

# **GE 15 PS - PSX**

**0 9 0 3**

**741569003 - GB**

## **USE AND MAINTENANCE MANUAL**





**UNI EN ISO 9001 : 2000**

ISO 9001:2000 - Cert. 0192/3

MOSA has certified its quality system according to UNI EN ISO 9001:2000 to ensure a constant, high quality of its products. This certification covers the design, production and servicing of engine driven welders and generating sets.

The certifying institute, ICIM, which is a member of the International Certification Network IQNet, awarded the official approval to MOSA after an examination of its operations at the head office and plant in Cusago (MI), Italy.

This certification is not a point of arrival but a pledge on the part of the entire company to maintain a level of quality of both its products and services which will continue to satisfy the needs of its clients, as well as to improve the transparency and the communications regarding all the company's activities in accordance with the official procedures and in harmony with the MOSA Manual of Quality.

The advantages for MOSA clients are:

- Constant quality of products and services at the high level which the client expects;
- Continuous efforts to improve the products and their performance at competitive conditions;
- Competent support in the solution of problems;
- Information and training in the correct application and use of the products to assure the security of the operator and protect the environment;
- Regular inspections by ICIM to confirm that the requirements of the company's quality system and ISO 9001 are being respected.

All these advantages are guaranteed by the CERTIFICATE OF QUALITY SYSTEM No.0192/3 issued by ICIM S.p.A. - Milano (Italy) - [www.icim.it](http://www.icim.it)

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**⚠ ATTENTION**

This use and maintenance manual is an important part of the machines in question.

The assistance and maintenance personnel must keep said manual at disposal, as well as that for the engine and alternator (if the machine is synchronous) and all other documentation about the machine.

We advise you to pay attention to the pages concerning the security (see page M1.1).



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## INFORMATION

Dear Customer,  
We wish to thank you for having bought from MOSA a high quality set.

Our sections for Technical Service and Spare Parts will work at best to help you if it were necessary.

To this purpose we advise you, for all control and overhaul operations, to turn to the nearest authorized Service Centre, where you will obtain a prompt and specialized intervention.

☞ In case you do not profit on these Services and some parts are replaced, please ask and be sure that are used exclusively original MOSA parts; this to guarantee that the performances and the initial safety prescribed by the norms in force are re-established.

☞ **The use of non original spare parts will cancel immediately any guarantee and Technical Service obligation from MOSA.**

## NOTES ABOUT THE MANUAL

Before actioning the machine please read this manual attentively. Follow the instructions contained in it, in this way you will avoid inconveniences due to negligence, mistakes or incorrect maintenance. The manual is for qualified personnel, who knows the rules: about safety and health, installation and use of sets movable as well as fixed.

You must remember that, in case you have difficulties for use or installation or others, our Technical Service is always at your disposal for explanations or interventions.

The manual for Use Maintenance and Spare Parts is an integrant part of the product. It must be kept with care during all the life of the product.

In case the machine and/or the set should be yielded to another user, this manual must also given to him.

Do not damage it, do not take parts away, do not tear pages and keep it in places protected from dampness and heat.

You must take into account that some figures contained in it want only to identify the described parts and therefore might not correspond to the machine in your possession.

## INFORMATION OF GENERAL TYPE

In the envelope given together with the machine and/or set you will find: the manual for Use Maintenance and Spare Parts, the manual for use of the engine and the tools (if included in the equipment), the guarantee (in the countries where it is prescribed by law).

Our products have been designed for the use of generation for welding, electric and hydraulic system; ANY OTHER DIFFERENT USE NOT INCLUDED IN THE ONE INDICATED, relieves MOSA from the risks which could happen or, anyway, from that which was agreed when selling the machine; MOSA excludes any responsibility for damages to the machine, to the things or to persons in this case.

Our products are made in conformity with the safety norms in force, for which it is advisable to use all these devices or information so that the use does not bring damage to persons or things.

While working it is advisable to keep to the personal safety norms in force in the countries to which the product is destined (clothing, work tools, etc.).

Do not modify for any motive parts of the machine (fastenings, holes, electric or mechanical devices, others..) if not duly authorized in writing by MOSA: the responsibility coming from any potential intervention will fall on the executioner as in fact he becomes maker of the machine.

☞ **Notice:** *this manual does not engage MOSA, who keeps the faculty, apart the essential characteristics of the model here described and illustrated, to bring betterments and modifications to parts and accessories, without putting this manual uptodate immediately.*



**MOSA**

I

GB

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**CE MARK**

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1.1-10/02

**GE, MS, TS, EAS****M  
1.4****MOSA**

20090 CUSAGO (MI) - ITALY

**DICHIARAZIONE  
DI CONFORMITA'**MOSA  
V.le Europa, 59  
20090 Cusago (MI) Italia  
Telefono: 0290352.1  
Fax: 0290390466  
E-mail: info@mosa.it

MOSA dichiara sotto la propria responsabilità che la macchina:  
 MOSA déclare, sous sa propre responsabilité, que la machine:  
 MOSA declares, under its own responsibility, that the machine:  
 MOSA erklärt, daß die Maschine:  
 MOSA verklaard, onder haar eigen verantwoordelijkheid, dat de machine:  
 MOSA declara bajo su responsabilidad que la máquina:

Modello/Modèle/Model/Modell/Modell/Modelo: \_\_\_\_\_

N. di serie/Nr. de série/Serial No./Seriennr./Serienr.In\* de série: \_\_\_\_\_

è conforme con quanto previsto dalle **Direttive Comunitarie** e relative modifiche:  
 est en conformité avec ce qui est prévu par les **Directives Communautaires** et relatives modifications:  
 conforms with the **Community Directive and related modifications**:  
 Mit den Vorschriften der Gemeinschaft und deren Ergänzungen übereinstimmt:  
 in overeenkomst is met de inhoud van gemeenschapsrichtlijnen en gerelateerde modificaties:  
 cumple con los requisitos de la **Directiva Comunitaria** y sus anexos:

CEE 89/392 (91/368 - 93/44 - 93/68)  
 CEE 73/23 (93/68)  
 CEE 89/336 (92/31 - 93/68)

per la verifica sono state considerate le seguenti norme armonizzate, direttive CEE, Norme nazionali e internazionali:

pour la vérification de la conformité ont été consultées les normes harmonisées suivantes, directives CEE, normes nationales et internationales:

to check the conformity, the following harmonized norms EEC directives, national and international norms, have been consulted:

zur Prüfung hat man die folgenden übereinstimmenden nationalen und internationalen Normen herangezogen:

ter verificatie van de overeenkomst, zijn de volgende geharmoniseerde normen EEG-richtlijnen, nationaal en internationaal, geconsulteerd:

para su verificación se han tenido en cuenta las Normas armonizadas, Directiva CEE, Normas nacionales e internacionales:

Norme armonizzate - normes harmonisées - *harmonized norms* - übereinstimmende Normen - geharmoniseerde normen - *Normas armonizadas*:

EN 292-1 EN 292-2

EN 60974-1 - EN 60439-1 - EN 60204-1

EN 60974-1 - EN 500199 (Solo per modelli - Seulement pour les modèles - *Only for models* - nur für die Modelle - Alleen voor de modellen - Sólo para modelos: **MS / TS**)

EN 50081-2 - EN 50082-2

Altre norme - autres normes - *other norms* - andere Normen - *andere normen* - otras normas:

84/536/CEE (Solo per modelli - Seulement pour les modèles - *Only for model* - nur für die Modelle - Alleen voor de modellen - Sólo para modelos: **GE**)

84/535/CEE (Solo per modelli - Seulement pour les modèles - *Only for model* - nur für die Modelle - Alleen voor de modellen - Sólo para modelos: **MS / TS**)



Ing. Benso Marelli  
 Direttore Generale

Cusago, \_\_\_\_\_




The CE mark (European Community) certifies that the product complies with the essential safety requirements provided by the applicable COMMUNITY DIRECTIVES. In the Conformity Declaration are reported the HARMONIZED NORMS and not, used for the checking.

## SYMBOLS IN THIS MANUAL

- The symbols used in this manual are designed to call your attention to important aspects of the operation of the machine as well as potential hazards and dangers for persons and things.

## IMPORTANT ADVICE

- Advice to the User about the safety:

 N.B.: The information contained in the manual can be changed without notice. Potential damages caused in relation to the use of these instructions will not be considered because these are only indicative. Remember that the non observance of the indications reported by us might cause damage to persons or things. It is understood, that local dispositions and/or laws must be respected.

## WARNING



**Situations of danger - no harm to persons or things**

### ***Do not use without protective devices provided***

Removing or disabling protective devices on the machine is prohibited.

### ***Do not use the machine if it is not in good technical condition***

The machine must be in good working order before being used. Defects, especially those which regard the safety of the machine, must be repaired before using the machine.

## SAFETY PRECAUTIONS



### **DANGEROUS**

This heading warns of an immediate danger for persons as well for things. Not following the advice can result in serious injury or death.



### **WARNING**

This heading warns of situations which could result in injury for persons or damage to things.



### **CAUTION**

To this advice can appear a danger for persons as well as for things, for which can appear situations bringing material damage to things.



### **IMPORTANT**



### **NOTE**



### **ATTENTION**

These headings refer to information which will assist you in the correct use of the machine and/or accessories.



**SYMBOLS** (for all MOSA models)



**STOP** - Read absolutely and be duly attentive



Read and pay due attention



**GENERAL ADVICE** - If the advice is not respected damage can happen to persons or things.



**HIGH VOLTAGE** - Attention High Voltage. There can be parts in voltage, dangerous to touch. The non observance of the advice implies life danger.



**FIRE** - Danger of flame or fire. If the advice is not respected fires can happen.



**HEAT** - Hot surfaces. If the advice is not respected burns or damage to things can be caused.



**EXPLOSION** - Explosive material or danger of explosion. in general. If the advice is not respected there can be explosions.



**WATER** - Danger of shortcircuit. If the advice is not respected fires or damage to persons can be caused.



**SMOKING** - The cigarette can cause fire or explosion. If the advice is not respected fires or explosions can be caused.



**ACIDS** - Danger of corrosion. If the advice is not respected the acids can cause corrosions with damage to persons or things.



**WRENCH** - Use of the tools. If the advice is not respected damage can be caused to things and even to persons.



**PRESSION** - Danger of burns caused by the expulsion of hot liquids under pressure.



**ACCES FORBIDDEN** to non authorizad people.

**PROHIBITIONS** No harm for persons

**Use only with safety clothing -**



It is compulsory to use the personal protection means given in equipment.

**Use only with safety clothing -**



It is compulsory to use the personal protection means given in equipment.

**Use only with safety protections -**



It is a must to use protection means suitable for the different welding works.

**Use with only safety material -**



It is prohibited to use water to quench fires on the electric machines.

**Use only with non inserted voltage -**



It is prohibited to make interventions before having disinserted the voltage.

**No smoking -**



It is prohibited to smoke while filling the tank with fuel.

**No welding -**



It is forbidden to weld in rooms containing explosive gases.

**ADVICE** No harm for persons and things

**Use only with safety tools, adapted to the specific use -**

It is advisable to use tools adapted to the various maintenance works.

**Use only with safety protections, specifically suitable**



It is advisable to use protections suitable for the different welding works.

**Use only with safety protections -**



It is advisable to use protections suitable for the different daily checking works.

**Use only with safety protections -**



It is advisable to use all protections while shifting the machine.

**Use only with safety protections -**











































































It is advisable to use protections suitable for the different daily checking works.and/or of maintenance.

<p>°C: temperature Celsius grades  <b>10:10</b> kVA synchronous (wording example)  <b>10000:10</b> kVA asynchronous (wording example)  <b>A:</b> Ampere  <b>A:</b> ADIM engine  <b>atm:</b> pressure  <b>B:</b> petrol  <b>BAT:</b> battery  <b>BC:</b> base current  <b>C.A.(c.a.):</b> alternating current  <b>C.B.:</b> battery charger  <b>C.C.(c.c.):</b> direct current  <b>cc:</b> cm<sup>3</sup> (volume)  <b>CE:</b> European norm conformity  <b>CF:</b> special for pipe welding  <b>CTL:</b> slow touring trolley  <b>CTM CTV:</b> fast touring trolley: hand touring trolley  <b>D:</b> diesel  <b>D:</b> GFI  <b>D:</b> Deutz engine  <b>E:</b> electric start  <b>EAS:</b> automatic intervention panel for generating sets for connection to the mains  <b>EL:</b> electronic regulation, allows to use welder and generating set simultaneously  <b>EP1:</b> automatic accelerator according to requested power, engine protection, low oil pressure, high temperature with engine stop, trouble warning lights  <b>EP2:</b> engine protection, low oil pressure, high temperature with engine stop, trouble warning lights  <b>EP4:</b> engine protection, low oil pressure, high temperature with engine stop, no battery charge, belt broken, low fuel level with engine stop, trouble warning lights  <b>EP5:</b> engine protection, low oil pressure, high temperature with engine stop, no battery charge, belt broken, low fuel level with engine stop, overspeed, trouble warning lights  <b>ES:</b> oil/temperature engine protection device  <b>EV:</b> electrovalve  <b>g/kwh:</b> grams/kilowatt hour (engine consumption)  <b>GA:</b> asynchronous alternator  <b>GE:</b> generating set  <b>GHF:</b> high frequency alternator  <b>GS:</b> synchronous alternator  <b>h:</b> hour meter (symbol)  <b>H:</b> Hatz engine  <b>H:</b> Honda engine  <b>HI:</b> hydraulic central  <b>Hz:</b> frequency  <b>I:</b> single-phase auxiliary generation (symbol 1~)  <b>IP:</b> protection grade for electric devices against access to dangerous parts according to the IEC 529 norm (Internal Protection)  <b>kg:</b> kilogram (mass)  <b>K:</b> welding cables set  <b>kVA:</b> kilovolt ampere  <b>kW:</b> kilowatt (engine power)  <b>kWh:</b> kilowatt hour (energy)  <b>l:</b> liters (capacity)</p>	<p><b>L:</b> Lombardini engine  <b>Lwa:</b> maximum acoustic (power level) according to EEC norm 535/536  <b>mm:</b> millimeter (length) (measure)  <b>m:</b> meter (length)  <b>mA:</b> milliampere  <b>MS-MSG:</b> MOSA engine driven welder with high frequency alternator  <b>MT:</b> magnetothermic switch  <b>MT:</b> grounding kit  <b>MTD:</b> magnetothermic switch / GFI  <b>OH:</b> heater (engine oil) for generating sets  <b>P:</b> plus  <b>PAC:</b> power electric frame  <b>PAR:</b> device for double  <b>PB:</b> battery holder  <b>PL:</b> „pipe line“ welding  <b>PS:</b> exhaust pipe extension  <b>PW:</b> welder for polyethylene and propylene pipes  <b>QEA:</b> automatic electric panel  <b>QEM:</b> manual electric panel  <b>R:</b> Ruggerini engine  <b>RVT:</b> voltage electronic regulator  <b>S:</b> symbol of EN 60974-1  <b>S:</b> Suzuki engine  <b>SKID:</b> unit assembled on a base with no protection (no fairing)  <b>S-SC:</b> silenced (faired) - silenced compact (faired)  <b>SX-SXC:</b> supersilenced (faired and sound proof) - supersilenced compact (faired and super sound proof)  <b>T:</b> thermic switch  <b>TC-TCM-TCPL:</b> remote control  <b>TS:</b> welder with asynchronous alternator  <b>V:</b> Volt  <b>Y:</b> Yanmar engine  <b>Y:</b> three-phase auxiliary generation (symbol 3~)</p>
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 Conformity CE	 EEC Sound power conformity	 EN 60974-1 conformity	 Triphase 3 ~	 Singlephase 1 ~	 Users' manual	 Information	 Various news
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**Equipment and optional**

Engine	 Gasoline engine	 Diesel engine	 Air cooling	 Water cooling	 Manual recoil	 Electric start	 Battery 12 V			
Engine protection	 Engine protection	 Engine protection	 Engine protection	 Engine protection	 Engine protection	 Engine protection	 Siren	 Engine shut down (oil)	 Engine speed	
Engine alarms	 Oil level indicator	 Battery charger indicator	 Fuel level gauge/low fuel	 Low fuel indicator	 Oil temperature	 Warning light for preheating glow plugs	 Air filter blockage	 Belt breakage	 Over speed	 Control unit QEA
Generation	 Asynchronous alternator	 Synchronous alternator	 Generator high frequency	 Voltmeter	 Frequency-meter	 Ammeter	 Compound	 Voltmeter phase selector	 Electronic Voltage regulator	 Switch
Electric protection	 Circuit breaker/ Ground fault interrupter	 Circuit breaker	 Ground fault interrupter	 Thermal shut off	 Fuse	 Isolation monitoring				
Generation use	 Terminal strip	 3 ~ CEE Socket 400/230V EEC	 1 ~ CEE Socket 230/110/48V EEC	 1 ~ Schuko Socket 230V Schuko	 Socket 48V EEC	 Battery charger	 Engine booster			
Welding control	 Arc control	 Welding with covered electrode	 Welding current electr. regulation	 Base current diode bridge	 Polarity inverter	 CC/CV selector				
Various devices	 Hour counter	 Ready for TC	 Ground connection point	 Emergency stop button	 Central lifting eye					
Various	 Standard equipment	 Options on request				 D.C.	 A.C.	 Plus	 Minus	 Maintenance Time
Optionals	 Trolley	 Site tow	 Welding cables	 Remote control						

 The installation and the general advice concerning the operations, are finalized to the correct use of the machine, in the place where it is used as generator group and/or welder.


<b>ENGINE</b>	Stop engine when fueling	<b>CHECKING BOARD</b>	Do not touch electric devices if you are barefoot or with wet clothes.
	Do not smoke, avoid flames, sparks or electric tools when fueling.		Always keep off leaning surfaces during work operations
	Unscrew the cap slowly to let out the fuel vapours.		Static electricity can damage the parts on the circuit.
	Slowly unscrew the cooling liquid tap if the liquid must be topped up.		An electric shock can kill
	The vapor and the heated cooling liquid under pressure can burn face, eyes, skin.		
	Do not fill tank completely.		
	Wipe up spilled fuel before starting engine.		
	Shut off fuel of tank when moving machine (where it is assembled).		
	Avoid spilling fuel on hot engine.		
	Sparks may cause the explosion of battery vapours		














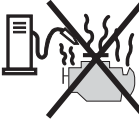






 **FIRST AID.** In case the operator should be sprayed by accident, from corrosive liquids a/o hot toxic gas or whatever event which may cause serious injuries or death, predispose the first aid in accordance with the ruling labour accident standards or of local instructions.

Skin contact	Wash with water and soap
Eyes contact	Irrigate with plenty of water, if the irritation persists contact a specialist
Ingestion	Do not induce vomit as to avoid the intake of vomit into the lungs, send for a doctor
Suction of liquids from lungs	If you suppose that vomit has entered the lungs (as in case of spontaneous vomit) take the subject to the hospital with the utmost urgency
Inhalation	In case of exposure to high concentration of vapours take immediately to a non polluted zone the person involved



 **FIRE PREVENTION.** In case the working zone, for whatsoever cause goes on fire with flames liable to cause severe wounds or death, follow the first aid as described by the ruling norms or local ones.

<b>EXTINCTION MEANS</b>	
Appropriated	Carbonate anhydride (or carbon dioxide) powder, foam, nebulized water
Not to be used	Avoid the use of water jets
Other indications	Cover eventual shedding not on fire with foam or sand, use water jets to cool off the surfaces close to the fire
Particular protection	Wear an autorespiratory mask when heavy smoke is present
Useful warnings	Avoid, by appropriate means to have oil sprays over metallic hot surfaces or over electric contacts (switches, plugs, etc.). In case of oil sprinkling from pressure circuits, keep in mind that the inflammability point is very low.

 <b>WARNING</b>					 <b>CAUTION</b>		 <b>DANGEROUS</b>
							
							

 **WARNING** **THE MACHINE MUST NOT BE USED IN AREAS WITH EXPLOSIVE ATMOSPHERE**



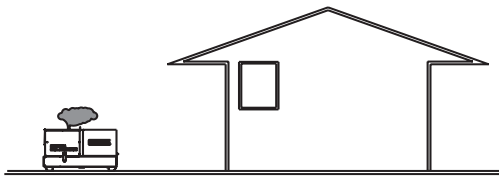
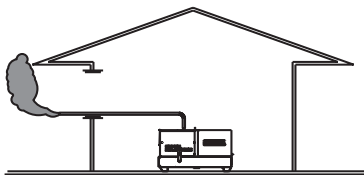
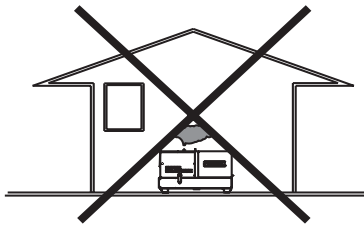
**INSTALLATION AND ADVICE BEFORE USE**

**GASOLINE ENGINES**

- Use in open space, air swept or vent exhaust gases, which contain the deadly carbone oxyde, far from the work area.

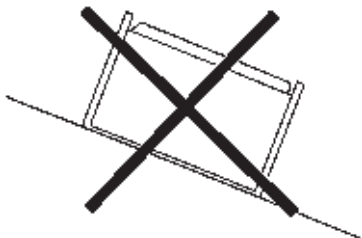
**DIESEL ENGINES**

- Use in open space, air swept or vent exhaust gases far from the work area.

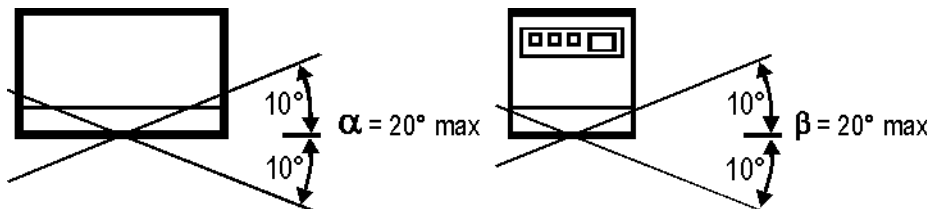


**POSITION**

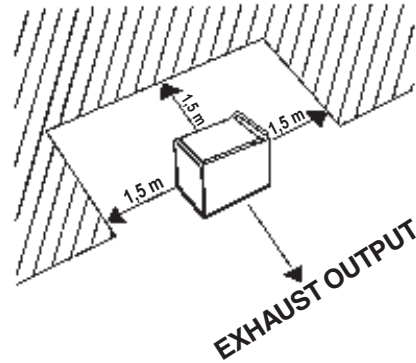
Place the machine on a level surface at a distance of at least 1,5 m from buildings or other plants.



Maximum leaning of the machine (in case of dislevel)



Check that the air gets changed completely and the hot air sent out does not come back inside the set so as to cause a dangerous increase of the temperature.



☞ Make sure that the machine does not move during the work: **block** it possibly with tools and/or devices made to this purpose.

**MOVES OF THE MACHINE**

☞ At any move check that the engine is **off**, that there are no connections with cables which impede the moves.

**PLACE OF THE MACHINE**

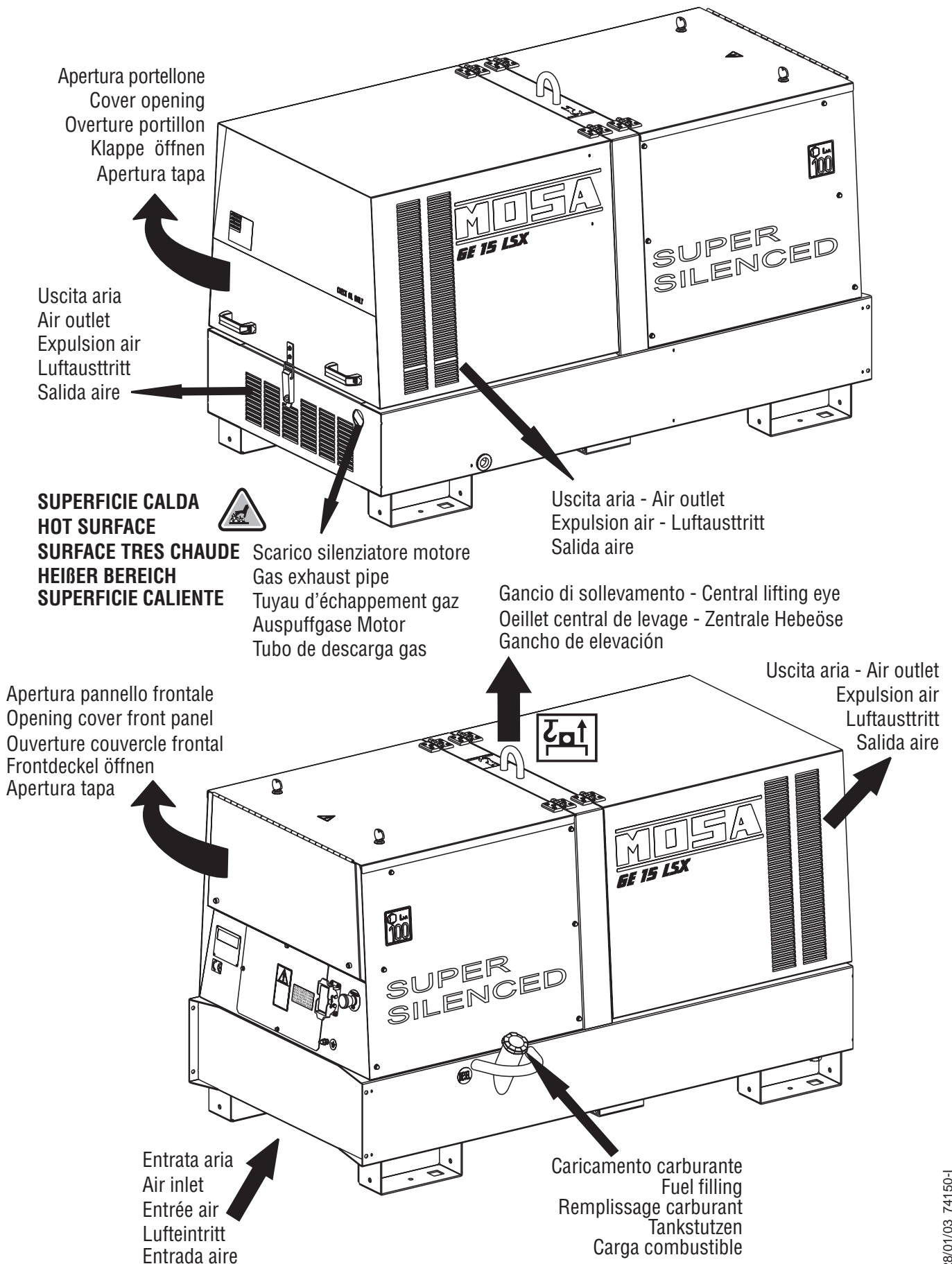


In spots where it often rains and/or there are flooded areas, do **not** put the machine:

- in the bad weather
- in flooded places.

**Protect all the electric parts at risk, because water infiltrations could cause short circuits with damages at persons and/or things.**

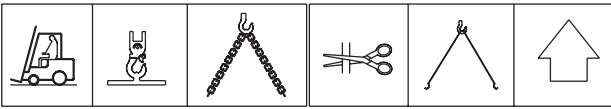
The protection degree of the machine is put on the data plate and in this manual at page "Technical Data".







**NOTE**



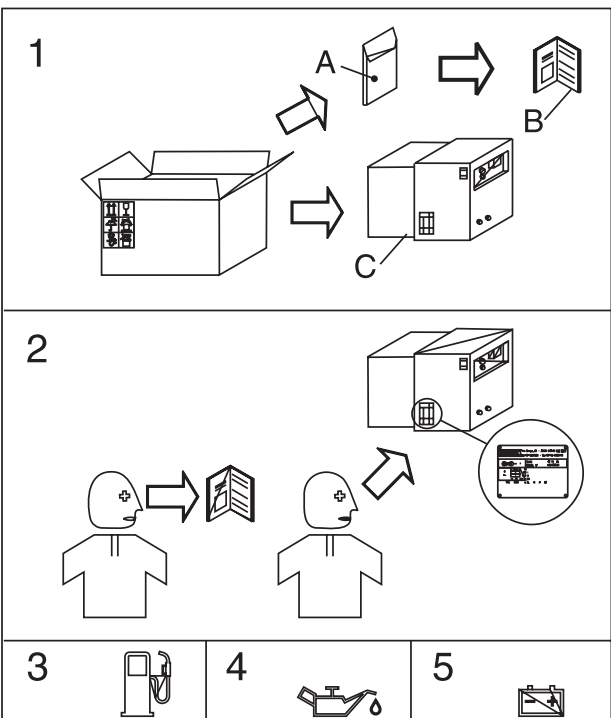
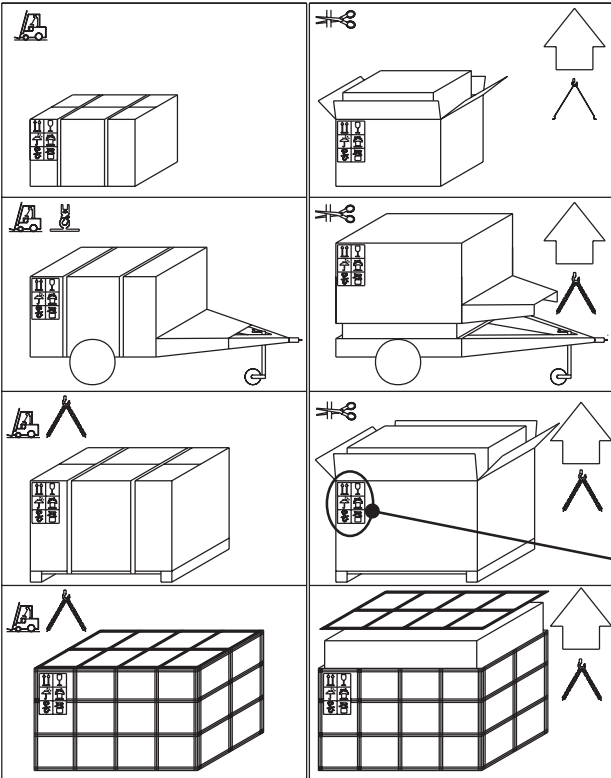
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with its packaging, and conforms to local rules and regulations.

When receiving the goods make sure that the product has not suffered damage during the transport, that there has not been rough handling or taking away of parts contained inside the packing or in the set.

In case you find damages, rough handling or absence of parts (envelopes, manuals, etc.), we advise you to inform immediately our Technical Service.



For eliminating the packing materials, the User must keep to the norms in force in his country.



- 1) Take the machine (C) out of the shipment packing. Take out of the envelope (A) the user's manual (B).
- 2) Read: the user's manual (B), the plates fixed on the machine, the data plate.
- 3) Fill the tank with fuel.
- 4) Introduce the engine oil (see engine manual).
- 5) Activate the battery (when assembled).

**NB.:** for points 3)-4)-5) keep to the instructions page M20 and/or M26.



**NOTE**

In case you should transport or move the machine, keep to the instructions as per the figures.

Make the transportation when the machine has **no** petrol in its tank, **no** oil in the engine and and electrolyte in the battery.

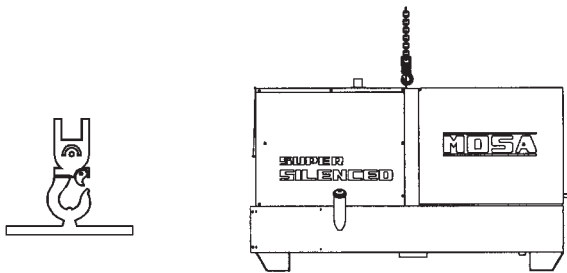
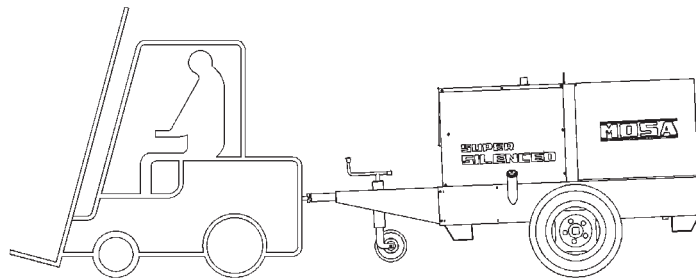
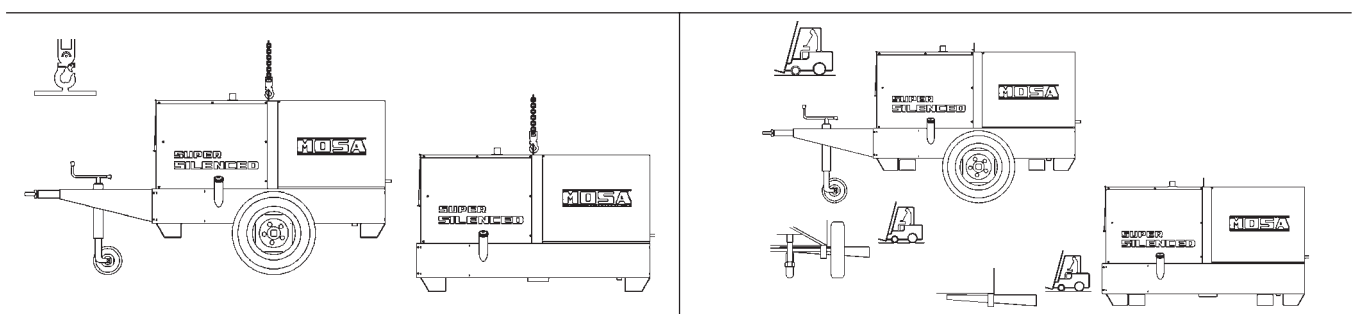
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

Only authorized persons involved in the transport of the machine should be in the area of movement.

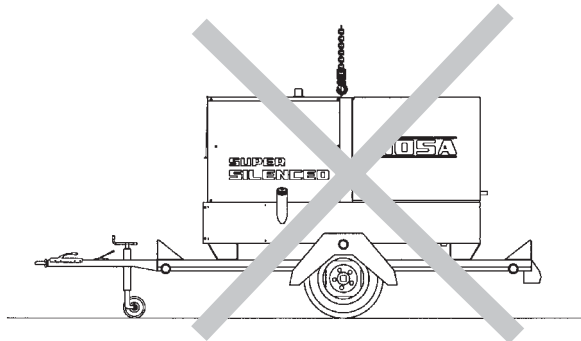
**DO NOT LOAD OTHER PARTS WHICH CAN MODIFY WEIGHT AND BARICENTER POSITION.**

**IT IS STRICTLY FORBIDDEN TO DRAG THE MACHINE MANUALLY OR TOW IT BY ANY VEHICLE (model with no CTL accessory).**

If you did not keep to the instructions, you could damage the structure of the machine.



LIFT ONLY THE MACHINE



DO NOT LIFT THE MACHINE AND TRAILER



**DANGER: LIFTING EYE IS NOT DESIGNED TO SUPPORT ADDED WEIGHT OF ROAD TOW TRAILER**







**ATTENTION**

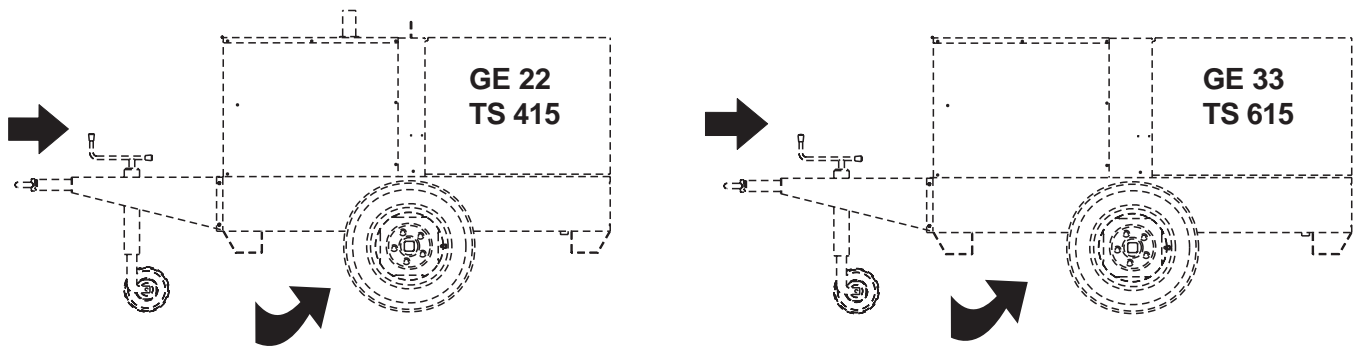
The CTL accessory cannot be removed from the machine and used separately (actioned manually or following vehicles) for the transport of loads or anyway for used different from the machine movements.

**TRAILERS**

The machines provided for assembling the CTL accessory (slow towing trolley) can be towed up to a **maximum** speed of **40 Kms/hour** on asphalted surfaces.

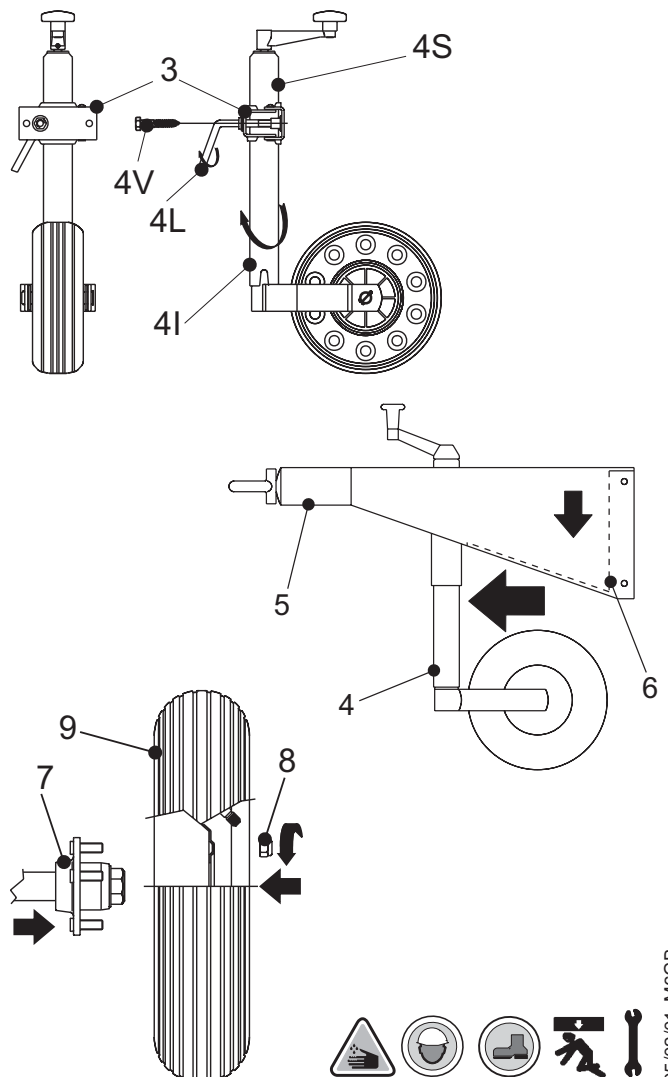
Towing on public roads or turnpikes of any type **IS EXCLUDED**, because **not** in possession of the requirements by national and foreign traffic norms.

**Nota:** Lift the machine and assemble the parts as shown in the drawing



For assembling the generating set on the trolley CTL22 please keep to following instructions:

- 1) - Lift the generating set (by means of suitable hook).
- 2) - Slightly fix the jaw (3) of the parking foot to the bar with the M10x20 screws, the M10 nuts and the washers (so as to let the foot sprag go through).
- 3) - Split (unscrewing them) the two parts of the foot (4S-4I) to be able later to assemble them on the jaw.
- 4) - Introduce into the jaw (3) the upper part (4S) of the foot and screw again the lower part (4I), then tighten the screws (4V) of the jaw to the towbar and block momentarily with the lever (4L) the whole foot.
- 5) - Assemble the tool holder (6) on the towbar with the M8x14 screws, nuts and washers.
- 6) - Assemble on the machine the towbar (5) complete of foot with the M10x20 screws, nuts and washers (see fig. page M6.3).
- 7) - Assemble the axle (7) to the base of the machine (see fig. page M6.3) with the M 10x25 screws and relative washers (two per part) so that their supports coincide.
- 8) - Insert the wheel (9) on the axle then screw the self blocking nuts (8).
- 9) - Pump the tyre (9) bringing the pressure to four atms.
- 10) - Lower the machine to the ground and place the parking foot definitively (regulating at the best height).



**⚠ ATTENTION**

Do not substitute the original tires with other types.





**BATTERY**



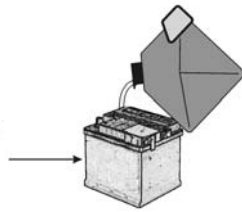
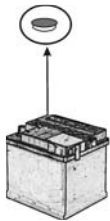
**WARNING**



Sulphuric acid is corrosive. Protect hands, eyes, clothing, etc.

Remove the battery from the machine before undertaking any operations.

**Note:** *Damage caused by the spilling of acid will VOID the warranty.*



Fill the battery (S1) with electrolyte up to the max. level; then wait approx. 30 minutes and top up with electrolyte.

If any acid is spilled, rinse with abundant fresh water before re-assembling.

**REFUELLING AND CONTROL:**

The motor is shipped without oil; carry out refuelling and controls with motor at level position.

1. Remove the oil-fill tap (24)
2. Pour oil and replace the tap
3. Check the oil level using the dipstick (23); the oil level must be comprised between the minimum and maximum indicators.



**ATTENTION**

It is dangerous to fill the motor with too much oil, as its combustion can provoke a sudden increase in rotation speed.



**AIR FILTER**

Check that the dry air filter is correctly installed and that there are no leaks around the filter which could lead to infiltrations of non-filtered air to the inside of the motor.



**LUBRICANT**

**RECOMMENDED OIL**

MOSA recommends selecting **AGIP** engine oil. Refer to the label on the motor for the recommended products.

To check the oil level:

<p>PRODOTTI RACCOMANDATI RECOMMENDED PRODUCTS</p>	
<p><b>AGIP</b> SUPERDIESEL 15W/40 API CF4-SG</p>	<p>OLIO MOTORE DIESEL DIESEL ENGINE OIL</p> <input type="checkbox"/>
<p><b>AGIP</b> SUPERMOTOROIL 20W/50 API CC-SF</p>	<p>OLIO MOTORE BENZINA GASOLINE ENGINE OIL</p> <input type="checkbox"/>
<p><b>AGIP</b> ANTIFREEZE EXTRA INIBITE ETHYLENE GLYCOL (50% + 50% H<sub>2</sub>O)</p>	<p>CIRCUITO DI RAFFREDDAMENTO COOLING CIRCUIT (CUNA NC 956-16 ED 97)</p> <input type="checkbox"/>

Please refer to the motor operating manual for the recommended viscosity.



**FUEL****ATTENTION**

Do not smoke or use open flames during refuelling operations, in order to avoid explosions or fire hazards.

Fuel fumes are highly toxic; carry out operations outdoors only, or in a well-ventilated environment.



Avoid accidentally spilling fuel. Clean any eventual leaks before starting up motor.

Refill the tank with good quality diesel fuel, such as automobile type diesel fuel, for example.

For further details on the type of diesel fuel to use, see the motor operating manual supplied.

Do not fill the tank completely; leave a space of approx. 10 mm between the fuel level and the wall of the tank to allow for expansion.

In rigid environmental temperature conditions, use special winterized diesel fuels or specific additives in order to avoid the formation of paraffin.

**COOLING LIQUID****ATTENTION**

Do not remove the radiator tap with the motor in operation or still hot, as the liquid coolant may spurt out and cause serious burns. Remove the tap very carefully.

Remove the tap and pour the liquid coolant into the radiator; the quantity and composition of the liquid coolant are indicated in the motor operating manual. Replace the tap, ensuring it is perfectly closed.

After refilling operations, allow the motor to run for a brief time and check the level, as it may have diminished due to air bubbles present in the cooling circuit; restore the level with water.

To replace the liquid coolant, follow the operations described in the motor operating manual.

**GROUNDING CONNECTION**

The grounding connection to an earthed installation **is obligatory** for all models equipped with a differential switch (circuit breaker). In these groups the generator star point is generally connected to the machine's earthing; by employing the TN or TT distribution system, the differential switch guarantees protection against indirect contacts.

In the case of powering complex installations requiring or employing additional electrical protection devices, the coordination between the protection devices must be verified.

For the grounding connection, use the terminal (12); comply to local and/or current regulations in force for electrical installations and safety.



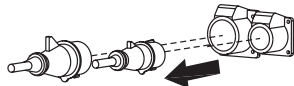
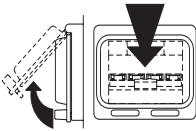


check before each start-up

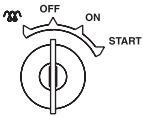


**START-UP FROM FRONT PANEL**

1. Position the LOCAL START / REMOTE START (I6) selector on LOCAL START; (**only EAS version**);
2. check to ensure the emergency stop button is unblocked;
3. make sure the load plugs are disconnected or the thermal-magnetic switch (Z2) is not inserted (intervention/insertion lever facing down), so as to ensure the motor's start-up without any loads inserted;



4. turn the start key (Q1) to the preheat position, identified by a picture of a spark plug. Keep the key in this position for about 5 seconds, the action is shown by the preheating light on (I4). Turn the start key to the ON position and then on START.



After the start-up of the motor, release the key, which will automatically place itself in the ON position;

5. the motor starts up at its operating speed, 1500 or 1800 rpm. After start-up, allow the motor to run for a few minutes before powering on the utilities. See table;

Temperature	Time
≤ - 20° C	5 min.
to - 20° C from -10° C	2 min.
to - 10° C from -5° C	1 min.
≥ 5° C	20 sec.

6. start-up at low temperatures.  
The motor will normally start up without problems down to temperatures of -10° C, -15° C.  
In case of starting difficulty, it is possible to repeat the starting preheating for a max. time of 10 seconds.

*In case of unsuccessful start-up, do not insist for longer than 5 seconds. Wait 10 - 15 seconds before attempting another start-up .*

**REMOTE START (Only EAS version)**

The unit can also be started by means of the remote TCM control device, or through the EAS automatic intervention panel.

1. Position the LOCAL START / REMOTE START (I6) selector on REMOTE START;
2. check that the emergency stop button is unblocked;
3. Connect to the EAS (B3) connector the TCM or the EAS panel.
4. **Start-up with EAS**  
The EAS panel automatically sees to controlling the motor's start-up cycle.  
The preheating time on the EAS panel is normally set at 5 seconds; for low temperatures, it may be necessary to increase it to 10 seconds to ensure start-up.  
Contact an authorized Service Centre or our Technical Service Department directly to modify this setting.
5. **Start-up with TCM**  
Perform the same procedure for start-up from the front panel using the TCM start-up key (Q1).

**CAUTION**

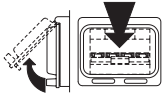
**RUNNING-IN**  
During the first 50 hours of operation, do not use more than 60% of the maximum output power of the unit and check the oil level frequently, in any case please stick to the rules given in the engine use manual.

## SHUT-DOWN FROM FRONT PANEL

For shutdown under normal conditions, proceed as follows:

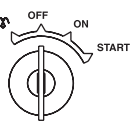
1. Position the LOCAL START /REMOTE START (I6) selector on LOCAL START; (**only EAS version**);

2. cut off power to all utilities by opening the load switch or opening the thermal-magnetic switch (Z2) (input lever in downward position);



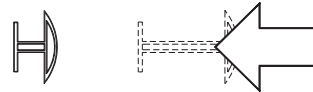
3. allow the motor to run without any load for a few minutes;

4. turn the key (Q1) to the OFF position.

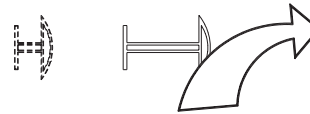


## EMERGENCY SHUTDOWN

To stop the group in a dangerous situation, press the emergency stop button (L5).



This button must be unblocked; to do so, turn it clockwise for a new start-up.



## SHUT-DOWN FROM REMOTE

(only EAS version)



### WARNING

The start-up selector (I6) LOCAL START / REMOTE START enables the start-up and stop controls for the selected position.

From the REMOTE START position, the start-up key on the front panel is completely disabled; to stop the generator, use the controls on the TCM or EAS panel.

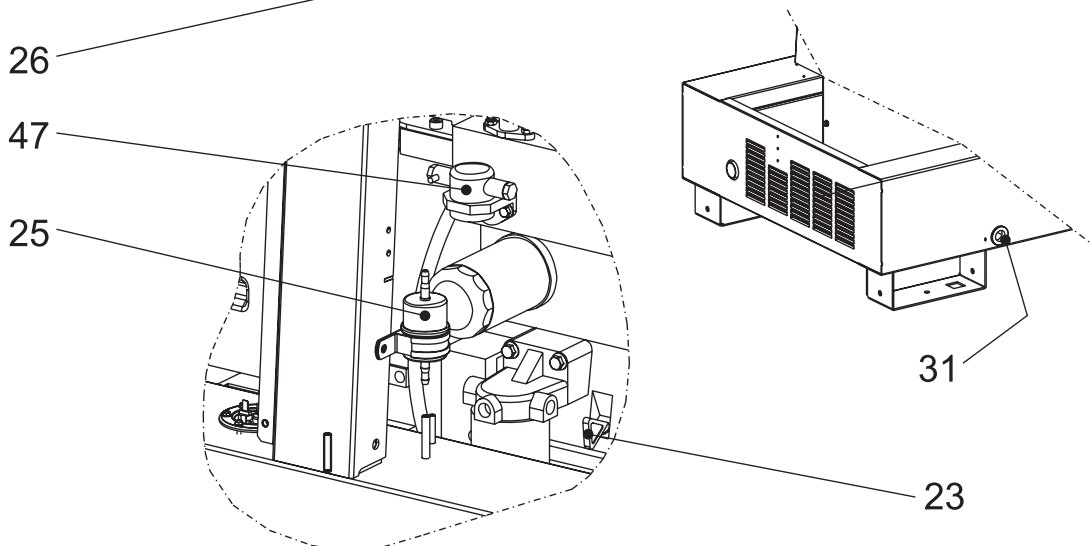
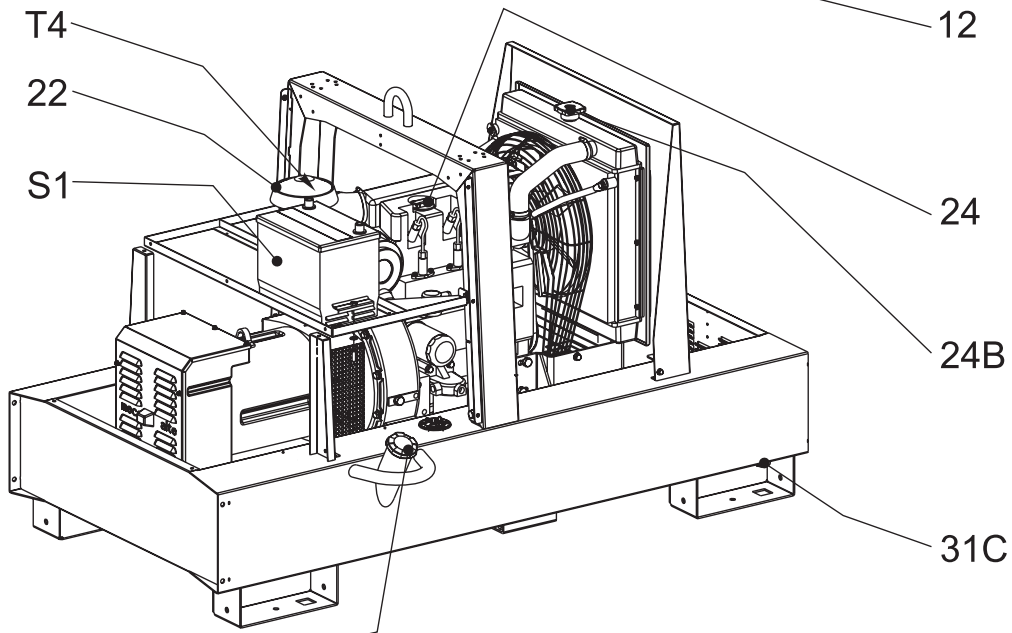
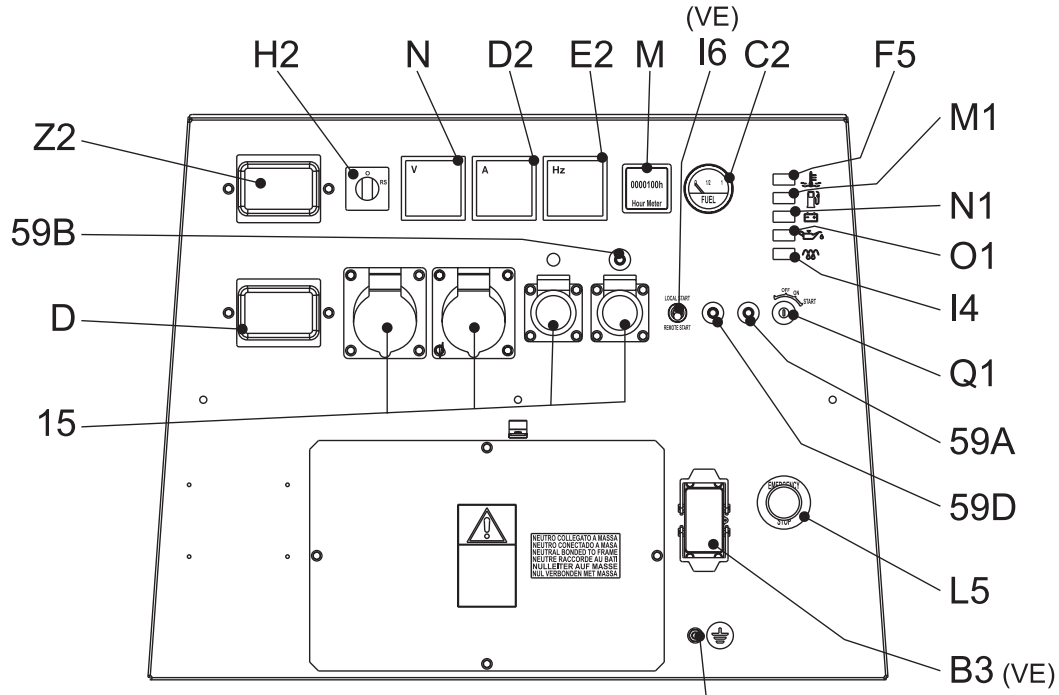
☞ **NB.: as a safety measure the start-up key must be entrusted to qualified personnel.**

The unit can also be shut down by means of the TCM remote control or EAS panel.

1. Check that the EAS (B3) connector is connected to the cable from the TCM or EAS panel.
2. Verify or position the LOCAL START / REMOTE START (I6) selector on REMOTE START.
3. **SHUT-DOWN with EAS**  
The EAS panel automatically sees to controlling the motor shutdown cycle, including the cooling cycle.
4. **SHUT-DOWN with TCM**  
Follow the same shutdown procedure described for shutdown from the front panel using the TCM key (Q1).

4A	Hydraulic oil level light	C6	Control unit for generating sets QEA
9	Welding socket ( + )	D	Ground fault interrupter ( 30 mA )
10	Welding socket ( - )	D1	Engine control unit and economiser EP1
12	Earth terminal	D2	Ammeter
15	A.C. socket	E2	Frequency meter
16	Accelerator lever	F	Fuse
17	Feed pump	F3	Stop switch
19	48V D.C. socket	F5	Warning light, high temperature
22	Engine air filter	F6	Arc-Force selector
23	Oil level dipstick	G1	Fuel level transmitter
24	Engine oil reservoir cap	H2	Voltage commutator
24A	Hydraulic oil reservoir cap	H6	Fuel electro pump
24B	Water filling cap	I2	48V A.C. socket
25	Fuel prefilter	I3	Welding scale switch
26	Fuel tank cap	I4	Preheating indicator
27	Muffler	I5	Y/s switch
28	Stop control	I6	Start Local/Remote selector
29	Engine protection cover	L	A.C. output indicator
30	Engine cooling/alternator fan belt	L5	Emergency button
31	Oil drain tap	L6	Choke button
31A	Hydraulic oil drain tap	M	Hour counter
31B	Water drain tap	M1	Warning level light
31C	Exhaust tap for tank fuel	M2	Contactora
32	Button	M5	Engine control unit EP5
33	Start button	M6	CC/CV switch
34	Booster socket 12V	N	Voltmeter
34A	Booster socket 24V	N1	Battery charge warning light
35	Battery charge fuse	N2	Thermal-magnetic circuit breaker/Ground fault interrupter
36	Space for remote control	N5	Pre-heat push-button
37	Remote control	N6	Connector – wire feeder
42	Space for E.A.S.	O1	Oil pressure warning light/Oil alert
42A	Space for PAC	P	Welding arc regulator
47	Fuel pump	Q1	Starter key
49	Electric start socket	Q3	Derivation box
54	Reset button PTO HI	Q4	Battery charge sockets
55	Quick coupling m. PTO HI	R3	Siren
55A	Quick coupling f. PTO HI	S	Welding ammeter
56	Hydraulic oil filter	S1	Battery
59	Battery charger thermal switch	S3	Engine control unit EP4
59A	Engine thermal switch	S6	Wire feeder supply switch
59B	Aux current thermal switch	T	Welding current regulator
59C	Supply thermal switch wire feeder-42V	T4	Dirty air filter warning light/indicator
63	No load voltage control	T5	Earth leakage relay
66	Choke control	U	Current transformer
67A	Auxiliary / welding current control	U3	R.P.M. adjuster
68	Cellulosic electrodes control	U4	Polarity inverter remote control
69A	Voltmeter relay	U5	Release coil
70	Warning lights	V	Welding voltage voltmeter
71	Selecting knob	V4	Polarity inverter control
72	Load commut. push button	V5	Oil pressure indicator
73	Starting push button	W1	Remote control switch
74	Operating mode selector	W3	Selection push button 30 I/1' PTO HI
75	Power on' warning light	W5	Battery voltmeter
76	Display	X1	Remote control socket
79	Wire connection unit	Y3	Button indicating light 20 I/1' PTO HI
86	Selector	Y5	Commutator/switch, serial/parallel
86A	Setting confirmation	Z2	Thermal-magnetic circuit breaker
87	Fuel valve	Z3	Selection push button 20 I/1' PTO HI
A3	Insulation monitoring	Z5	Water temperature indicator
A4	Button indicating light 30 I/1' PTO HI		
B2	Engine control unit EP2		
B3	E.A.S. connector		
B4	Exclusion indicating light PTO HI		
B5	Auxiliary current push button		
C2	Fuel level light		
C3	E.A.S. PCB		





	<b>15</b> Power sockets c.a. - Load connection point to generator
<b>MT</b>	<b>22</b> Thermal-magnetic switch - Protects the alternator and generation circuit from overloads and short circuits.
<b>D</b>	<b>D</b> Differential switch - Generally with a current of 30 mA, this is the safety device against indirect contacts
<b>T</b>	<b>59B</b> Thermal protection for inputs c.a. - Protects individual sockets, generally the monophasic inputs, from overloads.
	<b>H2</b> Voltmeter change-over switch - Selects the line voltage detected by the voltmeter
<b>V</b>	<b>N</b> Line voltmeter - The presence of line voltage indicates power can be drawn from the sockets c.a.
<b>A</b>	<b>D2</b> Line ammeter - Indicates the power drawn. In case of simultaneous supply from several inputs the ammeter measures the sum of the currents.
<b>Hz</b>	<b>E2</b> Frequency meter - Indicates the frequency of the current c.a. from the generator. Directly proportional to the number of revolutions of the motor. 50Hz corresponds to 1500 or 3000 rpm; 60Hz corresponds to 1800 or 3600 rpm.
	<b>12</b> Grounding terminal - PE terminal for the group's earthing connection to a grounding installation.

<b>EV</b>	Motor protection - Motor control circuit with automatic shutdown for low oil pressure and high temperature.
	<b>Q1</b> Start-up key - Control unit for start-up, shutdown and preheating operations.
<b>T</b>	<b>59A</b> Motor thermic protection - Protects the battery circuit auxiliary devices: pilot lights, relays, instruments, sensors, etc. from power overloads and short circuits.
<b>T</b>	<b>59D</b> Preheating thermic protection - Protects the preheating circuit from power overloads and short circuits.
<b>h</b>	<b>M</b> Hours counter - Indicates effective operating hours for the electricity-generating group.
	<b>O1</b> Oil pressure warning light - If on during the group's operation, indicates a malfunction in the motor's oil circuit.
	<b>F5</b> High temperature warning light - For groups with water cooled motor, indicates a malfunction in the cooling circuit.

	<b>N1</b> Battery charge warning light - If on during the group's operation, indicates a malfunction in the motor's battery charge circuit.
	<b>M1</b> Low fuel warning light - If on, indicates the fuel in the tank has reached the low level point.
	<b>I4</b> Preheating pilot light - If on, indicates the activation of the preheating circuit.
	<b>C2</b> Fuel level indicator - Indicates the percentage of fuel in the fuel tank.
	<b>L5</b> Emergency stop button - Allows for the group's immediate stop in case of danger, and prevents start-up until it is released.
	<b>B3</b> EAS connector - Connects the or electricity-generating group and automatic EAS start-up panel or TCM remote control.
	<b>I6</b> LOCAL/START-REMOTE/START switch - Allows for the group's start-up and shutdown from a sole command position: front panel or remote.



**WARNING**

***It is absolutely forbidden to connect the unit to the public mains and/or another electrical power source .***



**Access forbidden to area adjacent to electricity-generating group for all non-authorized personnel.**

The electricity-generating groups are to be considered electrical energy producing stations.

The dangers of electrical energy must be considered together with those related to the presence of chemical substances (fuels, oils, etc.), rotating parts and waste products (fumes, discharge gases, heat, etc.).

**GENERATION IN AC (ALTERNATING CURRENT)**

Before each work session check the efficiency of the ground connection for the electricity-generating group if the distribution system adopted requires it, such as, for example, the TT and TN systems.

Check that the electrical specifications for the units to be powered - voltage, power, frequency - are compatible with those of the generator. Values that are too high or too low for voltage and frequency can damage electrical equipment irreparably.

In some cases, for the powering of three-phase loads, it is necessary to ensure that the cyclic direction of the phases corresponds to the installation's requirements.

Connect the electric devices to be powered to the AC sockets, using suitable plugs and cables in prime condition.

Before starting up the group, make certain no dangerous situations exist on the installation to be powered.

Check that the thermal-magnetic switch (Z2) is in the OFF position (input lever in downward position).

Start up the electricity-generating group, positioning the thermal-magnetic switch (Z2) and differential switch (D) to ON (input lever in upward position).

Before powering on the utilities, check that the voltmeter (N) and frequency meter (E2) indicate nominal values; in addition, check on the voltmeter change-over switch (H2) that the three line voltages are the same.

☞ In the absence of a load, the values for voltage and frequency can be greater than their nominal values. See sections on VOLTAGE and FREQUENCY.

**OPERATING CONDITIONS****POWER**

The electrical power expressed in kVA on an electricity-generating group is the available output power to the reference environmental conditions and nominal values for: voltage, frequency, power factors (cos φ).

There are various types of power: PRIME POWER (PRP), STAND-BY POWER established by ISO 8528-1

and 3046/1 Norms, and their definitions are listed in the manual's TECHNICAL SPECIFICATIONS page.

☞ During the use of the electricity-generating group **NEVER EXCEED** the power indications, paying careful attention when several loads are powered simultaneously.

**VOLTAGE****GENERATORS WITH COMPOUND SETTING.**

In these types of generators, the no-load voltage is generally greater than 3–5% with respect to its nominal value; e.g. for nominal voltage  $V_n = 400V_{ac}$  the no-load voltage can be comprised between 410-420V. The precision of the load voltage is maintained within  $\pm 5\%$  with balanced loads and with a rotation speed variation of 4%. Particularly, with resistive loads ( $\cos \varphi = 1$ ), a voltage over-elevation occurs which, with the machine cold and at full load, can even attain +10 %, a value which in any case is halved after the first 10-15 minutes of operation.

The insertion and release of the full load, under constant rotation speed, provokes a transitory voltage variation that is less than 10%; the voltage returns to its nominal value within 0.1 seconds.

**GENERATORS WITH ELECTRONIC SETTING (A.V.R.).**

In these types of generators, the voltage precision is maintained within  $\pm 1,5\%$ , with speed variations comprised from -10% to +30%, and with balanced loads. The voltage is the same both with no-load and with load; the insertion and release of the full load provokes a transitory voltage variation that is less than 15%; the voltage returns to its nominal value within 0.2–0.3 seconds.

**FREQUENCY**

The frequency is a parameter that is directly dependent on the motor's rotation speed. Depending on the type of alternator, 2 or 4 pole, we will have a frequency of 50/60 Hz with a rotation speed of 3000/3600 or 1500/1800 revolutions per minute.

The frequency, and therefore the number of motor revolutions, is maintained constant by the motor's speed regulation system.

Generally, this regulator is of a mechanical type and presents a droop from no-load to nominal load which is less than 5 % (static or droop), while under static conditions precision is maintained within  $\pm 1\%$ . Therefore, for generators at 50Hz the no-load frequency can be 52–52.5 Hz, while for generators at 60Hz the no-load frequency can be 62.5-63Hz.

In some motors or for special requirements the speed regulator is electronic; in these cases, precision under static operating conditions attains  $\pm 0.25\%$ , and the frequency is maintained constant in operation from no-load to load (isochronal operation).



**POWER FACTOR - COS φ**

The power factor is a value which depends on the load's electrical specifications; it indicates the ratio between the Active Power (kW) and Apparent Power (kVA). The apparent power is the total power necessary for the load, achieved from the sum of the active power supplied by the motor (after the alternator has transformed the mechanical power into electrical power), and the Reactive Power (kVAR) supplied by the alternator. The nominal value for the power factor is  $\cos \varphi = 0,8$ ; for different values comprised between 0.8 and 1 it is important during usage not to exceed the declared active power (kW), so as to not overload the electricity-generating group motor; the apparent power (kVA) will diminish proportionally to the increase of  $\cos \varphi$ . For  $\cos \varphi$  values of less than 0.8 the alternator must be downgraded, since at equal apparent power the alternator should supply a greater reactive power. For reduction coefficients, contact the Technical Service Department.

**START-UP OF ASYNCHRONOUS MOTORS**

The start-up of asynchronous motors from an electricity-generating group can prove critical because of high start-up currents the asynchronous motor requires (I start-up = up to 8 times the nominal current  $I_n$ ). The start-up current must not exceed the alternator's admissible overload current for brief periods, generally in the order of 250–300% for 10–15 seconds. To avoid a group oversize, we recommend following these precautionary measures:

- in the case of a start-up of several motors, subdivide the motors into groups and set up their start-up at intervals of 30–60 seconds.
- when the operating machine coupled to the motor allows it, see to a start-up with reduced voltage, star point/triangle start-up or with autotransformer, or use a soft-start system.

In all cases, when the user circuit requires the start-up of an asynchronous motor, it is necessary to check that there are no utilities inserted into the installation, which in the case of a voltage droop can cause more or less serious disservices (opening of contact points, temporary lack of power to control and command systems, etc.).

**SINGLE-PHASE LOADS**

Power to monophasic utilities by means of three-phase generators requires some operating limitations.

- In single-phase operation, the declared voltage tolerance can no longer be maintained by the regulator (compound or electronic regulator), since the system becomes highly unbalanced. **The voltage variation on the phases not affected by the power can prove dangerous; we recommend sectioning the other loads eventually connected.**
- The maximum power which can be drawn between Neutral and Phase (start connection) is generally 1/3 of the nominal three-phase power; some types of alternators even allow for 40%. Between two Phases

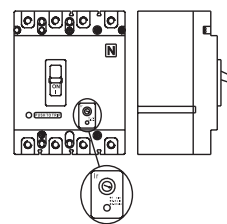
(triangle connection) the maximum power cannot exceed 2/3 of the declared three-phase power.

- In electricity-generating groups equipped with monophasic sockets, use these sockets for connecting the loads. In other cases, always use the "R" phase and Neutral.

**ELECTRIC PROTECTIONS**

**THERMAL-MAGNETIC SWITCH**

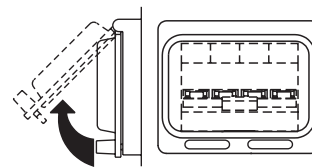
The electricity-generating group is protected against short-circuits and against overloads by a thermal-magnetic switch (Z2) situated upstream from the installation. Operating currents, both thermic and magnetic, can be fixed or adjustable in relation to the switch model.



In models with adjustable operating current **do not modify** the settings, since doing so can compromise the installation's protection or the electricity-generating group's output characteristics. For eventual variations, contact our Technical

Service Department.

The intervention of the protection feature against overloads is not instantaneous, but follows a current overload/time outline; the greater the overload the less the intervention. Furthermore, keep in mind that the nominal operating current refers to an operating temperature of 30°C, so that each variation of 10°C roughly corresponds to a variation of 5% on the value of nominal current.

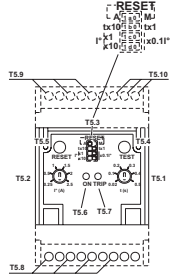
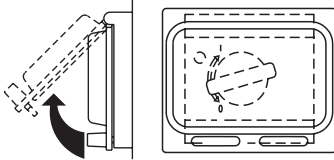


In case of an intervention on the part of the thermal magnetic protection device, check that the total absorption does not exceed the electricity-generating group's nominal current.



**DIFFERENTIAL SWITCH**

The differential switch or differential relay guarantee protection against indirect contacts due to malfunction currents towards the ground. When the device detects a malfunction current that is higher than the nominal current or the set current, it intervenes by cutting off



power to the circuit connected.

In the case of an intervention by the differential switch, check that there are no sheathing defects in the installation: connection cables, sockets and plugs, utilities connected.

☞ Before each work session, check the operation of the differential protection device by pressing the test key. The electricity-generating group must be in operation, and the lever on the differential switch must be in the ON position.

**THERMIC PROTECTION**

Generally present to protect against overloads on an individual power socket c.a.

When the nominal operating current has been exceeded, the protection device intervenes by cutting off power to the socket.

The intervention of the protection device against overloads is not instantaneous, but follows a current overload/time outline; the greater the overload the less the intervention.

In case of an intervention, check that the current absorbed by the load does not exceed the protection's nominal operating current.

Allow the protection to cool off for a few minutes before resetting by pressing the central pole.



**USAGE WITH EAS AUTOMATIC START-UP PANEL**

The electricity-generating group in combination with the EAS automatic start-up panel forms a unit for distributing electrical energy within a few seconds of a power failure from the commercial electrical power line.

Below is some general operating information; refer to the automatic panel's specific manual for details on installation, command, control and signalling operations.

Perform connections on the installation in safety conditions. Position the automatic panel in RESET or LOCKED mode.

Carry out the first start-up in MANUAL mode. Check that the generator's LOCAL START / REMOTE START switch (I6) is in the REMOTE position. Check that the generator switches are enabled (input lever in upward position).

Position the EAS panel in manual mode by pressing MAN. key, and only after having checked that there are no dangerous situations, press the START key to start the electricity-generating group.

During the operation of the generator, all controls and signals from both the automatic panel and group are enabled; it is therefore possible to control its operation from both positions.

In case of an alarm with a shutdown of the motor (low pressure, high temperature, etc.), the automatic panel will indicate the malfunction that has caused the stoppage, while the generator's front panel will be disabled and will no longer supply any information.

**⚠ ATTENTION**  
*Do not keep the central pole on the thermic protection forcefully pressed to prevent its intervention.*

Do not forcibly press the central pole on the thermoprotection to inhibit its intervention



**MAKE SURE**

- ➔ When the TCM 22-40 is used, it is not possible to connect the E.A.S automatic intervention unit.
- ➔ The selector LOCAL START/REMOTE START (16) of the generating set must be switched on REMOTE START.

**USE OF THE REMOTE CONTROL  
TCM 22**

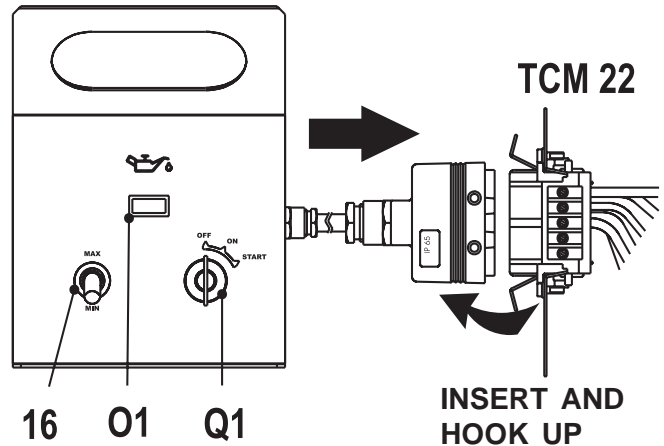
The coupling of the TCM 22 with the generating set, ready for remot starting, permits to work far from the set itself.

The remote control is connected to the front plate, and/or rear plate, with a multiple connector.

The TCM 22 assures the following functions:

- starting (starting key Q1)
- acceleration (selector 16)
- stop (starting key Q1)
- indication of oil low pressure (warning light O1)

To stop the set, move the accelerator lever (16) to the minimum position, then turn the key to "OFF" position.

**USE OF THE REMOTE CONTROL TCM 40**

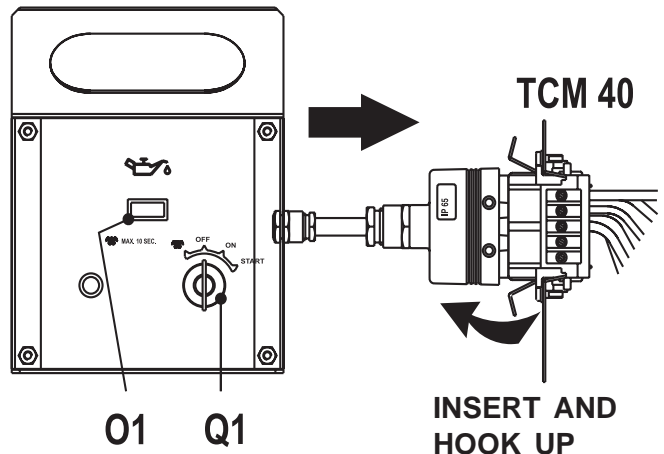
The coupling of the TCM 40 with the generating set, ready for remot starting, permits to work far from the set itself.

The remote control is connected to the front plate, and/or rear plate, with a multiple connector.

The TCM 40 assures the following functions:

- Preheat (starting key Q1). Use only for the models that need such function:
- starting (starting key Q1)
- stop (starting key Q1)
- indication of oil low pressure (warning light O1)

To stop the set turn the key to the position. "OFF".



**ENGINE PROTECTION (ES - EV)**

The devices ES or EV ensure the protection of the engine in case of low oil pressure or engine high temperature.

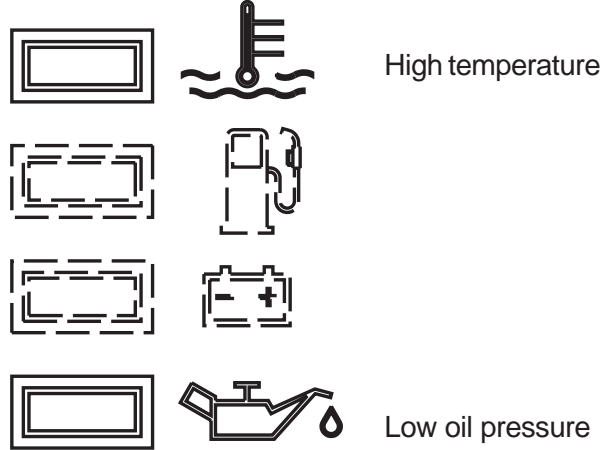
The system consist of electronic card of control and check, and of an engine stop device: solenoid (**ElettroStop**), electrovalve (**ElettroValvola**)

The device enter in operation when the engine starts and, in case of low oil pressure and high temperature, will stop the machine and show the cause of the stop with the warning light of high temperature or low oil pressure.

In case of low oil pressure, check the level and if it is correct, call the Service Station. In case of high temperature, make sure that there are no leaves and/or pieces of material obstructing the air ducts.

☞ **N.B.:** if the unit is used as a generator in hot climates and with loads near to the maximum, the protection device can be triggered off, please reduce the load of the engine.

Once the cause of the problem is removed, to reset the protection, it is enough to report the ignition key (Q1) on "OFF" position and start the engine again.



**NOTE**  
*THE ENGINE PROTECTIONS DO NOT WORK WHEN THE OIL IS OF LOW QUALITY BECAUSE NOT CHANGED REGULARLY AT INTERVALS AS PRESCRIBED IN THE OWNER'S ENGINE MANUAL.*



<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
The motor does not start up	<ol style="list-style-type: none"> <li>1) Start-up switch (I6) in incorrect position</li> <li>2) Emergency button (L5) pressed</li> <li>3) Preheating</li> <li>4) Battery low</li> <li>5) Battery cable terminals loose or corroded</li> <li>6) Start-up motor defective</li> <li>7) No fuel or air in feed circuit</li> <li>8) Malfunction on feed circuit: defective pump, injector blocked, etc.</li> <li>9) Air filter or fuel filter clogged</li> <li>10) Motor stopping device defective</li> <li>11) Malfunction on electrical power circuit on generator control panel</li> </ol>	<ol style="list-style-type: none"> <li>1) Check position</li> <li>2) Unblock</li> <li>3) Lacking or insufficient preheating phase for sparkplugs. Malfunction in circuit: repair.</li> <li>4) Recharge or replace. Check the battery charge circuit on motor and automatic panel.</li> <li>5) Tighten and clean. Replace if corroded.</li> <li>6) Repair or replace.</li> <li>7) Refill tank, un-aerate the circuit.</li> <li>8) Ask for intervention of Service Department.</li> <li>9) Clean or replace</li> <li>10) Replace.</li> <li>11) Check and repair.</li> </ol>
The motor does not accelerate. Inconstant speed.	<ol style="list-style-type: none"> <li>1) Air filter or fuel filter clogged.</li> <li>2) Malfunction on feed circuit: defective pump, injector blocked, etc.</li> <li>3) Oil level too high.</li> <li>4) Motor speed regulator defective.</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean or replace.</li> <li>2) Ask for intervention of Service Department.</li> <li>3) Eliminate excess oil.</li> <li>4) Ask for intervention of Service Department</li> </ol>
Black smoke	<ol style="list-style-type: none"> <li>1) Air filter clogged.</li> <li>2) Overload.</li> <li>3) Injectors defective. Injection pump requires calibration.</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean or replace</li> <li>2) Check the load connected and diminish.</li> <li>3) Ask for intervention of Service Department.</li> </ol>
White smoke	<ol style="list-style-type: none"> <li>1) Oil level too high.</li> <li>2) Motor cold or in prolonged operation with little or no load.</li> <li>3) Segments and/or cylinders worn out.</li> </ol>	<ol style="list-style-type: none"> <li>1) Eliminate excess oil.</li> <li>2) Insert load only with motor sufficiently hot</li> <li>3) Ask for intervention of Service Department.</li> </ol>
Too little power provided by motor.	<ol style="list-style-type: none"> <li>1) Air filter clogged.</li> <li>2) Insufficient fuel distribution, impurities or water in feed circuit.</li> <li>3) Injectors dirty or defective.</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean or replace.</li> <li>2) Check the feed circuit, clean and refill once again.</li> <li>3) Ask for intervention of Service Department.</li> </ol>
Low oil pressure	<ol style="list-style-type: none"> <li>1) Oil level insufficient</li> <li>2) Air filter clogged.</li> <li>3) Oil pump defective.</li> <li>4) Alarm malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1) Reset level. Check for leaks.</li> <li>2) Replace filter.</li> <li>3) Ask for intervention of Service Department.</li> <li>4) Check the sensor and electrical circuit.</li> </ol>
High temperature	<ol style="list-style-type: none"> <li>1) Overload</li> <li>2) Insufficient ventilation.</li> <li>3) Insufficient coolant liquid (Only for water cooled motors)</li> </ol>	<ol style="list-style-type: none"> <li>1) Check the load connected and diminish.</li> <li>2) Check the cooling vent and relative transmission belts</li> <li>3) Restore level. Check for leaks or breakage in the entire cooling circuit, pipes, couplings, etc.</li> </ol>

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
	4) Water radiator or oil clogged 5) Water circulating pump defective (Only for water cooled motors) 6) Injectors defective. Injection pump requires calibration 7) Alarm malfunction	4) Clean cooling fins on radiator 5) Ask for intervention of Service Department 6) Ask for intervention of Service Department 7) Check the sensor and electrical circuit
Absence of output voltage	1) Protection tripped due to overload 2) Differential protection device tripped. (Differential switch, differential relay) 3) Protection devices defective 4) Alternator not sparked 5) Alternator defective	1) Check the load connected and diminish 2) Check on the entire installation: cables, connections, utilities connected have no defective sheathing which may cause incorrect currents to ground 3) Replace 4) Carry out external spark test as indicated in alternator manual. Ask for intervention of Service Department 5) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace. Ask for intervention of Service Department
No-load voltage too low or too high	1) Incorrect motor running speed 2) Voltage regulating device defective or requires calibration 3) Alternator defective	1) Regulate speed to its nominal no-load value 2) Adjust regulator device as indicated in alternator manual, or replace 3) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace Ask for intervention of Service Department
Corrected no-load voltage too low with load	1) Incorrect motor running speed due to overload 2) Load with $\cos \varphi$ less than 0.8 3) Alternator defective	1) Check the load connected and diminish 2) Reduce or rephase load 3) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace Ask for intervention of Service Department
Unstable tension	1) Contacts malfunctioning 2) Irregular rotation of motor 3) Alternator defective	1) Check electrical connections and tighten 2) Ask for intervention of Service Department 3) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace Ask for intervention of Service Department

**⚠ WARNING**



**MOVING PARTS can injure**

- Have **qualified** personnel do maintenance and troubleshooting work.
  - Stop the engine before doing any work inside the machine. If for any reason the machine must be operated while working inside, **pay attention** moving parts, hot parts (exhaust manifold and muffler, etc.) electrical parts which may be unprotected when the machine is open.
  - Remove guards only when necessary to perform maintenance, and replace them when the maintenance requiring their removal is complete.
  - Use suitable tools and clothes.
  - Do not modify the components if not authorized.
- See pag. M1.1 -



**HOT surface can hurt you**

**NOTE**

By maintenance at care of the utilizer we intend all the operatios concerning the verification of mechanical parts, electrical parts and of the fluids subject to use or consumption during the normal operation of the machine.

For what concerns the fluids we must consider as maintenance even the periodical change and or the refills eventually necessary.

Maintenance operations also include machine cleaning operations when carried out on a periodic basis outside of the normal work cycle.

The repairs **cannot be considered** among the maintenance activities, i.e. the replacement of parts subject to occasional damages and the replacement of electric and mechanic components consumed in normal use, by the Assistance Authorized Center as well as by MOSA.

The replacement of tires (for machines equipped with trolleys) must be considered as repair since it is not delivered as standard equipment any lifting system.

The periodic maintenance should be performed according to the schedule shown in the engine manual. An optional hour counter (M) is available to simplify the determination of the working hours.

**⚠ IMPORTANT**



In the maintenance operations avoid that polluting substances, liquids, exhausted oils, etc. bring damage to people or things or can cause negative effects to surroindings, health or safety respecting completely the laws and/ or dispositions in force in the place.

**⚠ NOTE**

THE ENGINE PROTECTION NOT WORK WHEN THE OIL IS OF LOW QUALITY BECAUSE NOT CHARGED REGULARLY AT INTERVALS AS PRESCRIBED IN THE OWNER'S ENGINE MANUAL.





TYPE OF MAINTENANCE		🕒						
		Every day	Every 100 hours	Every 150 hours	Every 300 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
<b>CLEANING</b>	Filters	Dry air filter		X				
		Fuel pump filter		X				
	Radiator	Air passages	X				X	
		Fan	X					
	Fuel tank						X	
Injectors					X			
<b>CHECK</b>		Air filter condition	X					
		Crankcase oil level	X					
		Battery electrolyte level		X				
		Amount of coolant	X					
	Belt - Fan and fan belt		X		X			
	Tighten nuts and bolts					X		
	Valves, rocker arms						X	
	Injector regulation							X
Water in the fuel pre-filter		X						
<b>REPLACEMENT</b>	Crankcase 1)	Change oil			X			
		Change water						X
	Cartridge	Dry air filter					X	
		Fuel filter				X		
		Oil filter1)				X		
	Brushes, starter motor							X
Fan belt							X	

1) Replace oil and oil filter after the first 50 working hours.

**STRENUOUS OPERATING CONDITIONS**

Under extreme operating conditions (frequent stops and starts, dusty environment, cold weather, extended periods of no load operation, fuel with over 0.5% sulphur content) do maintenance more frequently.

**ALTERNATOR**

**Brushless:** if no periodic maintenance is necessary, as the alternator has no brushing electrical parts.

**With brushless:** Control the wear and the position of the carbon brushes at regular intervals (refer to the alternator manual supplied with the machine for details).

**VENTILATION**

Make certain there are no obstructions (rags, leaves or other) in the air inlet and outlet openings on the machine, alternator and motor.

**ELECTRICAL PANELS**

Check condition of cables and connections daily. Clean periodically using a vacuum cleaner, **DO NOT USE COMPRESSED AIR.**

**DECALS AND LABELS**

All warning and decals should be checked once a year and **replaced** if missing or unreadable.

**PROCEDURE FOR RECHARGING A BATTERY**

Take off the breather caps of the battery.

Check the electrolyte level in all the elements of the battery.

If necessary, add up **distilled water** to have the liquid at the recommended level.

Put back the breather caps of the battery.

Use a densimeter to determine the charge state of the battery.

SPECIFIC WEIGHT	CHARGE PERCENTAGE
1.265	100%
1.230	75%
1.200	50%
1.170	25%

👉 For more information on maintenance to the motor and alternator, refer to the specific manuals provided.




**ATTENTION**

- Maintenance operations on the electricity-generating group prearranged for automatic operation must be carried out with the panel in RESET mode.
- Maintenance operations on the installation's electrical panels must be carried out in complete safety by cutting off all external power sources: ELECTRICAL POWER, GROUP and BATTERY.

For the electricity-generating groups prearranged for automatic operation, in addition to carrying out all periodic maintenance operations foreseen for normal usage, various operations must be carried out that are necessary in relation to the specific type of use. The electricity-generating group in fact must be continuously prepared for operation, even after prolonged periods of inactivity.

**MAINTENANCE GENERATING SET WITH AUTOMATIC BOARD**

	EVERY WEEK	EVERY MONTH AND/OR AFTER INTERVENTION ON LOAD	EVERY YEAR
1. TEST or AUTOMATIC TEST cycle to keep the generating set constantly operative	NO-LOAD X	WITH LOAD X	
2. Check all levels: engine oil, fuel level, battery electrolyte,, if necessary top it up.	X	X	
3. Control of electrical connections and cleaning of control panel		X	X

**➡ Carry out motor oil change at least once a year, even if the requested number of hours has not been attained.**

In case the machine should not be used for more than 30 days, make sure that the room in which it is stored presents a suitable shelter from heat sources, weather changes or anything which can cause rust, corrosion or damages to the machine.

☞ Have **qualified** personnel prepare the machine for storage.

### **GASOLINE ENGINE**

Start the engine: It will run until it stops due to the lack of fuel.

Drain the oil from the engine sump and fill it with new oil (see page M25).

Pour about 10 cc of oil into the spark plug hole and screw the spark plug, after having rotated the crankshaft several times.

Rotate the crankshaft slowly until you feel a certain compression, then leave it.

In case the battery, for the electric start, is assembled, disconnect it.

Clean the covers and all the other parts of the machine carefully.

Protect the machine with a plastic hood and store it in a dry place.

### **DIESEL ENGINE**

For short periods of time it is advisable, about every 10 days, to make the machine work with load for 15-30 minutes, for a correct distribution of the lubricant, to recharge the battery and to prevent any possible bloking of the injection system.

For long periods of inactivity, turn to the after sales service of the engine manufacturer.

Clean the covers and all the other parts of the machine carefully.

Protect the machine with a plastic hood and store it in a dry place.

In case of necessity for first aid and of fire prevention, see page. M2.5.



### **IMPORTANT**



In the storage operations avoid that polluting substances, liquids, exhausted oils, etc. bring damage to people or things or can cause negative effects to surroundings, health or safety respecting completely the laws and/or dispositions in force in the place.

☞ Have **qualified** personnel disassemble the machine and dispose of the parts, including the oil, fuel, etc., in a correct manner when it is to be taken out of service.

As cust off we intend all operations to be made, at utilizer's care, at the end of the use of the machine. This comprises the dismantling of the machine, the subdivision of the several components for a further reutilization or for getting rid of them, the eventual packing and transportation of the eliminated parts up to their delivery to the store, or to the bureau entrusted to the cust off or to the storage office, etc.

The several operations concerning the cust off, involve the manipulation of fluids potentially dangerous such as: lubricating oil and battery electrolyte.

The dismantling of metallic parts liable to cause injuries or wounds, must be made wearing heavy gloves and using suitable tools.

The getting rid of the various components of the machine must be made accordingly to rules in force of law a/o local rules.

**Particular attention must be paid when getting rid of:**

**lubricating oils, battery electrolyte, and inflammable liquids such as fuel, cooling liquid.**

The machine user is responsible for the observance of the norms concerning the environment conditions with regard to the elimination of the machine being cust off and of all its components.

In case the machine should be cust off without any previous disassembly it is however compulsory to remove:

- tank fuel
- engine lubricating oil
- cooling liquid from the engine
- battery

**NOTE:** MOSA is involved with custing off the machine **only** for the second hand ones, when not reparable.

This, of course, after authorization.

In case of necessity for first aid and fire prevention, see page M2.5.



## IMPORTANT



In the cust-off operations avoid that polluting substances, liquids, exhausted oils, etc. bring damage to people or things or can cause negative effects to surroundings, health or safety respecting completely the laws and/or dispositions in force in the place.

The generating set GE 15 is a unit which transforms the mechanical energy, generated by endothermic engine, into electric energy, through an alternator.

Is meant for industrial and professional use, powered by an endothermic engine; it is composed of various main parts such as: engine, alternator, electric and electronic controls, the fairing or a protective structure.

The assembling is made on a steel structure, on which are provided elastic support which must damp the vibrations and also eliminate sounds which would produce noise.

<b>Technical data</b>	<b>GE 15 PS</b>	<b>GE 15 PSX</b>
<b>GENERATOR</b>		
Three-phase generation (Stand-by)	15 kVA / 400 V / 21.7 A	
Three-phase generation(P.R.P.)	13.5 kVA / 400 V / 19.5 A	
Active power (*stand-by)	12 kW / 400 V / 17.3 A	
Active power (**P.R.P.)	10.8 kW / 400 V / 15.6 A	
Single-phase generation	5 kVA (kW) / 230 V / 21.7 A	
Frequency	50 Hz	
Cos φ	0.8	
<b>ALTERNATOR</b>		
	Self-excited, self-regulated, brushless	
Type	synchronous, three-phase	
Insulation class	H	
<b>MOTOR</b>		
Make	Perkins	
Model	403C-15G	
Type	4-Stroke, indirect injection	
Displacement	1496 cm <sup>3</sup>	
Cylinder	3 on line	
Power (*stand-by)	13.3 kW (17.8 HP)	
Power (**P.R.P.)	12 kW (16.1 HP)	
Speed	1500 rpm	
Fuel consumption	258 g/kWh	
Cooling system	Water	
Capacity of oil sump and filter	6 l	
Starter	Electric	
Fuel	Diesel	
<b>GENERAL SPECIFICATION</b>		
Battery	12V - 100 Ah	
Fuel tank capacity	60 l	
Running time (75%)	21 h	
Protection	IP 23	
Dimensions on base Lxwxh (mm)*	1720x980x1060	
Weight on base *	530 Kg	540 Kg
Noise level	93 LWA (68 dB(A) - 7 m)	90 LWA (65 dB(A) - 7 m)
* Dimensions and weight are inclusive of all parts		

Declared power according to ISO 3046/1 (temperature 25°C, 30% relative humidity, altitude 100 m above sea level).

(\*Stand-by) = maximum available power for use at variable loads for a yearly number of hours limited at 500 h. No overload is admitted.

(\*\*Prime power P.R.P.) = maximum available power for use at variable loads for a yearly illimited number of hours. The average power to be taken during a period of 24 h must not be over 80% of the P.R.P. It's admitted overload of 10% each hour every 12 h.

#### OUTPUT

In an **approximative** way one reduces: of 1% every 100 m altitude and of 2.5% for every 5°C above 25°C.

For possible modifications or changes to be brought on the engines, with climate conditions different from those above mentioned, please call our Assistance Authorized Centers.

#### ACOUSTIC POWER LEVEL

The machine respects the noise limits, expressed in sound power, given in the a.m. directives.

These limits can be used to judge the sound level produced on site.

For example: the sound power level of 100 LWA.

The sound pressure (noise produced) at 7 meters distance is about 75dBA (the limit value less 25).

To calculate the sound level at other distances use this formula:

$$dB_{Ax} = dB_{Ay} + 10 \log \frac{r_y^2}{r_x^2}$$

$$\text{At 4 meters the noise level becomes: } 75 \text{ dBA} + 10 \log \frac{7^2}{4^2} = 80 \text{ dBA}$$

**MOSA**

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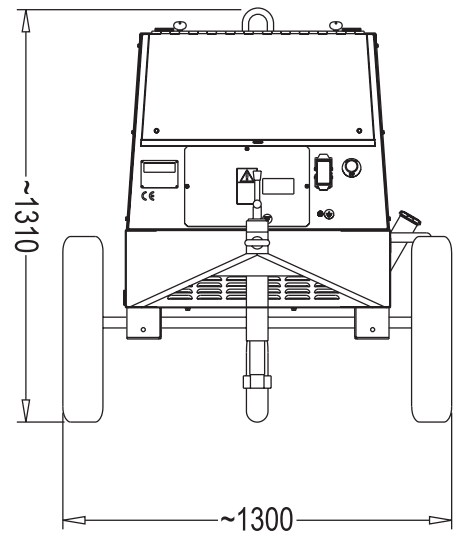
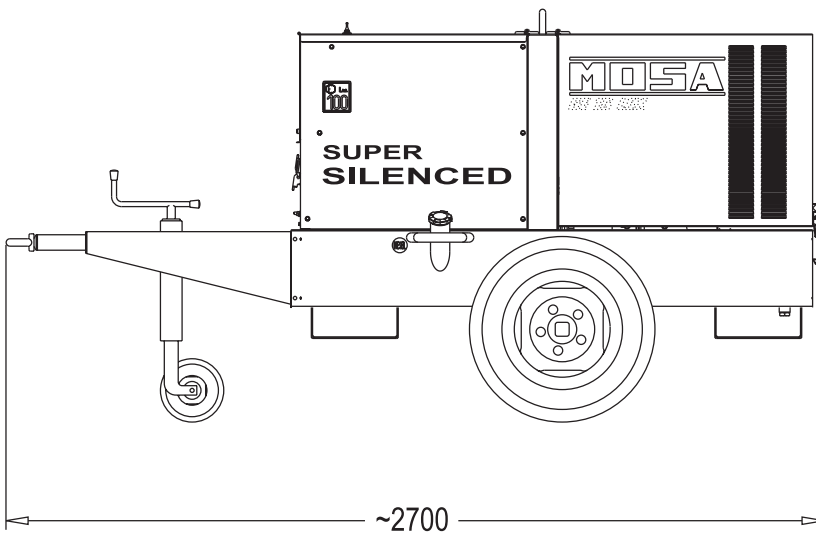
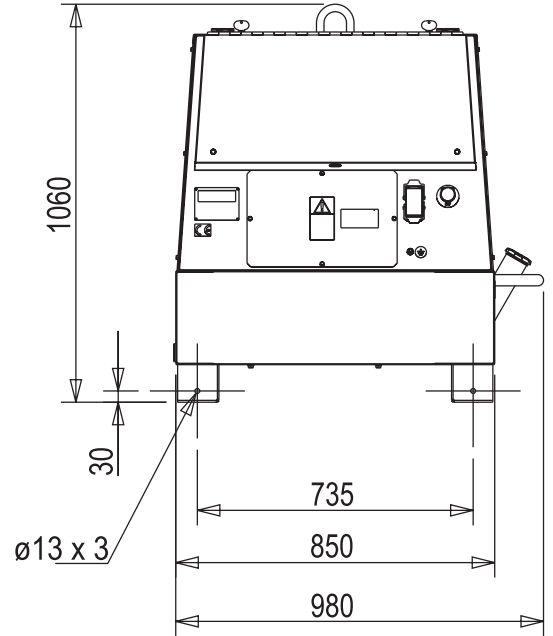
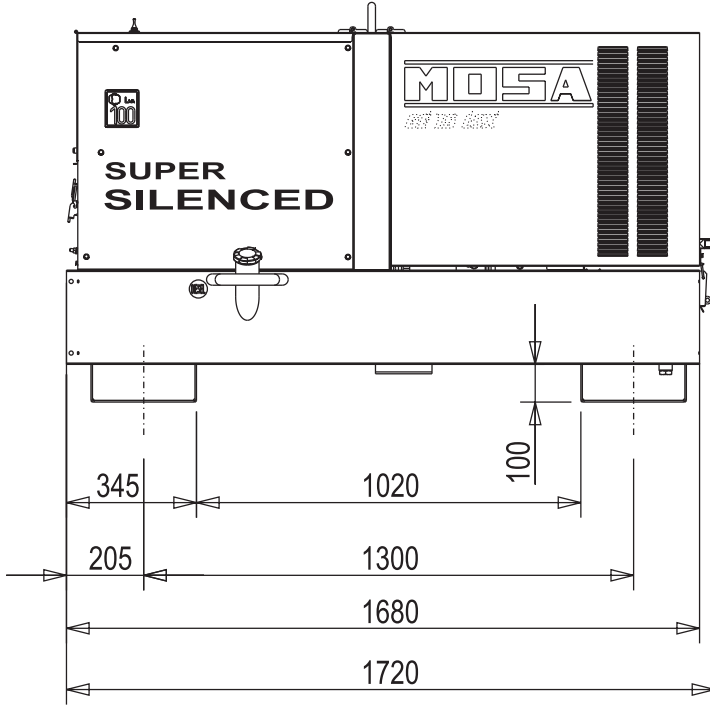
1.0-01/03

Ⓛ Dimensioni  
ⓐ Dimensions  
ⓕ Dimensions

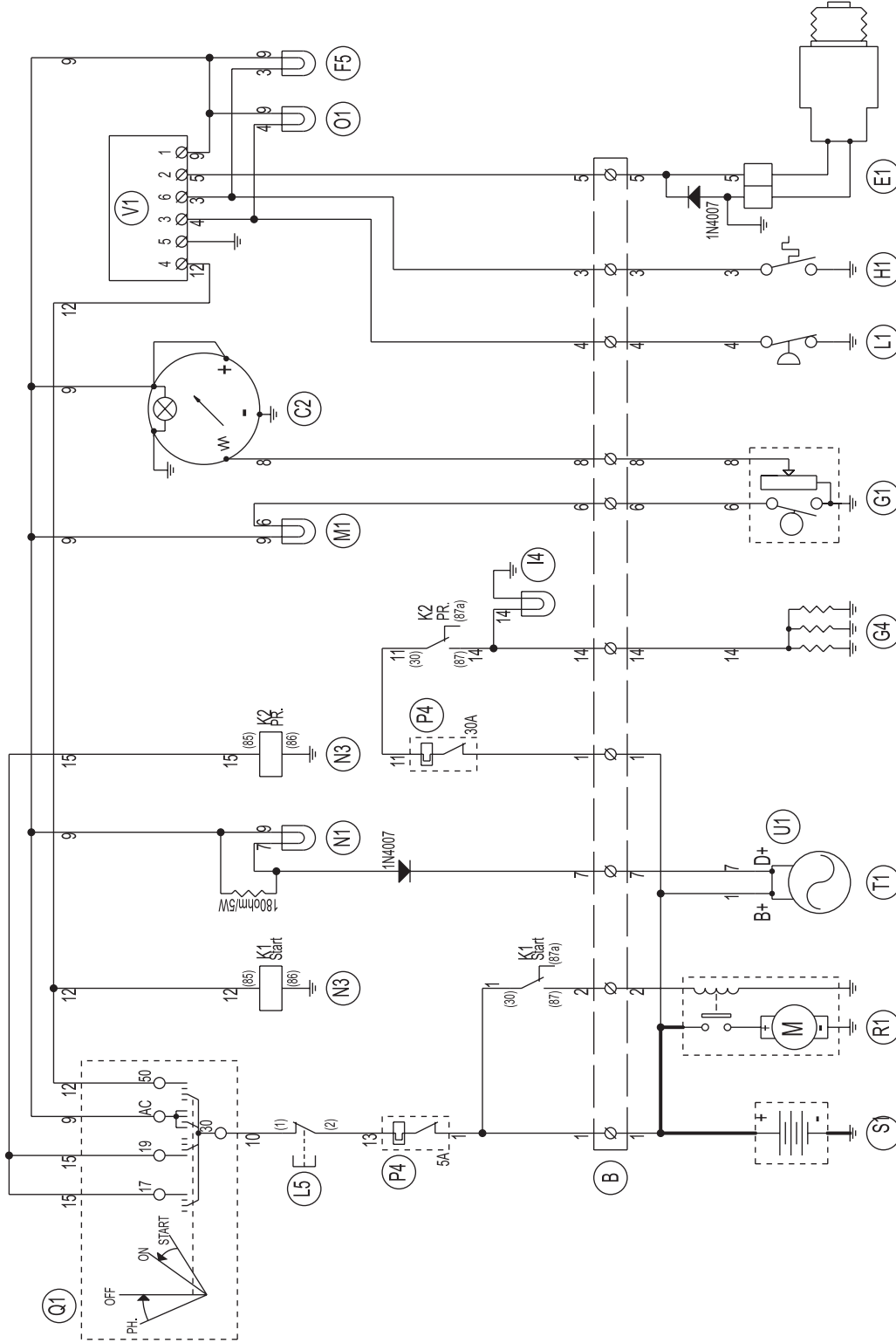
ⓓ Abmessungen  
ⓔ Dimensiones  
Ⓝ

GE 15 LS - LSX  
GE 15 PS - PSX

M  
53



A: Alternator	A3: Insulation monitoring	A6: Commutator/switch
B: Wire connection unit	B3: E.A.S. connector	B6: Key switch, on/off
C: Capacitor	C3: E.A.S. PCB	C6: QEA control unit
D: G.F.I.	D3: Booster socket	D6: Connector, PAC
E: Welding PCB transformer	E3: Open circuit voltage switch	E6: Frequency rpm regulator
F: Fuse	F3: Stop push-button	F6: Arc-Force selector
G: 400V 3-phase socket	G3: Ignition coil	G6: Device starting motor
H: 230V 1phase socket	H3: Spark plug	H6: Fuel electro pump 12V c.c.
I: 110V 1-phase socket	I3: Range switch	I6: Start Local/Remote selector
L: Socket warning light	L3: Oil shut-down button	L6: Choke button
M: Hour-counter	M3: Battery charge diode	M6: Switch CC/CV
N: Voltmeter	N3: Relay	N6: Connector – wire feeder
P: Welding arc regulator	O3: Resistor	O6: 420V/110V 3-phase transformer
Q: 230V 3-phase socket	P3: Sparkler reactor	P6: Switch IDLE/RUN
R: Welding control PCB	Q3: Output power unit	Q6: Hz/V/A analogic instrument
S: Welding current ammeter	R3: Electric siren	R6: EMC filter
T: Welding current regulator	S3: E.P.4 engine protection	S6: Wire feeder supply switch
U: Current transformer	T3: Engine control PCB	T6: Wire feeder socket
V: Welding voltage voltmeter	U3: R.P.M. electronic regulator	U6: DSP chopper PCB
Z: Welding sockets	V3: PTO HI control PCB	V6: Power chopper supply PCB
X: Shunt	Z3: PTO HI 20 l/min push-button	Z6: Switch and leds PCB
W: D.C. inductor	W3: PTO HI 30 l/min push-button	W6: Hall sensor
Y: Welding diode bridge	X3: PTO HI reset push-button	X6: Water heater indicator
	Y3: PTO HI 20 l/min indicator	Y6: Battery charge indicator
A1: Arc striking resistor	A4: PTO HI 30 l/min indicator	A7: Transfer pump selector AUT-0-MAN
B1: Arc striking circuit	B4: PTO HI reset indicator	B7: Fuel transfer pump
C1: 110V D.C./48V D.C. diode bridge	C4: PTO HI 20 l/min solenoid valve	C7: „GECO“ generating set test
D1: E.P.1 engine protection	D4: PTO HI 30 l/min solenoid valve	D7: Flooting with level switches
E1: Engine stop solenoid	E4: Hydraulic oil pressure switch	E7: Voltmeter regulator
F1: Acceleration solenoid	F4: Hydraulic oil level gauge	F7: WELD/AUX switch
G1: Fuel level transmitter	G4: Preheating glow plugs	G7: Reactor, 3-phase
H1: Oil or water thermostat	H4: Preheating gearbox	H7: Switch disconnecter
I1: 48V D.C. socket	I4: Preheating indicator	I7: Solenoid stop timer
L1: Oil pressure switch	L4: R.C. filter	L7:
M1: Fuel warning light	M4: Heater with thermostat	M7:
N1: Battery charge warning light	N4: Choke solenoid	N7:
O1: Oil pressure warning light	O4: Step relay	O7:
P1: Fuse	P4: Circuit breaker	P7:
Q1: Starter key	Q4: Battery charge sockets	Q7:
R1: Starter motor	R4: Sensor, cooling liquid temperature	R7:
S1: Battery	S4: Sensor, air filter clogging	S7:
T1: Battery charge alternator	T4: Warning light, air filter clogging	T7:
U1: Battery charge voltage regulator	U4: Polarity inverter remote control	U7:
V1: Solenoid valve control PCBT	V4: Polarity inverter switch	V7:
Z1: Solenoid valve	Z4: Transformer 230/48V	Z7:
W1: Remote control switch	W4: Diode bridge, polarity change	W7:
X1: Remote control and/or wire feeder socket	X4: Base current diode bridge	X7:
Y1: Remote control plug	Y4: PCB control unit, polarity inverter	Y7:
A2: Remote control welding regulator	A5: Base current switch	A8:
B2: E.P.2 engine protection	B5: Auxiliary push-button ON/OFF	B8:
C2: Fuel level gauge	C5: Accelerator electronic control	C8:
D2: Ammeter	D5: Actuator	D8:
E2: Frequency meter	E5: Pick-up	E8:
F2: Battery charge transformer	F5: Warning light, high temperature	F8:
G2: Battery charge PCB	G5: Commutator auxiliary power	G8: Polarity inverter two way switch
H2: Voltage selector switch	H5: 24V diode bridge	H8:
I2: 48V a.c. socket	I5: Y/s commutator	I8:
L2: Thermal relay	L5: Emergency stop button	L8:
M2: Contactor	M5: Engine protection EP5	M8:
N2: G.F.I. and circuit breaker	N5: Pre-heat push-button	N8:
O2: 42V EEC socket	O5: Accelerator solenoid PCB	O8:
P2: G.F.I. resistor	P5: Oil pressure switch	P8:
Q2: T.E.P. engine protection	Q5: Water temperature switch	Q8:
R2: Solenoid control PCBT	R5: Water heater	R8:
S2: Oil level transmitter	S5: Engine connector 24 poles	S8:
T2: Engine stop push-button T.C.1	T5: Electronic GFI relais	T8:
U2: Engine start push-button T.C.1	U5: Release coil, circuit breaker	U8:
V2: 24V c.a. socket	V5: Oil pressure indicator	V8:
Z2: Thermal magnetic circuit breaker	Z5: Water temperature indicator	Z8:
W2: S.C.R. protection unit	W5: Battery voltmeter	W8:
X2: Remote control socket	X5: Contactor, polarity change	X8:
Y2: Remote control plug	Y5: Commutator/switch, series/parallel	Y8:

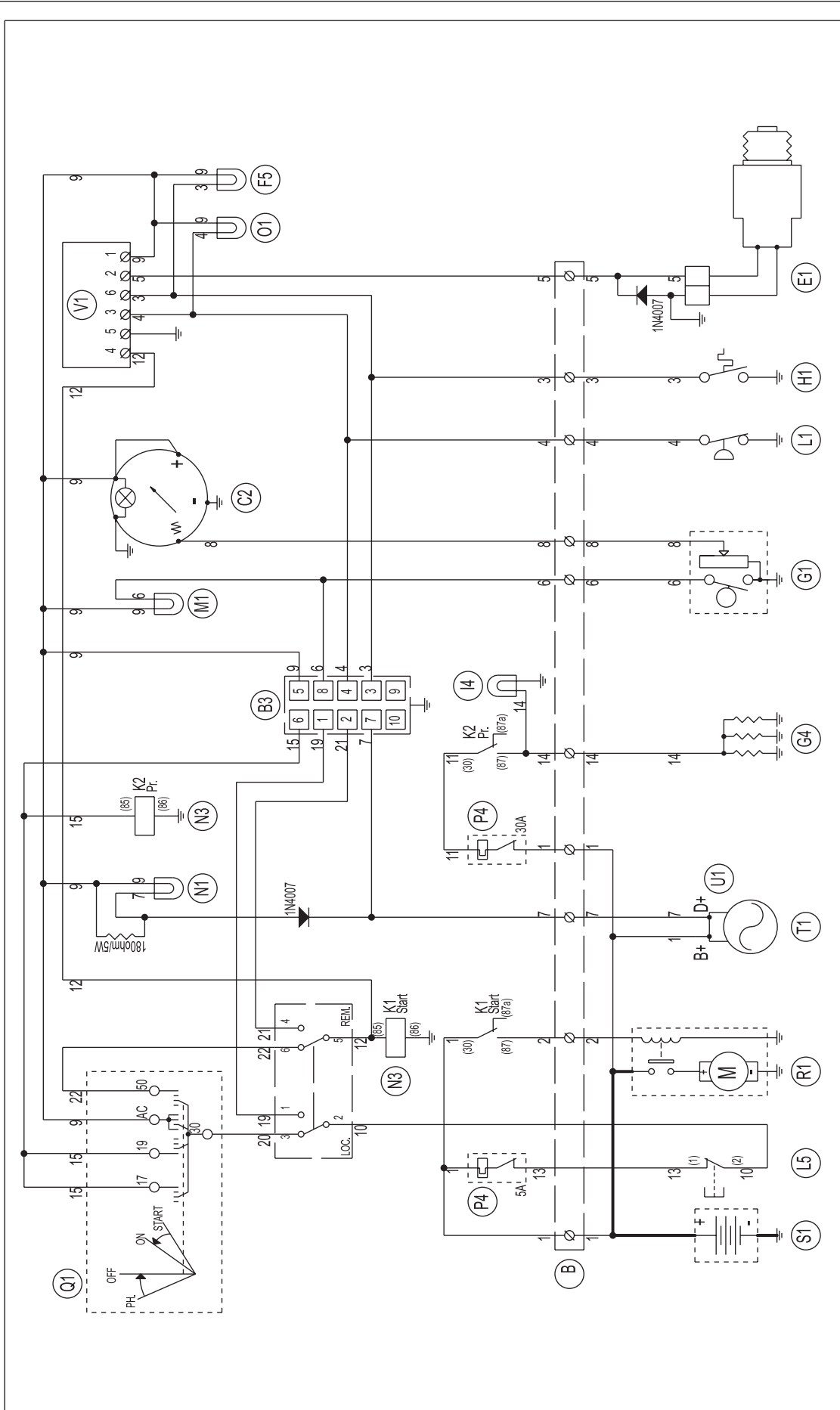


STARTER KEY	
30	19 AC 50
PR	OFF
ON	ON
ST	ST

Exp. Exel.	Modifica Modification	Data Date	Appr. Appr.
MOSA	Engine Perkins 403C-15(G) (ES)	74156.prg	
20090-CUSAGO (MI)-ITALY	Macchina: GE 15 PSX		
http://www.mosa.it			
	Disegnatore: Leporace N.	Data: 26.03.2003	Dis. n.°: 74156.S.010
			Dwg. n.°: 74156.S.010
			Approvato: [Signature]
			Page n.° of n.°: 2 / 3
			Project: 74156.prg

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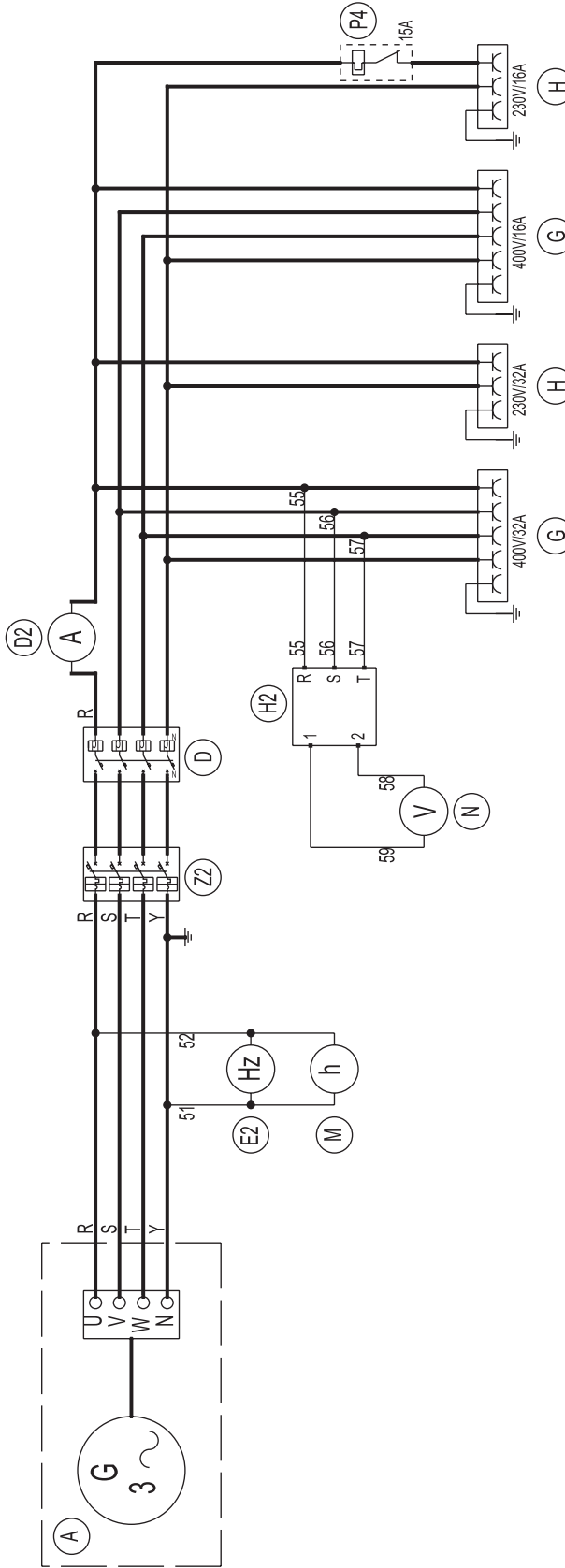




STARTER KEY	
30	17 AC 50
PR	OFF
ON	ON
ST	ST

Ess. Exp.	Modifica Modification	Data Date	Dis. Desig.	Appr. Approv.
Denominazione: Engine Perkins 403C-15IG (ES/IAS)		Progetto: 84156.prg	Dis. n°: 84156.S.010	Dis. n°: 84156.S.010
Dia. Paga. From Page: MOSA		Macchina: GE 15 PSX	Designatore: Leporace N.	Dis. n°: 84156.S.010
Alia Paga. To Page: 20090-CUSAGO (MI)-ITALY		Machine: GE 15 PSX	Designatore: Leporace N.	Dis. n°: 84156.S.010
http://www.mosa.it		Date: 26.03.2003	Designatore: Leporace N.	Dis. n°: 84156.S.010
		Date: 26.03.2003	Designatore: Leporace N.	Dis. n°: 84156.S.010
		Date: 26.03.2003	Designatore: Leporace N.	Dis. n°: 84156.S.010

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Esp. Exp.	Modifica	Data	Appr.
	Modification	Date	Appr.
	Denominazione:	Progetto:	di n°
	AUX. (400Tx2(230Mx2) DMT	74156.pig	3
	Disegnatore:	Data:	Dis. n°
	Leporace N.	26.03.2003	74156.S.020
	Macchina:	Dis. n°	Dis. n°
	GE 15 PSX	74156.S.020	3
	http://www.mosa.it	Dis. n°	3
		Dis. n°	3
		Dis. n°	3

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