

GenSet



MPM 6/230 S-L

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MOTOR WELDING SET / GENERATING SET
FOR STATIONARY USE
USE AND MAINTENANCE MANUAL



Sistema di Gestione Qualità
conforme ai requisiti
UNI EN ISO 9001:2008
Certification
in accordance with
UNI EN ISO 9001:2008
N° IT07/1433



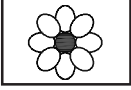




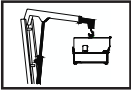
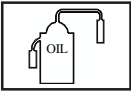
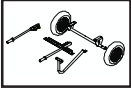
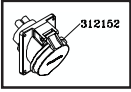
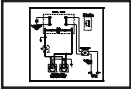



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Machine specifications can be modified at any time without any obligation to update this publication. It is recommended to read this manual thoroughly because incorrect operation may result in the warranty being void. Therefore it is also recommended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

Reproduction of this manual is not permitted, unless written approval is obtained from Gen Set 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 manual has been produced according to the regulations provided by:

- Attachment “I” to 2006/42/EC Directive
- UNI EN 292/2 - 1992, article 5.5.

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

- 2006/42/EC: Machine Directive;
- 2006/108/EC: Electromagnetic Compatibility Directive;
- 2006/95/EC: Low Voltage Directive;
- 2000/14/EC: Noise Emission in the Environment Directive.

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 L_{WA} and L_p . In this manual the noise emission is indicated as sound power level (L_{WA}) 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 (L_{WA}) using the following table:

L_p at 1 m = L_{WA} - 8 dB

L_p at 4 m = L_{WA} - 20 dB

L_p at 7 m = L_{WA} - 25 dB

L_p at 10 m = L_{WA} - 28 dB

L_p at 16 m = L_{WA} - 32 dB

Example: for equipment with $L_{WA} = 90$ 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 (L_{WA}) 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 L_{WA} 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.

WELDING PROCESS: LEGEND



Shielded metal arc welding (SMAW).



Gas tungsten arc welding (GTAW) Lift Start only.



Gas metal arc welding (GMAW).

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
kWm	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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02.3- Protective clothing recommended for operators.....	page 9
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02.5- Location of safety signs provided on the unit.....	page 13

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

02.1 SAFETY PRECAUTIONS TO BE OBSERVED



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

- 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.

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:





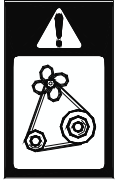
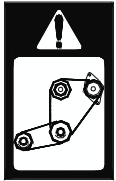
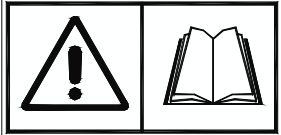
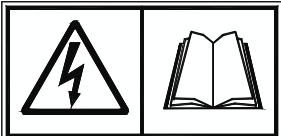
- Coveralls
- Medium/heavy duty gloves
- Acid resistant gloves (only for battery maintenance)
- Protective ear plugs and/or earmuffs

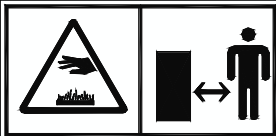
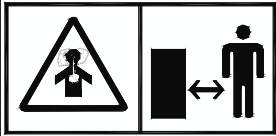
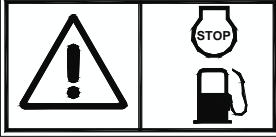
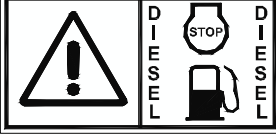


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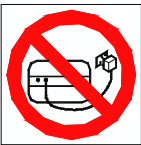



02.4 MEANING OF SAFETY SIGNS







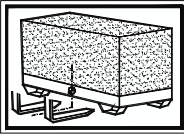
These signs inform the user about any hazards that can cause severe injury. Read carefully the meanings and precautions indicated in this manual.

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

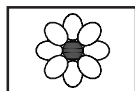
Danger signs	Meaning
	Danger of electric discharges.
	Danger: the generator can be started remotely, do not stay in the proximity.
	Danger of burns: hot surfaces.
	Danger: do not open when the engine is hot.
	Danger: belt and fan propeller. Turn off the generator before opening covers or raising the 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.</p> <p>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.</p> <p>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>

[illegible]



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.

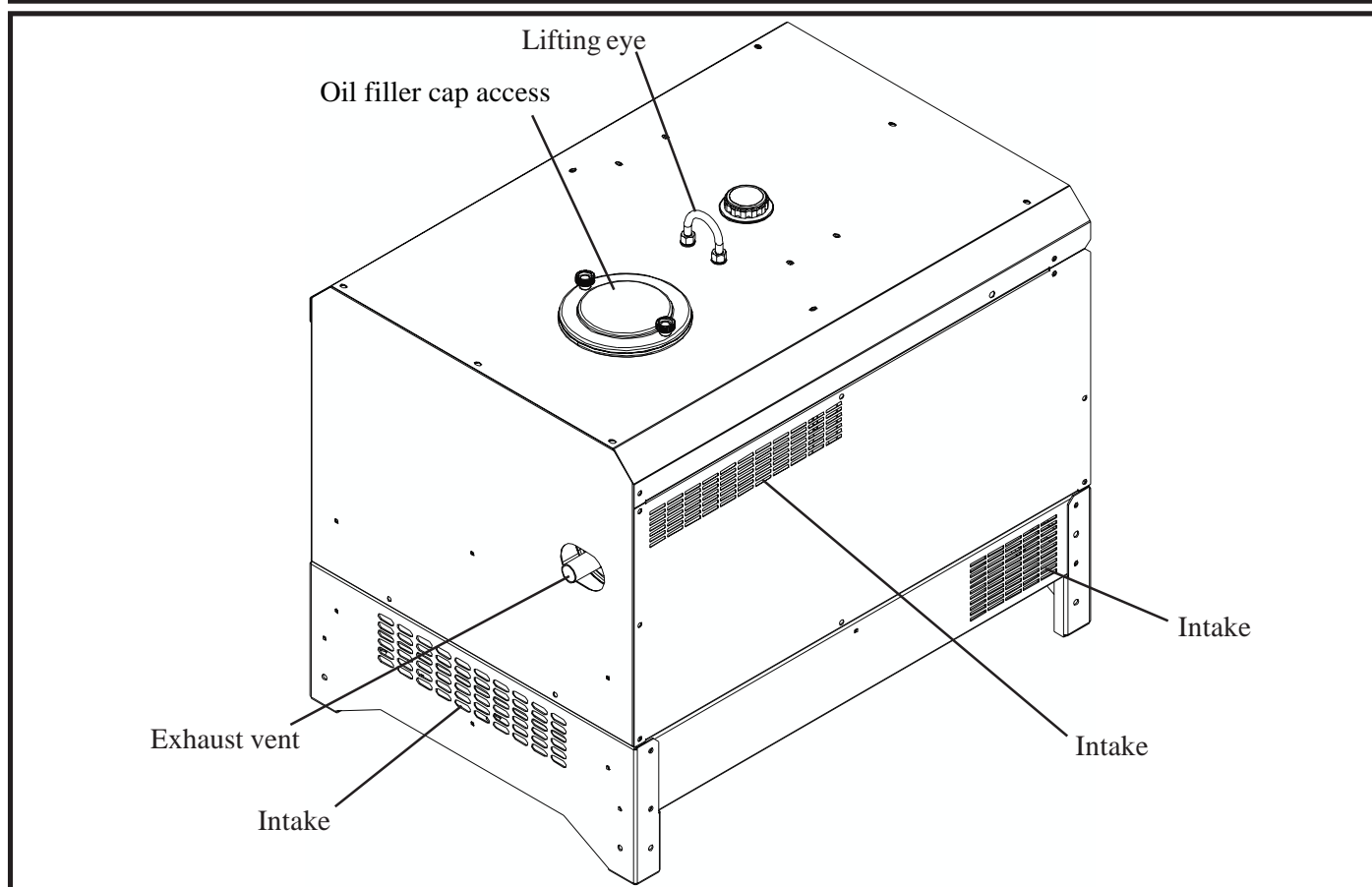
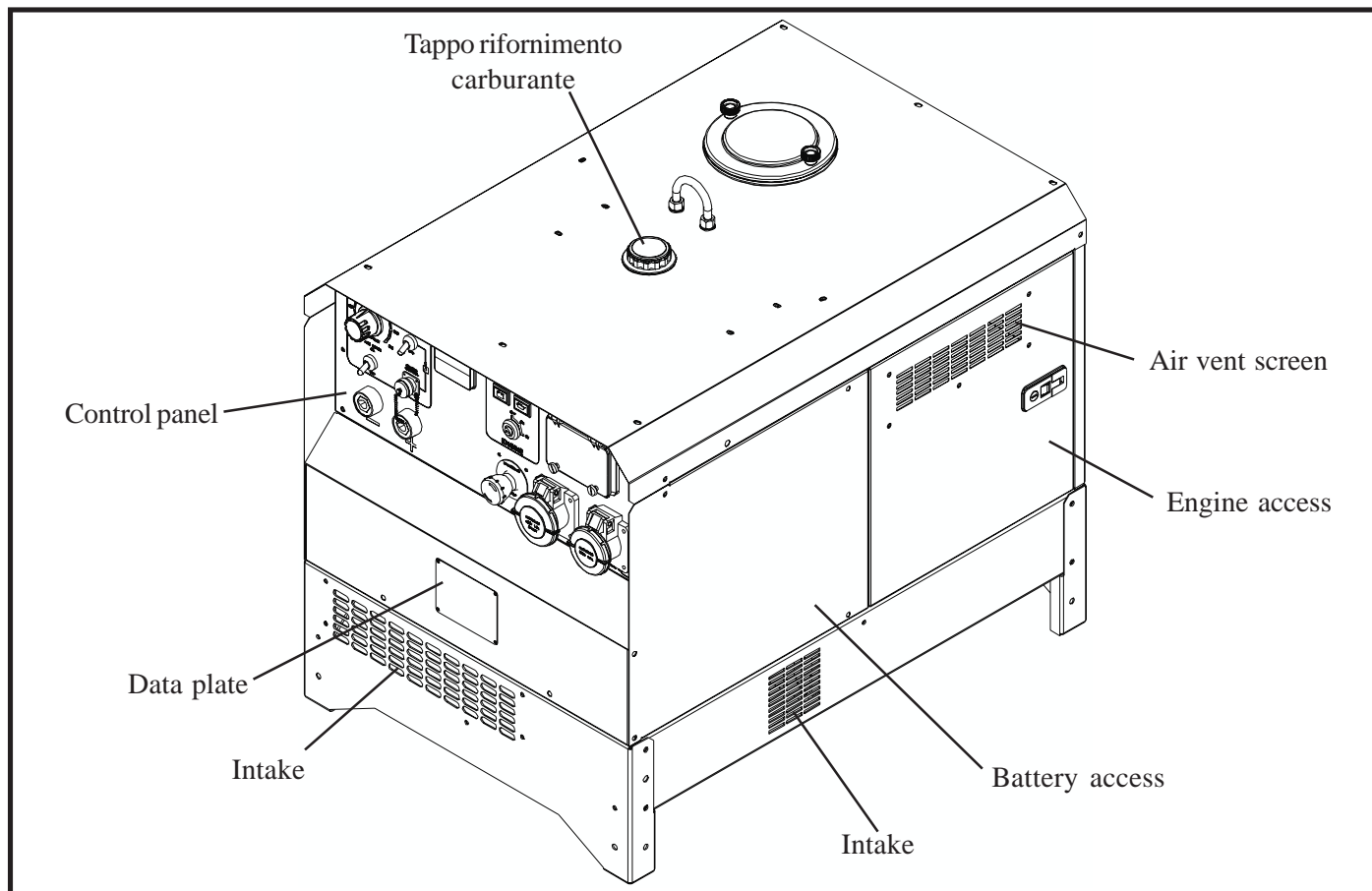
Dispose of batteries as instructed by local legislation.

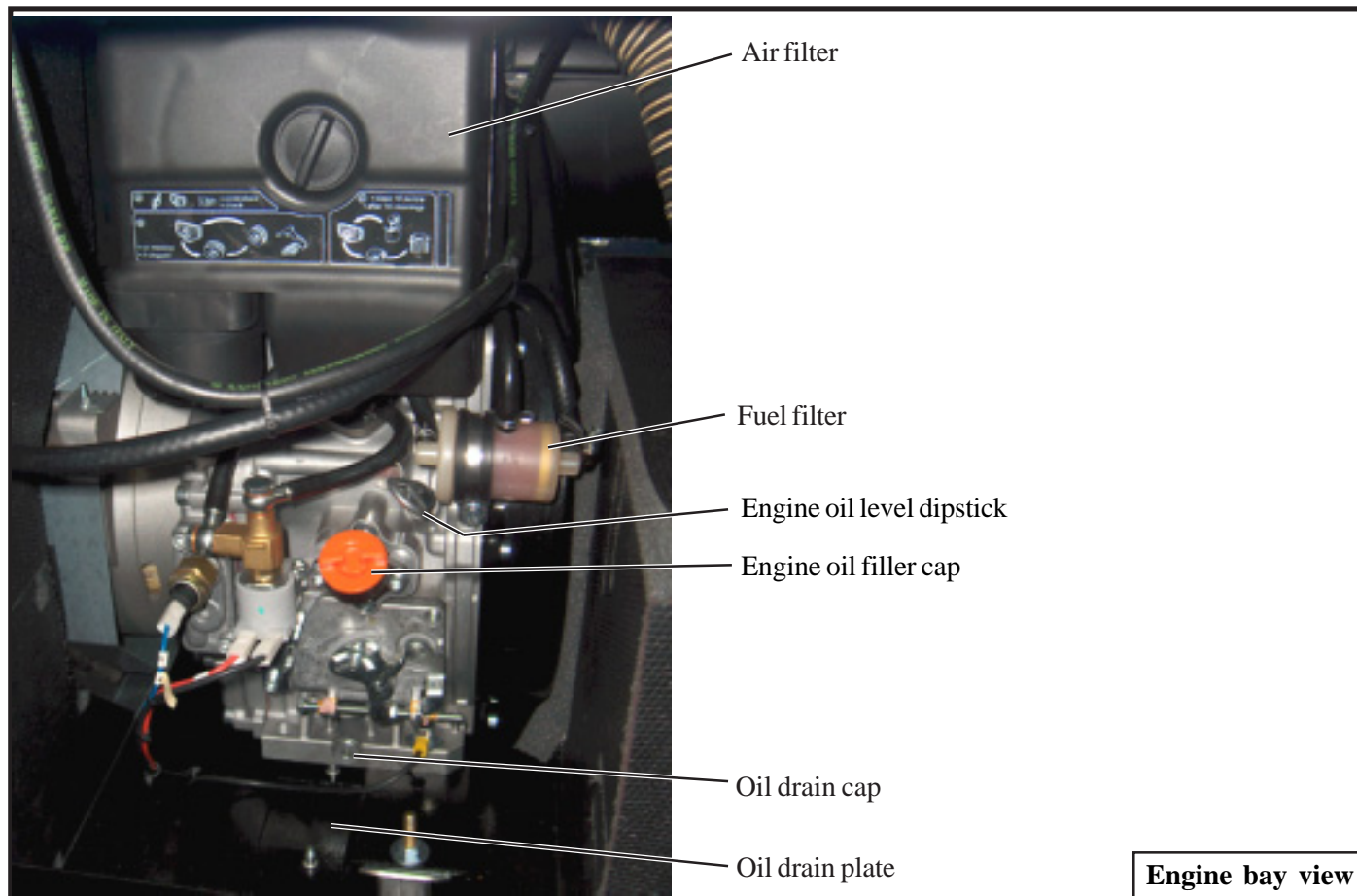


04.1- Machine components.....page 17

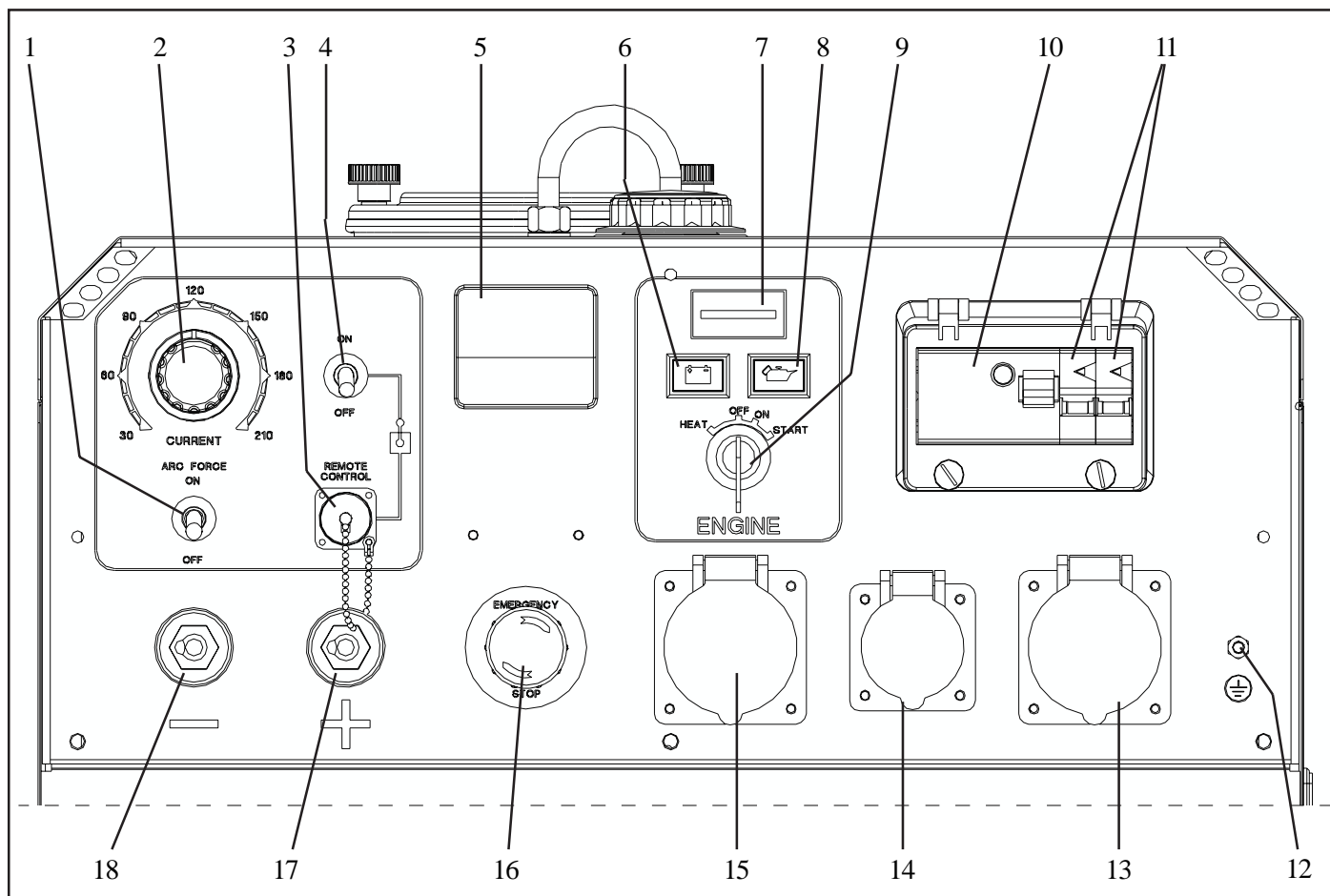
04.2- Control panel description.....page 19

04.1 MACHINE COMPONENTS





04.2 CONTROL PANEL DESCRIPTION



LEGEND

1. Arc force switch
2. Welding current regulator
3. Remote control connector
4. Remote control switch
5. Voltmeter
6. Battery charger failure alarm lamp
7. Hourmeter
8. Low oil pressure alarm lamp
9. Starting key
10. 40 A 4 poles earth leakage circuit breaker
11. 16 A 1 pole circuit breaker
12. Earth clamp connection
13. 415 V 16 A three-phase current socket
14. 240 V 16 A single-phase current socket
15. 110 V 32 A single-phase current socket
16. Emergency stop button
17. Welding socket: Positive
18. Welding socket: Negative



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05.1 DEFINITIONS

DUTY CYCLE

The duty cycle of a welding generator is the time that a welding generator can be used at a given amperage without causing damage to the materials making up the unit.

This time is indicated as a percentage of a ten-minute period. If the welding generator is designed to work at 400 A and 60% duty cycle, that means that the unit can provide 400 A for a period of 6 minutes, while for the remaining 4 minutes in a 10 minutes period the unit must operate at no load.

WELDING VOLTAGE

WELDING AT NO LOAD

The voltage at no load is the voltage at the welding receptacles when the engine is running at the rated speed and no load is connected to the unit.

NOMINAL VOLTAGE UNDER LOAD

The nominal voltage under load must comply with precise regulations (as indicated by standard IEC60974-1), and in particular:



CC welding (constant current):

$$V = (I \times 0,04) + 20$$

For current values higher than 600 A:

$$V = 44 \text{ V}$$



CV welding (constant voltage):

$$V = (I \times 0,05) + 14$$

For current values higher than 600 A:

$$V = 44 \text{ V}$$



TIG welding:

$$V = (I \times 0,04) + 10$$

For current values higher than 600 A:

$$V = 34 \text{ V}$$

Where V is the voltage at the welding receptacles and I is the welding current selected.

05.2 GENERATOR

Type	Asynchronous
Three-phase power (Standby Power)	6 kVA - 415 V (according to DIN 6271)
Three-phase power (Prime Power)	5,4 kVA - 415 V (according to DIN 6271)
Single-phase power (Prime Power)	5 kVA - 240 V (according to DIN 6271)
Single-phase power (Prime Power)	2 kVA - 110 V (according to DIN 6271)
Frequency	50 Hz
Power factor	$\cos \varphi 0,8$
Insulation class	H
Degree of protection	IP 23

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

Standby power: no overload permitted

05.3 D.C. WELDING

Welding at 60% duty cycle	210 A
Welding at 100% duty cycle	180 A
Range of continuous control	20 ÷ 210 A
OCV	65 V
Electrodes diameter	6 mm

05.4 ENGINE

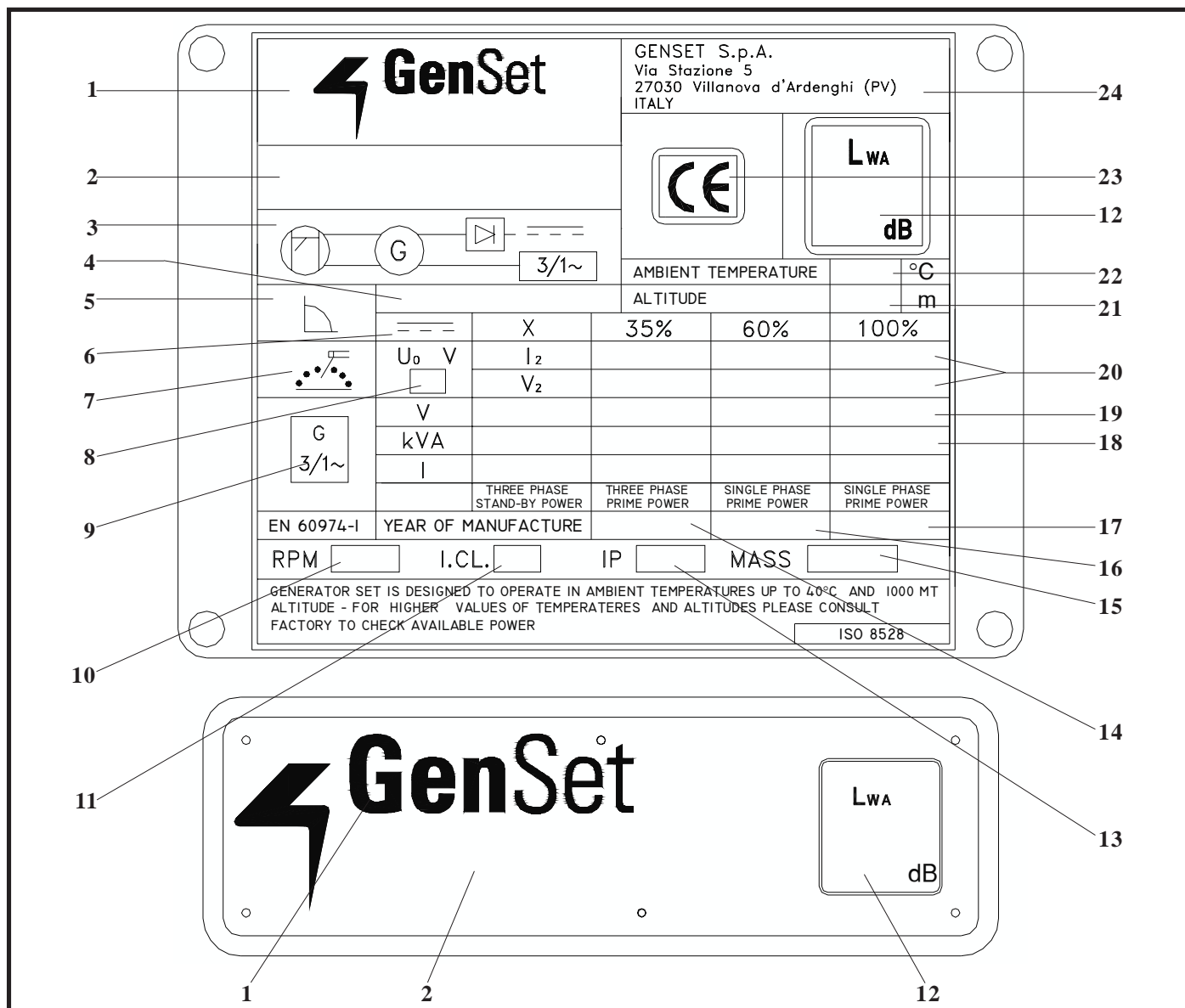
Engine type	Lombardini 15LD440
Number of cylinders	1
Displacement	442 cm ³
Power (emergency service)	9,3 hp (6,8 kWm)
Engine speed	3000 rpm
Cooling system	Air
Fuel type	Diesel
Oil system capacity	1,5 l
Starting system	Electric (12 Vdc)
Consumption per hour (at 75% of continuous service)	1,5 l/h

05.5 GENERAL SPECIFICATIONS

Noise power emission level	$L_{wa} 96$
Battery	12 V - 44 Ah
Fuel tank capacity	10,5 l
Operating range at 75% of continuous service power	7 h ~
Dry weight	185 Kg

05.6 RATING PLATE DESCRIPTION

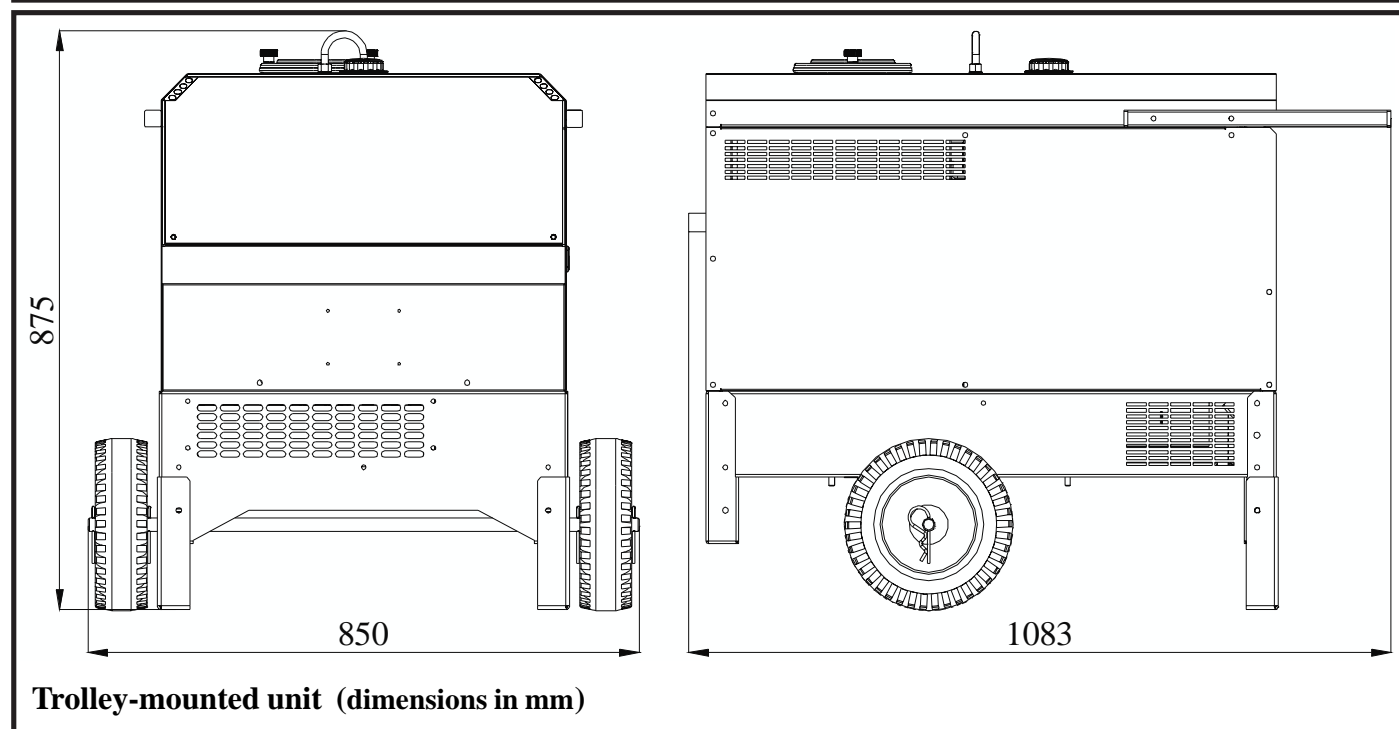
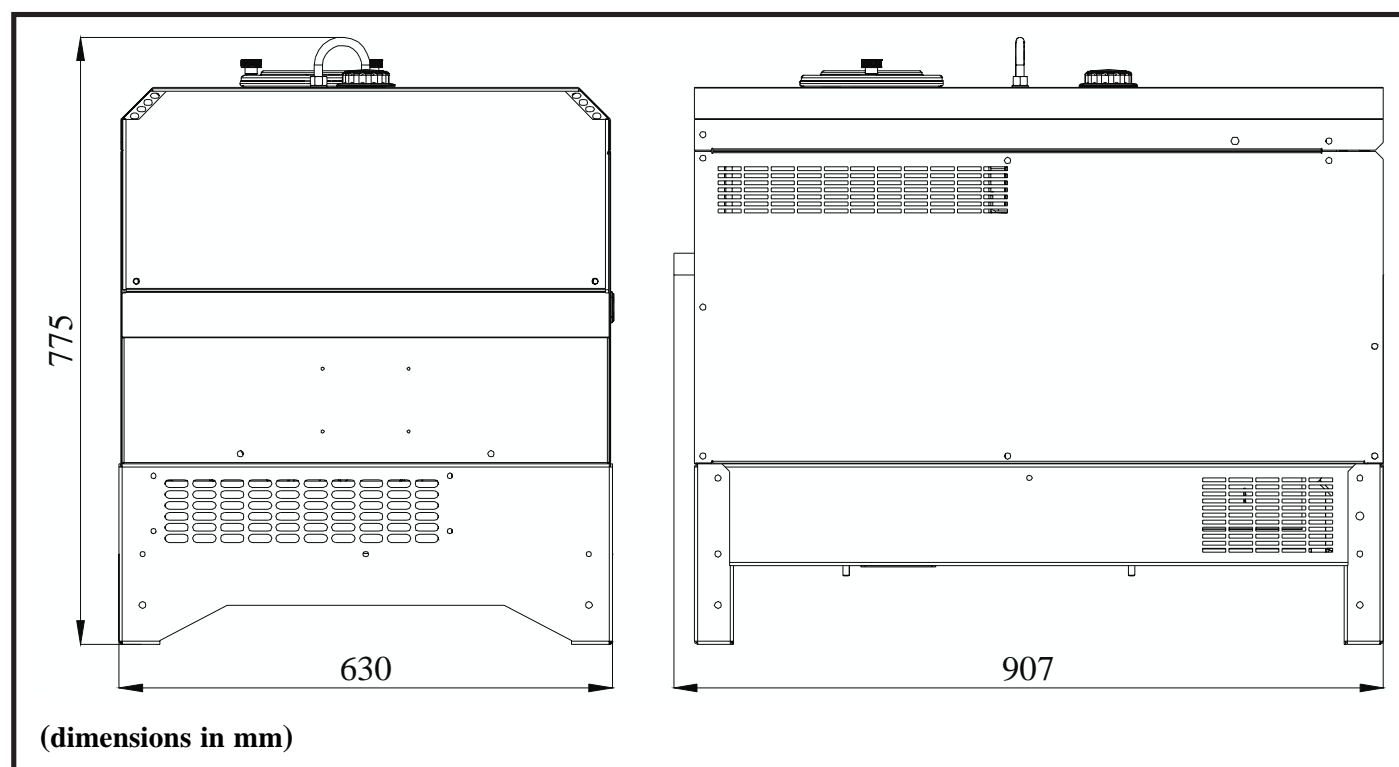
A rating plate showing the operation capabilities and performance limits is provided on the unit.



LEGEND

- | | |
|--|----------------------------|
| 1. Manufacturer's logo | 14. Manufacture year |
| 2. Generator model | 15. Weight |
| 3. Welding symbol | 16. Rated frequency |
| 4. Welding current / voltage range | 17. Power factor |
| 5. Static characteristic curve symbol | 18. Rated power kVA |
| 6. Welding direct current | 19. Rated voltage values |
| 7. Welding processes | 20. Welding values |
| 8. OCV - Open circuitry voltage (at no load) | 21. Altitude reference |
| 9. Three/Single-phase voltage generator | 22. Ambient temperature |
| 10. Engine speed | 23. EC mark |
| 11. Insulation class | 24. Manufacturer's address |
| 12. Noise level | |
| 13. Unit's degree of protection | |

05.7 OVERALL DIMENSIONS





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06.5-Checking machine operation.....	page 28
06.6-Run-in.....	page 28

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 (1) located on the right side of the engine (see Checking the oil level on page 37); refill the correct level using the oil filler (2) or (3), if necessary; choose the oil viscosity according to the ambient temperature (for other temperatures check the table at page 38).

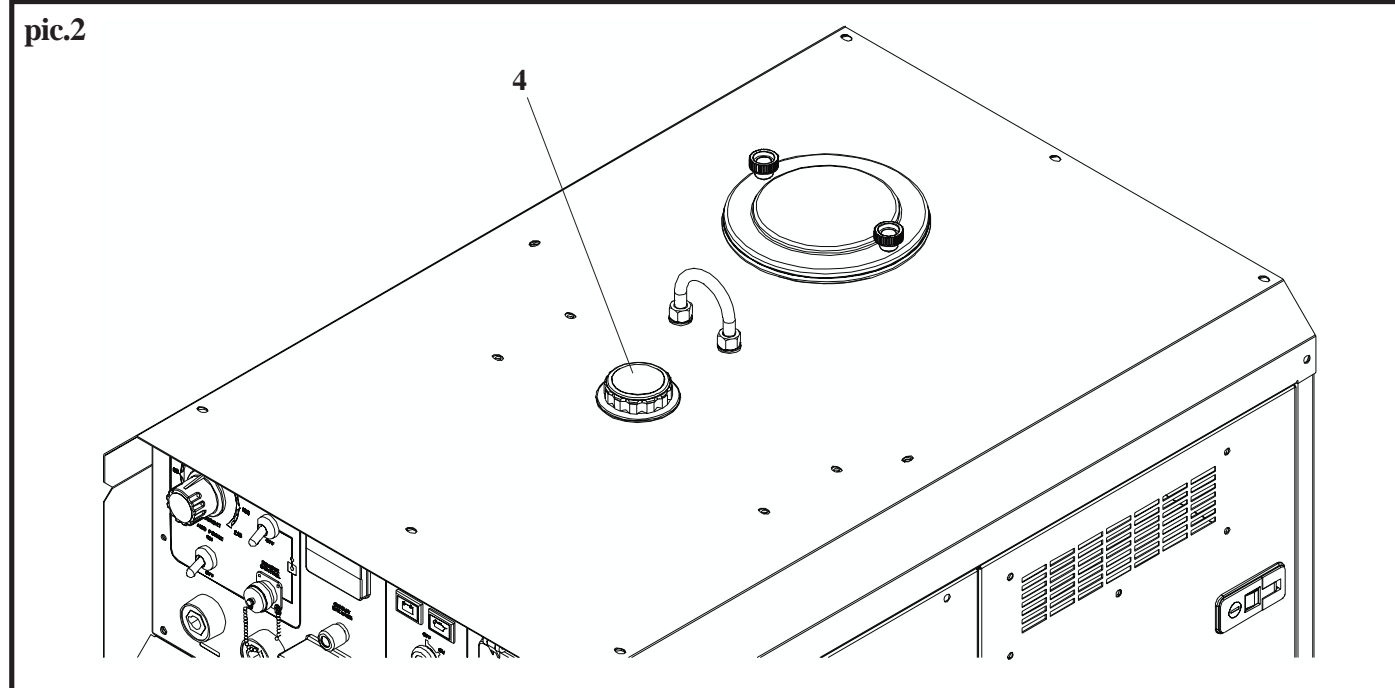
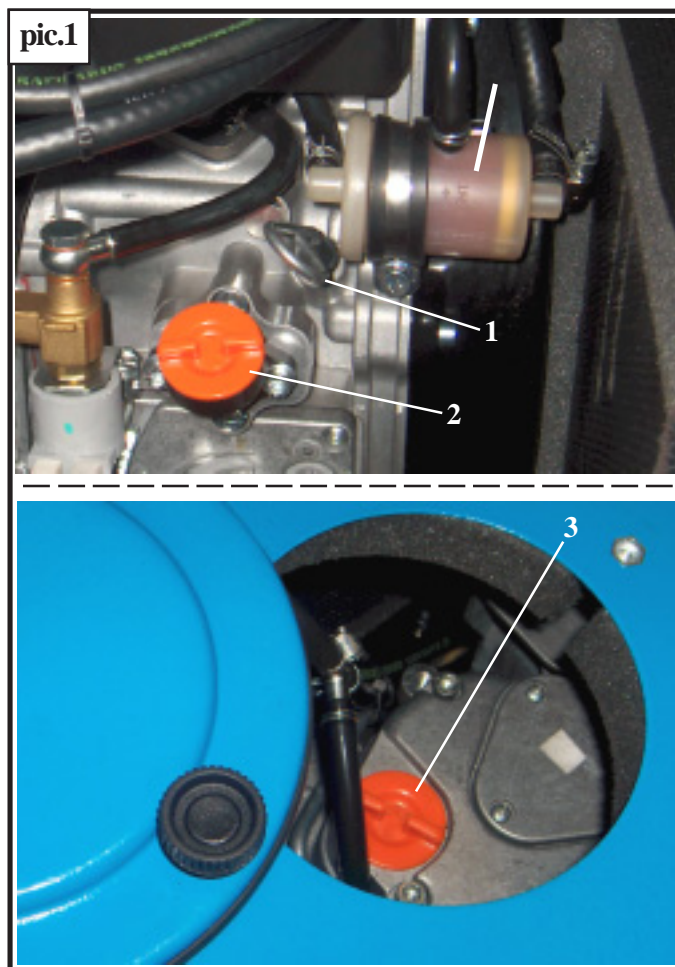
Wait at least five minutes, then check the oil level again. It is important that the unit is sitting on level ground.

FUEL CHECKING (picture 2)

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 (4).
- 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.



BATTERY (picture.3)



The unit is delivered with a fully charged battery (disconnected).

The battery is factory filled with acid at density of 1.28 g/ml and is ready for operation.

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.

- Remove the panel (1).
- 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 a proper voltage to the system.
- 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 44 Ah battery it is advised that the charging current be about 4,4 A).
- The battery is deemed fully charged if the charging voltage has no increased within the two 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.

06.2 MAXIMUM OPERATING ANGLES



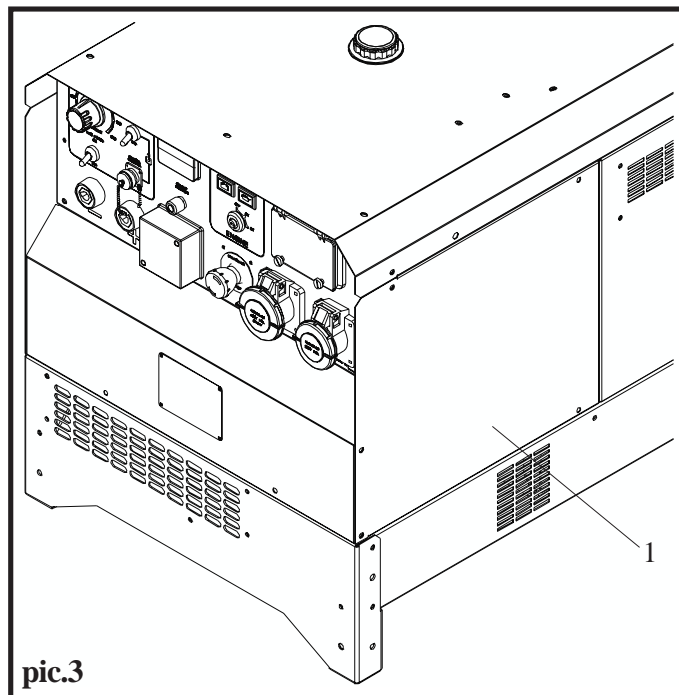
Do not exceed the operating angles shown in the picture 4 while running the power generator unit, or engine damage will occur.

06.3 LOCATION

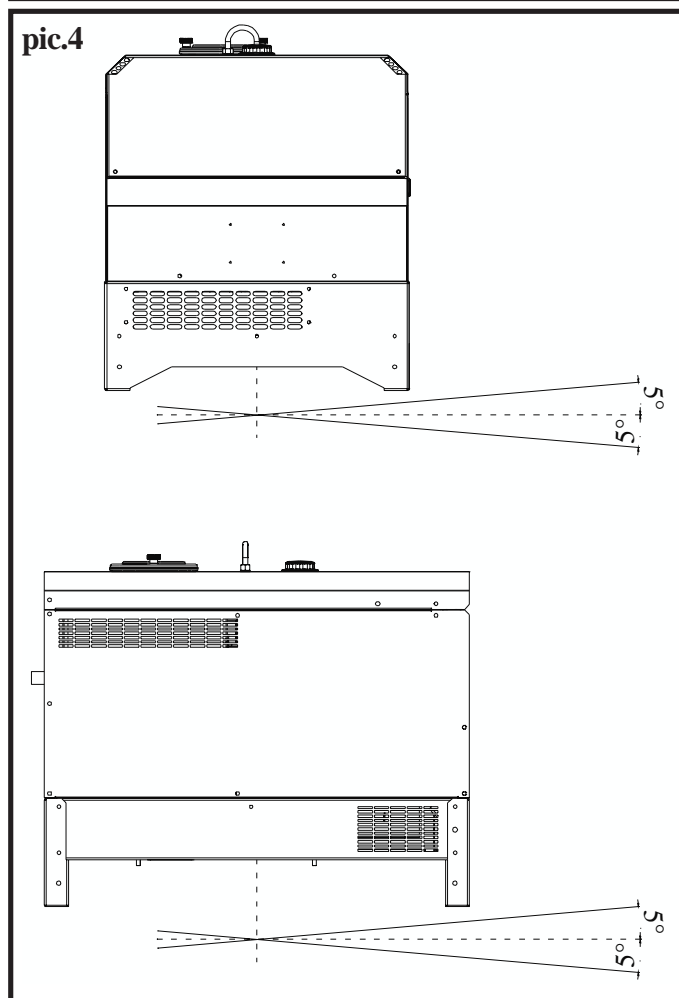
A proper installation site should be selected for the power generator if the unit is to provide dependable service.



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.



pic.3



pic.4

06.4 AIR FLOW CLEARANCE (picture 5)

Maintain at least 1 metre of unrestricted space on all sides of the unit. 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.



Do not place any additional filtering device over the air intake and air outlet.

Keep clean the area surrounding the air intake and outlet screen.



Operate in well ventilated environment, worrying himself that the gases of unloading don't stagnate in the environment of job; tender the unit away from walls or other obstacles to avoid recycles of air or of gas that they would provoke the overheating of it. In the case you had to be operated in local closed, to use some aspirators to guarantee a correct exchange of air.

06.5 CHECKING MACHINE OPERATION

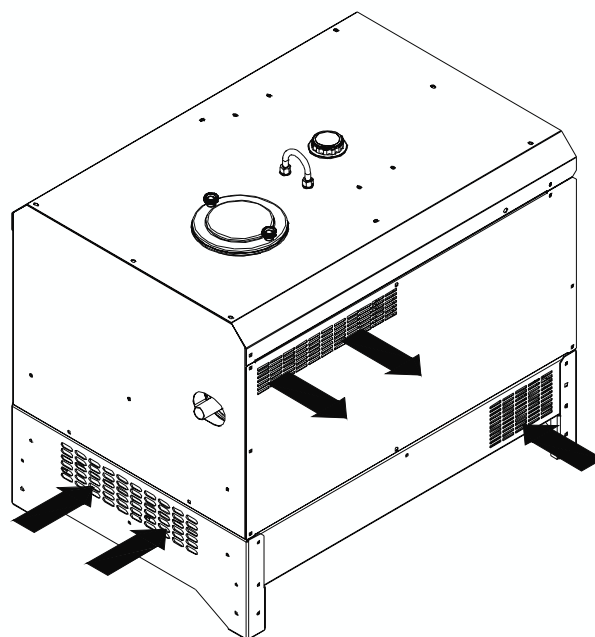
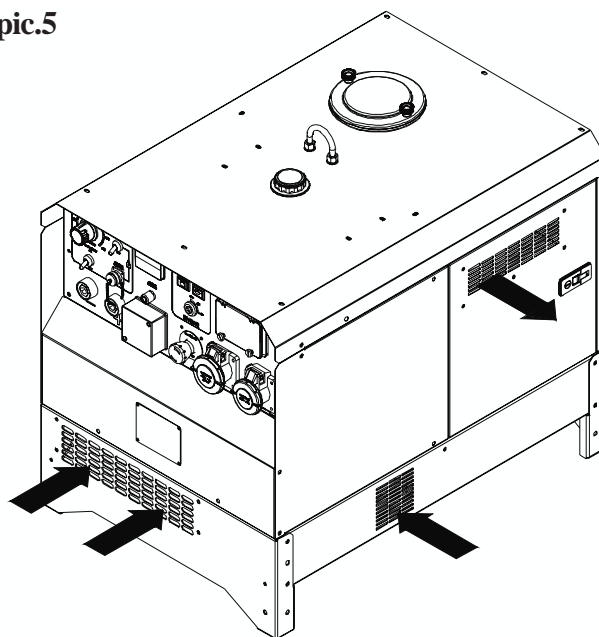
Perform a test of operation according to the instructions included in the following Chapter

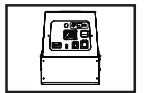
06.6 RUN-IN

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.5





07.1- Control devices mounted aboard.....	page 30
07.2- Earthing the machine.....	page 30
07.3- Starting the engine.....	page 30
07.4- Stop the engine.....	page 31
07.5- Using the unit as a welding generator.....	page 31
07.6- Using the unit as a generating set.....	page 32
07.7- Adjustments and settings.....	page 32
07.8- Putting the machine temporarily out of service and restarting operation.....	page 32

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 (4) 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.

Das, automatic engine shut off

Safety device mounted aboard. It shuts off the engine automatically to avoid possible damage, in case of one of the following irregularities: low oil pressure (No. 2 pic.1), failure of the battery charger (No.3 pic.1).

The lighting of one of the indicator lamps on the control panel points to the specific failure.



When the engine is off and the start key switch is in the ON position, the low oil pressure and battery charger failure lamps will be illuminated.



This device does not exempt the user from checking the engine oil level by using the dipstick located on the left side of the unit. This check must be made daily.

Arc force control

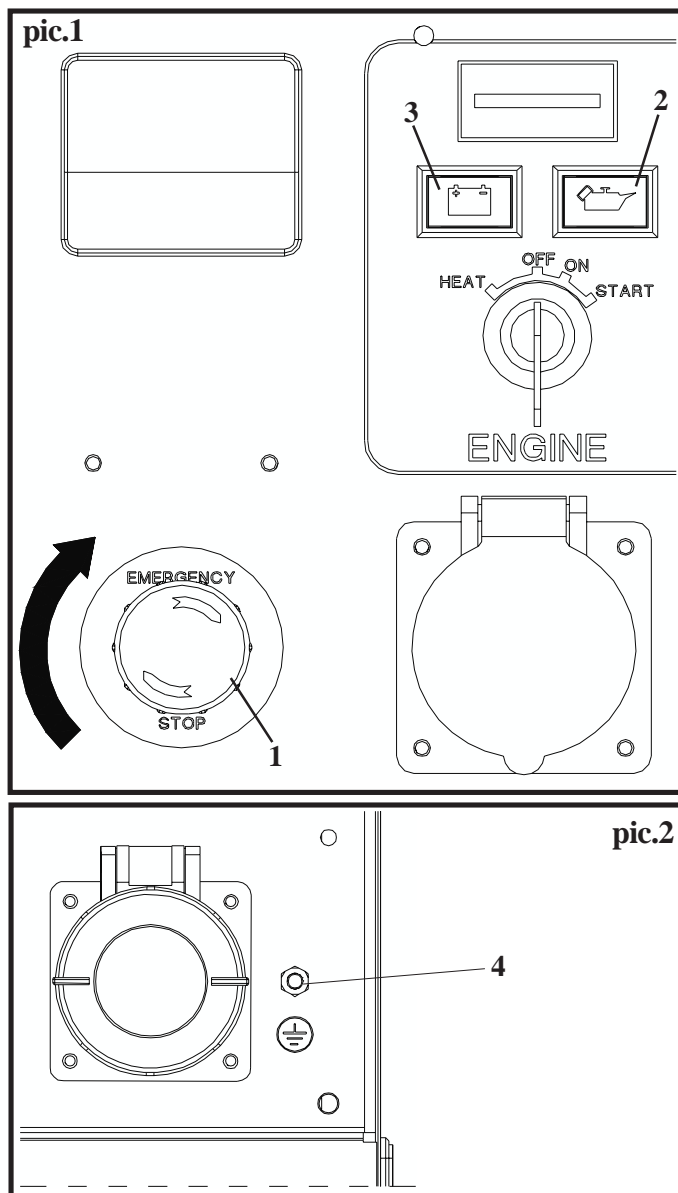
This device allows the welding generator to supply and control automatically an additional welding current in a condition of low voltage of the welding arc, without changing the welding current value selected. Any electrode sticking problem is so prevented.

07.2 EARTHING THE MACHINE (picture 2)

Before starting the generator, connect it to earth by using the earth connection provided (4) 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 STARTING THE ENGINE (picture 3)

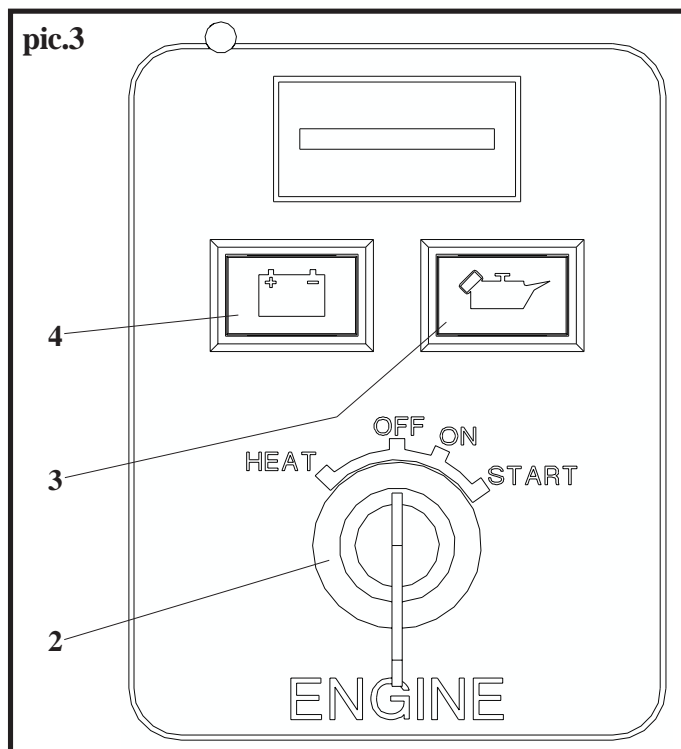
After checking and restoring if necessary the engine oil level, and fuelling the unit, (if this is the first starting, it is necessary to supply the unit of fuel), proceed as follows:

- Make sure that no load is connected to the unit.
- Turning the key switch (2) in "ON" position; (the lamps 3 and 4 will be lighted).
- Turning the key switch (2) in "ST" position.



If the engine does not start, turn the key switch (2) to the OFF position (otherwise, the automatic engine shut off - DAS, will prevent starting the engine), wait about 10 seconds and repeat the starting procedure.

- Let the unit run for about 10 minutes without connecting any load, to allow the regular warm-up. The unit is running at low rpm.
- Now it is possible to insert the load.



07.4 STOP THE ENGINE (picture 3)

- Disconnect the loads.
- Turning the key switch (2) in “OFF” position.

07.5 USING THE UNIT AS A WELDING GENERATOR (picture 4)

- Plug the welding cables in the relating receptacles (10) (positive), (9) (negative).
- The welding current control is achieved by acting on the Welding Current Control (5).
- The activation of the arc force is achieved by setting the switch (7) in “ON” position.
- If the welding current remote control is used (provided only upon request) set the Remote Control switch (6) to position “ON” and connect the remote control device to receptacle (8).



SHIELDED METAL ARC WELDING (SMAW) (picture 4)

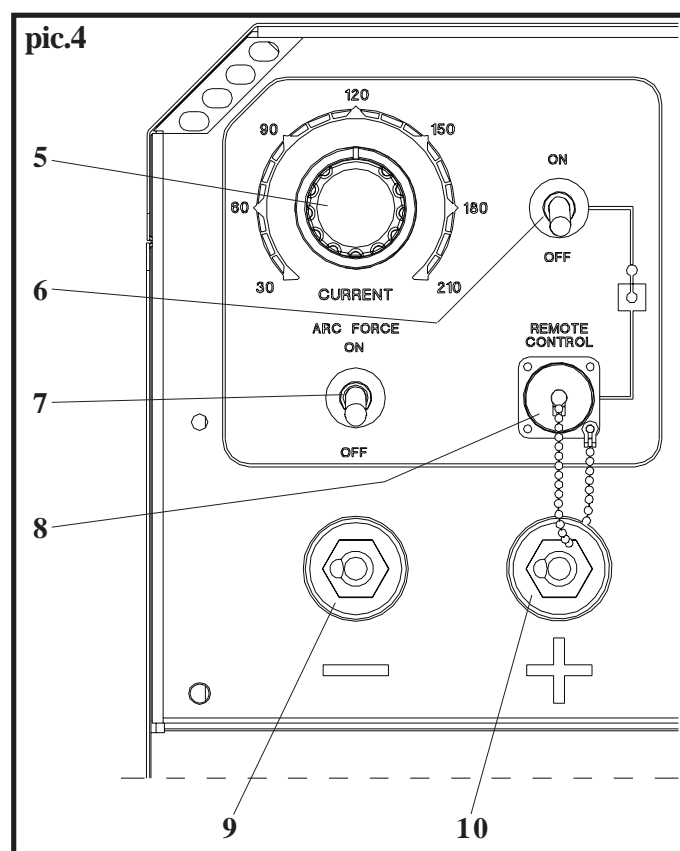
- Connect the welding cables to the respective receptacles (9) negative and (10) positive.
- Position the Remote Control switch (6) to “OFF” position.
- Adjust the welding current using the Welding Current Control (5).
- If the welding current remote control is used (provided only upon request), this must be connected to the 3 poles receptacle (8), the Remote Control switch (6) must be in “ON” position, and the welding current is adjusted by acting on the remote control.

- The activation of the arc force is achieved by setting the switch (7) in “ON” position.
- For basic and cellulosic electrodes the electrode holder must be connected to receptacle (10) (positive) and the work clamp to receptacle (9) (negative).
- For rutile and acid electrodes, it is advised to connect the electrode holder to receptacle (9) (negative) and the work clamp to receptacle (10) (positive).



GAS TUNGSTEN ARC WELDING (GTAW) LIFT START ONLY (picture 4)

- Connect the electrode holder to receptacle (9) (negative) and the work clamp to receptacle (10) (positive).
- Position the Remote Control switch (6) to “OFF” position.
- Adjust the welding current using the Welding Current Control (5).
- If the welding current remote control is used (provided only upon request), this must be connected to the 3 poles receptacle (8), the Remote Control switch (6) must be in “ON” position, and the welding current is adjusted by acting on the remote control.
- The activation of the arc force is achieved by setting the switch (7) in “ON” position.



07.6 USING THE UNIT AS A GENERATING SET

Earth leakage circuit breaker (picture 5)

The unit is equipped with an earth leakage circuit breaker (2) 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 factory centres for technical service on electrical components.

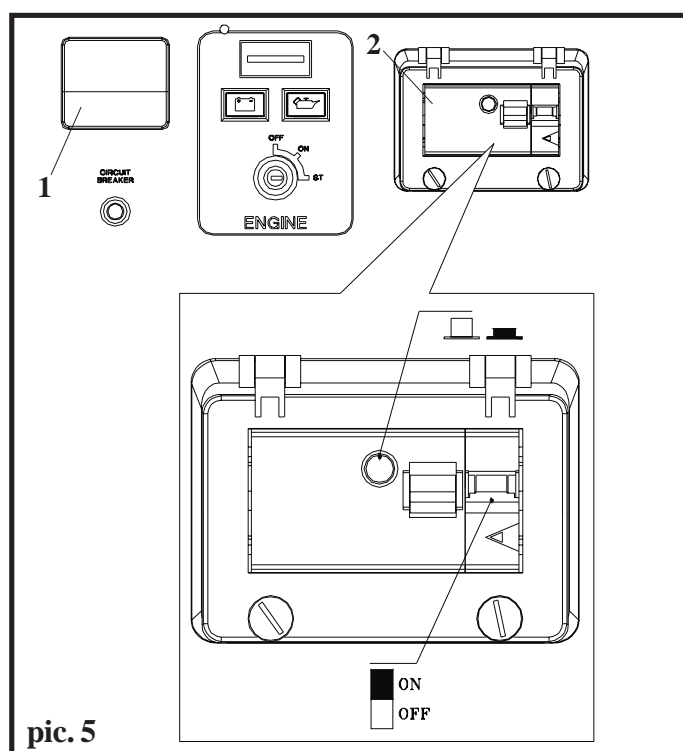
- Before connecting a load to sockets on the front panel of the unit, make sure that the generator supplies enough power for the tools that are connected.



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.
- The voltmeter (1) shows the single phase voltage (about 235 V at full speed).



07.7 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.

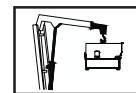


When using the generator on its trolley, it is the operator's responsibility to position the unit in a safe location.

07.8 PUTTING THE MACHINE 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 Gen Set Service Department.



08.1- Packing, transporting and storing the unit.....page 34

08.2- Lifting and moving the unit.....page 34

08.1 PACKING, TRANSPORTING AND STORING THE UNIT

Packaging

The package is provided by factory.



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.

08.2 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 pictures 3 and 4. Make sure that lift ropes or chains are approved and of sufficient capacity. Always use the lifting eyes provided by the manufacturer as indicated. Use a fork lift of proper capacity, fitted with wide forks, and lift the unit as illustrated (picture 4).



Never leave the load insecure.



Lay the generator on the ground gently.



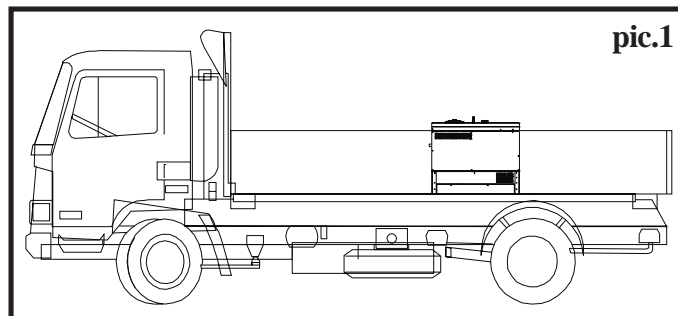
When lifting and moving the generator, do not stay or walk within its proximity.



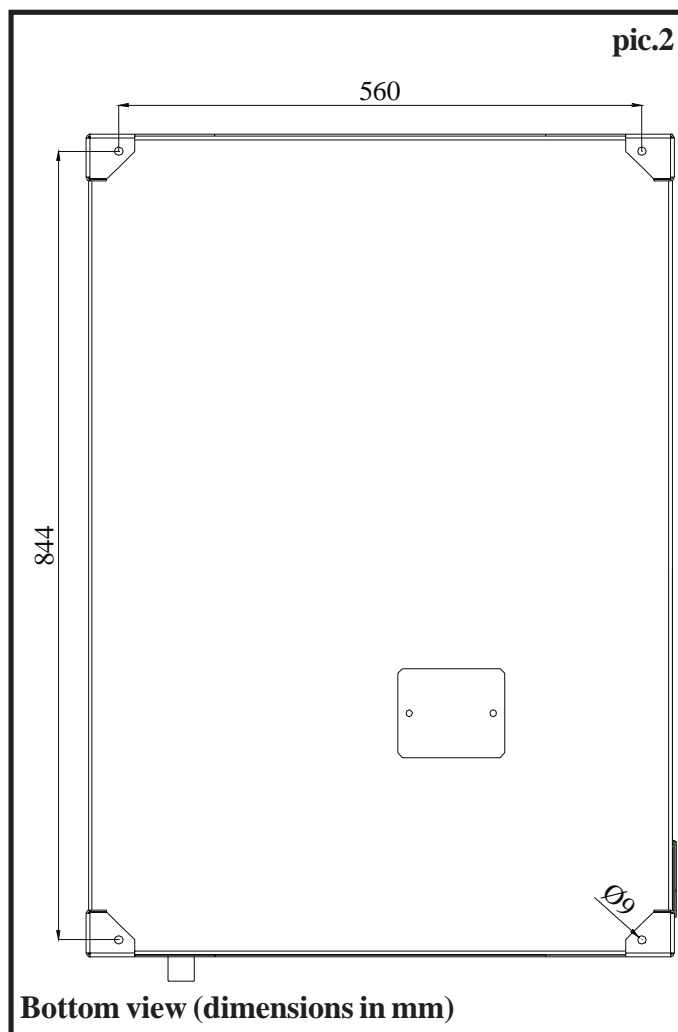
Never leave the generator slung overhead.



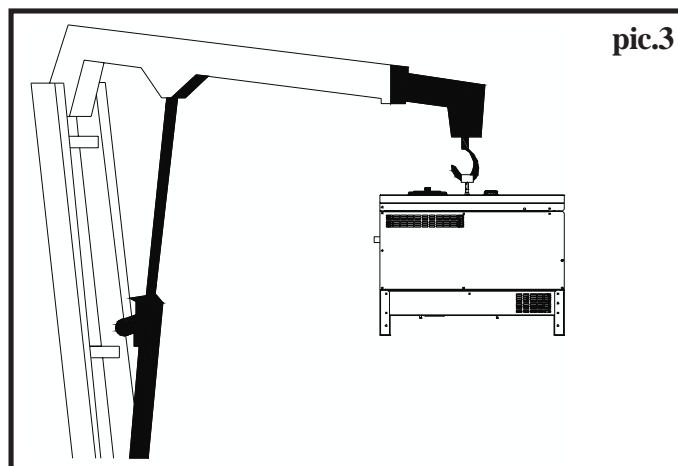
When moving and transporting the generator, do not tilt it excessively.



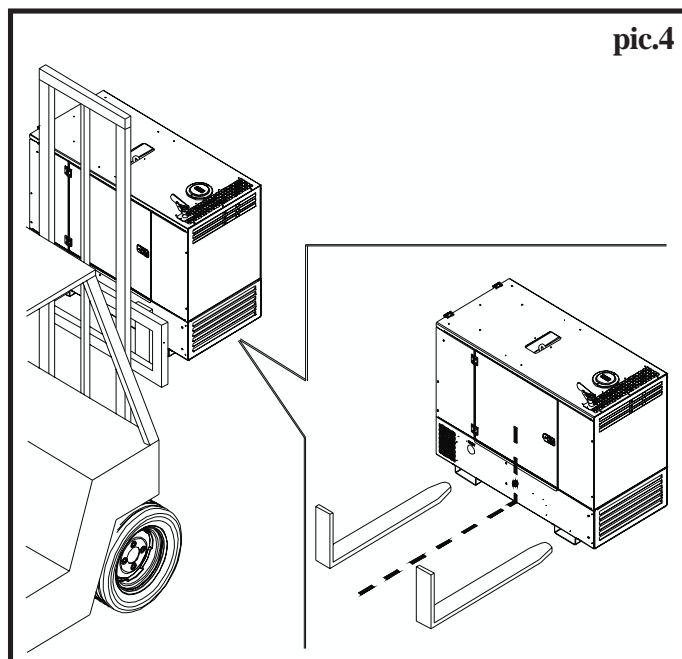
pic.1

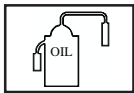


pic.2



pic.3





09.1- Maintenance.....page 37

09.1 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

FREQUENCY	OPERATIONS
Every 10 hours.	Clean air filter
	Check oil sump level.
Every 50 hours.	Check air filter oil level.
Every 250 hours.	Replace oil sump.
Every 500 hours.	Clean head fins and cylinder.
	Clean injector.
	Check valve clearance and rockers.
	Check calibration of the injector.
	Replace oil filter cartridge.
	Replace fuel filter.

If the generator works in adverse conditions, the intervals between maintenance schedules must be reduced.

Checking the engine oil level (picture 1 page 38)

• The oil level check must be performed when the engine is cold, before starting or at least 5 minutes after engine shut-off.



To check the oil level correctly, the power generator must be sitting on level ground.



The lubricating oil and the engine can be very hot, take care when performing these checks and in particular when cleaning the dipstick.

Check the lubricating oil level using the dipstick (1), located on the right side of the engine.

- Pull the dipstick out and clean it with cloth or paper towels.
- Fully push the dipstick back into its seating.
- Pull the dipstick out again and check that the lubricating oil level is between the minimum and maximum marks.

If the oil level is too low add new oil (see the **Engine oil grade table**) through the oil fill cap (2) or (3), located on the top side of the engine.

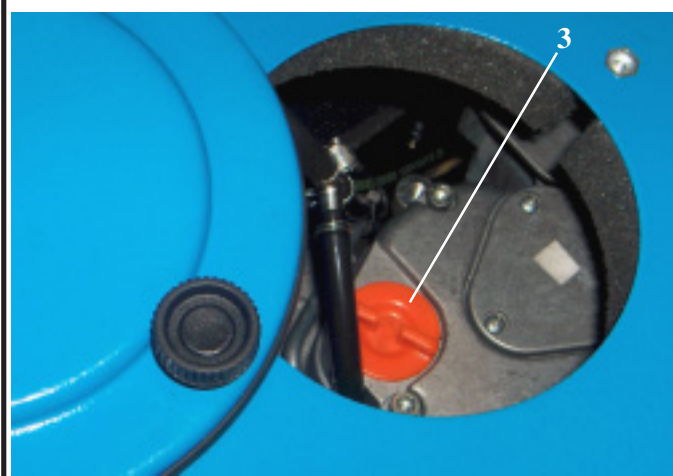
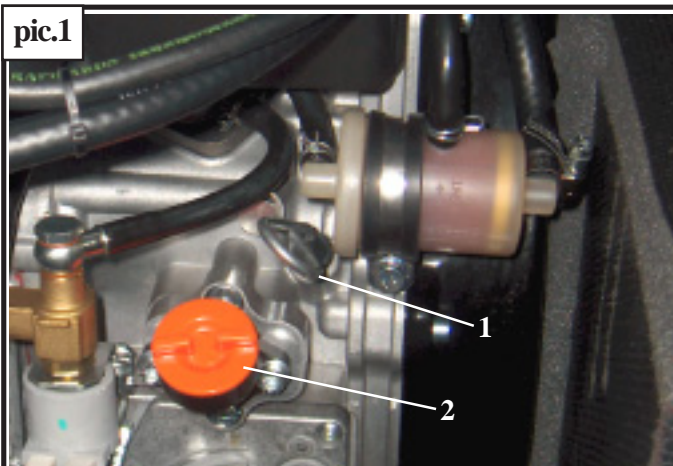
Wait at least five minutes, then recheck that the oil level is between the minimum and maximum marks.

When using oil or different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.



Do not overfill the oil above the maximum mark on the dipstick because oil combustion can cause a sudden increase in engine speed.

pic.1



The chart displays the temperature ranges for different SAE oil grades. The x-axis represents temperature in degrees Fahrenheit, ranging from -40 to 50. The y-axis lists the oil grades. The ranges are as follows:

SAE Grade	Temperature Range (°F)
SAE 10W	-25 to -5
SAE 20W	-10 to 5
SAE 30	5 to 35
SAE 40	10 to 45
SAE 10W-30	-25 to 35
SAE 10W-40	-25 to 45
SAE 10W-60	-25 to 50
SAE 15W-40	-10 to 45
SAE 15W-50	-10 to 50
SAE 20W-50	5 to 50
SAE 5W-30	-30 to 35
SAE 5W-40	-30 to 45
SAE 0W-30	-40 to 35

Engine oil grade table

Changing engine oil (picture 2)

For the substitution to proceed like it follows:

- Remove the plate **(4)**.
- Place a container under the machine
- Remove the oil drain cap **(5)**.
- Allow to drain the oil when the engine is hot. The hot oil is discharged quickly and completely.



Caution hot oil may cause burns, always use protective gloves.



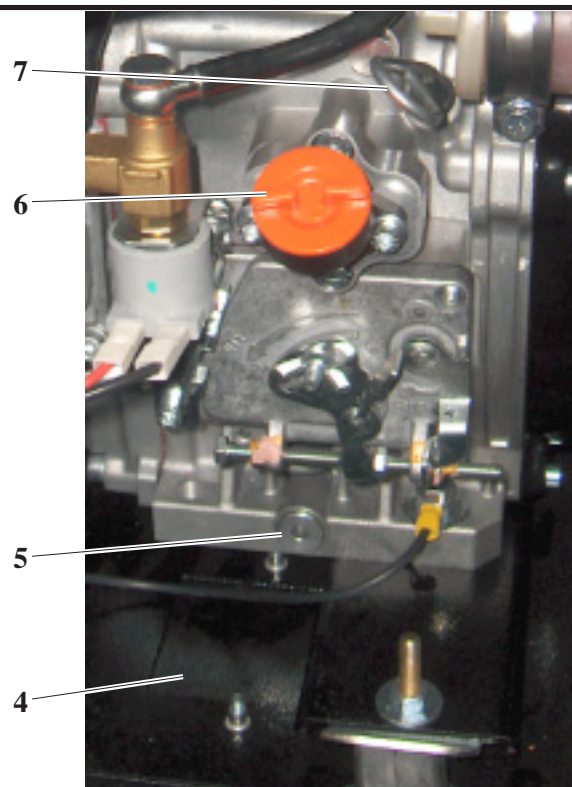
Always use the best gradient oil and clean. The use of contaminated or bad oil quality and insufficient quantity of oil can cause engine damage or shorten the durability.



The waste oil must be collected in a suitable container and delivered to centres of authorized collection. Refer to the regulations and laws in force in your country regarding the disposal of hazardous waste.

Replace and tighten the oil drain plug (5). Supply of new oil, choose the oil viscosity according to the ambient temperature (for other temperatures check the “**Engine oil grade table**”). Introduce new oil through the cap (6). Wait at least five minutes, then check the oil level again. It is important that the unit is sitting on level ground.

pic.2



Air filter cleaning



Clean the filter with air flow. The air must be blown from the inside to the outside of the cartridge at a distance of not less than 15 cm from the paper.

If you need to beat the element on a hard surface, lightly and repeatedly, in order to remove excess dirt.

Proceed as follows:

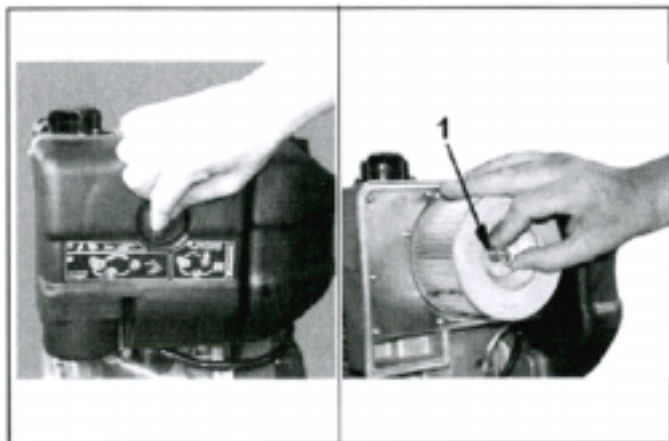
- Open the filter (fig. 4).
- Unscrew the finned nut 1 (fig. 4a).
- Remove the filtering mass (fig. 5).
- Verify the integrity of the rubber seal A (fig. 5a).
- Clean the filtering mass with air flow.

If the element has been cleaned other times, or if it is irreparably clogged, throw it away and replace.

Remount the air filter paying attention that the o-ring is properly inserted, then tighten the finned nut 1.

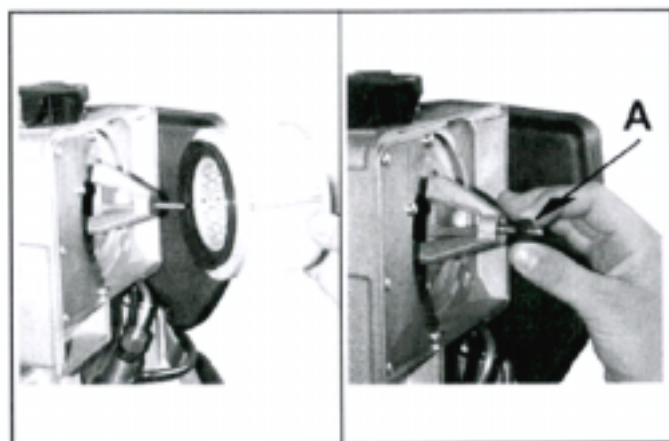


Make sure that the filter is mounted in the correct way otherwise dust and other impurities could infiltrate into the intake ducts.



4

4a



5

5a

Pre-filter for air filter

Disassemble and clean the pre-filter if clogged.



6



7

Replacing the battery (picture 3)

- Remove the panel (1).
- Loosen the two retaining nuts from the battery.
- Disconnect the battery cables, negative terminal first and remove the battery.
- Replace the battery, using type of same amperage.



To avoid damage to the battery, do not disconnect the battery cables whilst the engine is running.



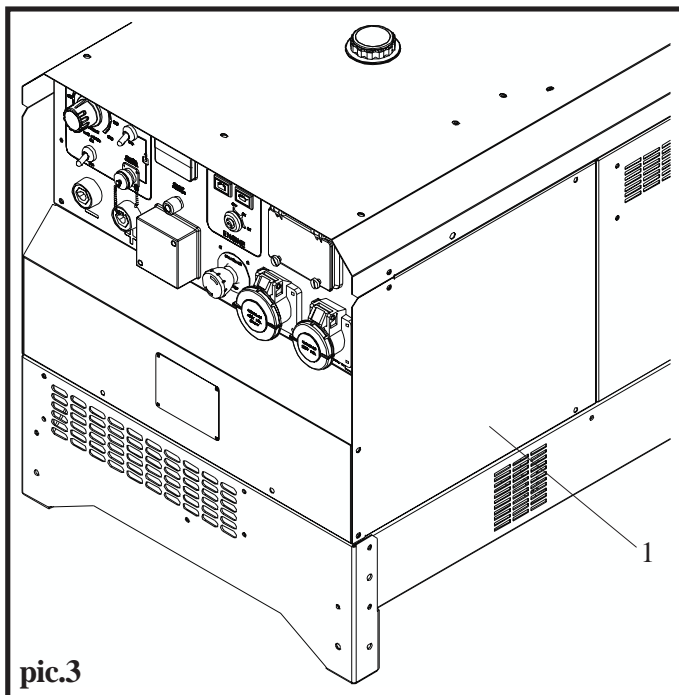
When reconnecting the battery, note position of positive and negative cables.



The battery contains sulphuric acid, always use acid resistant protective gloves.



The old battery should be given to authorised collection centres. Refer to local regulations and laws relating to disposal of waste materials.



Cleaning the generator

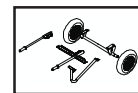


Water is a electricity conductor, therefore it can causes shorts.

- Always shut off the unit, disconnect and remove the battery before starting the washing.
- In case it is necessary to wash the generator unit, it is recommended not to direct the jet of water to the alternator and/or the electric or electronic components of the unit.
- At the end of the washing, disconnect capacitors from the alternator before starting the unit.
- Let the unit run in this condition until fully dry.
- Only at this point, after switching off the unit, reconnect the capacitors to the alternator.

Unplanned maintenance

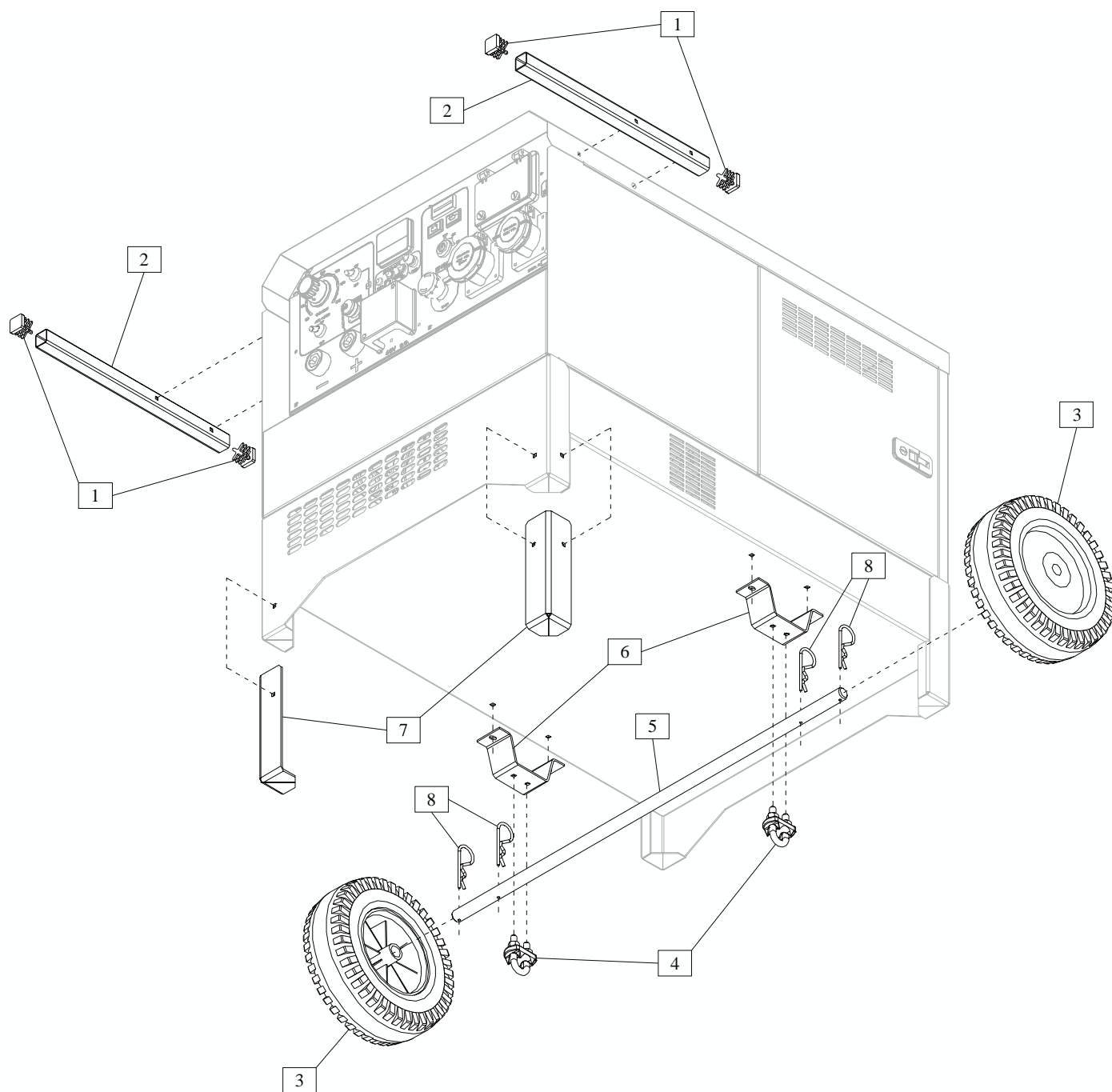
Apply only to authorised factory centres for any unplanned service operations related to electrical components.
Apply to service centres authorised by the manufacturer of the engine for any problems related to the engine.



10.1- Trolley: two-wheels and handles.....page 42

10.2- Remote control.....page 43

10.1 TROLLEY: TWO-WHEELS AND HANDLES



List of spare part codes

N.	DESCRIPTION	SPARE PART CODE
-	Complete trolley	153565
1	Handle cap	011582
2	Handle	2462019
3	Wheel	071120
4	Clamp	011581

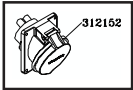
N.	DESCRIPTION	SPARE PART CODE
5	Axle	153564
6	Axle plate	2462014
7	Supports	2462020
8	Split pin	120931

10.2 REMOTE CONTROL










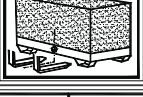








List of spare part codes












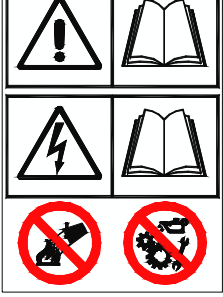
No.	DESCRIPTION	SPARE PART CODE
-	Remote control with cable of 20 m	133210/20

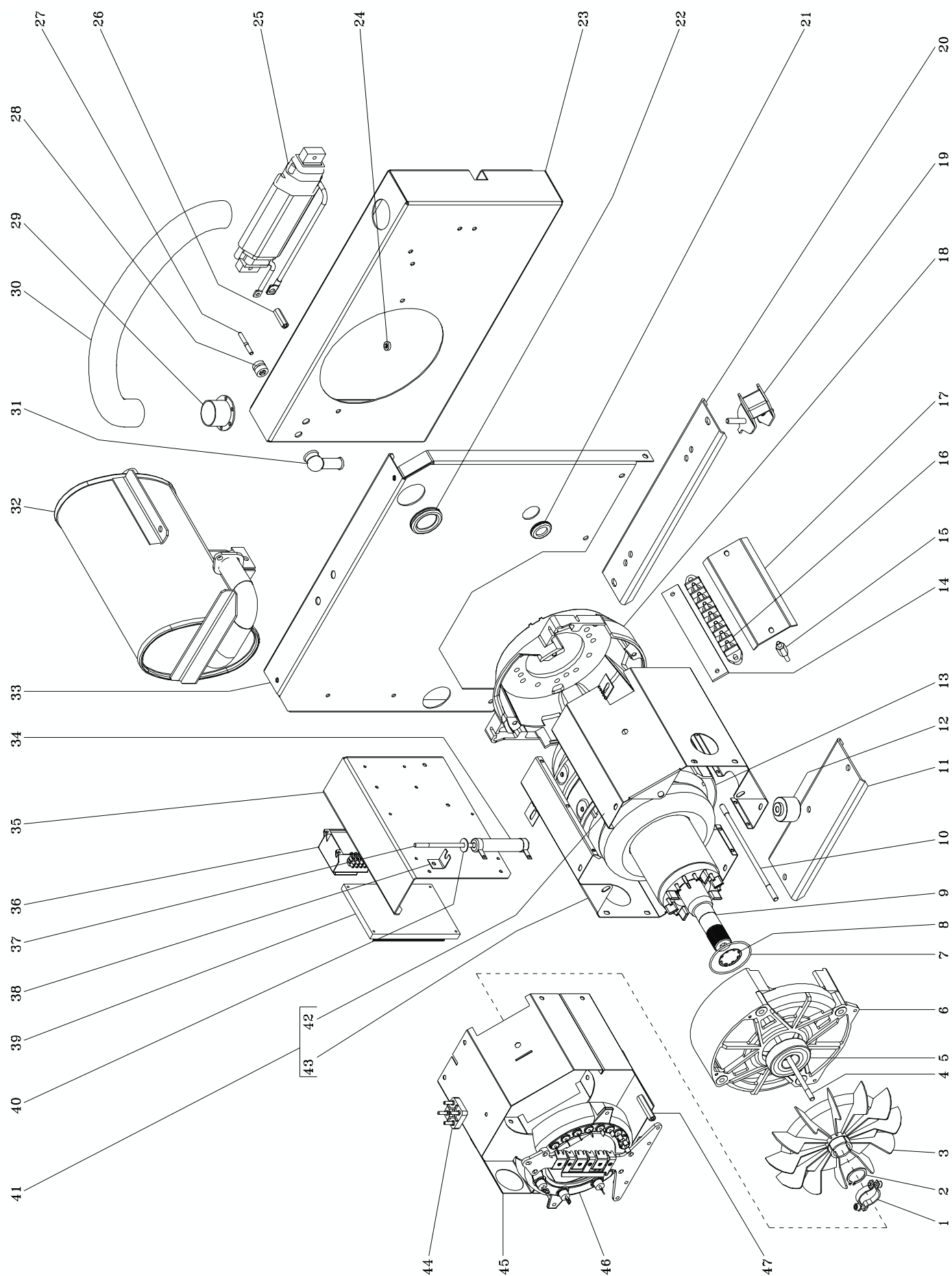


11.1- Spare part codes.....	page 45
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11.1 SPARE PART CODES

STICKER	SPARE PART CODE
	41810
	41811
	41776
	41775
	41777
	41778
	41781
	42353
	42109
	42132
	42108
	42110
	42111
	42112
	42119
	42114

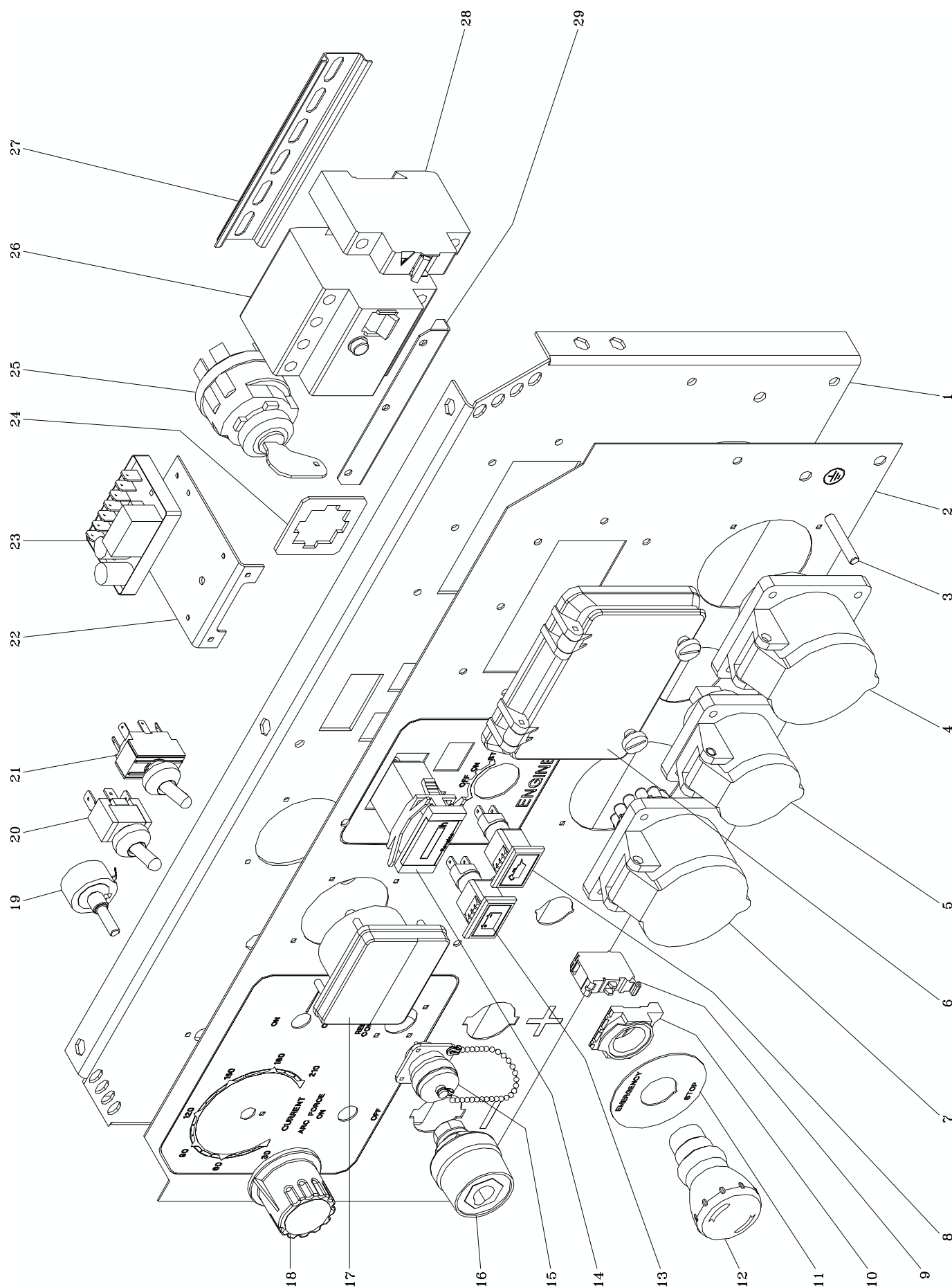
STICKER	SPARE PART CODE
	42116
	42117
	42115
	42348
	42349 (120X30) 42352 (160X40)
	42467
	42653
	42350
	42351
	42466
	42573
	42397



List of spare part codes

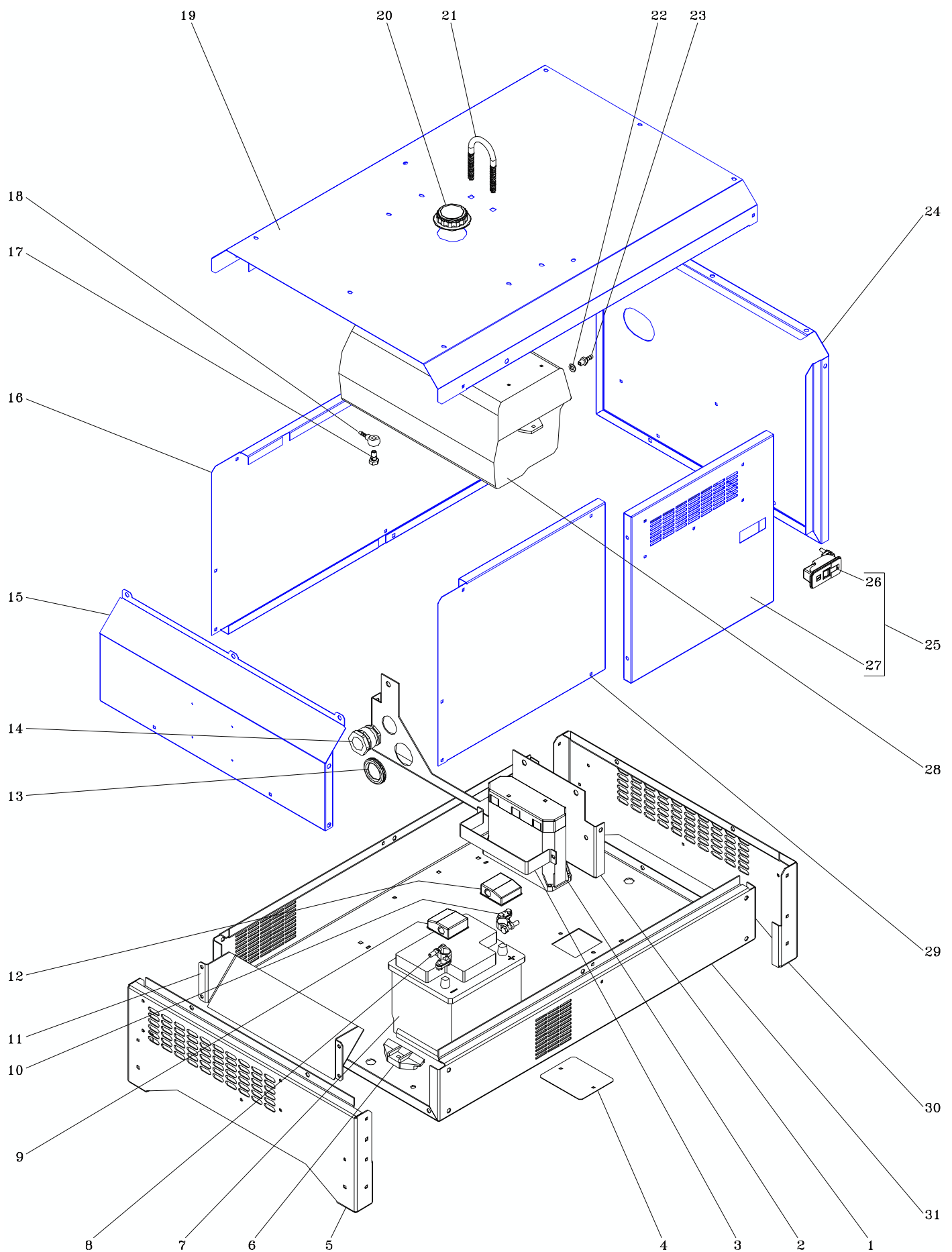
N.	DESCRIPTION	SPARE PART CODE
1	Fan clamp	1015
2	Seeger ring	3186
3	Fan	3123
4	Rotor tie rod	152597
5	Bearing	1007
6	Bearing flange	113023
7	O-ring	110128
8	Clamp ring	126465
9	Rotor	152596
10	Flanges tie rod	152598
11	Alternator support	152800
12	Spacer	153001
13	Stator	157070
14	Insulator plate	147831
15	Spacer	152997
16	7 poles terminal board	131585
17	Terminal board protection	149676
18	Engine flange	124919
19	Schock absorber	135025
20	Engine support	152877
21	DC21 rubber wire holder	101523
22	DG36 rubber wire holder	5748
23	Intake box	154119/R
24	Spacer	105384
25	Reactor	114046
26	Reactor spacer	115165
27	Clamp tie rod	3308
28	Clamp	3307
29	Air filter collector	152666
30	Air filter pipe	12717
31	Cable terminal protection	116222
32	Silencer	027864

N.	DESCRIPTION	SPARE PART CODE
33	Top separator	152690/R
34	Resistance	2381
35	Electric panel support	152681
36	Transformer	4067
37	Resistance tie rod	107957
38	Resistance support	115541
39	P92062B electric panel	113861
40	Insulator washer	109010
41	Complete alternator protection	154132
42	Alternator right protection	152996
43	Alternator left protection	152995
44	4 poles terminal board	152998
45	Diode bridge support	153000
46	Diode bridge	114045
47	Diode bridge spacer	102740



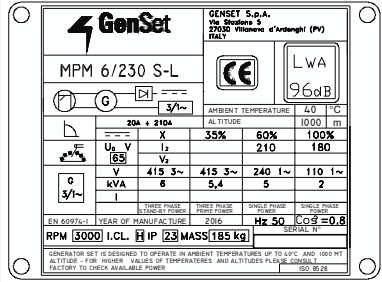

List of spare part codes

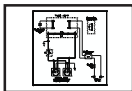
N.	DESCRIPTION	SPARE PART CODE
1	Instruments plate	157073
2	Aluminium plate	157075
3	Tie rod	102550
4	415 V 16 A current socket	1844
5	240 V 16 A current socket	1836
6	Transparent cover	134281
7	110 V 32 A current socket	3613
8	Oil lamp	4888/O
9	Stop button contact	33485
10	Stop button base	33483
11	Stop button rating plate	129871
12	Stop button	33482
13	Battery lamp	4889
14	Hourmeter	100980
15	3 poles connector	6050/A
16	Welding socket	3134/P
17	Voltmeter	1026
18	D.45 knob	116305/D
19	Potentiometer	4056
20	1 pole switch	118424/A
21	2 poles switch	4057/A
22	Electric panel support	126414
23	GS0007 electric panel	121004
24	Starting switch plate	135314
25	Starting switch	148637/1
26	40A 4 poles ELCB	4097
27	L.150 omega profile	5828/150
28	16A 1 pole circuit breaker	1428
29	Circuit breakers spacer	135998



List of spare part codes

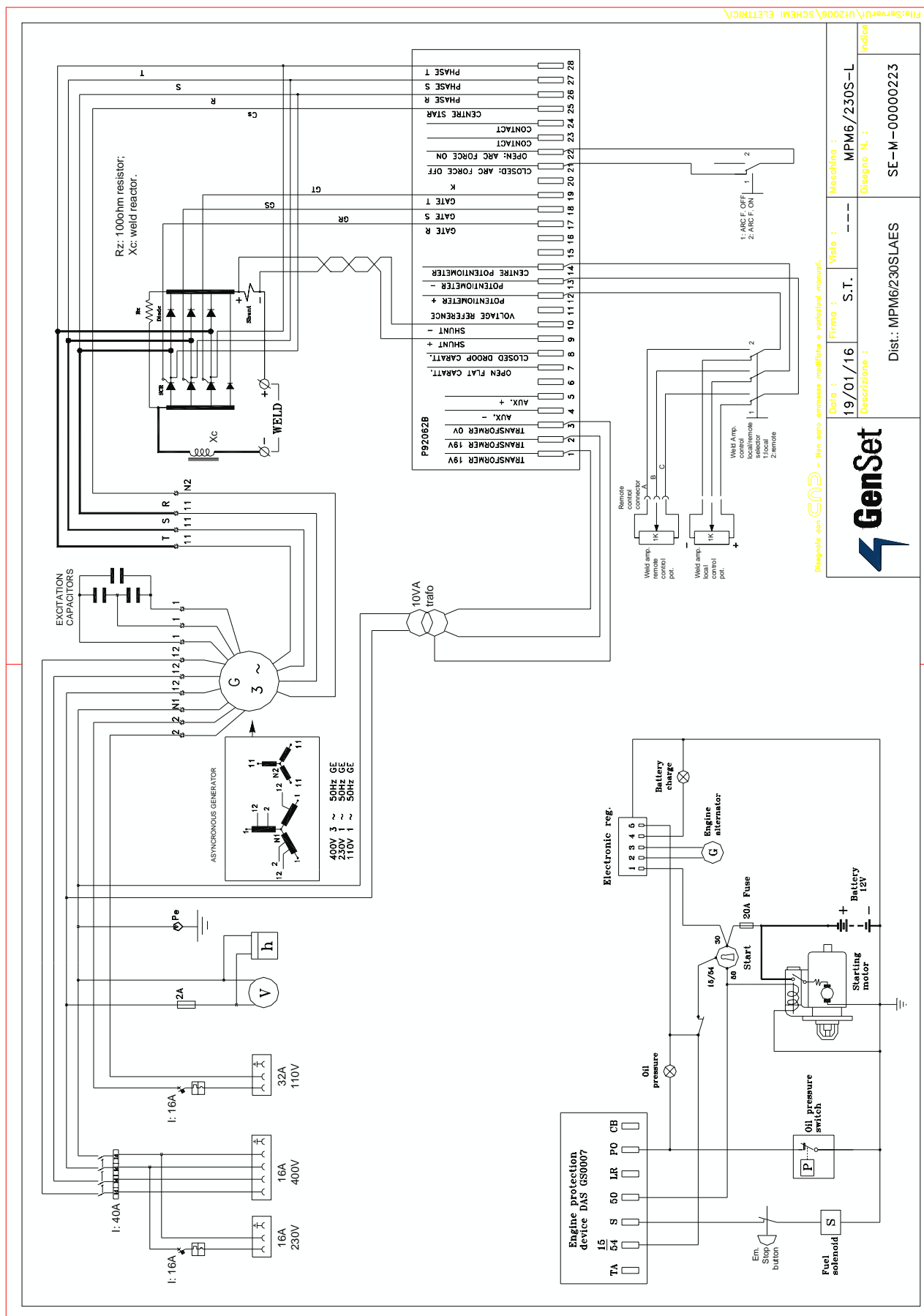
N.	DESCRIPTION	SPARE PART CODE
1	Inferior separator	152634/R
2	Capacitor	1689
3	Capacitor clamp	134453
4	Oil drain plate	152639
5	Basement front plate	152640
6	Battery clamp	133064
7	Battery	116187
8	Battery negative clamp	4352
9	Blue clamp cover	109606/B
10	Battery positive clamp	4351
11	Air deflector	152999
12	Red clamp cover	109606/R
13	DG36 rubber wire holder	5748
14	PG29 wire holder	120806
15	Canopy front body side	152685/R
16	Canopy left body side	152683/R
17	Perforated screw	10558
18	Connector	10571
19	Top canopy	152686/R
20	Fuel tank cap	04675
21	Lifting eye	11301
22	Washer	10089
23	Pipe fitting	11587
24	Canopy rear body side	152684/R
25	Complete door	154117/R
26	Handle	136211
27	Door	154117
28	Fuel tank	71368
29	Canopy right body side	152682/R
30	Basement rear plate	152641
31	Basement	152626/R

Plate	Spare part code
	157072
	146434



12.1- Electrical diagram.....page 53

12.1 ELECTRICAL DIAGRAM





13.1- List of documents.....page 55

13.2- Statement of warranty.....page 55

13.1 LIST OF DOCUMENTS

The instructions for use supplied with each generator set are made up of documents of which this manual is the General Part. Normally the following documents are supplied:

- Declaration of CE conformity.
- Instruction manual for the use and maintenance of the generating sets including the list of service centres and the **Gen Set S.p.A** certificate of guarantee.
- Instruction manual for the use and maintenance of the motor.
- Warranty card.

13.2 STATEMENT OF WARRANTY

GEN SET S.p.A. warrants its products, on condition that they are not altered, for a period of **24 months** beginning on the date of sale to the first user.

Within this time period, in the countries where a service organisation is established, **GEN SET S.p.A.** undertakes to replace or repair the defective parts because of material defects, workmanship and/or assembly by means of its own **AUTHORISED WOKSHOPS.**

The option if repairing or replacing the defective parts is in the sole judgement of the **MANUFACTURER** or the **AUTHORISED WOKSHOPS.**

The warranty in the rest of the world consists exclusively of the supply free of charge, ex works at the Villanova D'Ardenghi facility, the parts no longer usable because of material defect.

The warranty is applied by the manufacturer, subject to examination of the defective materials.

All travelling and expenses for the personnel performing the repairs under warranty shall be borne by the user, as well as the packaging and shipment expenses for both the defective and replacement parts.

The purchaser cannot terminate the contract or make a claim for compensation or damage resulting from the use or the impossibility to use the equipment, both total or partial.

This warranty does not apply to batteries, diesel or petrol engines installed on Gen Set equipment. These are covered by the respective manufacturers.

The rights under this warranty are void if:

- the customer has not complied with their contractual payment obligations
- the factory seals have been broken
- disassembly, repairs or alterations have been carried out by personnel that do not belong to GEN SET service organisation
- the equipment has been subject to misuse or neglect.

This warranty is not applicable for deterioration due to normal wear and tear.

DIRECTIONS FOR EXERCISING YOUR RIGHTS UNDER THIS WARRANTY

Every GEN SET unit is provided with a certification of warranty.

Complete the certification and have it validated with seller's stamp and signature.

Mail to: GEN SET S.p.A. - Servizio Assistenza

Via Stazione, 5 - 27030 Villanova D'Ardenghi (Pavia).

The certification of warranty must be kept and used as a reference when requesting service.

ENGINE WARRANTY

Compliance with the maintenance directions reported in the manual ENGINE USE AND MAINTENANCE, will ensure a safe use of the generator unit.

When purchasing the generator, fill in the engine certification of warranty and mail it to the manufacturer.