Max" levels.
- Dispose of used oil according to current requirements.

Change oil filter (picture 8)

Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning.

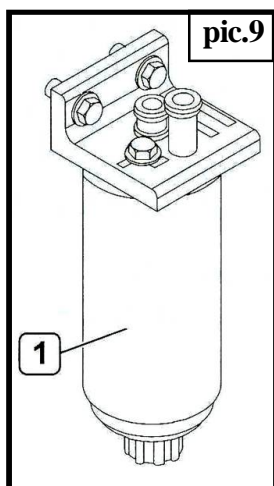
Only use filters with a filtration level equivalent to the ones you are replacing.

- Place a container under the filter support (1) to collect the used oil.
- Unscrew the filter and remove it (2).
- Carefully clean the surfaces of the support that are in contact with the seal gasket.
- Damp the new seal gasket with a thin layer of oil.
- Hand screw the new filter into place until the seal gasket touches the support, then lock by a further 3/4 of a turn.
- Dispose of the old filter according to current requirements.

**Change fuel filter (picture 9)**

Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning. Only use filters with a filtration level equivalent to the ones you are replacing.

- Remove the filter (1) by unscrewing it.
- Check that the new filter has performance levels that satisfy the needs of the engine (e.g. by comparing them with the old one).
- Damp the new filter seal with diesel or engine oil.
- Hand screw the new filter into place until the seal gasket touches the support, then lock by a further 3/4 of a turn.
- Pay particular attention to the electrical fuel pre-heater (if available) and relevant electrical connection.

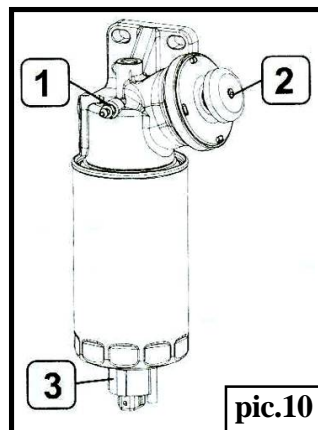


Do not fill up the new filter before it is fitted to the support, to avoid inserting harmful impurities into the injection system and circuit.

Changing the fuel pre-filter (picture 10)

Only proceed with the engine stopped.

- Should the filter be fitted with a sensor to detect the presence of water (3), remove the whole sensor from its seat.
- Remove the pre-filter by unscrewing it.
- Check that the new filter has performance levels that satisfy the needs of the engine (e.g. by comparing them with the old one).

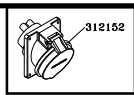


- Damp the new filter seal with diesel or engine oil.
- Hand screw the new filter into place until the seal gasket touches the support, then lock by a further 3/4 of a turn.
- Place the water presence sensor in its seat, taking care to couple the threads correctly.
- Loosen the bleeder screw (1) on the pre-filter support and activate the hand pump (2) until the supply circuit is full. Ensure that any fuel coming out is not dispersed into the environment.
- Lock the bleeder screw tightly.
- Start the engine and run it at idle for a few minutes to eliminate any residual air.

Change coolant


























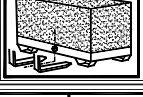











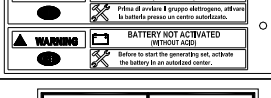









Only proceed with the engine stopped and at a low temperature, so as to avoid the risk of burning.

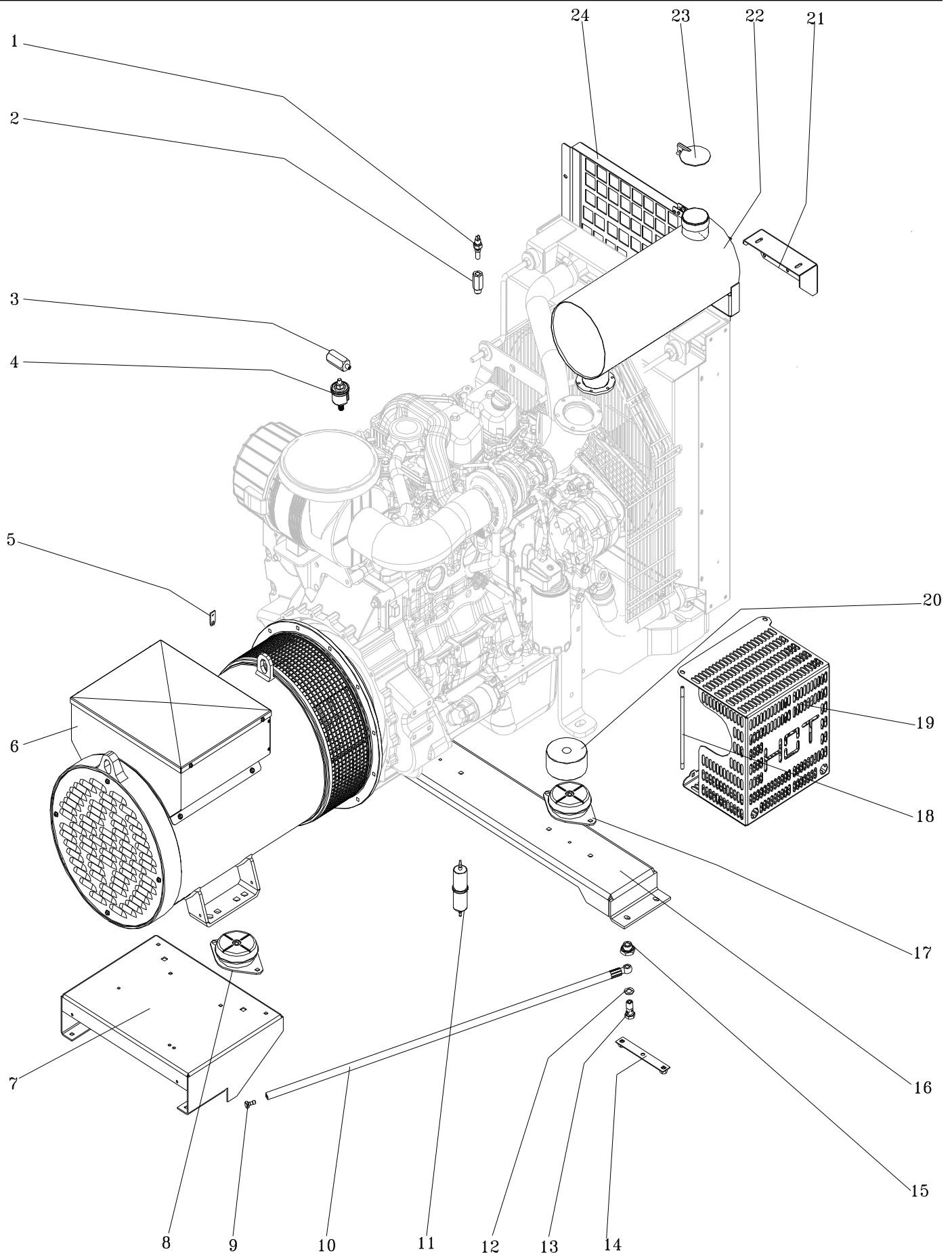
- Provide suitable containers to ensure that no coolant is dispersed into the environment.
- Loosen the seal elements, remove the sleeves connecting the engine circuit to the heat exchanger and wait until it has emptied completely. When empty, repair the circuit making sure that the sleeves are perfectly sealed.
- Fill up the circuit.
- Refill the engine and the heat exchanger until complete top up.
- With the filler cap open, start the engine and keep it idling for nearly one minute. This phase facilitates the cooling liquid air bleed.
- Stop the engine and top up again.



11.1- Spare part codes.....pag.53

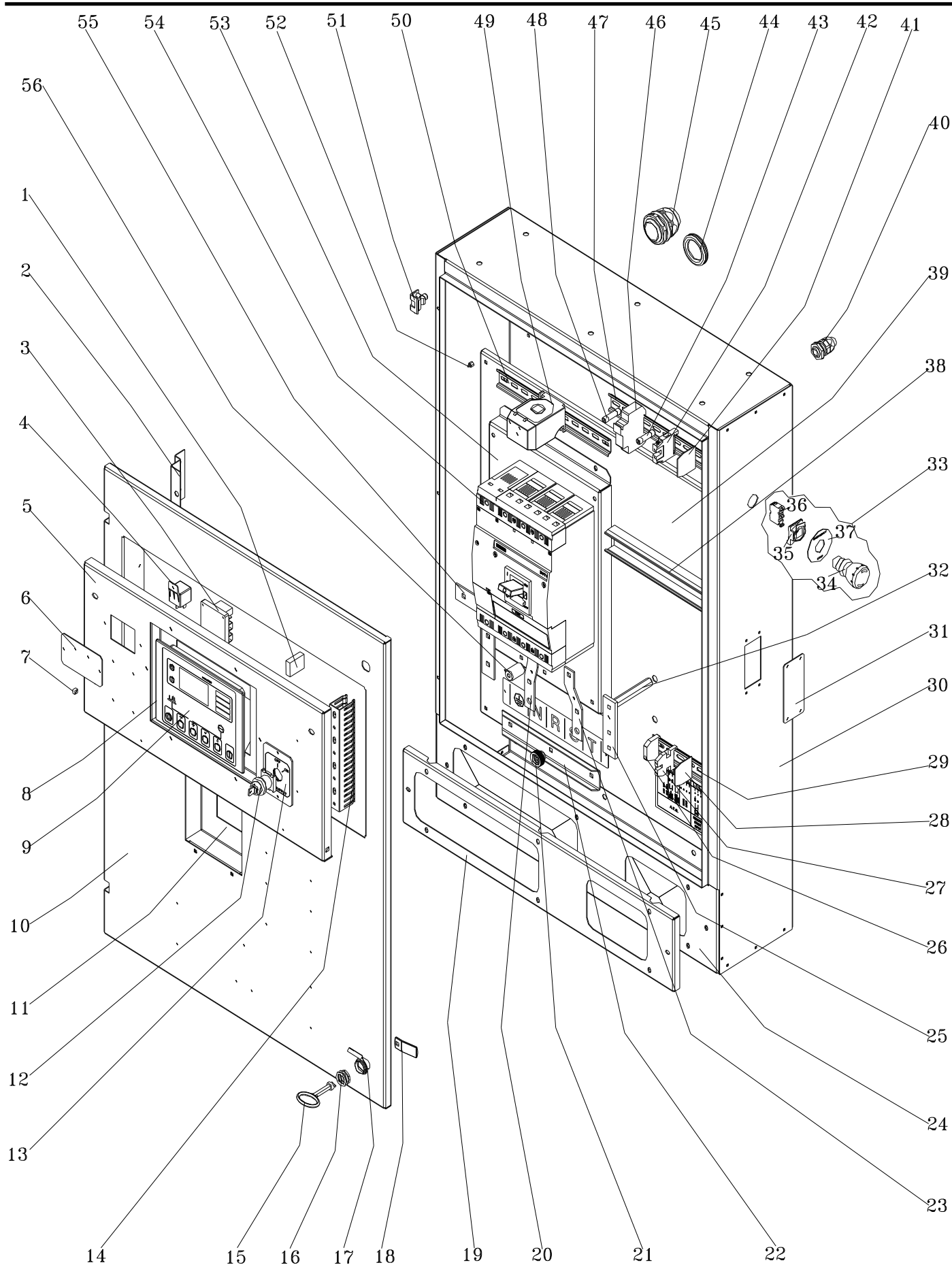
11.1 SPARE PART CODES

STICKER	SPARE PART CODE	STICKER	SPARE PART CODE
	41810		42116
	41811		42117
	41776		42115
	41775	   	42348
	41777	   	42349 (120X30) 42352 (160X40)
	41778	   	42467
	41781	  	42653
	42353	  	42350
	42109	  	42351
	42132	 	42466
	42108		42573
	42110		42397
	42111		
	42112	 	
	42119		
	42114		



Spare parts codes

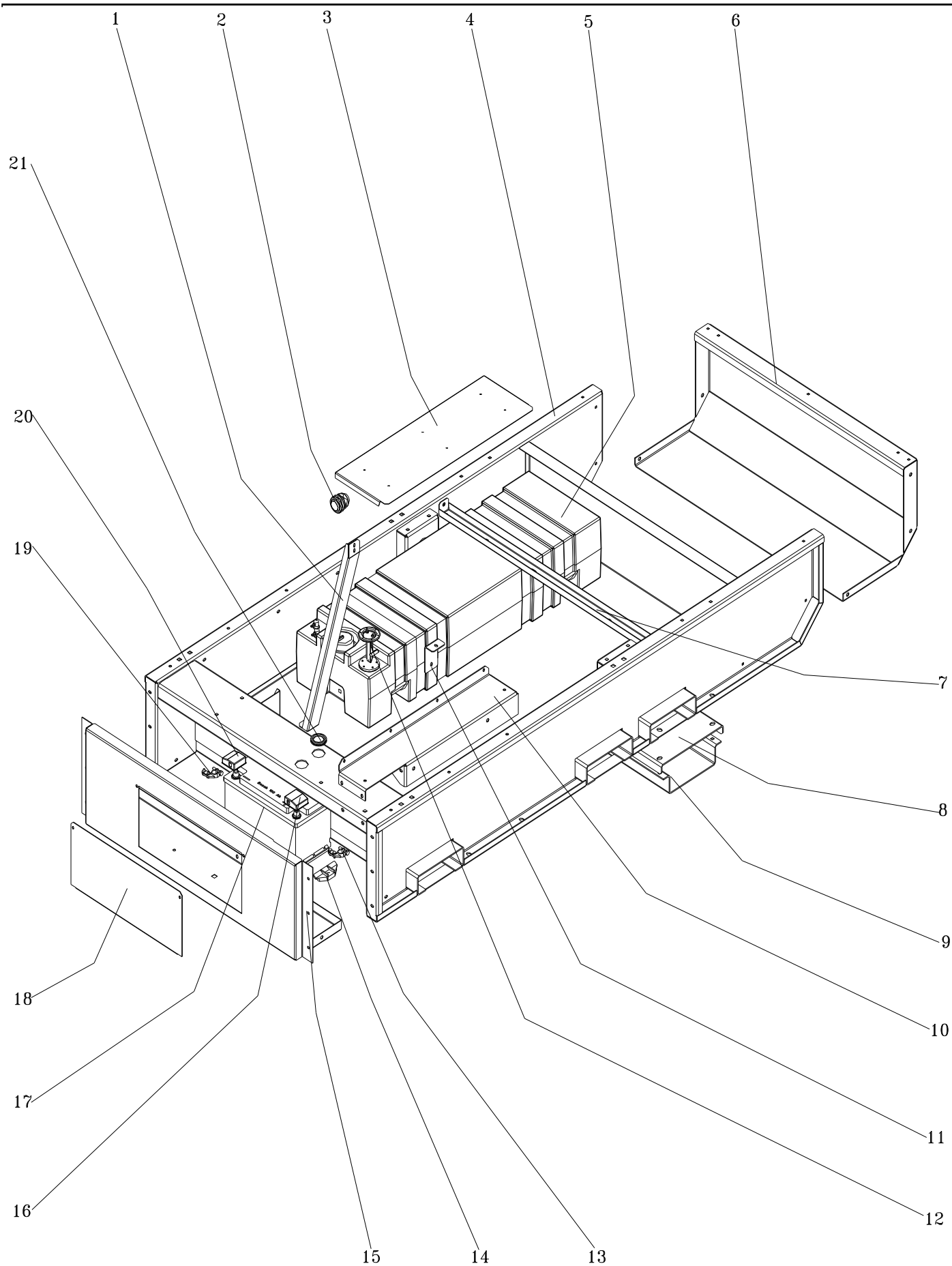
N.	DESCRIPTION	CODE
1	Temperature sensor	130679
2	Reduction	139648
3	Reduction	158129
4	Pressure sensor	130678
5	Engine plate	136960
6	Alternator	81965
7	Alternator support	159905
8	Shock absorber	134960
9	Pipe cap	117221
10	Oil drain pipe	138806
11	Fuel pre-filter	134661
12	Gasket	118521
13	Perforated screw	116074
14	Shock absorber plate	136196
15	Reduction	143957
16	Engine support	159904
17	Shock absorber	135110
18	Tie	101714
19	Turbo protection	157431
20	Shock absorber spacer	
21	Silencer support	159925
22	Silencer	159924
23	Flap	103945
24	Radiator grid	159908



Spare parts codes

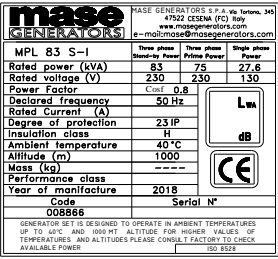
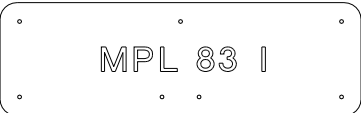
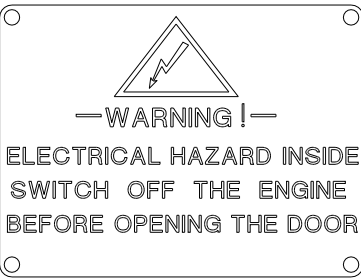
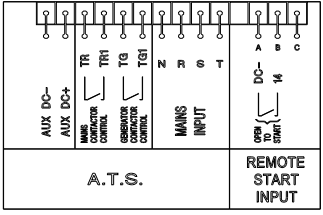

N.	DESCRIPTION	CODE
1	Contact	134825
2	Door support	136306/2
3	GS0804	143118
4	12V relay	6306
5	Front plate	157994
6	Relay plate	158088
7	Bushing	136858
8	Control panel frame	157993
9	Control panel	146521
10	Front panel	159912
11	Circuit breaker box	159911
12	DC Supply selector	145869
13	Dc Supply plate	151676
14	Cables duct	137637
15	Key	6486
16	Lock	6485
17	Lock protection	124734
18	Lock plate	145809
19	Rubber wire holder frame	150230
20	Conductor	155737
21	Knob	117551
22	Cables plate	141956
23	Conductor	155736
24	Rubber wire holder	150232
25	Grounding plate	145760
26	Black clamp	5996
27	4 mmq clamp	5975
28	Clamp stop	5979/4
29	L.125 Omega profile	5828/125
30	Box	159915
31	Box plate	159914
32	Spacer	143238

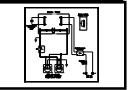
N.	DESCRIPTION	CODE
33	Complete emergency stop button	156209
34	Emergency stop button	33482
35	Emergency stop button base	33483
36	N.C. contact	33485
37	Emergency stop button rating plate	129871
38	Cables duct	141793/630
39	Instrument panel	159913
40	D16 wire holder	5960/4
41	Clamp stop	5979
42	10 mmq clamp	7122
43	10A fuse	133286
44	DG36 wire holder	5748
45	1" 1/4 wire holder	5661
46	Fuse holder	133205
47	L.300 Omega profile	5828/300
48	2A fuse	133285
49	Transformer	6428
50	L.275 Omega profile	5828/275
51	Hinge	145499
52	Spacer	132131
53	Circuit breaker support	158882
54	Circuit breaker	159325
55	Ground conductor	155733
56	Insulator	141787



Spare parts codes

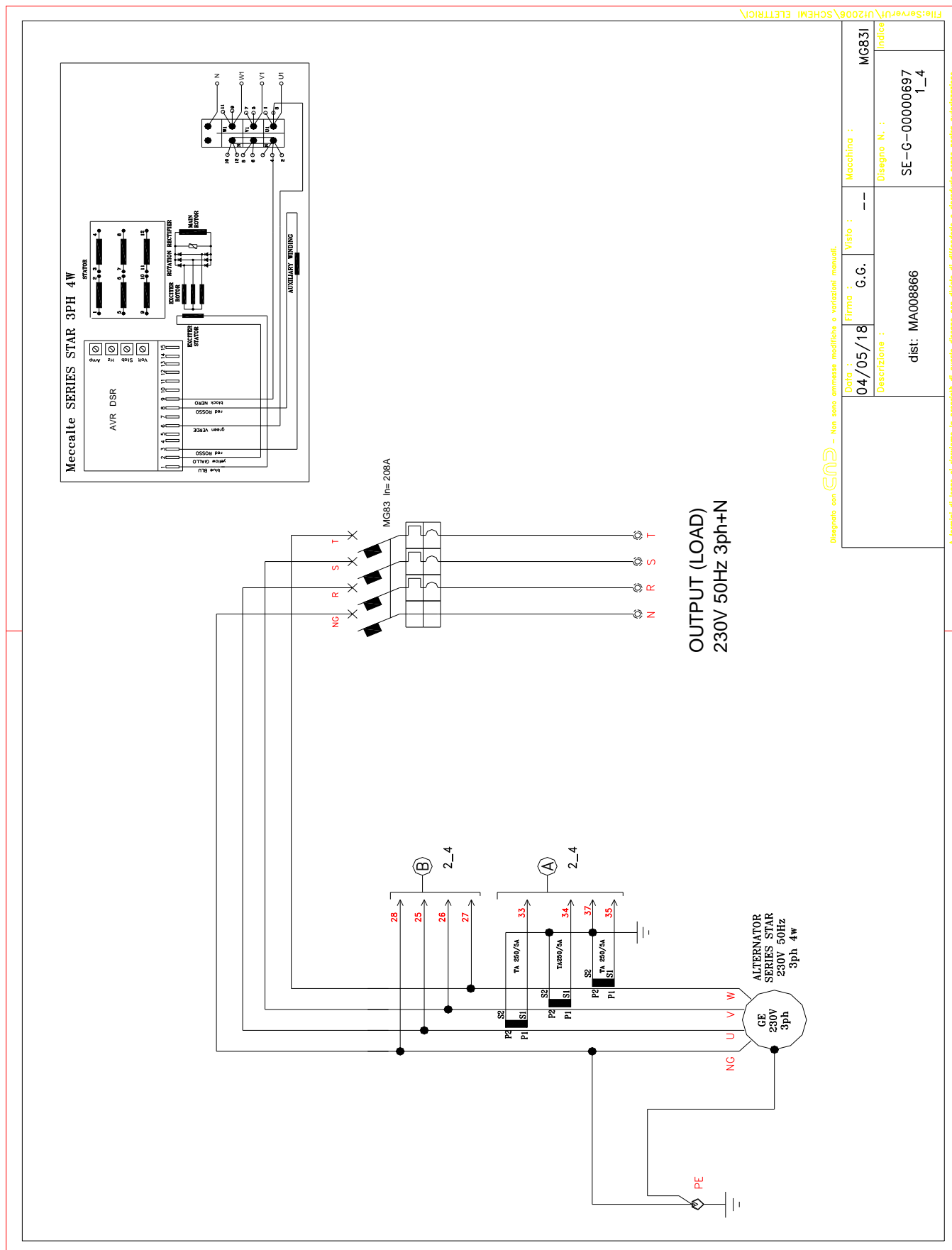
N.	DESCRIPTION	CODE
1	Front panel plate	159907
2	1" 1/4 wire holder	5661
3	Top cover	150221
4	Basement	157095
5	Fuel tank	71391
6	Rear basement panel	157094
7	Fuel tank support	157490
8	Contrast plate	159617
9	Support plate	159616
10	Front panel support	159907
11	Fuel tank plate	151565
12	Float	141910
13	Battery positive clamp	4351
14	Battery fixing plate	133064
15	Battery compartment	159906
16	Blue clamp cover	109606/B
17	Battery	116357
18	Battery door	157097
19	Battery negative clamp	4352
20	Red clamp cover	109606/R
21	DG36 wire holder	5748

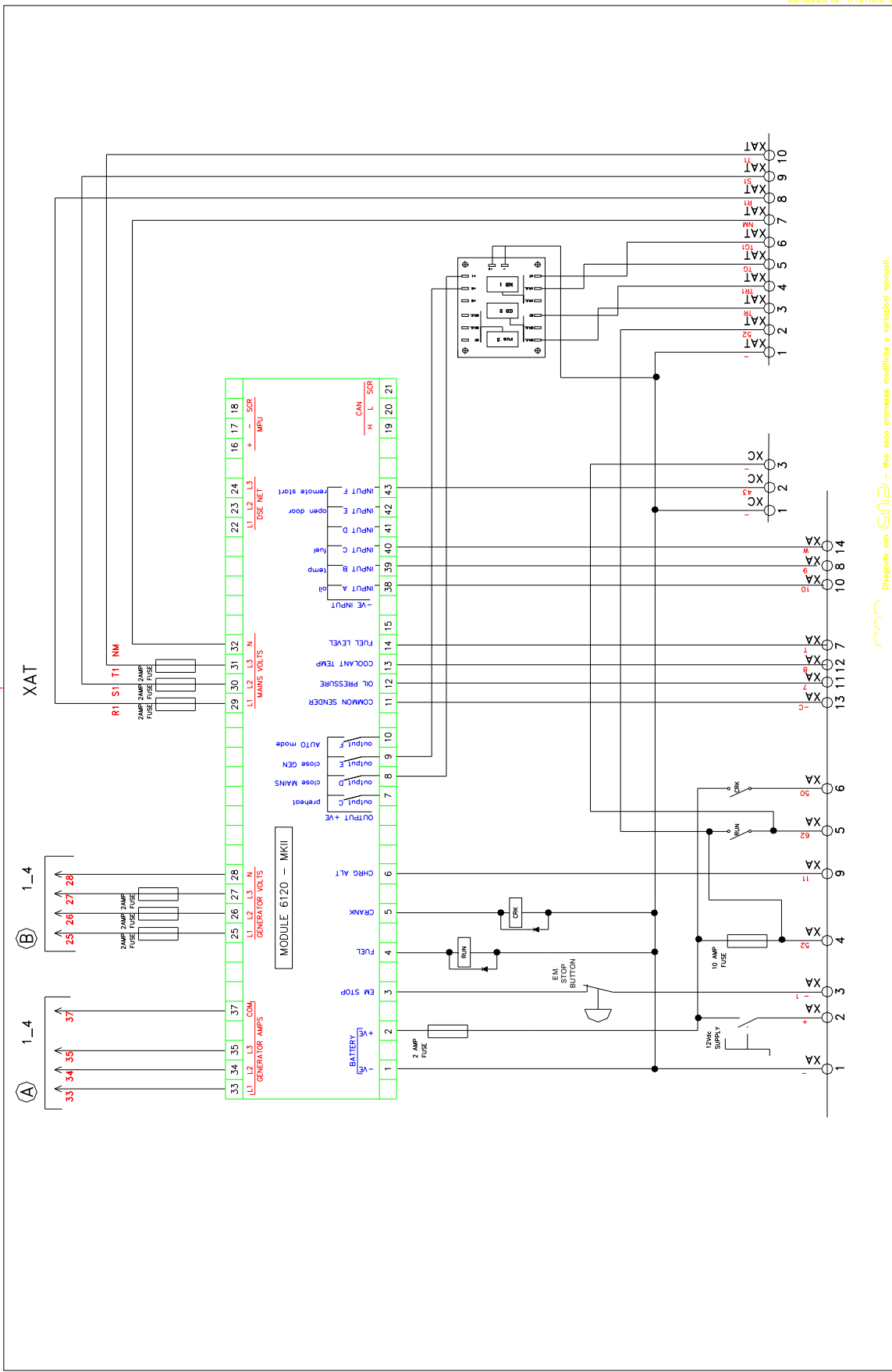
RATING PLATE	SPARE PART CODE
 <p>MPL 83 S-I</p> <p>Rated power (kVA) 83 75 27.6</p> <p>Rated voltage (V) 230 230 130</p> <p>Power Factor Cosφ 0.8</p> <p>Declared frequency 50 Hz</p> <p>Rated Current (A) 231P</p> <p>Degree of protection H</p> <p>Insulation class 40°C</p> <p>Ambient temperature 1000</p> <p>Altitude (m) 1000</p> <p>Mass (kg) 2018</p> <p>Performance class 2018</p> <p>Year of manufacture 2018</p> <p>Code 008866</p> <p>Serial N°</p>	159919
 <p>MPL 83 I</p>	159918
 <p>—WARNING!—</p> <p>ELECTRICAL HAZARD INSIDE</p> <p>SWITCH OFF THE ENGINE</p> <p>BEFORE OPENING THE DOOR</p>	151922
 <p>AUX DC- AUX DC+ TR TH TG TGT N R S T MANS INPUT A.T.S. REMOTE START INPUT</p>	153550
 <p>INRST</p>	137346



12.1- Electrical diagrampag.62

12.1 ELECTRICAL DIAGRAM

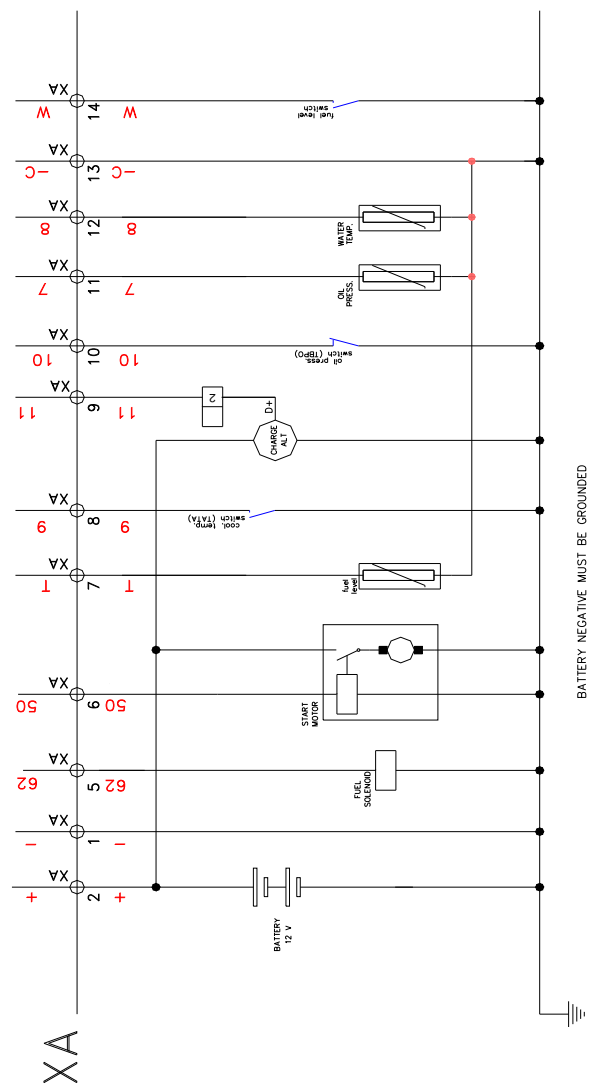




Diagnostico con - Non sono ammesse modifiche o variazioni manuali.

Data :	04/05/18	Firma :	G.G.	Visto :	--	Macchina :	MG831
Descrizione :						Disegno N. :	SE-G-00000697 2_4
						dist:	MA008866

A termini di legge ci riserviamo la proprietà di questo disegno con divieto di diffonderlo o riprodurlo senza nostra autorizzazione.



File:Server\U\U2008\SCHEMI ELETTRICI\

Disegnato con CAD - Non sono ammesse modifiche e variazioni manuali.		Macchina : MG83J	
Data : 04/05/18	Firma : G.G.	Visio : ---	Indice
Descrizione : dist: MA008866		Disegno N. : SE-G-00000697 3_4	

A termini di legge ci riserviamo la proprietà di questo disegno con diritto di diffonderlo e riprodurlo senza nostra autorizzazione.

