

# **GE 12000 SXC/GS**

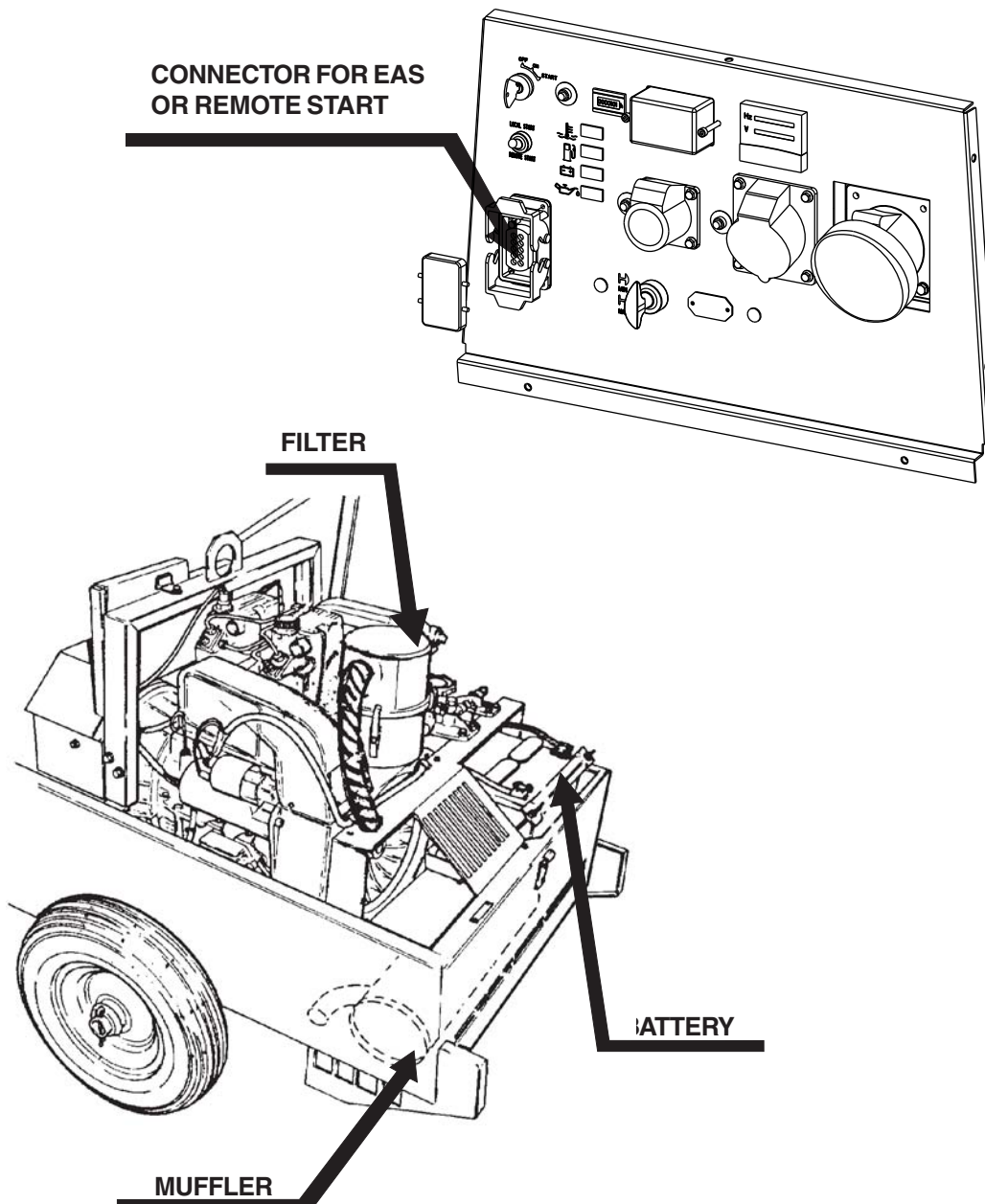
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**359219003 - GB**

## **USE AND MAINTENANCE MANUAL SPARE PARTS CATALOG**

**Main Characteristics of the unit:**

- Single-phase electric power 13.5 kVA / 230 V / 50 Hz
- Diesel engine LOMBARDINI 12LD 477/2
- Asynchronous alternator brushless
- Tank of 23l with autonomy of 8.2 h
- Dimensions / weight: 1320x790x750 / 297 Kg
- Noise level at 7m 71dBA
- Prepared for automatic start unit
- Prepared for remote start/stop.



The unit is composed of: a structured base which includes a tank, an engine/alternator unit fixed on the base by 3 elastic dampers, a roll-bar, with hook for an easy and sure lifting, a chest hinged to the base for a quick access to the engine, to the air filter and to the battery. The set is completed by a frontal panel where the sockets, the protections and the measuring instruments are mounted, all this protected by a same sized cover.


**UNI EN ISO 9001 : 2000**

ISO 9001:2000 - Cert. 0192

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 issued by ICIM S.p.A. - Milano (Italy) - [www.icim.it](http://www.icim.it)

|          |   |
|----------|---|
| M 01     | QUALITY SYSTEM                          |
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| M 1.4    | CE MARK                                 |
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| R 1      | SPARE PARTS LIST                        |
| .....    | SPARE PARTS                             |
| K...     | ACCESSORIES                             |



## 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.

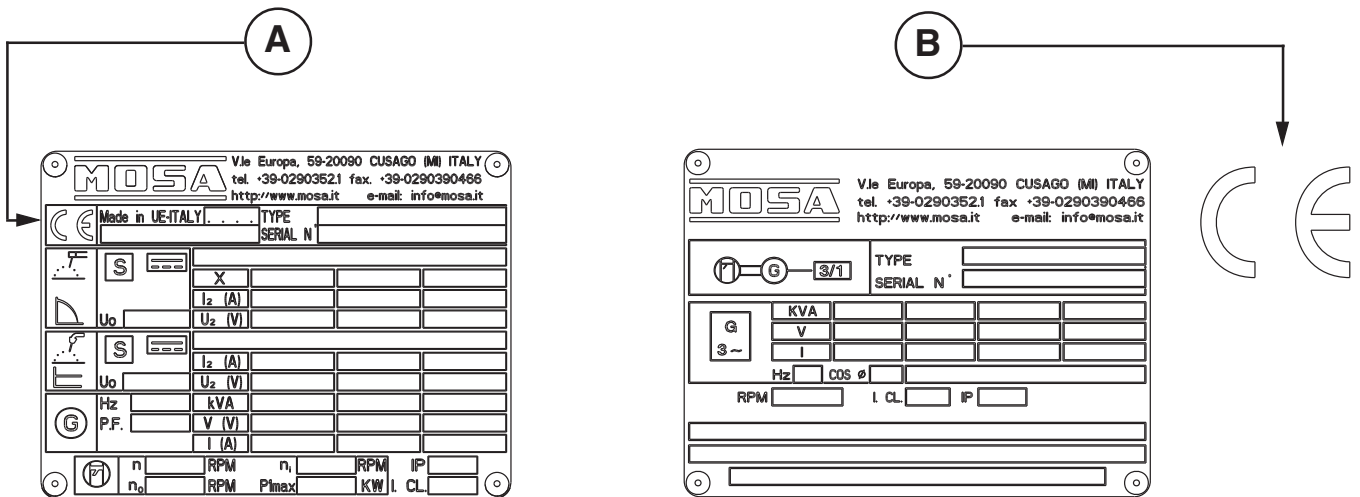
- ☞ **Notice:** *this manual does not engage MOSA, who keeps the faculty, apart the essential characteristics of the model here described and illustrated, to bring betterments and modifications to parts and accessories, without putting this manual uptodate immediately.*



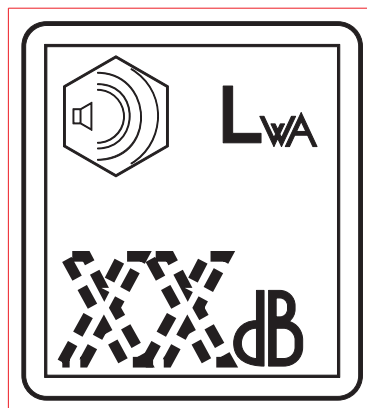
Any of our product is labelled with CE marking attesting its conformity to appliable directives and also the fulfillment of safety requirements of the product itself; the list of these directives is part of the declaration of conformity included in any machine standard equipment. Here below the adopted symbol:



CE marking is clearly readable and unerasable and it can be either part of the data-plate (A) or placed as a sticker near the data-plate (B)



Furthermore, on each model it is shown the noise level value; the symbol used is the following:



The indication is shown in a clear, readable and indeleble way on a sticker.

The generating set GE 12000 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.

## Technical data

## GE 12000 SXC/GS

### A. C. GENERATOR

|                                    |                                      |
|------------------------------------|--------------------------------------|
| <b>Stand-by single-phase power</b> | 13.5 kVA (12.1 kW) / 230 V / 58.7 A  |
| <b>P.R.P. single-phase power</b>   | 12 kVA (10.8 kW) / 230 V / 52.5 A    |
| <b>Stand-by single-phase power</b> | 13.5 kVA (12.1 kW) / 115 V / 117.4 A |
| <b>P.R.P. single-phase power</b>   | 12 kVA (10.8 kW) / 115 V / 104.3 A   |
| <b>Frequency</b>                   | 50 Hz                                |
| <b>Cos φ</b>                       | 0.9                                  |

### ALTERNATOR

|                         |  |
|-------------------------|--|
| <b>Type</b>             | synchronous, single-phase, self-excited, self-regulated, brushless |
| <b>Insulating class</b> | H  |

### ENGINE

|   |                         |
|---|-------------------------|
| <b>Mark / Model</b>                     | LOMBARDINI 12LD 477/2   |
| <b>Type / Cooling system</b>            | Diesel 4 Stroke / air   |
| <b>Cylinders / Displacement</b>         | 2 / 954 cm <sup>3</sup> |
| <b>Stand-by output</b>                  | 14.9 kW ( 20.3 HP)      |
| <b>P.R.P. output</b>                    | 13.5 kW (18.4 HP)       |
| <b>Speed</b>                            | 3000 rpm                |
| <b>Fuel consumption (75% of P.R.P.)</b> | 2.8 l/h                 |
| <b>Engine oil capacity</b>              | 3 l                     |
| <b>Starter</b>                          | Electric                |

### GENERAL SPECIFICATIONS

|  |                         |
|--|-------------------------|
| <b>Tank capacity</b>                               | 23 l                    |
| <b>Running time (75% of P.R.P.)</b>                | 8.2 h                   |
| <b>Protection</b>                                  | IP 23                   |
| <b>Dimensions / max. Lxwxh (mm) *</b>              | 1320x790x750            |
| <b>Weight on base*</b>                             | 297 Kg                  |
| <b>Measured acoustic power LwA (pressure LpA)</b>  | 96 db(A)(71 db(A) @ 7m) |
| <b>Garanteed acoustic power LwA (pressure LpA)</b> | 96 db(A)(71 db(A) @ 7m) |



\* Dimensions and weight are inclusive of all parts

### OUTPUT

Declared power according to ISO 8528-1 (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.

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

### ACOUSTIC POWER LEVEL

**ATTENTION:** The concrete risk due to the machine depends on the conditions in which it is used. Therefore, it is up to the end-user and under his direct responsibility to make a correct evaluation of the same risk and to adopt specific precautions (for instance, adopting a I.P.D. -Individual Protection Device)

**Acoustic Noise Level (LWA) - Measure Unit dB(A):** it stands for acoustic noise released in a certain delay of time. This is not submitted to the distance of measurement.

**Acoustic Pressure (Lp) - Measure Unit dB(A):** it measures the pressure originated by sound waves emission. Its value changes in proportion to the distance of measurement.

The here below table shows examples of acoustic pressure (Lp) at different distances from a machine with Acoustic Noise Level (LWA) of 95 dB(A)

Lp a 1 meter = 95 dB(A) - 8 dB(A) = 87 dB(A)

Lp a 7 meters = 95 dB(A) - 25 dB(A) = 70 dB(A)

Lp a 4 meters = 95 dB(A) - 20 dB(A) = 75 dB(A)

Lp a 10 meters = 95 dB(A) - 28 dB(A) = 67 dB(A)

**PLEASE NOTE:** the symbol when with acoustic noise values, indicates that the device respects noise emission limits according to 2000/14/CE directive.




**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.



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> |
|----------------|--|--|--|--|----------------|--|------------------|
|                |  |  |  |  |                |  |                  |
|                |  |  |  |  |                |  |                  |

|  |  |
|--|--|
|  | <b>THE MACHINE MUST NOT BE USED IN AREAS WITH<br/>EXPLOSIVE ATMOSPHERE</b> |
|--|--|



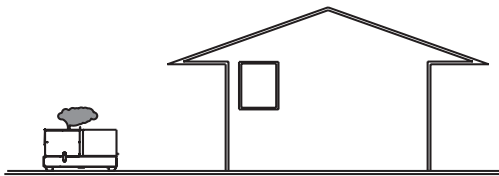
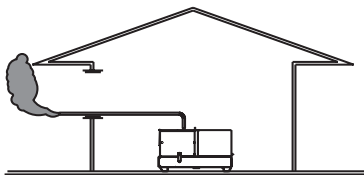
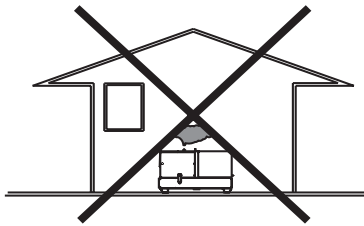
**INSTALLATION AND ADVICE BEFORE USE**

**GASOLINE ENGINES**

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

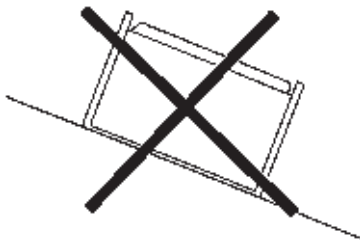
**DIESEL ENGINES**

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

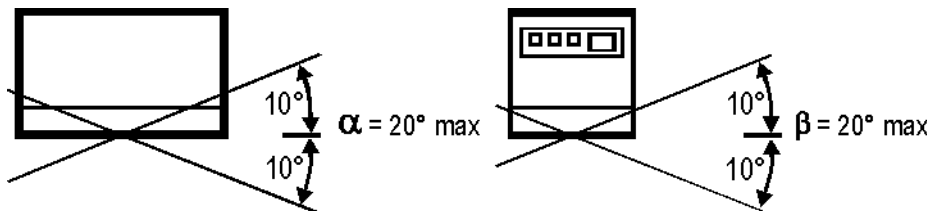


**POSITION**

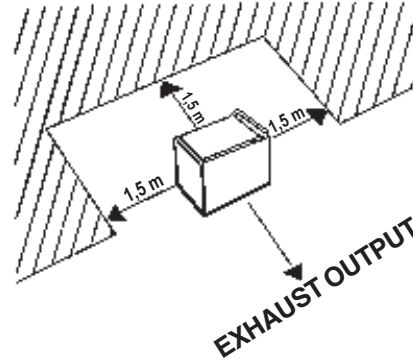
Place the machine on a level surface at a distance of at least 1,5 m from buildings or other plants.



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.



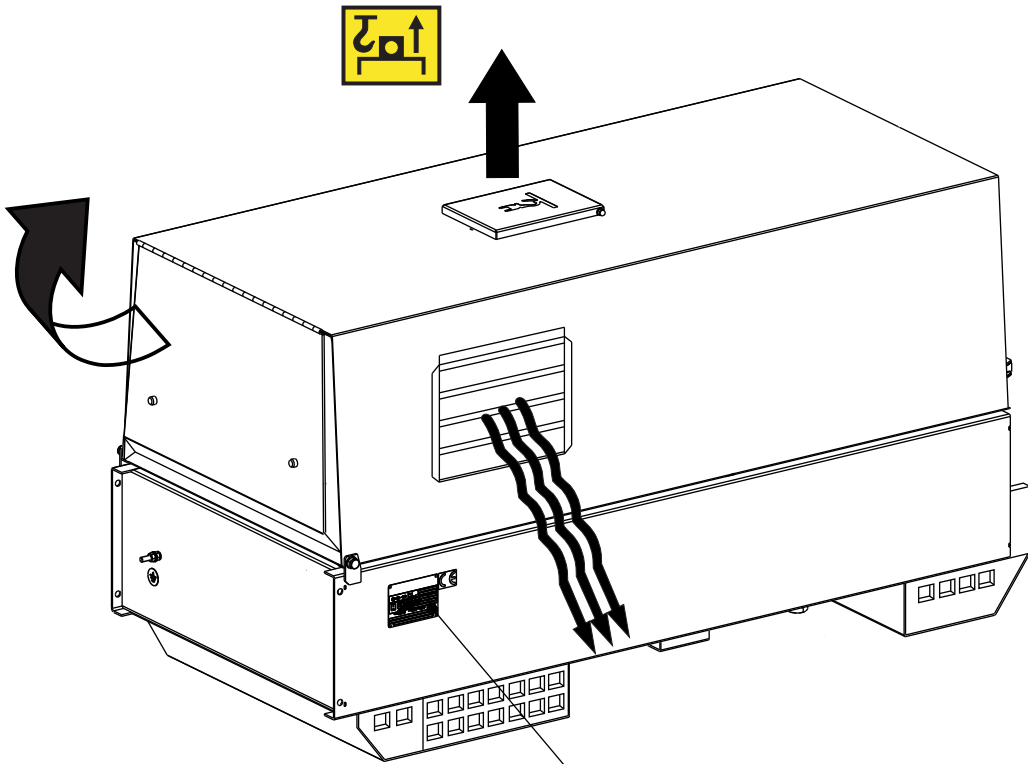
☞ Make sure that the machine does not move during the work: **block** it possibly with tools and/or devices made to this purpose.

**MOVES OF THE MACHINE**

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

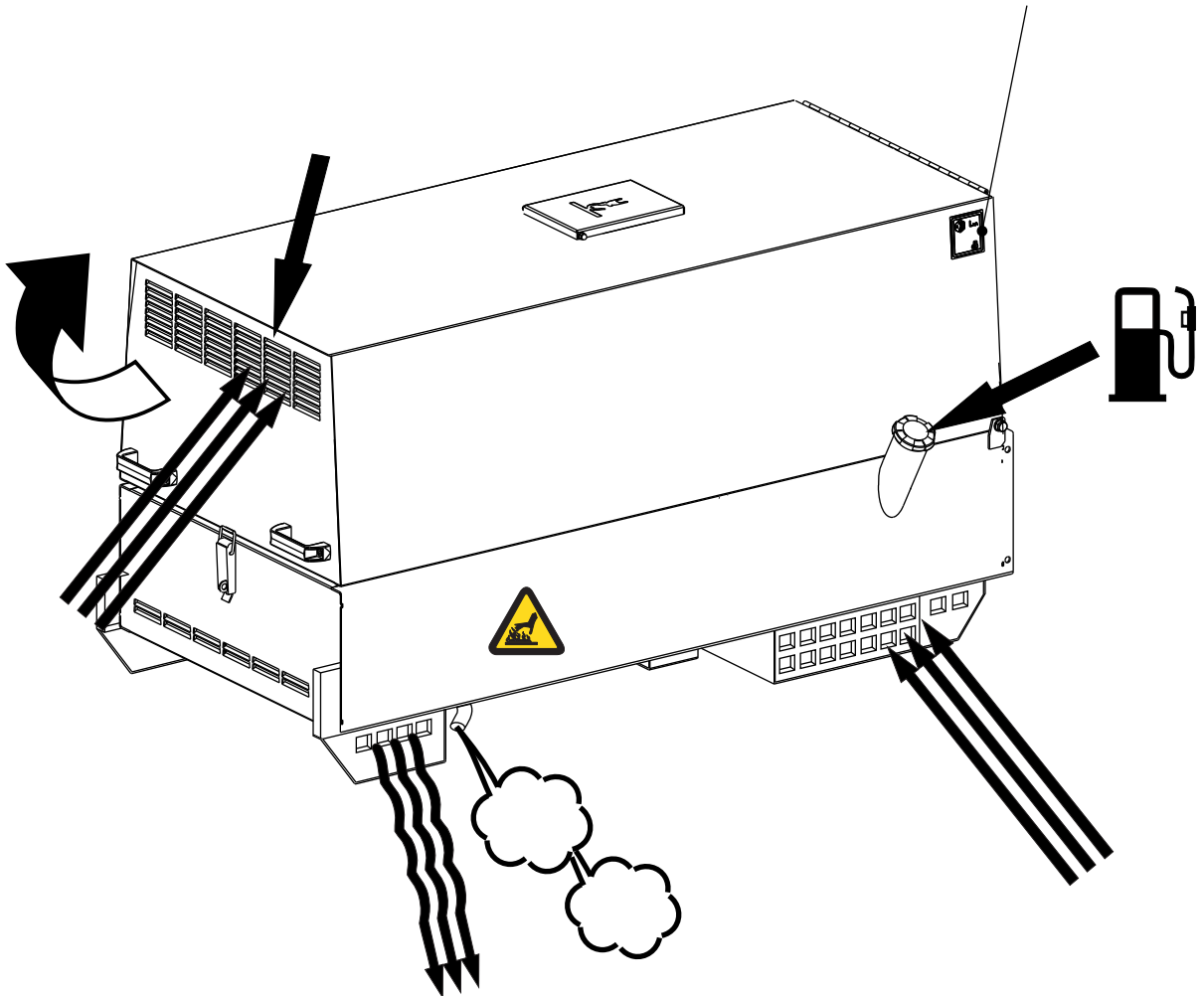
**PLACE OF THE MACHINE**

|  |   |
|--|---|
|  | <b>ATTENTION</b>  |
|  | For a safer use from the operator <b>DO NOT</b> fit the machine in locations with high risk of flood.   |
|  | Please do not use the machine in weather conditions which are beyond IP protection shown both in the data plate and on page named "technical data" in this same manual. |



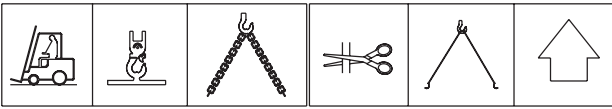
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M1.4 





**NOTE**



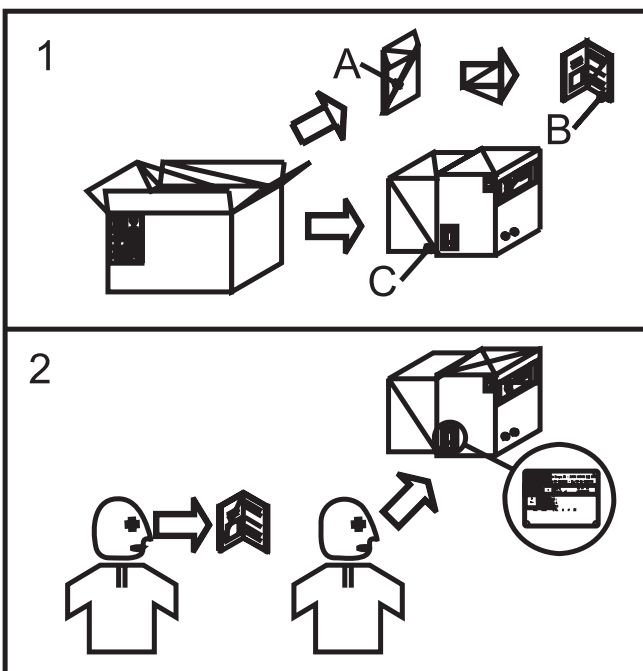
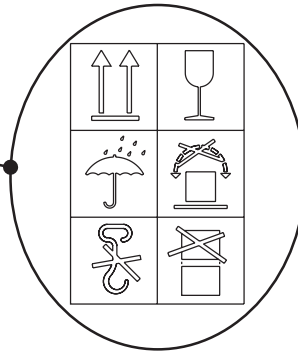
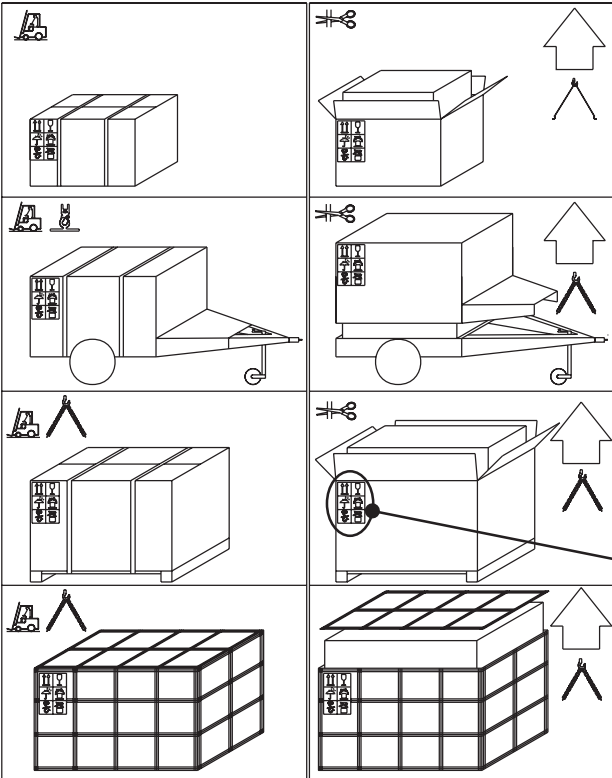
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with its packaging, and conforms to local rules and regulations.

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.





**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.

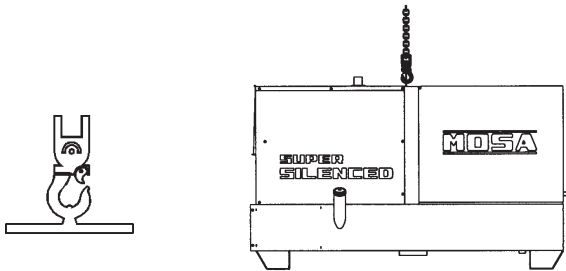
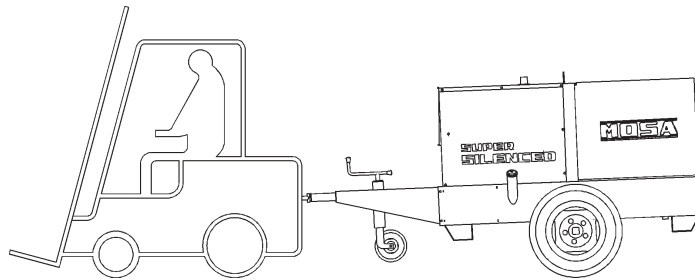
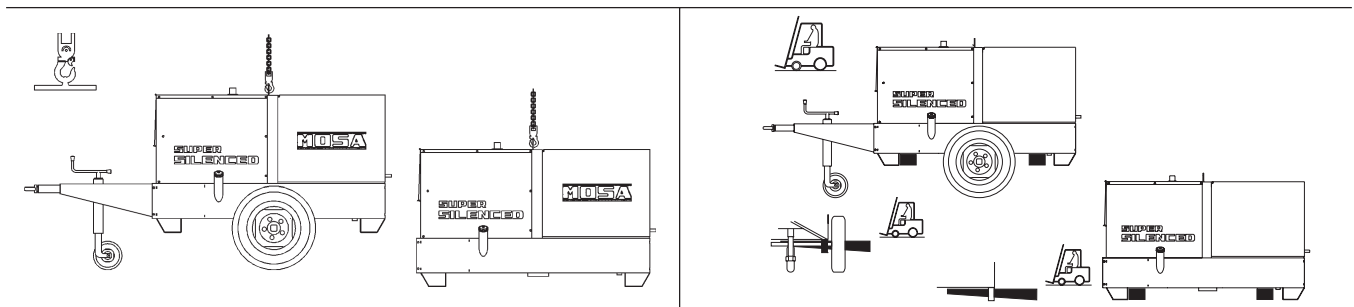
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

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

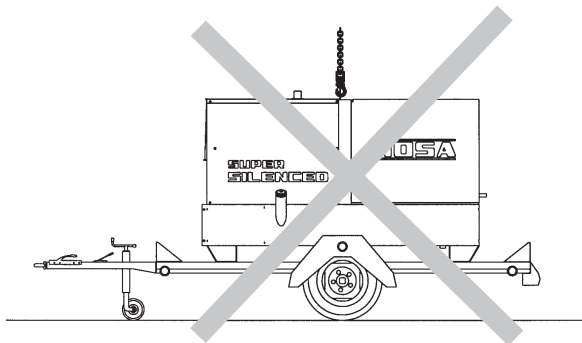
**DO NOT LOAD OTHER PARTS WHICH CAN MODIFY WEIGHT AND BARICENTER POSITION.**

**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**



**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.

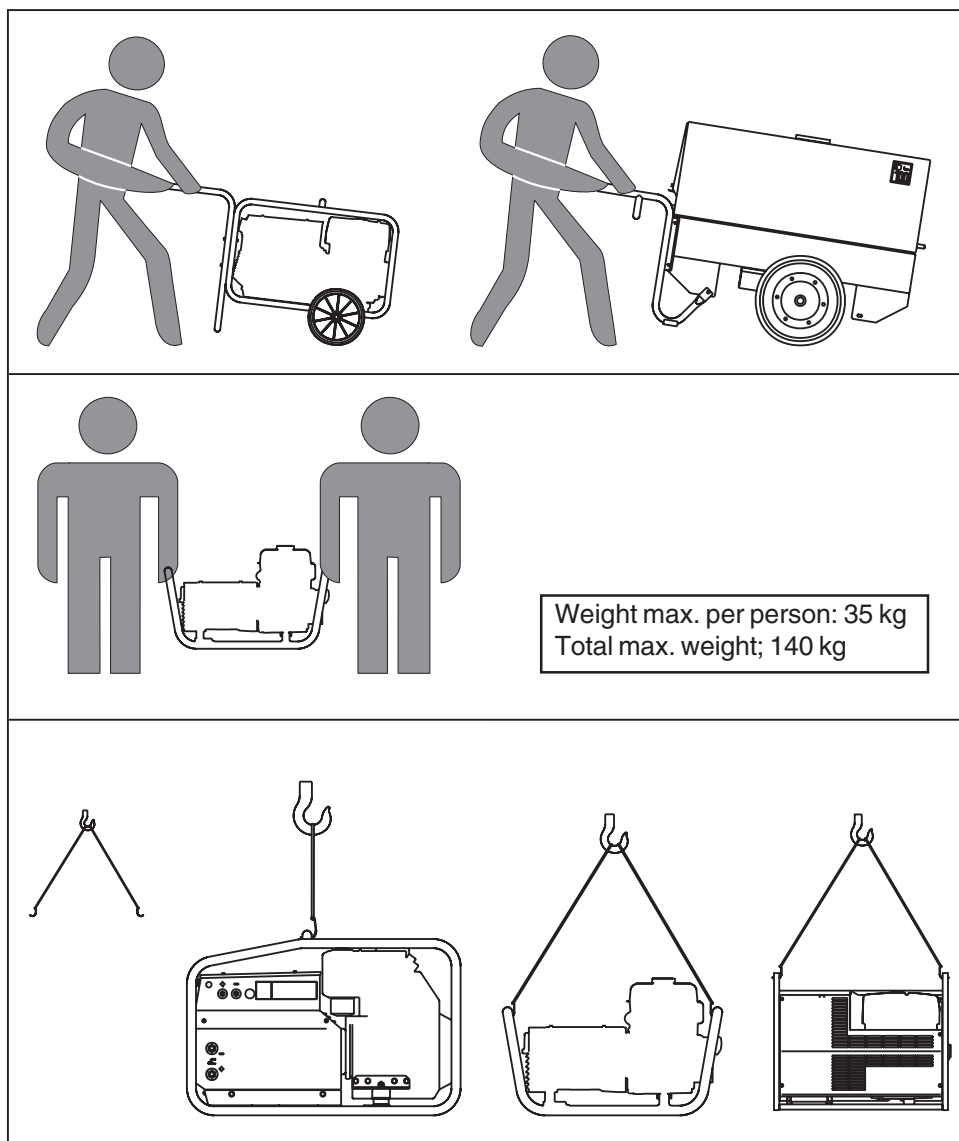
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

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 CTM accessory).**

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







## ATTENTION

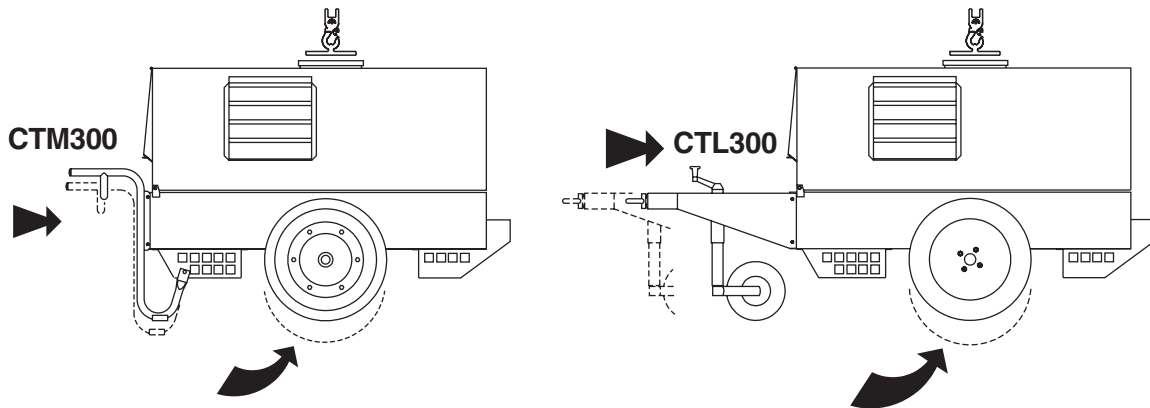
The CTL or CTM accessory cannot be removed from the machine and used separately (actioned manually or following vehicles) for the transport of loads or anyway for used different from the machine movements.

### 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.

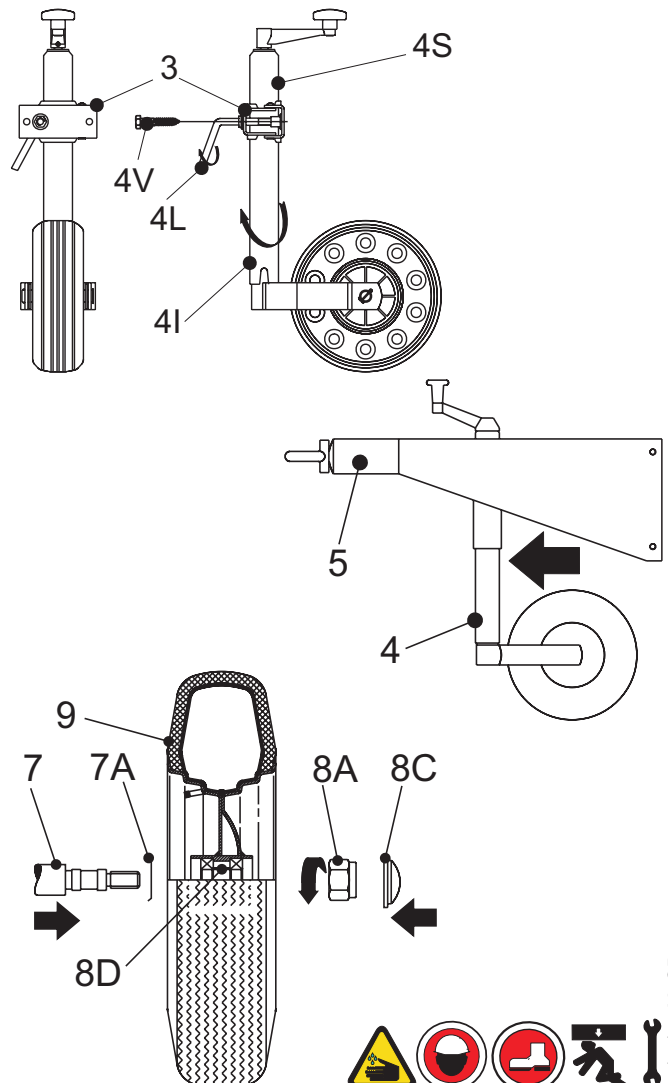
Towing on public roads or turnpikes of any type **IS EXCLUDED**, because **not** in possession of the requirements by national and foreign traffic norms.

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



For assembling the generating set on the trolley CTL300 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 on the machine the towbar (5) complete of foot with the M10x20 screws, nuts and washers (see fig. page M6.4).
- 6) - Assemble the axle (7) to the base of the machine (see fig. page M6.4) with the M 8x20 screws and relative washers (two per part) so that their supports coincide.
- 7) - Introduce on the axle the antidust ring (7A) with folded edges turned toward the machine.
- 8) - Insert the wheel (9) on the axle paying attention to the spacer (8D) which is between the two bearings, then insert the selflocking nut (8A) and finally assemble the shutting cap (8C).
- 9) - Pump the tyre (9) bringing the pressure to three 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 WITHOUT MAINTENANCE



Connect the cable + (positive) to the pole + (positive) of the battery (after having taken away the protection), by properly tightening the clamp.

Check the state of the battery from the colour of the warning light which is in the upper part.

- Green colour: battery OK
- Black colour: battery to be recharged
- White colour: battery to be replaced

**DO NOT OPEN THE BATTERY.**



## LUBRICANT

### RECOMMENDED OIL

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

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

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

### REFUELLING AND CONTROL:

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.



## DRY 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.



## OIL BATH AIR FILTER

Fill the air filter using the same engine oil up to the level indicated on the filter.



## 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.



## 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.



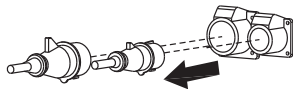
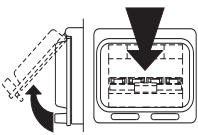


check before each start-up

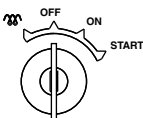


**START-UP FROM FRONT PANEL**

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 (where it is assembled);
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. Make sure that the accelerator lever or the switch (I6) is at its minimum setting;
5. Insert the electric protection device (D-Z2-N2) lever towards above and, where mounted, check the isolation monitor (A3) see page M37 –
6. Introduce the key (Q1), turn it clockwise completely, leaving it as soon as the engine starts and/or the push button (32) (models without key) leaving it as soon as the engine starts.



**NB.: for safety reason the key must be kept by qualified personel.**

**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 (where it is assembled);
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 10 seconds; for low temperatures, it may be necessary to increase it to 15 or 20 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).

| 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. |

7. Once the engine has started leave it running at a reduced speed for some minutes.
8. Accelerate the engine at max., set lever on maximum position and then take up load.



**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**);

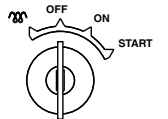
2. cut off power to all utilities by opening the load switch or opening the thermal-magnetic switch (Z2) (input lever in downward position);



3. Turn and push the accelerator lever (16) in minimum position;

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

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



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

**EMERGENCY SHUTDOWN**

Turn the key (Q1) to the OFF position.

**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.*

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.

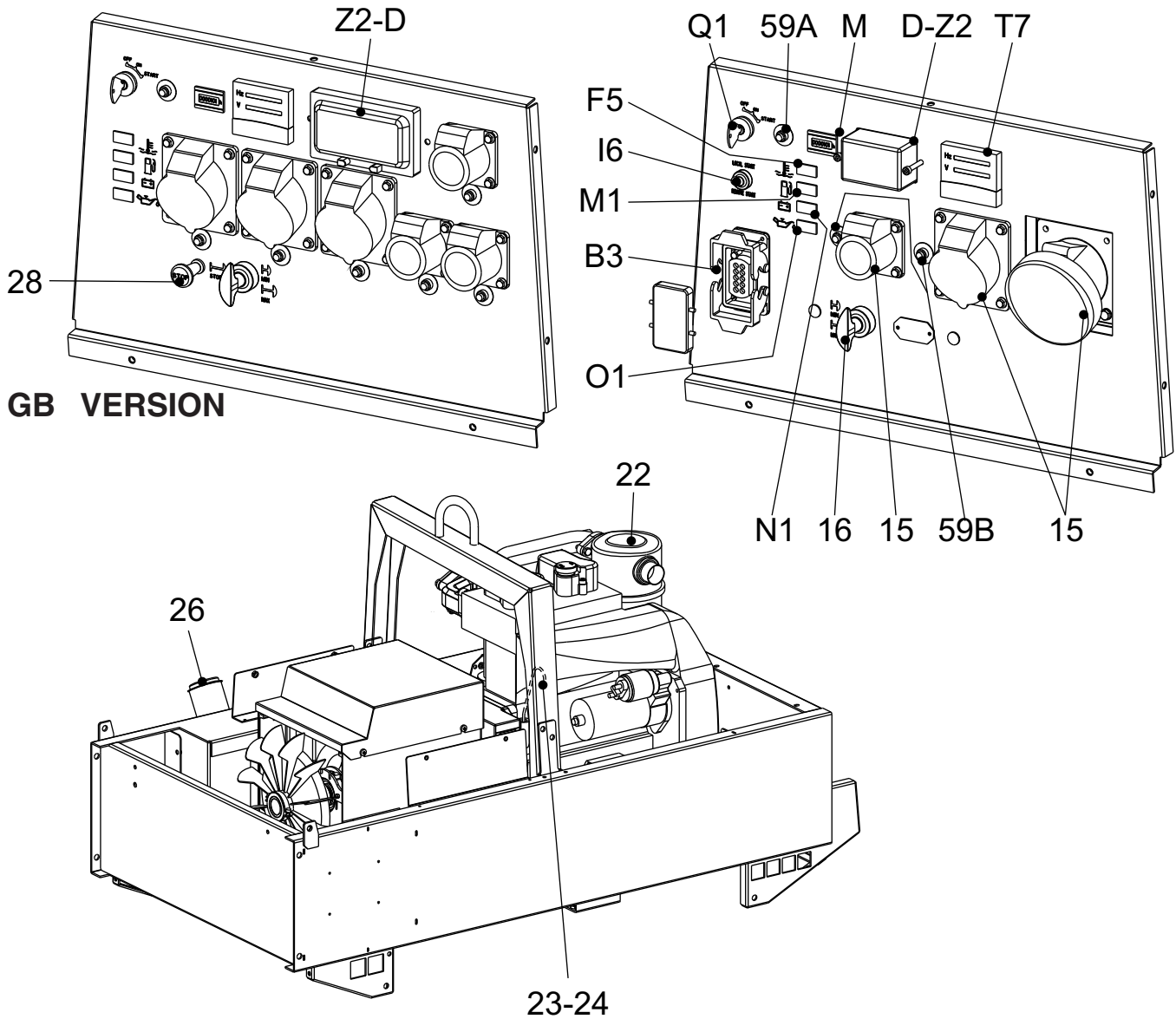
2. Verify or position the LOCAL START / REMOTE START (I6) selector on REMOTE START.

**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).



| Pos. | Descrizione                       | Description                       | Description                           | Descripción                      |
|------|-----------------------------------|-----------------------------------|---------------------------------------|----------------------------------|
| 15   | Presse di corrente in c.a.        | A.C. socket                       | Prises de courant en c.a.             | Toma de corriente en c.a         |
| 16   | Comando acceler./puls. marcia     | Accelerator lever                 | Commande accélér./bouton marche       | Mando de acel./pulsador marcha   |
| 22   | Filtro aria motore                | Engine air filter                 | Filtre air moteur                     | Filtro aire motor                |
| 23   | Asta livello olio motore          | Oil level dipstick                | Jauge niveau huile moteur             | Aguja nivel aceite motor         |
| 24   | Tappo caricamento olio motore     | Engine oil reservoir cap          | Bouchon remplissage huile moteur      | Tapón llenado aceite motor       |
| 26   | Tappo serbatoio                   | Fuel tank cap                     | Bouchon réservoir                     | Tapón depósito                   |
| 28   | Comando stop                      | Stop control                      | Commande stop                         | Mando stop                       |
| 59A  | Protezione termica motore         | Engine thermal switch             | Protection thermique moteur           | Protección térmica motor         |
| 59B  | Protezione termica corrente aux   | Aux current thermal switch        | Protection thermique courant aux.     | Protección térmica corr. aux     |
| B3   | Connettore EAS                    | EAS connector                     | Connecteur EAS                        | Conector E.A.S.                  |
| D    | Interruttore differenziale (30mA) | G.F.I.                            | Interrupteur différentiel             | Interruptor diferencial (30 mA)  |
| F5   | Spia alta temperatura             | Warning light, high temperature   | Voyant haute température              | Piloto alta temperatura          |
| I6   | Selettore Start Local/Remote      | Start Local/Remote selector       | Selecteur Start Local/Remote          | Selector Start Local/Remote      |
| M    | Contaore                          | Hour counter                      | Compte-heures                         | Cuentahoras                      |
| M1   | Spia livello combustibile         | Warning level light               | Voyant niveau carburant               | Piloto nivel combustible         |
| N1   | Spia carica batteria              | Battery charge warning light      | Voyant charge batterie                | Piloto carga batería             |
| O1   | Spia lumin. press. olio/oil alert | Oil press.warning light/oil alert | Voyant lumin. press.huile / oil alert | Indic.lum.pres. aceite/oil alert |
| Q1   | Chiave di avviamento              | Starter key                       | Clé de démarrage                      | Llave de arranque                |
| T7   | Strumento analogico V/Hz          | Analogic instrument V/Hz          | Instrument analogique                 | Instrumento analógico V/Hz       |
| Z2   | Interruttore magnetotermico       | Thermal-magnetic circ.breaker     | Interrupteur magnétothermique         | Interruptor magnetotérmico       |



## 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) (where it is assembled) 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; f.e. for nominal voltage, threephase 400Vac or singlephase 230Vac, the no-load voltage can be comprised between 410-420V (threephase) and 235-245V (singlephase). The precision of the load voltage is maintained within ±5% with balanced loads and with a rotation speed variation of 4%. Particularly, with resistive loads (cos φ = 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 ±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 ±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  $\phi$**

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  $\cos \phi = 0,8$ ; 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  $\cos \phi$ .

For  $\cos \phi$  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**

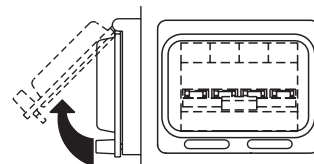
**THERMAL-MAGNETIC SWITCH**

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.

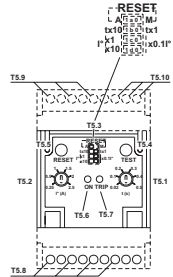
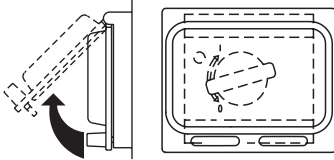


In case of an intervention on the part of the thermal magnetic protection device, check that the total absorption does not exceed the electricity-generating group's nominal current.



**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.*







**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 (I6) of the generating set must be switched on REMOTE START.

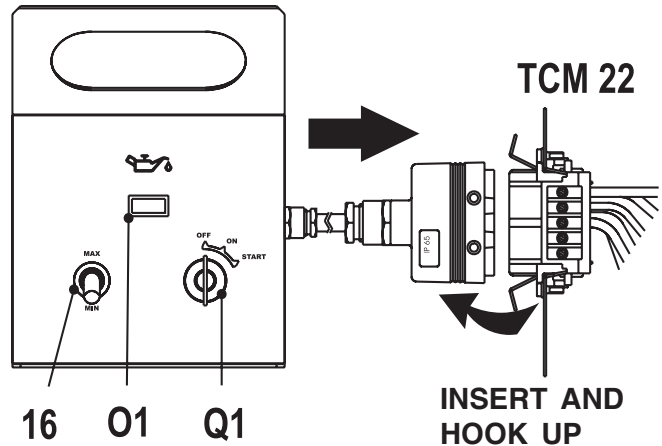
**USE OF THE REMOTE CONTROL TCM 22**

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.



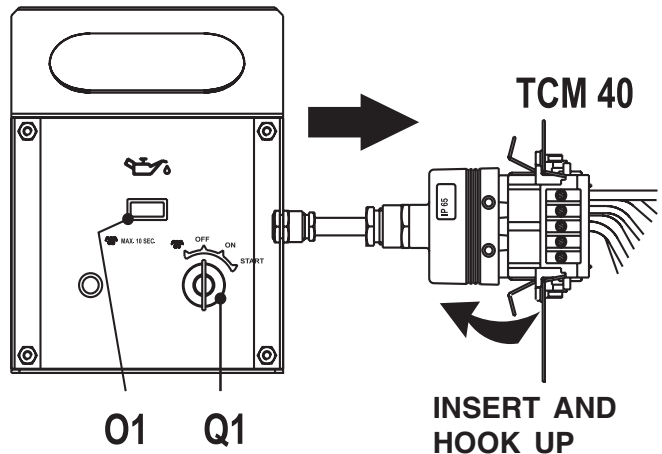
**USE OF THE REMOTE CONTROL TCM 40**

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.

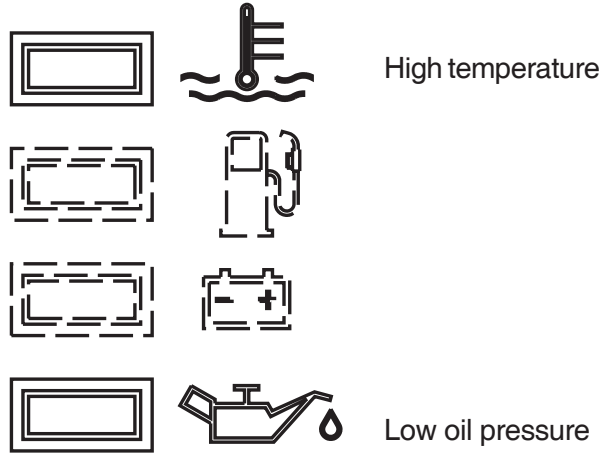
The system consist of electronic card of control and check, and of an engine stop device: solenoid (**ElettroStop**), electrovalve (**ElettroValvola**)

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>  |
|--|---|--|
| <b>ENGINE</b>                                    |   |  |
| The motor does not start up                      | 1) Start-up switch (I6) (where it is assembled) in incorrect position<br>2) Emergency button (L5) pressed<br>3) Preheating (where it is assembled)<br><br>4) Engine control unit or starting key faulty.<br>5) Battery low<br><br>6) Battery cable terminals loose or corroded<br>7) Start-up motor defective<br>8) No fuel or air in feed circuit<br>9) Malfunction on feed circuit: defective pump, injector blocked, etc.<br>10) Air filter or fuel filter clogged<br>11) Air in the gasoil filter.<br>12) Motor stopping device defective<br>13) Malfunction on electrical power circuit on generator control panel | 1) Check position<br><br>2) Unblock<br>3) Lacking or insufficient preheating phase for sparkplugs.<br>Malfunction in circuit: repair.<br>4) Replace<br><br>5) Recharge or replace.<br>Check the battery charge circuit on motor and automatic panel.<br>6) Tighten and clean. Replace if corroded.<br>7) Repair or replace.<br>8) Refill tank, un-aerate the circuit.<br>9) Ask for intervention of Service Department.<br>10) Clean or replace<br>11) Take the air out filling the filter with gasoil.<br>12) Replace.<br>13) Check and repair. |
| The motor does not accelerate. Inconstant speed. | 1) Air filter or fuel filter clogged.<br>2) Malfunction on feed circuit: defective pump, injector blocked, etc.<br>3) Oil level too high.<br>4) Motor speed regulator defective.  | 1) Clean or replace.<br>2) Ask for intervention of Service Department.<br>3) Eliminate excess oil.<br>4) Ask for intervention of Service Department  |
| Black smoke                                      | 1) Air filter clogged.<br>2) Overload.<br><br>3) Injectors defective. Injection pump requires calibration.  | 1) Clean or replace<br>2) Check the load connected and diminish.<br>3) Ask for intervention of Service Department.   |
| White smoke                                      | 1) Oil level too high.<br>2) Motor cold or in prolonged operation with little or no load.<br>3) Segments and/or cylinders worn out.   | 1) Eliminate excess oil.<br>2) Insert load only with motor sufficiently hot<br>3) Ask for intervention of Service Department.  |
| Too little power provided by motor.              | 1) Air filter clogged.<br>2) Insufficient fuel distribution, impurities or water in feed circuit.<br>3) Injectors dirty or defective.   | 1) Clean or replace.<br>2) Check the feed circuit, clean and refill once again.<br>3) Ask for intervention of Service Department.  |
| Low oil pressure                                 | 1) Oil level insufficient<br>2) Air filter clogged.<br>3) Oil pump defective.<br><br>4) Alarm malfunction.  | 1) Reset level. Check for leaks.<br>2) Replace filter.<br>3) Ask for intervention of Service Department.<br>4) Check the sensor and electrical circuit.  |
| High temperature                                 | 1) Overload<br><br>2) Insufficient ventilation.<br><br>3) Insufficient coolant liquid (Only for water cooled motors)  | 1) Check the load connected and diminish.<br>2) Check the cooling vent and relative transmission belts<br>3) Restore level. Check for leaks or breakage in the entire cooling circuit, pipes, couplings, etc.  |

| <b>Problem</b>                              | <b>Possible cause</b>   | <b>Solution</b>   |
|---|---|---|
| <b>ENGINE</b>                               |   |   |
|   | 4) Water radiator or oil clogged (where it is assembled)<br>5) Water circulating pump defective (Only for water cooled motors)<br>6) Injectors defective. Injection pump requires calibration<br>7) Alarm malfunction   | 4) Clean cooling fins on radiator<br>5) Ask for intervention of Service Department<br>6) Ask for intervention of Service Department<br>7) Check the sensor and electrical circuit   |
| <b>GENERATOR</b>                            |   |   |
| Absence of output voltage                   | 1) Voltage switch in position 0<br>2) Voltage switch faulty<br>3) Protection tripped due to overload<br>4) Differential protection device tripped. (Differential switch, differential relay)<br>5) Protection devices defective<br>6) Alternator not sparked<br>7) Alternator defective | 1) Check position<br>2) Check connections and working of the switch, repair or replace<br>3) Check the load connected and diminish<br>4) Check on the entire installation: cables, connections, utilities connected have no defective sheathing which may cause incorrect currents to ground<br>5) Replace<br>6) Carry out external spark test as indicated in alternator manual. Ask for intervention of Service Department<br>7) 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<br>2) Voltage regulating device (where it is assembled) defective or requires calibration<br>3) Alternator defective   | 1) Regulate speed to its nominal no-load value<br>2) Adjust regulator device as indicated in alternator manual, or replace<br>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<br>2) Load with $\cos \varphi$ less than 0.8<br>3) Alternator defective  | 1) Check the load connected and diminish<br>2) Reduce or rephase load<br>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<br>2) Irregular rotation of motor<br>3) Alternator defective   | 1) Check electrical connections and tighten<br>2) Ask for intervention of Service Department<br>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.

**ENGINE and ALTERNATOR**

**PLEASE REFER TO THE SPECIFIC MANUALS PROVIDED.**

**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.

**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.

**BATTERY WITHOUT MAINTENANCE DO NOT OPEN THE BATTERY**

The battery is charged automatically from the battery charger circuit supplied with the engine.

Check the state of the battery from the colour of the warning light which is in the upper part.

- Green colour: battery OK
- Black colour: battery to be recharged
- White colour: battery to be replaced



**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 surroundings, 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.






## 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<br>X | WITH LOAD<br>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 encharged 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.

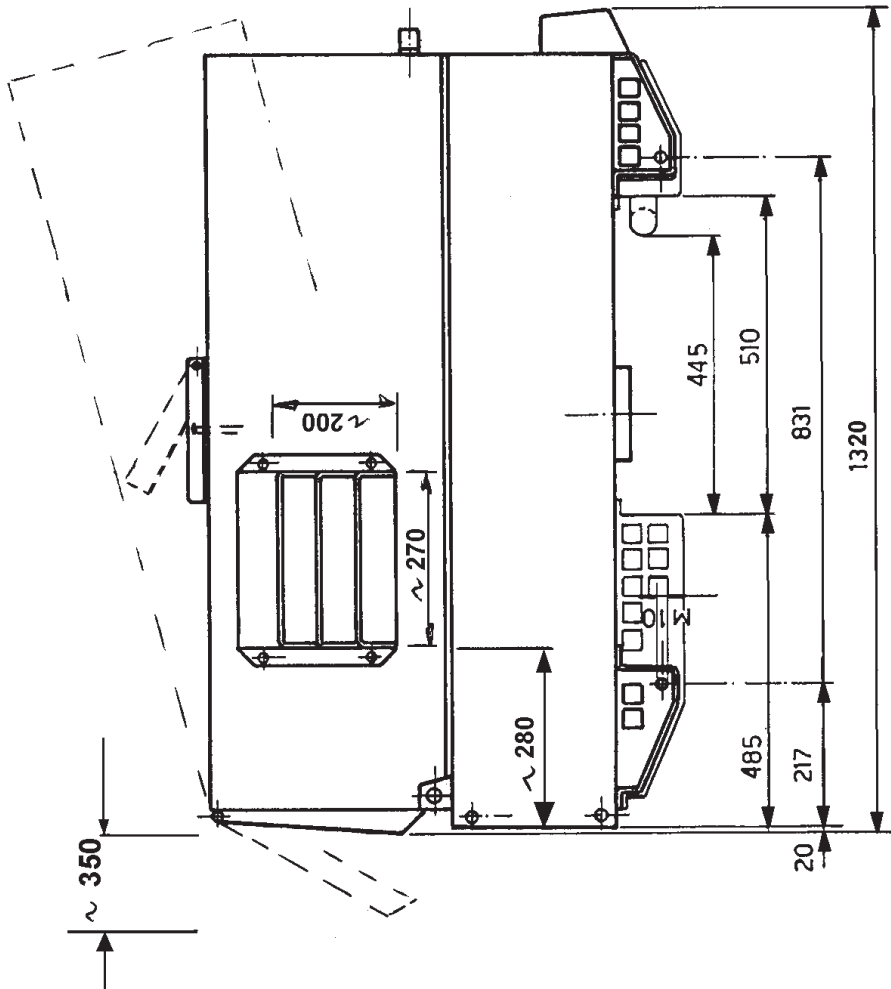
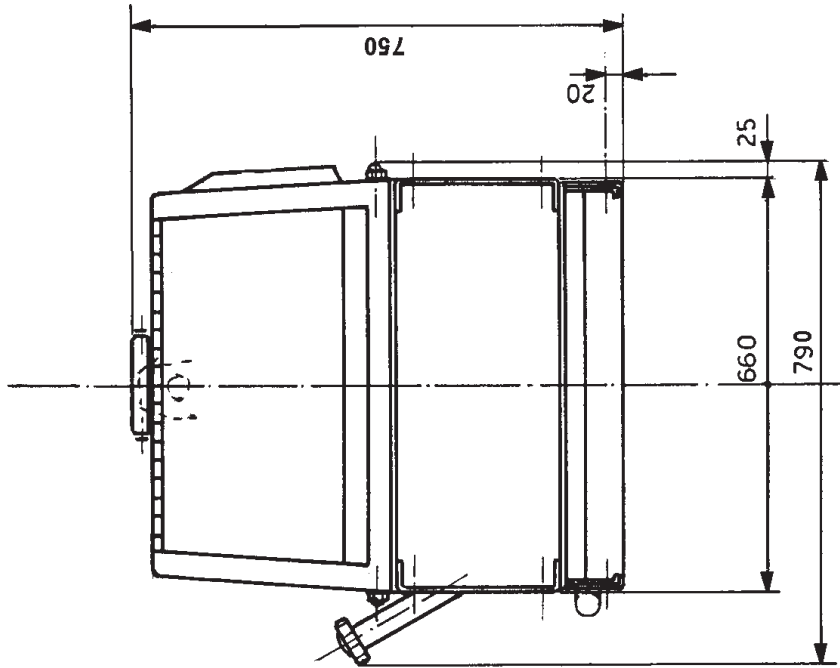


## IMPORTANT

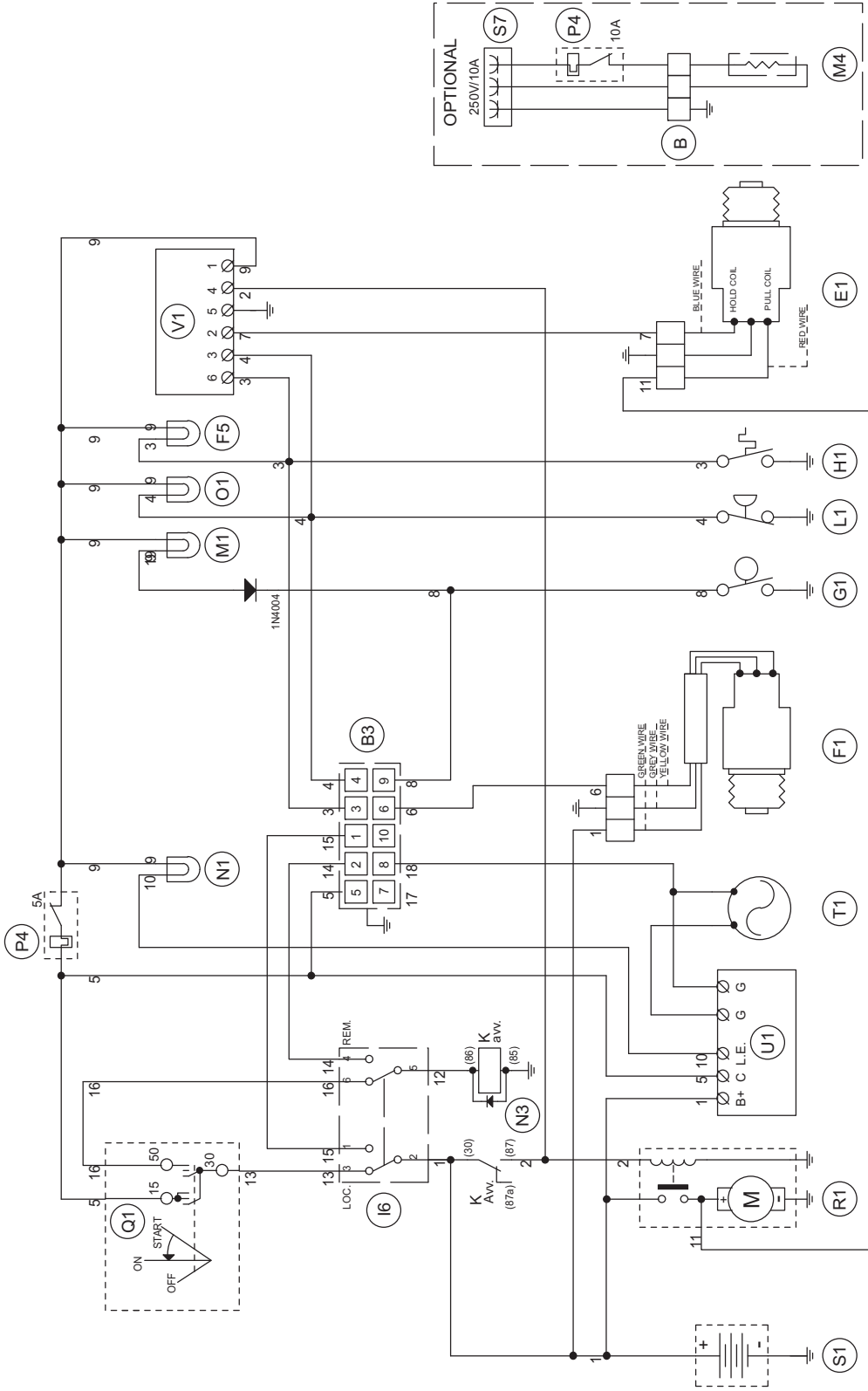


In the cust-off operations avoid that polluting substances, liquids, exhausted oils, etc. bring damage to people or things or can cause negative effects to surroundings, health or safety respecting completely the laws and/or dispositions in force in the place.





|    |  |    |                                       |    |   |
|----|--|----|---------------------------------------|----|---|
| 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 | : "VODIA" connector                       |
| M1 | : Fuel warning light                       | M4 | : Heater with thermostat              | M7 | : "F" EDC4 connector                      |
| N1 | : Battery charge warning light             | N4 | : Choke solenoid                      | N7 | : OFF-ON-DIAGN. selector                  |
| O1 | : Oil pressure warning light               | O4 | : Step relay                          | O7 | : DIAGNOSTIC push-button                  |
| P1 | : Fuse                                     | P4 | : Circuit breaker                     | P7 | : DIAGNOSTIC indicator                    |
| Q1 | : Starter key                              | Q4 | : Battery charge sockets              | Q7 | : Welding selector mode                   |
| R1 | : Starter motor                            | R4 | : Sensor, cooling liquid temperature  | R7 | : VRD load                                |
| S1 | : Battery                                  | S4 | : Sensor, air filter clogging         | S7 | : 230V 1-phase plug                       |
| T1 | : Battery charge alternator                | T4 | : Warning light, air filter clogging  | T7 | : V/Hz analogic instrument                |
| U1 | : Battery charge voltage regulator         | U4 | : Polarity inverter remote control    | U7 | : Engine protection EP6                   |
| V1 | : Solenoid valve control PCBT              | V4 | : Polarity inverter switch            | V7 | : G.F.I. relay supply switch              |
| Z1 | : Solenoid valve                           | Z4 | : Transformer 230/48V                 | Z7 | : Radio remote control receiver           |
| W1 | : Remote control switch                    | W4 | : Diode bridge, polarity change       | W7 | : Radio remote control trasnsmmitter      |
| X1 | : Remote control and/or wire feeder socket | X4 | : Base current diode bridge           | X7 | : Isometer test push-button               |
| Y1 | : Remote control plug                      | Y4 | : PCB control unit, polarity inverter | Y7 | : Remote start socket                     |
| A2 | : Remote control welding regulator         | A5 | : Base current switch                 | A8 | : Transfer fuel pump control              |
| B2 | : E.P.2 engine protection                  | B5 | : Auxiliary push-button ON/OFF        | B8 | : Ammeter selector switch                 |
| C2 | : Fuel level gauge                         | C5 | : Accelerator electronic control      | C8 | : 400V/230V/115V commutator               |
| D2 | : Ammeter                                  | D5 | : Actuator                            | D8 | : 50/60 Hz switch                         |
| E2 | : Frequency meter                          | E5 | : Pick-up                             | E8 | : Cold start advance with temp. switch    |
| F2 | : Battery charge trasformer                | F5 | : Warning light, high temperature     | F8 | : START/STOP switch                       |
| G2 | : Battery charge PCB                       | G5 | : Commutator auxiliary power          | G8 | : Polarity inverter two way switch        |
| H2 | : Voltage selector switch                  | H5 | : 24V diode bridge                    | H8 | : Engine protection EP7                   |
| I2 | : 48V a.c. socket                          | I5 | : Y/s commutator                      | I8 | : AUTOIDLE switch                         |
| L2 | : Thermal relay                            | L5 | : Emergency stop button               | L8 | : AUTOIDLE PCB                            |
| M2 | : Contactor                                | M5 | : Engine protection EP5               | M8 | : A4E2 ECM engine PCB                     |
| N2 | : G.F.I. and circuit breaker               | N5 | : Pre-heat push-button                | N8 | : Remote emergency stop connector         |
| O2 | : 42V EEC socket                           | O5 | : Accelerator solenoid PCB            | O8 | : V/A digital instruments and led VRD PCB |
| P2 | : G.F.I. resistor                          | P5 | : Oil pressure switch                 | P8 | : Water in fuel                           |
| Q2 | : T.E.P. engine protection                 | Q5 | : Water temperature switch            | Q8 | : Battery disconnect switch               |
| R2 | : Solenoid control PCBT                    | R5 | : Water heater                        | R8 | : Inverter                                |
| S2 | : Oil level transmitter                    | S5 | : Engine connector 24 poles           | S8 | : Overload led                            |
| T2 | : Engine stop push-button T.C.1            | T5 | : Electronic GFI relais               | T8 | : Main IT/TN selector                     |
| U2 | : Engine start push-button T.C.1           | U5 | : Release coil, circuit breaker       | U8 | : NATO socket 12V                         |
| V2 | : 24V c.a. socket                          | V5 | : Oil pressure indicator              | V8 | : Diesel pressure switch                  |
| Z2 | : Thermal magnetic circuit breaker         | Z5 | : Water temperature indicator         | Z8 | : Remote control PCB                      |
| W2 | : S.C.R. protection unit                   | W5 | : Battery voltmeter                   | W8 | : Pressure turbo protection               |
| X2 | : Remote control socket                    | X5 | : Contactor, polarity change          | X8 | :   |
| Y2 | : Remote control plug                      | Y5 | : Commutator/switch, series/parallel  | Y8 | :   |

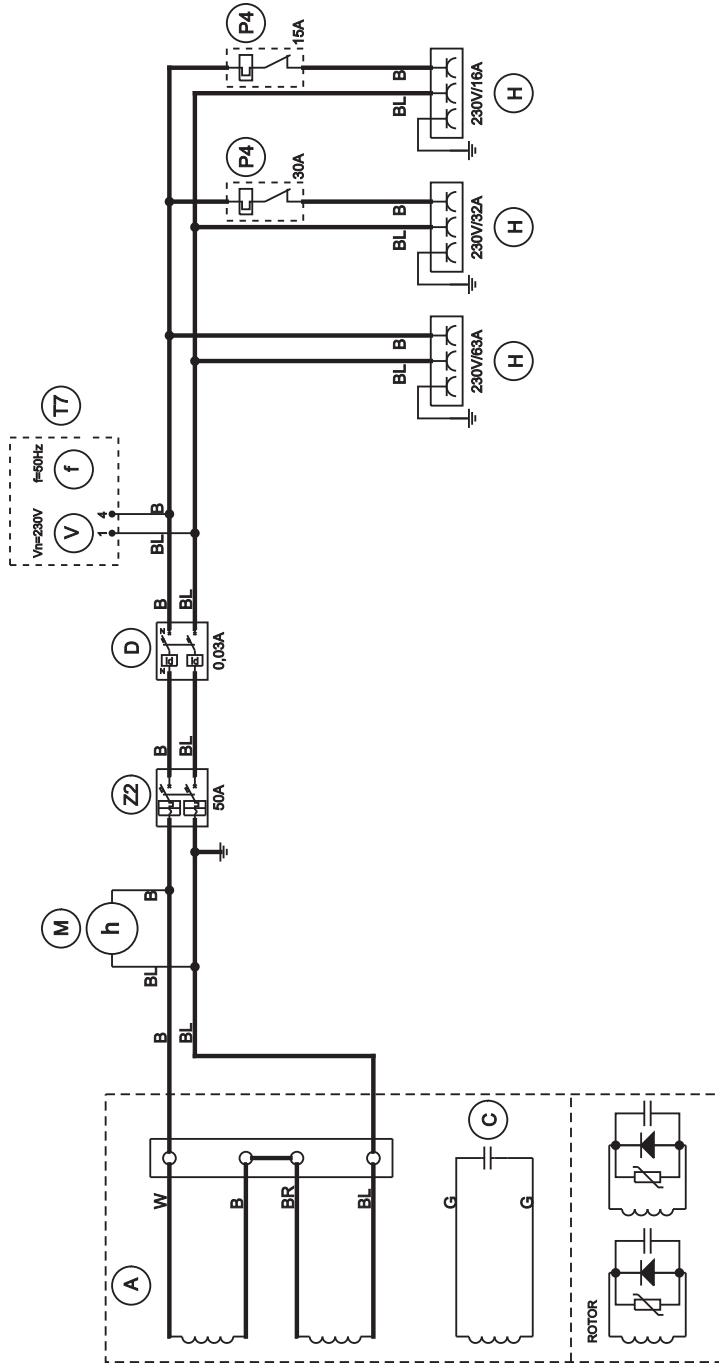


| STARTER KEY |        |
|-------------|--------|
| 30          | 15 50  |
| OFF         | ON     |
| ON          | OFF    |
| ST          | ON-OFF |

|            |   |                 |            |
|------------|---|-----------------|------------|
| C          | Sostituito elettromagnete stop con m odello senza elettronica (E1). | 20.02.2008      | N.L.       |
| B          | Sostituiti elettromagneti con modello CEI (E1) (F1).                | 25.07.2007      | N.L.       |
| A          | Eliminato collegamento su pin 7 del connettore EAS (B3).            | 06.10.2006      | N.L.       |
| Esp. Evol. | Modifica  | Data            | Dis. Appr. |
|            | Denominazione:  | Progetto:       | di n°      |
|            | Denominazione:  | Project:        | Page n°    |
|            | Da Pag. From Page   | 35921.prg       | 2          |
|            | Alia Pag. To Page   |                 | 3          |
|            | Macchina: Machine:  | Dis. n°:        | Approvato: |
|            | 20090-CUSAGO (MI)-ITALY   | 35926.S.010-C   | Approvato: |
|            | http://www.mosa.it  | Leporace N.     | Dis. n°:   |
|            |   | GE 12000 SXC/GS | Dvg. n°:   |
|            |   | 22.12.2004      |            |

La MOSA si riserva a termini di legge la proprietà del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione.





| LEGENDA COLORI<br>KEY COLOR |               |
|-----------------------------|---------------|
| B                           | NERO/BLACK    |
| BL                          | BLU/BLUE      |
| BR                          | MARRONE/BROWN |
| G                           | GRIGIO/GREY   |
| W                           | BIANCO/WHITE  |

|  |                  |                              |                        |                               |
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| Esp. Exp.  | Modifica<br>Date |                              | Dis. Desi.             | Appr. Abbr.                   |
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| 20090-CUSAGO (MI)-ITALY<br><a href="http://www.mosa.it">http://www.mosa.it</a> |                  | Denominazione: Denomination: | 35921.prg              | 3                             |
| 20090-CUSAGO (MI)-ITALY<br><a href="http://www.mosa.it">http://www.mosa.it</a> |                  | Aux. (230MX3) DMT            | Dis. n°:<br>Dwg. n°:   | 3                             |
| 20090-CUSAGO (MI)-ITALY<br><a href="http://www.mosa.it">http://www.mosa.it</a> |                  | Macchine: Machine:           | Disegnatore: Designer: | Approvato: Approved:          |
| 20090-CUSAGO (MI)-ITALY<br><a href="http://www.mosa.it">http://www.mosa.it</a> |                  | GE 12000 SXC/GS              | Leporace N.            | 17.02.2005                    |
| 20090-CUSAGO (MI)-ITALY<br><a href="http://www.mosa.it">http://www.mosa.it</a> |                  | 35921.S.020                  | 35921                  | 17.02.2005                    |

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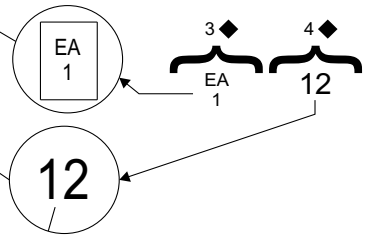
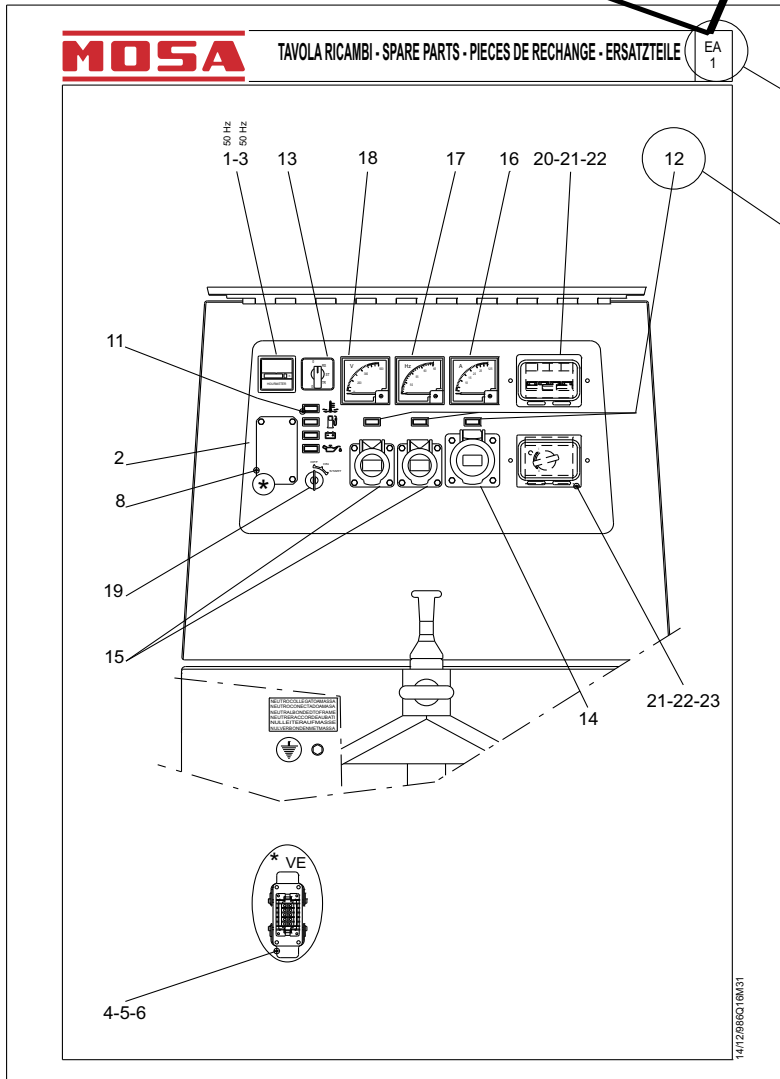
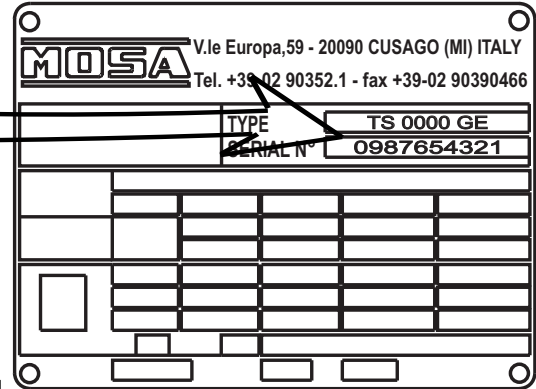
## MOSA guarantees that any request for spare parts will be satisfied.

To keep the machine in full working order, when replacement of MOSA spare parts is required, always ask for genuine parts only.

The requested data are to be found on the data plate located on the machine structure, quite visible and easy to consult. \*

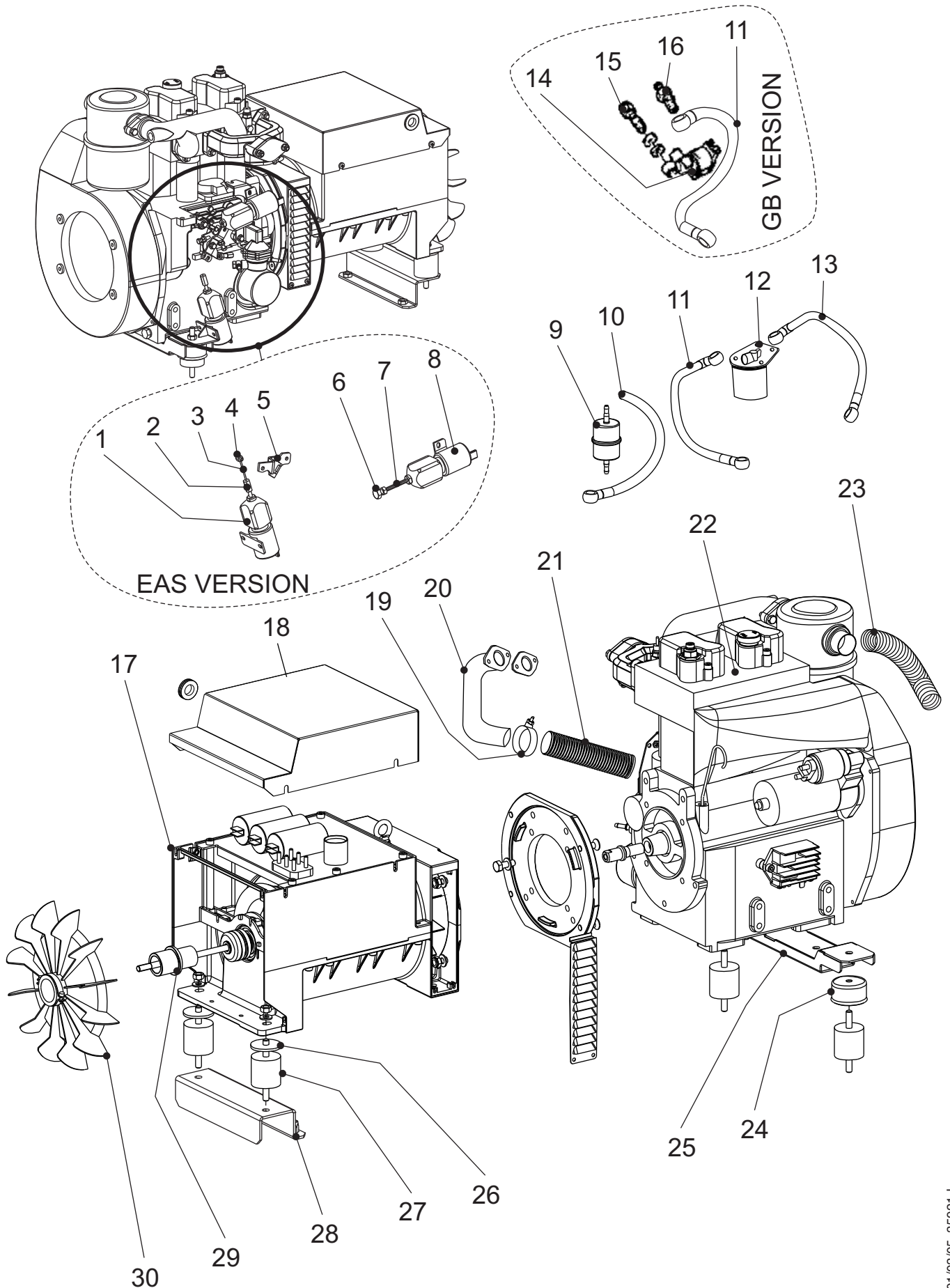
When ordering the spare parts, it is recommended to indicate:

- 1) \* serial number
- 2) \* model of welder and/or generating set
- 3) ◆ n. table
- 4) ◆ n. position
- 5) quantity



### ABBREVIATIONS AND SYMBOLS:

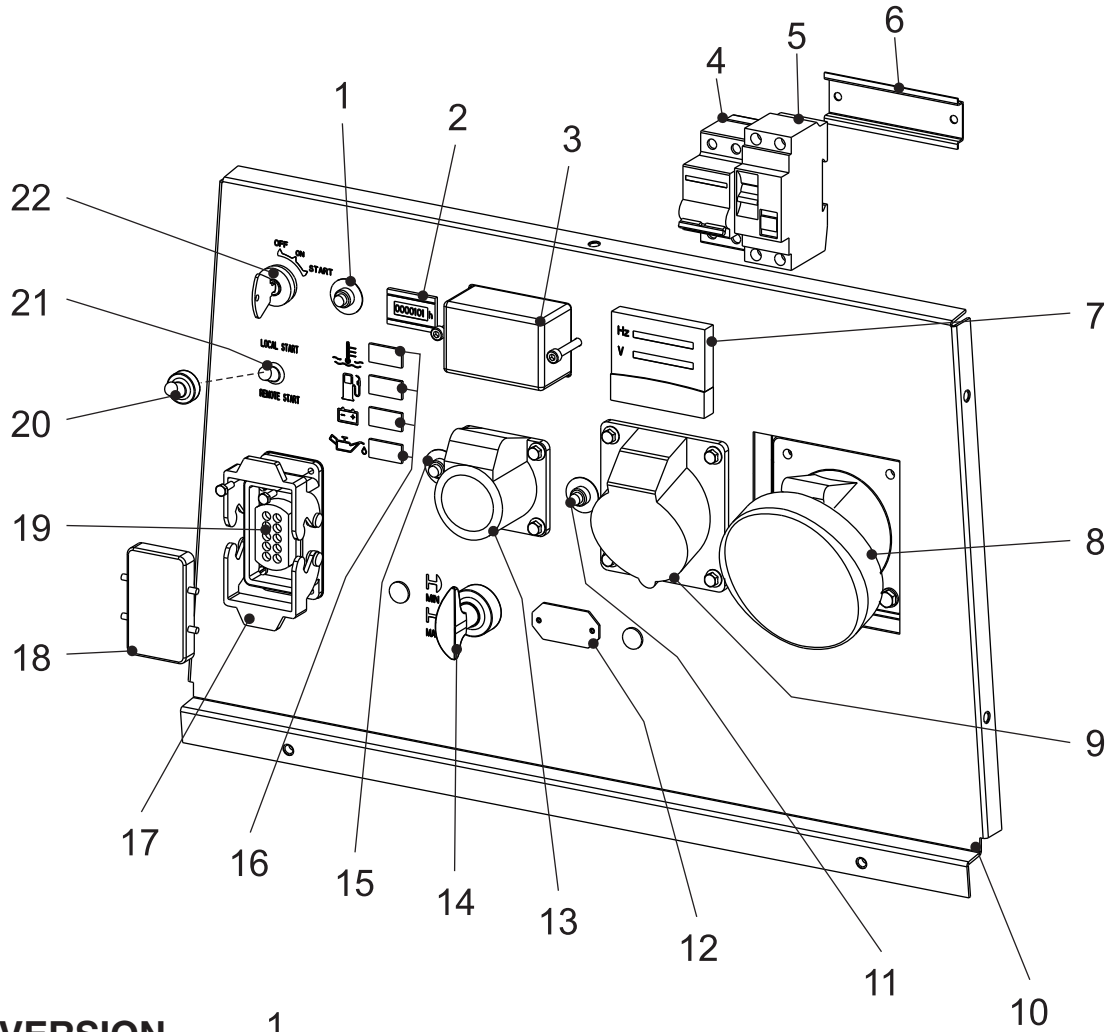
- (EV) When ordering, specify the engine type and the auxiliary voltage
- (ER) Engine with recoil starter only
- (ES) Engine with electric starter only
- (VE) E.A.S version only.
- (QM) When ordering, specify the length in meters
- (VS) Special version only
- (SR) By request only



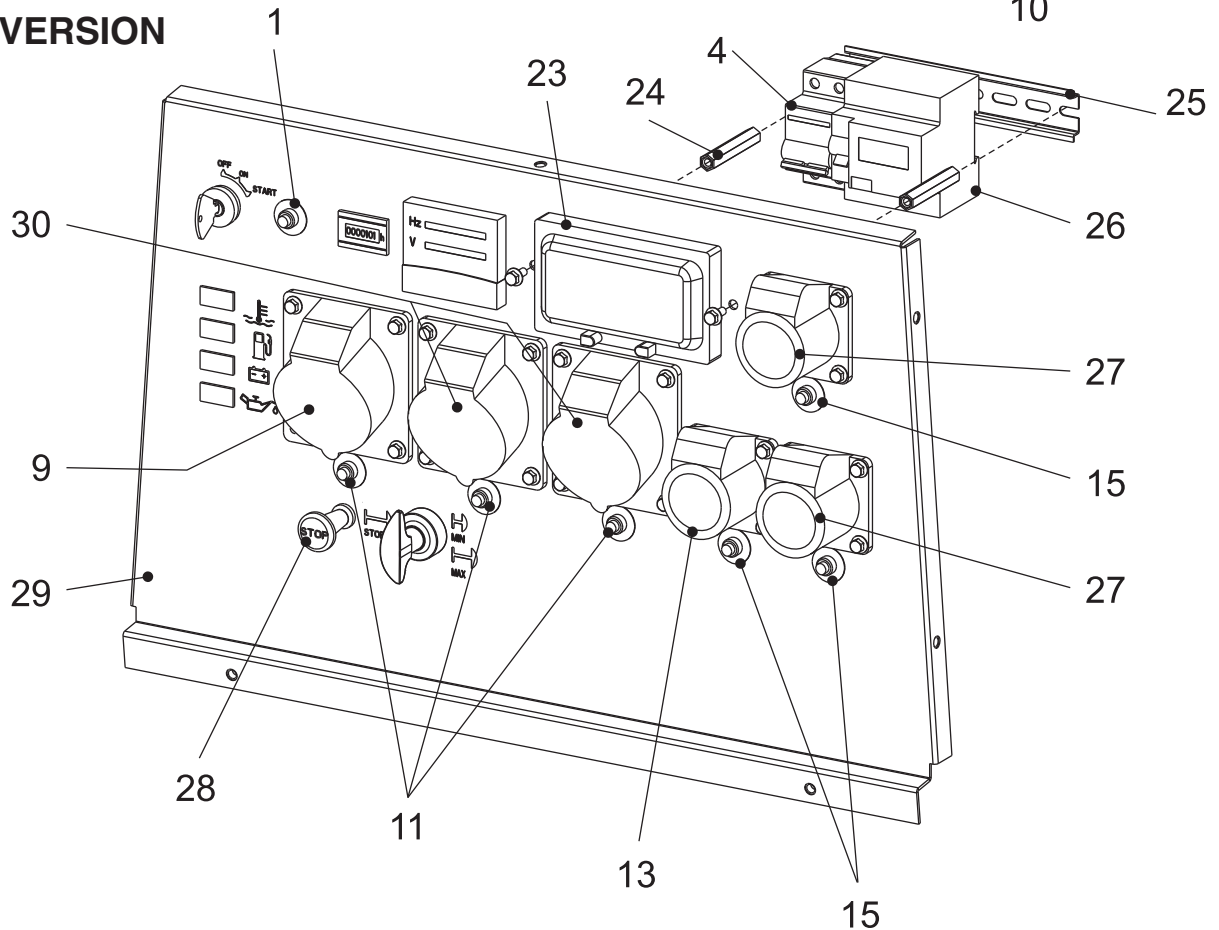


| <i>Pos.</i> | <i>Cod.</i> | <i>Descr.</i>                  | <i>Note</i>  |
|-------------|-------------|--------------------------------|--|
| 1           | 219869050   | ELETTROMAGNETE ECONOMIZZATORE  | EAS VERSION - Fino a REV.0-09/05 Del.176/07-25/07/07 |
| 1           | 264149050   | ELETTROMAGNETE ECONOMIZZATORE  | Da REV.0-09/05 Del.176/07-25/07/07                   |
| 2           | 107302860   | GHIERA                         | EAS VERSION  |
| 3           | 319869056   | FUNE COMANDO ELETTROMAGNETE    | EAS VERSION  |
| 4           | 319862244   | MORSETTO PER FUNE              | EAS VERSION  |
| 5           | 209812230   | LEVA                           | EAS VERSION  |
| 6           | 209509057   | DISTANZIALE                    | EAS VERSION  |
| 7           | 209509056   | TIRANTE                        | EAS VERSION  |
| 8           | 219869055   | ELETTROMAGNETE ARRESTO MOTORE  | EAS VERSION - Fino a REV.0-09/05 Del.176/07-25/07/07 |
| 8           | 274009055   | ELETTROMAGNETE ARRESTO MOTORE  | Da REV.1-09/09 Del.46/08-26/02/08                    |
| 9           | 256602228   | FILTRO GASOLIO                 |  |
| 10          | 209702203   | TUBO COMBUSTIBILE              |  |
| 11          | 209712205   | TUBO COMBUSTIBILE              |  |
| 12          | 102011190   | FILTRO NAFTA                   |  |
| 13          | 209712206   | TUBO COMBUSTIBILE              |  |
| 14          | 309409060   | ELETTROVALVOLA                 | GB VERSION   |
| 15          | 309409061   | VALVOLA NON RITORNO            | GB VERSION   |
| 16          | 309402225   | VITE FORATA                    | GB VERSION   |
| 17          | 359203100   | ALTERNATORE                    |  |
| 18          | 359253024   | COPERCHIO ALTERNATORE          |  |
| 19          | 6087740     | FASCETTA STR.TUBO 38-50 ACC.ZN |  |
| 20          | 219932070   | TUBO DI SCARICO                |  |
| 21          | 309502077   | TUBO FLESSIBILE FINITO         |  |
| 22          | 209502200   | MOTORE LOMBARDINI 12LD477/2    |  |
| 23          | 1229810     | TUBO FLESSIBILE (MT.1)         |  |
| 24          | 307012037   | PROTEZIONE ANTIVIBRANTE        |  |
| 25          | 209812035   | TRAVERSA SUPPORTO MOTORE       |  |
| 26          | 307012038   | RONDELLA PER ANTIVIB. 10,5X52  |  |
| 27          | 105112020   | ANTIVIBRANTE                   |  |
| 28          | 359253101   | SUPPORTO ALTERNATORE           |  |
| 29          | 359253039   | DISTANZIALE FISSAGGIO VENTOLA  |  |
| 30          | 210016020   | VENTOLA                        |  |

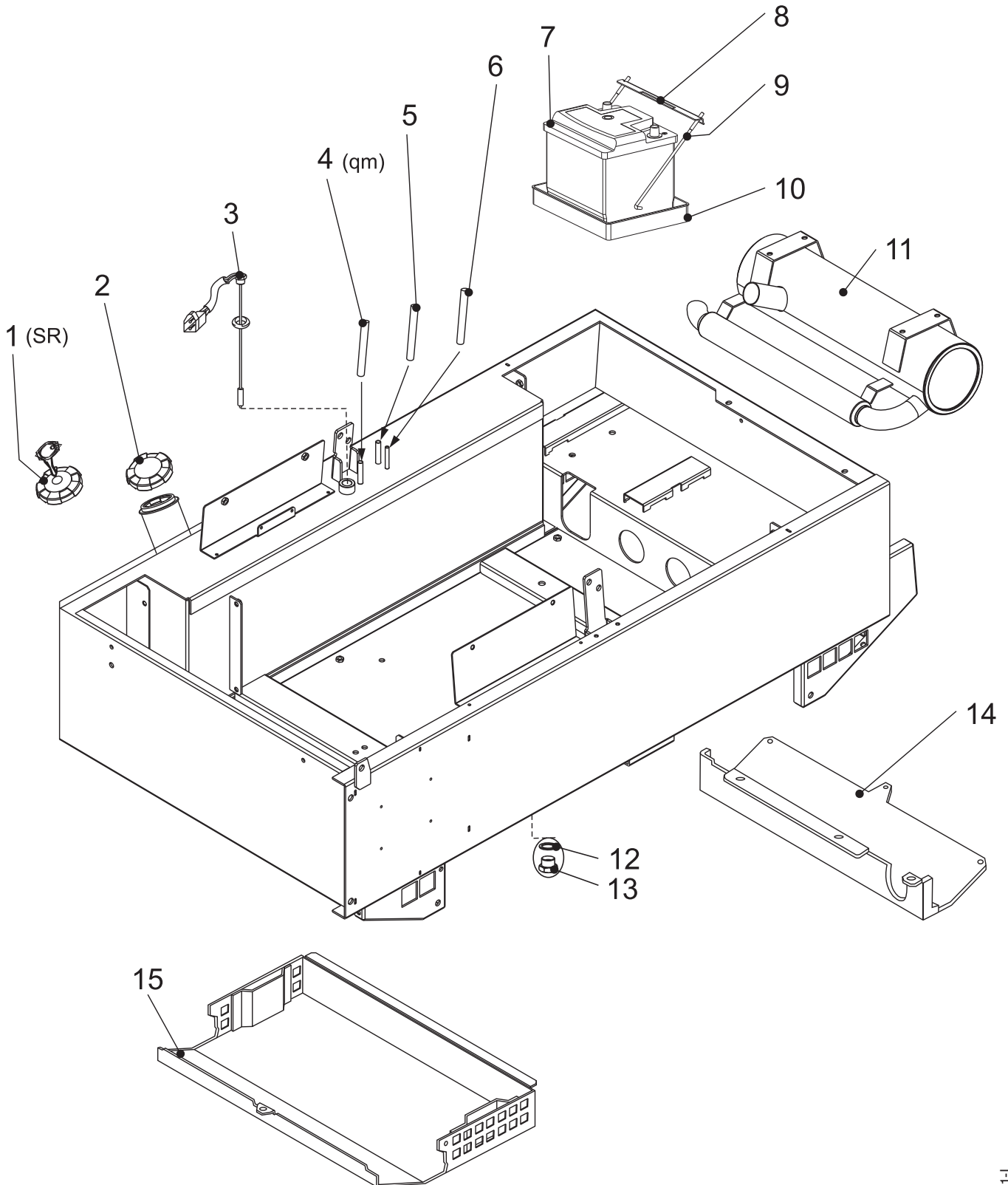
| <i>Pos.</i> | <i>Cod.</i> | <i>Descr.</i>                | <i>Note</i>   |
|-------------|-------------|------------------------------|---|
| 1           | 219869050   | ACCELERATOR SOLENOID         | EAS VERSION - Up to REV.0-09/05 Del.176/07-25/07/07 |
| 1           | 264149050   | ACCELERATOR SOLENOID         | From REV.0-09/05 Del.176/07-25/07/07                |
| 2           | 319862244   | TERMINAL                     | EAS VERSION   |
| 3           | 319869056   | WIRE                         | EAS VERSION   |
| 4           | 107302860   | RING NUT                     | EAS VERSION   |
| 5           | 209812230   | LEVER                        | EAS VERSION   |
| 6           | 209509057   | SPACER                       | EAS VERSION   |
| 7           | 209509056   | TIE-ROD                      | EAS VERSION   |
| 8           | 219869055   | STOP SOLENOID                | EAS VERSION - Up to REV.0-09/05 Del.176/07-25/07/07 |
| 8           | 274009055   | STOP SOLENOID                | From REV.1-09/09 Del.46/08-26/02/08                 |
| 9           | 256602228   | FUEL FILTER                  |   |
| 10          | 209702203   | PIPE, FUEL                   |   |
| 11          | 209712205   | PIPE, FUEL                   |   |
| 12          | 102011190   | FILTER, FUEL                 |   |
| 13          | 209712206   | PIPE, FUEL                   |   |
| 14          | 309409060   | SOLENOID VALVE               | GB VERSION  |
| 15          | 309409061   | NON RETURN VALVE             | GB VERSION  |
| 16          | 309402225   | SCREW, DRILLED               | GB VERSION  |
| 17          | 359203100   | ALTERNATOR                   |   |
| 18          | 359253024   | ALTERNATOR COVER             |   |
| 19          | 6087740     | CLAMP                        |   |
| 20          | 219932070   | EXHAUST PIPE                 |   |
| 21          | 309502077   | FLEXIBLE PIPE (COMPL.)       |   |
| 22          | 209502200   | LOMBARDINI ENGINE 12LD477/2  |   |
| 23          | 1229810     | FLEXIBLE PIPE (MT.1)         |   |
| 24          | 307012037   | PROTECTION, VIBRATION-DAMPER |   |
| 25          | 209812035   | ENGINE SUPPORT CROSSBAR      |   |
| 26          | 307012038   | WASHER X VIBRATION DAMPER    |   |
| 27          | 105112020   | VIBRATION DAMPER             |   |
| 28          | 359253101   | ALTERNATOR SUPPORT           |   |
| 29          | 359253039   | FIXING FAN SPACER            |   |
| 30          | 210016020   | FAN                          |   |



**GB VERSION**

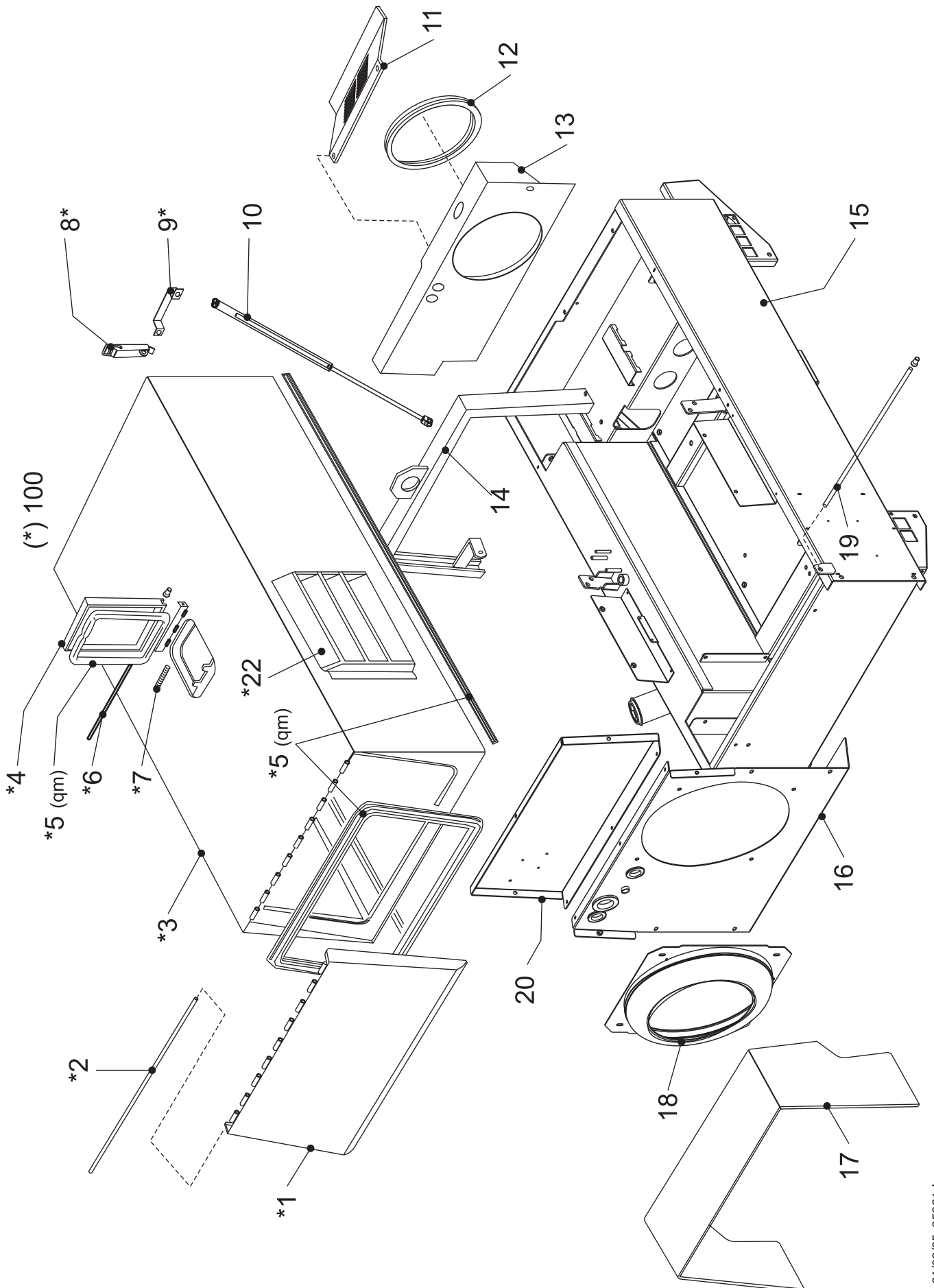


| <i>Pos.</i> | <i>Rev. Cod.</i> | <i>Descr.</i>                   | <i>Note</i>                           |
|-------------|------------------|---------------------------------|---------------------------------------|
| 1           | 352007109        | PROTEZIONE TERMICA 5A           |                                       |
| 2           | 105511810        | CONTAORE 230V 50Hz IP65         |                                       |
| 3           | 232027130        | CAPPUCCIO PROTEZIONE I.D.       |                                       |
| 4           | 107669705        | INTERRUTTORE MAGNETOTERMICO 2P  |                                       |
| 5           | 359207105        | INTERRUTTORE DIFFERENZIALE 2P   |                                       |
| 6           | 232027036        | GUIDA                           |                                       |
| 7           | 359207300        | STRUM. ANALOGICO A LED V/Hz     |                                       |
| 8           | 305767240        | PRESA CEE 63A 220V 2P+T         |                                       |
| 9           | 105111520        | PRESA CEE 220V MONOF. 2P+T      |                                       |
| 10          | 359207020        | FRONTALE                        |                                       |
| 11          | 873407107        | DISGIUNTORE TERMICO 30A/250V    |                                       |
| 12          | 359257032        | COPERCH. CHIUS. FORO SCALDIGLIA |                                       |
| 13          | 307017240        | PRESA 220V 16A                  |                                       |
| 14          | 209719105        | COMANDO ACCELERATORE            |                                       |
| 15          | 155307107        | DISGIUNTORE TERMICO 15A-250V    |                                       |
| 16          | 1302040          | SPIA ROSSA 12V                  | Fino a REV.0-09/05 Del.58/08-10/03/08 |
| 16          | 1302500          | SPIA ROSSA 12V                  | Da REV.1-09/09 Del.58/08-10/03/08     |
| 17          | 105191550        | CUSTODIA PER PRESA EAS          |                                       |
| 18          | 105191570        | COPERCHIO PER PRESA EAS         |                                       |
| 19          | 105191560        | FRUTTO PRESA CONNETTORE         |                                       |
| 20          | 102042740        | CAPPUCCIO                       |                                       |
| 21          | 102013290        | COMMUTATORE                     |                                       |
| 22          | 107302460        | STARTER A CHIAVE                |                                       |
| 23          | 220117130        | COPERCHIO PROTEZIONE            | GB VERSION                            |
| 24          | 201308039        | COLONNETTA                      | GB VERSION                            |
| 25          | 1243020          | GUIDA PER MORSETTIERA           | GB VERSION                            |
| 26          | 305027105        | INTERRUTTORE DIFFERENZIALE      | GB VERSION                            |
| 27          | 307047250        | PRESA CEE 110V 16A 2 P+T        | GB VERSION                            |
| 28          | 105611890        | COMANDO STOP                    | GB VERSION                            |
| 29          | 359227020        | FRONTALE                        | GB VERSION                            |
| 30          | 105111530        | PRESA CEE 110V 32A 2 P+T        | GB VERSION                            |
| <i>Pos.</i> | <i>Rev. Cod.</i> | <i>Descr.</i>                   | <i>Note</i>                           |
| 1           | 352007109        | THERMOPROTECTION                |                                       |
| 2           | 105511810        | HOURMETER 230V 50Hz IP65        |                                       |
| 3           | 232027130        | CAP                             |                                       |
| 4           | 107669705        | CIRCUIT BREAKER 2POLES          |                                       |
| 5           | 359207105        | GFI 2 POLES                     |                                       |
| 6           | 232027036        | FIXING GUIDE                    |                                       |
| 7           | 359207300        | ANALOGIC INSTRUMENT V/HZ        |                                       |
| 8           | 305767240        | EEC SOCKET 63A 220V 2P+T        |                                       |
| 9           | 105111520        | EEC SOCKET SINGLE-PH.220V 2P+   |                                       |
| 10          | 359207020        | FRONT PANEL                     |                                       |
| 11          | 873407107        | CIRCUIT BREAKER 30A/250V        |                                       |
| 12          | 359257032        | COVER                           |                                       |
| 13          | 307017240        | EEC SOCKET 16A, 220V 2P+T       |                                       |
| 14          | 209719105        | ACCELERATOR LEVER               |                                       |
| 15          | 155307107        | THERMAL SWITCH 15A-250V         |                                       |
| 16          | 1302040          | RED WARNING LIGHT 12V           | Fino a REV.0-09/05 Del.58/08-10/03/08 |
| 16          | 1302500          | RED WARNING LIGHT 12V           | Da REV.1-09/09 Del.58/08-10/03/08     |
| 17          | 105191550        | BOX, EAS SOCKET                 |                                       |
| 18          | 105191570        | BLIND PLATE, EAS SOCKET         |                                       |
| 19          | 105191560        | SOCKET, EAS                     |                                       |
| 20          | 102042740        | CAP                             |                                       |
| 21          | 102013290        | COMMUTATOR                      |                                       |
| 22          | 107302460        | STARTER KEY                     |                                       |
| 23          | 220117130        | PROTECTION COVER                | GB VERSION                            |
| 24          | 201308039        | CONNECTING CYLINDER             | GB VERSION                            |
| 25          | 1243020          | TERMINAL GUIDE                  | GB VERSION                            |
| 26          | 305027105        | GROUND FAULT INTERRUPTOR (GFI)  | GB VERSION                            |
| 27          | 307047250        | EEC SOCKET 110V 16A 2 P+N       | GB VERSION                            |
| 28          | 105611890        | FRONT PANEL                     | GB VERSION                            |
| 30          | 105111530        | EEC SOCKET 32A 110V 2 P+N       | GB VERSION                            |



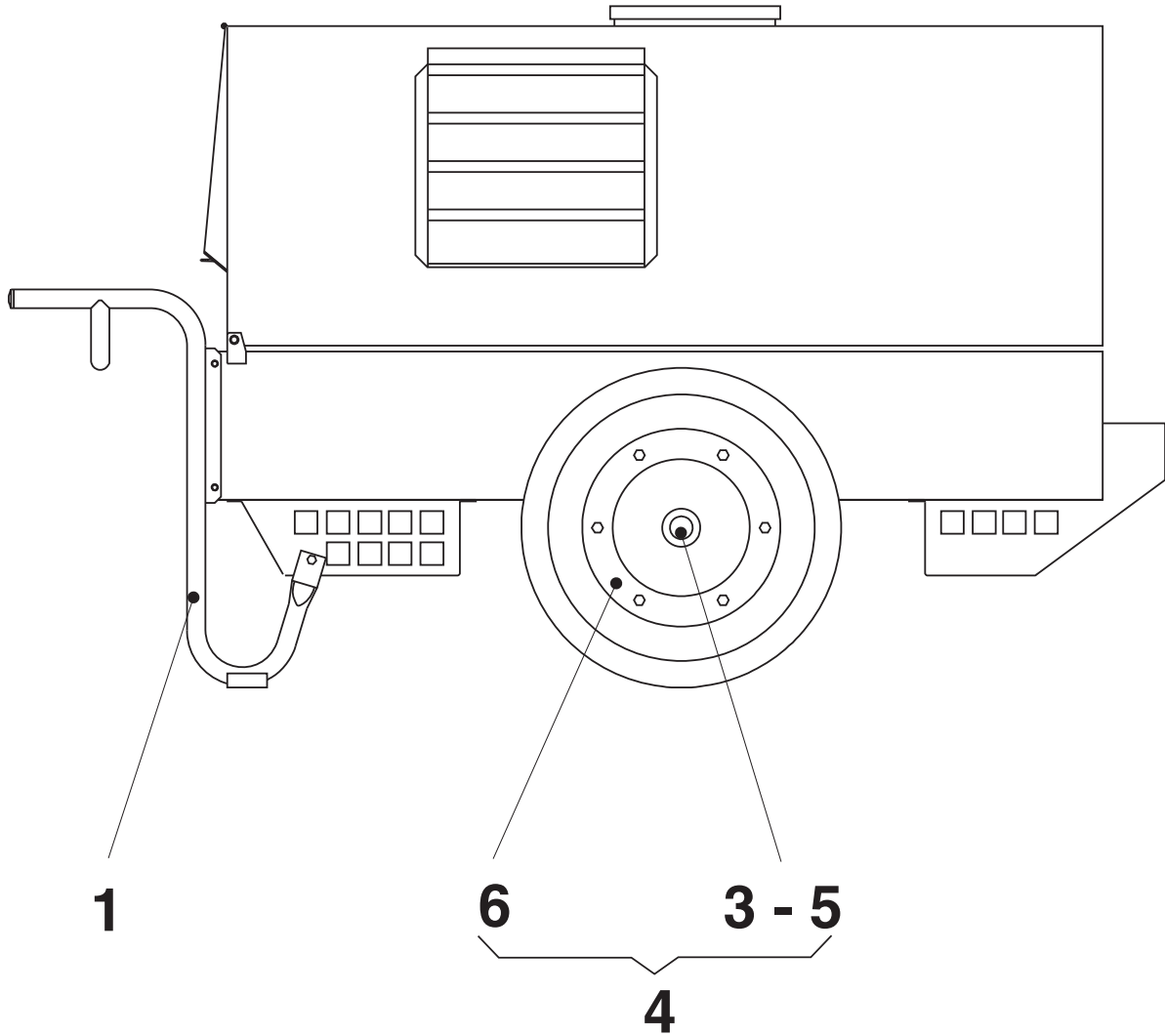
| <i>Pos.</i> | <i>Rev. Cod.</i> | <i>Descr.</i>                    | <i>Note</i> |
|-------------|------------------|----------------------------------|-------------|
| 1           | 317802026        | TAPPO SERBATOIO CON CHIAVE       | (SR)        |
| 2           | 342202026        | TAPPO SERBATOIO                  |             |
| 3           | 305719875        | GALLEGGIANTE                     |             |
| 4           | 107301890        | TUBO GOMMA                       | (qm)        |
| 5           | 107502208        | TUBETTO RITORNO GASOLIO          | (qm)        |
| 6           | 209702203        | TUBO COMBUSTIBILE                |             |
| 7           | 359259150        | BATTERIA 12V 45Ah (senza manut.) |             |
| 8           | 209509152        | TRAVERSA FISSAGGIO BATTERIA      |             |
| 9           | 105611270        | TIRANTE PER BATTERIA             |             |
| 10          | 102042380        | VASCHETTA BATTERIA               |             |
| 11          | 309702050        | SILENZIATORE DI SCARICO          |             |
| 12          | 308102023        | GUARNIZIONE                      |             |
| 13          | 308101262        | TAPPO SCARICO SERBATOIO          |             |
| 14          | 319930515        | CASSONETTO SCARICO               |             |
| 15          | 309708200        | CASSONETTO ASPIRAZ.ALTERNATORE   |             |

| <i>Pos.</i> | <i>Rev. Cod.</i> | <i>Descr.</i>                          | <i>Note</i> |
|-------------|------------------|--|-------------|
| 1           | 317802026        | CAP,TANK                               | (SR)        |
| 2           | 342202026        | CAP, FUEL TANK                         |             |
| 3           | 305719875        | FLOAT                                  |             |
| 4           | 107301890        | PIPE, BREATHER (L=MT1)                 | (qm)        |
| 5           | 107502208        | PIPE                                   | (qm)        |
| 6           | 209702203        | PIPE, FUEL                             |             |
| 7           | 359259150        | BATTERY 12V 45Ah (without maintenance) |             |
| 8           | 209509152        | BRACKET, BATTERY FIXING                |             |
| 9           | 105611270        | TIE ROD, BATTERY                       |             |
| 10          | 102042380        | HOLDER, BATTERY                        |             |
| 11          | 309702050        | MUFFLER, EXHAUST                       |             |
| 12          | 308102023        | GASKET                                 |             |
| 13          | 308101262        | FUEL TANK CAP                          |             |
| 14          | 319930515        | BOX, EXHAUST                           |             |
| 15          | 309708200        | ALTERNATOR INTAKE BOX                  |             |



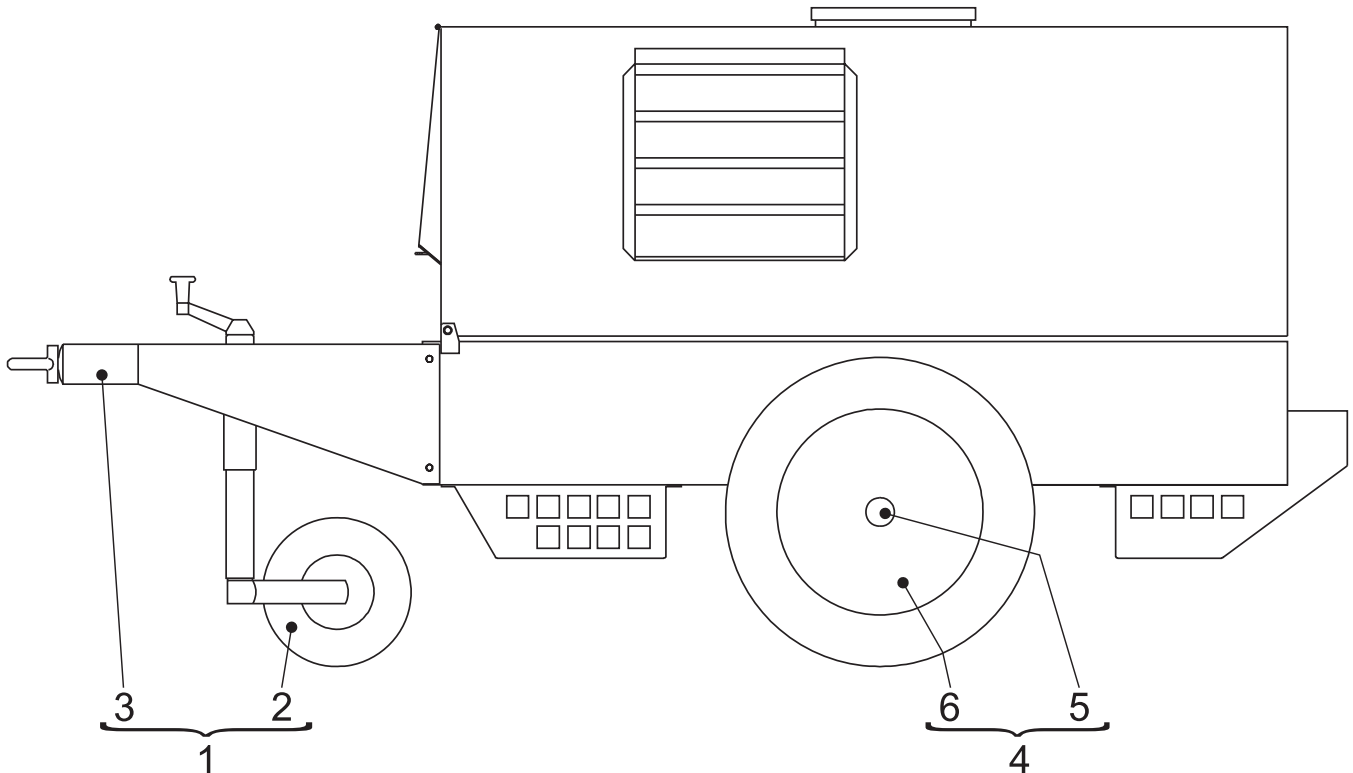
| <i>Pos.</i> | <i>Rev. Cod.</i> | <i>Descr.</i>                  | <i>Note</i> |
|-------------|------------------|--------------------------------|-------------|
| 1           | 209748100        | COPERCHIO FRONTALE             | (*)         |
| 2           | 209818270        | PERNO PER CERNIERA             | (*)         |
| 3           | 373008005        | CARENATURA (COMPL.)            | (*)         |
| 4           | 209718070        | COPERCHIETTO                   | (*)         |
| 5           | 105112270        | GUARNIZIONE (L=MT.1)           | (qm) (*)    |
| 6           | 209718073        | TIRANTE                        | (*)         |
| 7           | 102042870        | MOLLA                          | (*)         |
| 8           | 107300180        | CHIUSURA COMPL.A LEVA          | (*)         |
| 9           | 343339601        | MANIGLIA                       | (*)         |
| 10          | 209508115        | PISTONE SOSTEGNO               |             |
| 11          | 219828230        | GRIGLIA ASPIRAZIONE ARIA       |             |
| 12          | 105112270        | GUARNIZIONE (L=MT.1)           |             |
| 13          | 219828200        | PARATIA ASPIRAZ. MOTORE        |             |
| 14          | 209711100        | ROLL BAR                       |             |
| 15          | 319930501        | BASAMENTO (VERS.SX/C)          |             |
| 16          | 359258218        | PARATIA INF. ASP. ALTERNATORE  |             |
| 17          | 359258121        | COPERTURA APP. ELETTRICHE      |             |
| 18          | 359256010        | CONVOGLIATORE ARIA ALTERNATORE |             |
| 19          | 209718024        | PERNO DI CERNIERA              |             |
| 20          | 359258217        | PARATIA SUP. ASP. ALTERNATORE  |             |
| 22          | 209808065        | GRIGLIA USCITA ARIA            |             |
| 100         | 219938280        | GR.CARENATURA COMPL.RICAMBI    | (*) 1-9+22  |

| <i>Pos.</i> | <i>Rev. Cod.</i> | <i>Descr.</i>                  | <i>Note</i> |
|-------------|------------------|--------------------------------|-------------|
| 1           | 209748100        | FRONT COVER                    | (*)         |
| 2           | 209818270        | HINGE PIN                      | (*)         |
| 3           | 373008005        | COVER (COMPL.)                 | (*)         |
| 4           | 209718070        | COVER                          | (*)         |
| 5           | 105112270        | STRIP, SEALING (L=MT.1)        | (qm) (*)    |
| 6           | 209718073        | TIE-ROD                        | (*)         |
| 7           | 102042870        | SPRING                         | (*)         |
| 8           | 107300180        | LATCH                          | (*)         |
| 9           | 343339601        | KNOB                           | (*)         |
| 10          | 209508115        | SUPPORT, AIR INLET WALL        |             |
| 11          | 219828230        | ENGINE INTAKE GRATE            |             |
| 12          | 105112270        | STRIP, SEALING (L=MT.1)        |             |
| 13          | 219828200        | ENGINE INTAKE COVER            |             |
| 14          | 209711100        | ROLL BAR                       |             |
| 15          | 319930501        | CRANKASE (VERS.SX/C)           |             |
| 16          | 359258218        | ALTERNATOR INTAKE UNDERWALL    |             |
| 17          | 359258121        | COVER, ELEVTRICAL BOX          |             |
| 18          | 359256010        | ALTERNATOR AIR CONVEYOR        |             |
| 19          | 209718024        | HINGE PIN                      |             |
| 20          | 359258217        | ENGINE AIR INTAKE EXHAUST SITE |             |
| 22          | 209808065        | SCREEN, AIR OUTLET             |             |
| 100         | 219938280        | COVER UNIT                     |             |

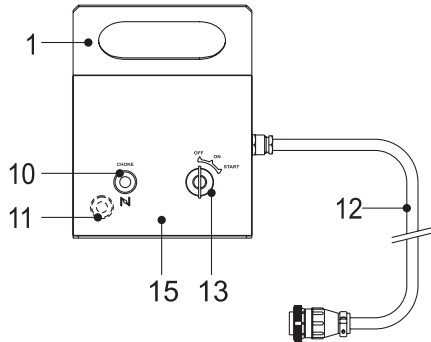
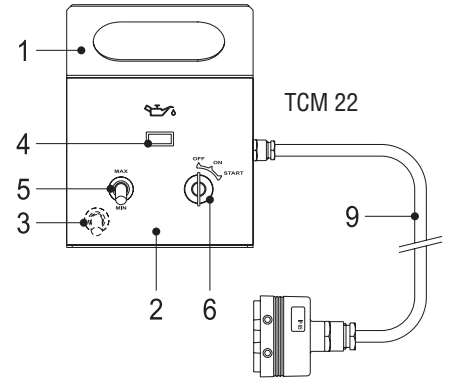
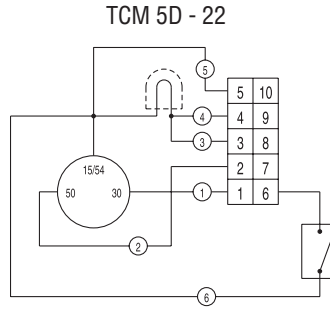
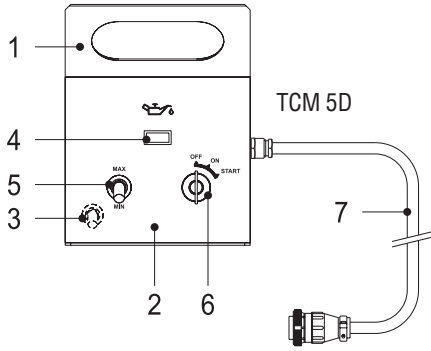


| <i>Pos.</i> | <i>Rev.</i> | <i>Cod.</i>   | <i>Descr.</i>                  | <i>Descr.</i>       | <i>Note</i> |
|-------------|-------------|---------------|--------------------------------|---------------------|-------------|
| 1           |             | 0000219930131 | GR.TIMONE,PIEDE x TRAINO LENTO | <i>KIT SITE TOW</i> |             |
| 3           |             | 102012560     | PARAPOLVERE                    | <i>COVER,DUST</i>   |             |
| 4           |             | 0000219930132 | GR. ASSALE, RUOTE TRAINO LENTO | <i>KIT SITE TOW</i> |             |
| 5           |             | 209711160     | ASSALE                         | <i>AXLE</i>         |             |
| 6           |             | 209711170     | RUOTA                          | <i>WHEEL</i>        |             |

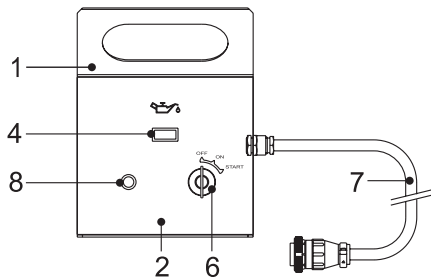
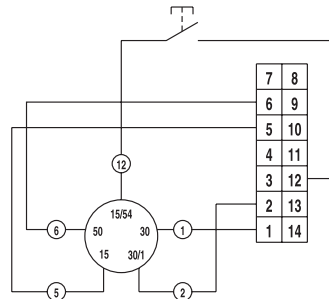




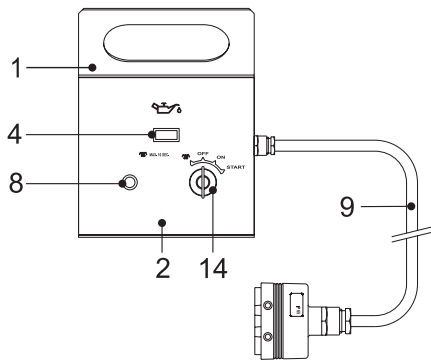
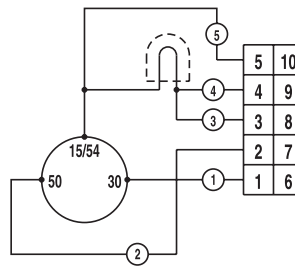
| <i>Pos.</i> | <i>Rev.</i> | <i>Cod.</i>   | <i>Descr.</i>                  | <i>Descr.</i>        | <i>Note</i> |
|-------------|-------------|---------------|--------------------------------|----------------------|-------------|
| 1           |             | 0000219930141 | GR.TIMONE,PIEDE X TRAINO LENTO | <i>KIT SITE TOW</i>  |             |
| 2           |             | 102351750     | PIEDE DI STAZIONAMENTO         | <i>PARKING STAND</i> |             |
| 3           |             | 209701150     | TIMONE                         | <i>TOW BAR</i>       |             |
| 4           |             | 0000219930142 | GR. ASSALE, RUOTE TRAINO LENTO | <i>KIT SITE TOW</i>  |             |
| 5           |             | 209701160     | ASSALE                         | <i>AXLE</i>          |             |
| 6           |             | 105112770     | RUOTA                          | <i>WHEEL</i>         |             |



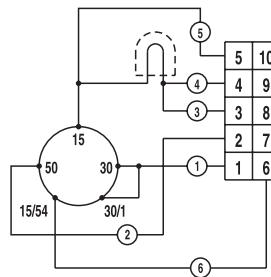
TCM 5



TCM 6



TCM 40



SCHEMA ELETTRICO  
ELECTRICAL DIAGRAM  
ELECTRIQUE SCHEMA  
ELEKTRISCHES SCHEMA  
ELECTRISCH GEDEELTE  
ESQUEMA ELÉCTRICO

| Pos. | Rev. | Cod.      | Descr.                        | Descr.            | Note     |
|------|------|-----------|-------------------------------|-------------------|----------|
| 1    |      | 107509900 | SCATOLA                       | CASE, BOTTOM HALF |          |
| 2    |      | 330109901 | COPERCHIO PER SCATOLA TCM     | TCM COVER         |          |
| 3    |      | 102042740 | CAPPUCCIO                     | CAP               |          |
| 4    |      | 1302040   | SPIA 12V                      | WARNING LIGHT 12V |          |
| 5    |      | 102013290 | COMMUTATORE                   | COMMUTATOR        |          |
| 6    |      | 107302460 | STARTER A CHIAVE              | STARTER KEY       |          |
| 7    |      | 33010C060 | GRUPPO CAVI TC                | TC CABLE KIT      | TCM5D-6  |
| 8    |      | 6062050   | TAPPO                         | CAP               |          |
| 9    |      | 33020C060 | GR.CAVI TCM                   | TCM CABLE KIT     | TCM22-40 |
| 10   | A    | 101091830 | PULSANTE DI STOP              | BUTTON, STOP      | TCM5     |
| 11   | A    | 101091840 | CAPPUCCIO                     | CAP               | TCM5     |
| 12   | A    | 93015C060 | GRUPPO CAVI TCM               | TCM CABLE KIT     | TCM5     |
| 13   | A    | 259107055 | STARTER A CHIAVE              | KEY STARTER       | TCM5     |
| 14   | A    | 307457055 | INTERRUTT.ACCENSIONE A CHIAVE | STARTER SWITCH    | TCM40    |
| 15   | A    | 930159901 | COPERCHIO PER SCATOLA TCM     | TCM COVER         | TCM5     |